Raising the Price of Talk: An Experimental Analysis of Transparent Leadership

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June 2014

Discussion Paper

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Raising the Price of Talk:
An Experimental Analysis of Transparent Leadership

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25 March 2014

Abstract: Does transparent leadership promote cooperative groups? We address this issue using a public goods experiment with exogenously selected leaders who are able to send non-binding contribution suggestions to the group. To investigate the effect of transparency in this setting we vary the ease with which a leader's actions are known by the group. We find leaders' suggestions encourage cooperation in all treatments, but that both leaders and their group members are more likely to follow leaders' recommendations when institutions are transparent so that non-leaders can easily see what the leader does. Consequently, transparency leads to significantly more cooperation, higher group earnings and reduced variation in contributions among group members.

I. Introduction

When are people most likely to follow advice to behave selflessly? This question is of enduring importance to leadership in any social environment, ranging from big-business to national politics to little-league teams to families. In this paper we take a step towards an answer by exploring the motivational force of the age-old aphorism, "Do as I say, not as I do." One simple interpretation suggests this is an injunction against hypocrisy, as when children dismiss parental advice that runs counter to their parents' observed behavior. Aware that the motivational force of advice can be weakened by the presence of a gap between saying and doing, leaders (including parents) -- might be motivated to follow their own suggestions of selflessness (e.g., save more and smoke less). But this supposes transparency, that "doing" is observable.

The issue with advising selfless behavior, of course, is that it may be individually costly to follow. Consequently, if we were able to get away with doing so unseen, we each have the incentive to give such advice but not to follow it. Our approach harkens back to the classical period of economics in which the question of motivation by praise and blame was often raised. Indeed, the issue of institutions that attenuated such motivation was explicitly addressed.[1] This paper reports data from a laboratory experiment to shed light on how varying degrees of transparency of the leader's behavior impacts the leader's decisions and the group's behavior in a

[1] This insight, that transparency links private motivations and social consequences, dates at least to Adam Smith's 1759 poetic statement: "If we saw ourselves in the light in which others see us, or in which they would see us if they knew all, a reformation would generally be unavoidable. We could not otherwise endure the sight." Smith (1759 III.i.93). A hundred years later, J S Mill, in an argument against the secret ballot (which he viewed as a non-transparency in the selection of leaders) argued that secrecy attenuated social motivations: "the point to be decided is, whether the social feelings connected with an act, and the sense of social duty in performing it, can be expected to be as powerful when the act is done in secret, and he can neither be admired for disinterested, nor blamed for mean and selfish conduct. But this question is answered as soon as stated." Mill (1865, p. 1214).

social dilemma setting[2]. We design a social dilemma experiment to test the hypotheses that (i) leaders are more likely to follow their own advice when their decisions are transparent and (ii) transparency of leaders' behavior promotes obedience to a leader's advice. Consistent with these hypotheses, we find that exogenously imposed transparency disciplines a leader's decisions, and that doing so is welfare improving.

Our investigation employs a game where the leader has the right to encourage particular contribution decisions by others, but then the leader and followers act simultaneously. This means the leader, like all group members, has the incentive to encourage maximum contributions and yet contribute nothing (Levy, et al. 2011). Our simultaneity condition allows the transparency of the leader's behavior to be a treatment variable. We compare among outcomes where the leader's behavior is fully transparent (revealed at the end of each round), fully undisclosed, and revealed to the group with noise. We emphasize the simultaneity because in the growing literature which studies leadership in the context of a sequential game, transparency of the leader's behavior is imposed by the supposition that the leader is first-mover. [3]

Our experiment connects also to the cheap-talk literature, in that each group's leader sends the group a cheap-talk message prior to every round. Cheap talk has been shown to foster cooperation in various institutions (Crawford 1998). A contribution of our experiment is that it

[2] Previous studies have investigated the effect of transparency on cooperation from other perspectives. For example, Croson (1996) shows in an ultimatum game that responders' decisions are affected by whether they are informed of the size of the pie. Also, Loewenstein et al. (2011) discusses consequences of disclosing conflicts of interest on the ability to reach efficient outcomes.

[3] Important contributions of studying leadership in the context of a sequential game are found in Hermalin 1998; Hermalin 2007; Hermalin, Komai et al. 2007) Important connections have been made to the theory of charitable giving (Andreoni 1998; Vesterlund 2003; Andreoni 2006). The value of this approach has been confirmed experimentally both in the laboratory (Meidinger and Villeval 2003; Potters, Sefton et al. 2005; Rey-Biel and Huck 2006; Guth, Levati et al. 2007; Potters, Sefton et al. 2007) as well as the field (List and Lucking-Reiley 2002; List and Rondeau 2003).

assesses the interaction of transparency and cheap-talk on leader and follower behavior. Consequently, we obtain evidence on how cheap talk varies between veiled and transparent leader actions and in particular whether, under transparency, leaders more likely to adjust their messages or their actions. Our design also takes a step towards understanding how transparency influences the impact of cheap-talk on followers' decisions.

With respect to followers' decisions, we focus on the role of a leader in promoting both higher mean contributions as well as contributions with lower dispersion across group-members. It is perhaps worth noting that this connects to the issue of an optimal constitution, because as the dispersion of observed behavior shrinks, the risk associated with transactions decreases. A leader's message received by all in the group offers a salient anticipation of group effort from which we can measure dispersion of the group contributions. With a reduction in dispersion comes an increase in predictability, a consideration stressed by James Buchanan (1962). A key finding of this study is that the most effective groups have leaders who successfully promote high mean, low dispersion contributions.

This paper is organized as follows. We next discuss the experimental design and procedures. This is followed by an overview of the data and tests of the hypotheses. Finally, concluding remarks and possibilities for future research are presented.

II. Experiment Design and Procedure

II.1 Overview

This design extends the methodology of a standard linear public goods game which has been widely used to study social dilemma problems when personal and group interests conflict

(see e.g., Ledyard, 1995). In a standard game, for each round t each subject i is given y experimental dollars (E$) which are exchanged for US dollars at a known exchange rate at the end of the experiment. Each subject then chooses, simultaneously with other subjects, the amount to invest in the group account g_{it} and the amount to keep in her own individual account. Each E$ kept in the individual account 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:

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

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 for each round. This follows from

$$\partial \pi_{it} / \partial g_{it} = -1 + \alpha < 0, \text{ where } 1 < n\alpha \tag{2}$$

The $1 < n\alpha$ restriction ensures

$$\partial \sum_{i=1}^{n} \pi_{it} / \partial g_{it} = -1 + n\alpha > 0 \tag{3}$$

so that the aggregate group payoff, $\sum_{i=1}^{n} \pi_{it}$, is now maximized if every subject contributes everything to the group account.

As detailed below, this experiment studies variants of this game in which a leader sends a contribution suggestion to all group members. This suggestion needs not be followed by the leader or by any group member. Leaders in our experiment are selected only once as we are interested in the effect of transparency when there exist repeated interaction betweens members

and leaders, a case with evident ecological validity. We adopt a randomly elected leadership mechanism to minimize the potential interaction between election mechanisms and the transparency effect. Doing so allows us to draw clean inferences with respect to the role of transparency in leadership.

For example, if the leader is elected, then group members may infer the leader's behavior from the leader's suggestions as they trust the elected-leader will follow her own suggestions. In contrast, a randomly selected leader's contribution suggestions may provide less information regarding the leader's decisions. Indeed, previous experiments (Levy, et al. 2011), show that groups with a randomly-selected leaders are less effective than groups with a leader selected by majority vote. An explanation is that the majority election mechanism may promote transparency in leadership.

Our experiment consists of three treatments that vary only the opacity of leader's decisions. To ensure this experiment remains comparable with our previous studies on leadership in public goods games, our design closely follows Levy et al. (2011).[4] In particular, as in Levy et al. (2011), in each treatment, after playing a few rounds of a standard public goods game, each group member adopts a platform (writes a message) that is distributed to all group members, and on which group members then vote. This message voting opportunity also provides group members the opportunity to inform the leader of the policies they wish to pursue. This feature of our experiment is advantaged by the fact that it mirrors many naturally occurring environments where leaders have some knowledge about the preferences of their constituents.

[4] While alternative designs could have been used, the advantage of staying closely connected to Levy et al (2011) is that it allows us to answer the questions that interest us while simultaneously building a body of data comparable across multiple investigations.

II.2 Opaque Leader Treatment

The key features of the opaque leader 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 is asked to allocate the 10E$ between her individual and group accounts.

This experiment includes two stages to maintain comparability between this experiment and those reported earlier (Levy et al. 2011). The first stage of the 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 message (or platform), on carbon paper in a way that produces four identical copies. Subjects are not restricted with respect to the content of the message, and understand that copies of the messages will be collected and distributed to each member of the group.

After each group member has a copy of all the members' messages (including her own, for a total of four messages), they vote for the message they prefer. No criteria are given to select a message. Subjects are aware that the person who writes the winning message will have no special role in the remainder of the experiment. The specific subject who wrote the winning message remains anonymous except to herself.

The second stage of the experiment, the final 10 rounds of the game, uses a random number generator to select a leader. Subjects are then informed whether or not they have been selected as the leader for the second stage. This selection mechanism allows for an equal chance of leadership and thus could be seen as producing a fair decision (Levy, 1989). As we mentioned above, suggestions from randomly selected leadership have been found to be less effective in influencing group members' behavior than elected leaderships in non-transparent

setting (Levy et al., 2011). To provide clean evidence on the effect of pure transparency effect, we examine whether the constitution of transparency matters in a randomly selected leadership setting.

The opaque leader sends out a message before each round starting from the sixth round that reads:

"Let's contribute ____E$ to the group account."

These message slips are pre-printed and distributed by the experimenter. The leader has no opportunity to communicate in any way with the group members except by filling in the number. It is common information to the subjects that: 1) each group member receives the same message from the leader; 2) each group member makes his/her decision after observing the leader's message; 3) the message is an unenforceable suggestion and group members can make any decision they like; and 4) the leader needs not follow her own suggestion. The second stage includes exactly 10 rounds, after which the experiment concludes (see the instructions in Appendix for details).

II.3 Transparent Leader Treatment

The only difference between this treatment and the Opaque Leadership Treatment is that in the second stage (round 6 through round 15), after the randomly selected leader sends out a message to the other members of the group that reads: "Let's contribute ____ E$ to the group account.", the experimenter will copy this message and add an extra message saying what the leader did in the previous round. The experimenter will distribute the following message:

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

Last Period the Message Writer wrote:

"Let's contribute ____ E$ to the group account."[5]

The Message Writer's actual contribution to the group account was ____ E$.

These message slips are distributed by the experimenter once the leader has made her decision. Subjects are informed that the messages will be filled in accurately by the experimenter. The experiment continues in this way for the remaining ten rounds.

II.4 Noisy Leader Treatment

The noisy leader treatment is similar to the transparent treatment, except that the actions of the leader are imperfectly revealed to the group. In the second stage of the experiment, subjects receive a slightly modified message from what they receive in the transparent treatment.

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

Last Period the Message Writer wrote

"Let's contribute ____ E$ to the group account."

The Message Writer may have contributed ___ E$ to the group account.

The noisy leader treatment has a stochastic error term attached to reveal the contribution of the leader. The subjects are informed that there is a 50 percent chance that the leader's contribution is inaccurately revealed. When the leader's contribution is inaccurately revealed there is a 50 percent chance that the revealed contribution will have 1E$ added to it and a 50 percent chance that it will have 2E$ added. Subjects are informed about the nature of the error term (see the instructions in Appendix for details). Note, therefore, that opacity will never lead a

[5] Note that in period 6, the first period in which the leader made a contribution suggestion, there was no "last period" information to provide to subjects.

leader to seem be viewed as less socially oriented than they actually are (this feature of our design is clearly important for the purpose of informing the value of transparent leaders).

II.5 Procedure

There were nine sessions which included 12 subjects and one session which included 8 subjects.[6] 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 $7 bonus for arriving on time and they earned E$ during the experiment. 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 the first five rounds, group members received an endowment and made simultaneous investment decisions via the software user's interface.

At the end of the fifth round each subject wrote a message on four-layer, xeno-graphic paper. These messages were collected, stapled and redistributed to the entire group along with a ballot. Group members read the messages and voted for one. Subjects were asked not to vote for

[6] One group from a 12 subject session was dropped due to a failure of the recruiter to eliminate a subject with past institutional experience. This is the standard procedure for dealing with accidently sophisticated subjects.

their own message. Voting ballots and messages were collected and the results tabulated. The experimenter then informed each subject only about whether s/he wrote the winning message. Again, only the winner knew the identity of the winning message. This procedure was identical in each of the three treatments.

At the beginning of each round of the second stage, the experimenter collected messages from leaders and distributed them to their corresponding group members. The specific procedures are detailed in the experiment's instructions reproduced in the Appendix. Figure 1 provides details on the timing of our experiments.

[Figure 1]

III. Results

Contribution to the public goods

Tables A, B, and C in the appendix list all the platforms that were written in the transparent leader and opaque leader treatments. As in our previous experiments (Levy at al. 2011), subjects generally took this exercise seriously. Winning platforms tend to support the socially optimal strategy of maximal contributions to the group account.

Figure 2 visualizes mean contributions to the group account for each treatment condition. Mean contribution levels are nearly identical in the first five rounds for transparent and opaque treatment conditions. In the noisy treatment, contributions start at a similar level and decrease in subsequent rounds. Beginning in round 6, subjects receive information about their leaders' suggested contribution amount. In that round, mean contributions in the transparent condition reach 9.54E$; in the noisy treatment, 8.29E$; and in the opaque treatment, 6.50E$. Mean contributions remained higher on average in the transparent and noisy leader treatments than in

the opaque leader treatment for the remainder of the experiment. Mean contributions in the final round were 4.96E$, 2.67E$, and 2.00E$ in the transparent, noisy and opaque treatment conditions, respectively.

We compare the average group contributions across treatment from round 6 to 15 (i.e. the rounds during which messages were received) by calculating the average total contribution for each group over that 10 rounds. The sample size is 6 in the transparent and noisy treatment conditions and 7 in the opaque condition. We find that the mean contribution is significantly higher in the transparent leader treatment than in the opaque treatment (8.25 vs. 4.97, $p=0.06$, Mann-Whitney two-sided test). The difference in the mean contribution between transparent and opaque treatments is not significant (8.25 vs. 7.15, $p=0.26$, Mann-Whitney two-sided test). Neither is the difference between opaque and transparent treatments significant (7.15 vs. 4.97, $p=0.12$, Mann-Whitney two-sided test). We next report regression analysis results to compare the dynamics of the contribution among treatments.

[Figure 2]

Table 1 reports the results of two random group effect, censored regressions of group account contributions between rounds 6 and 15 by each group on an intercept and trend effects by treatment. The first regression includes leaders and non-leaders, while the second includes non-leaders only. Testing the null hypothesis that intercept and round coefficient are pair-wise jointly identical between treatment conditions yields similar results for both regressions: we reject equality of transparent and opaque treatments (chi-square tests, $p<0.05$), of opaque and noisy treatments (chi-square tests, $p<0.05$) but we cannot reject equality of transparent and noisy treatments at conventional significance levels (chi-square tests, $p>0.40$).

[Table 1]

Leaders' contribution suggestions

Figure 3 displays the average contribution amounts that were suggested by group leaders in each treatment condition. Transparent leaders' average suggestions per round varied between 10.00E$ and 8.33E$, and opaque leaders' between 9.57E$ and 6.14E$.In the noisy treatment, mean suggested contributions were between 10.00E$ and 8.50E$.

[Figure 3]

Table 2 reports random group effect regression results of the suggested contribution amounts by the each group leader on an intercept and the round. We reject the null hypothesis that coefficients are jointly identical between transparent and opaque leaders (chi-square test, p=0.0297) and between noisy and opaque leaders (chi-square test, p=0.0269), but we do not reject equality between transparent and noisy leaders (chi-square test, p=0.4509).

The statistically significant differences detected between Opaque and the other two treatments are due to the significantly negative coefficient of Round in the Opaque treatment: it is significantly different than both of the positive Round coefficients found in the Transparent and Noisy treatments (p=0.0772 and p=0.0269, respectively) . The estimates reported in Table 2 imply that contribution recommendations are statistically identical among all treatments in the early rounds but significantly decline over rounds in Opaque. This decline does not occur in either the Transparent or Noisy treatments.

[Table 2]

Next we examine how people follow the leaders' messages in each treatment.

Message following behavior

We find that non-leaders and leaders follow leaders' suggestions more closely in the transparent condition than in the opaque condition. Figure 4 visualizes mean absolute deviations from leaders' suggested contributions[7] between rounds 6 and 15 (since there were no messages in the first five rounds) when including both non-leaders and leaders. In each treatment condition, mean deviations are greatest in the final round. Means in the transparent and noisy condition are monotonically increasing starting in round 10 and 8, respectively. The opaque condition, by contrast, does not seem to follow a clear trend, with mean deviations fluctuating in the range 1.79E$ to 4.00E$ between rounds 6 and 14, reaching 6.86E$ in the final round. Mean deviations in the transparent conditions are uniformly lower than in the opaque condition, starting at 0.46E$ in round 6 and moving as low as 0.38E$ and as high as 5.04E$ in round 15. As to the noisy condition, mean deviations start at 0.71E$ and range from 0.63E$ to 6.17E$.

[Figure 4]

Breaking up the sample into non-leaders (Figure 5) and leaders (Figure 6), we find that patterns are somewhat similar. In both subsamples, mean deviations always reach their maximum in round 15. Among non-leaders in noisy and transparent conditions, means increase between most rounds, similar to the pattern in Figure 4. In the case of leaders, it is striking that transparent leaders never deviate from their own suggestion until round 12, whereas leaders in the other conditions deviate substantially from their own suggestions in most rounds.

[Figure 5]

[Figure 6]

[7] We calculate mean absolute deviations rather than squared deviations, in order to prevent results from being overly influenced by outliers (Mosteller and Tukey 1977).

To provide statistical analysis of the differences across treatment conditions, we report in Table 3 the results of a random group effect, censored regression of the mean absolute deviation of each group's mean contribution from the suggested contribution on an intercept and the round. Testing for pair-wise joint equality of coefficients across treatments, we can reject joint equality of coefficient estimates for the transparent and opaque treatments (chi-square test, $p<0.01$) and the opaque and noisy treatments (chi-square test, $p<0.01$), but not the transparent and noisy treatments (chi-square test, $p=0.3933$).

[Table 3]

We also compare mean absolute deviations from suggested contributions across treatments. For each group in each treatment, we calculate the mean absolute deviation from leaders' suggested contributions across rounds 6 to 15. We then average these means over all groups in a treatment condition (including leaders and non-leaders, the average is 1.30E$ in the transparent condition, 3.05E$ in the opaque condition, and 2.37E$ in the noisy condition). By means of Mann-Whitney tests, we establish whether these averages are significantly different across treatment conditions. We summarize test statistics and p-values in the Table 4. As shown in Table 4, on average, people (both the leader and the non-leaders) follow the leader's contribution suggestions significantly more closely in the transparent condition than in the opaque condition. The difference between the noisy and opaque conditions, however, is not significant.

[Table 4]

By far we have examined the absolute deviation from the message. We next report the direction of deviation in each treatment. Across all decisions taken by subjects, it is rare for subjects to make contributions that are greater than the amounts suggested by their group

leader's suggestion in the same round. In Transparent and Opaque treatment groups, only about 1% of decisions involve contributions that exceed leaders' suggestions. In the Noisy group, the number is about 5%. These numbers seem to suggest that leaders' suggestions may act as an upper bound in subjects' determination of their contribution decisions, in line with Levy et al. (2011).

Further inspection provides a more complicated picture. In most cases (76%), leaders suggested the full contribution of 10E$ to group members, thus making it impossible for subjects to exceed the suggested amount. Figure 7 marks the frequency of the message-contribution combinations corresponding to each individual decision across all treatments (including both leaders and followers). Out of 184 decisions (including leaders and followers) with suggested contributions lower than 10E$, 75 exactly match the suggested amount; in 91 cases, contributions are below the suggested amount; and 18 times does the contribution exceed the suggested amount.

[Figure 7]

We calculate the number of followers' contribution decisions that are higher, lower or equal to the suggested contributions by treatment. The data is reported in Table 5. As shown in Table 5, we find non-leaders contribute in excess of suggested amounts in about 12% of cases, while choosing amounts below the suggested amount in 54% of those cases. Contributing less than the suggested amount is thus much more common than the reverse case.

[Table 5]

IV. Conclusion

This paper reported data from a public goods game that compared the effects of transparency on the words and actions of leaders and the actions of followers. Our results suggest that leaders are more inclined to adhere to their advice when institutions are relatively transparent. Moreover, subjects were more likely to follow a leader's suggestion when the price of talk is raised by making a leader's actions transparent. Consequently, transparency leads to more cooperation and significantly higher group earnings as well as reduced dispersion in contributions among group members.

Substantively, our data shed light on the efficiency consequences of specific changes in the relationship between the leader and the group. This helps to inform the question of whether, to improve group effectiveness, we should seek a "superior" leader or instead superior processes governing the relationship between a leader and her group. This long-discussed issue arises in both the modern game theory literature as well as traditional political economy. Our evidence that suggested contributions are not lower, and can even become higher, under transparent than opaque institutional arrangements contributes to this discussion. In particular, one might be concerned that leaders would suggest lower contribution levels if they were held accountable for their own actions. Our data indicate that this need not occur. Thus, this concern might be to some degree misplaced. Linking this to J. S. Mill's concern about the secret ballot, our experimental results suggest that an opaque institution encourages behavior in both word and deed that differs from that found in a transparent institution.

A feature of our design is that in transparency treatments leaders are told that their decisions will be publicly revealed, and they may interpret this as the experimenter asking them to maintain consistency between their words and their decisions, and participants may respond to this perceived request. This does not worry us because participants are always told that they can

make any decision they like, and we have no evidence that participants felt compelled by the experimenter to follow their written suggestions.

In our experiment, once a subject is selected as leader, his/her leadership role is implemented for all remaining rounds. It is interesting to consider whether the outcome might be different if in every round a different leader is selected. For example, knowing he/she will not be the leader in the next round, a leader might be less likely to follow his/her own suggestion even in the transparent treatment because any inconsistency between his/her behavior and words may have no or little impact on group members behavior in the next round. It would be worthwhile to conduct future studies investigating how the length of the leadership term may interact with the transparency effect. More generally, understanding how transparency and length of term jointly impact the dynamics of leaders' decisions (words and actions) is a rich direction to explore.

It is worth emphasizing that our results stem from an environment where leaders are imposed exogenously. While in many natural environments leaders emerge from a selection process, this surely is not always the case. Small community groups, parent-teacher organizations or academic departments, for example, often request volunteers and, in their absence, use random or pseudo-random processes to determine leaders (e.g., turn-taking where order is randomized). The extent to which our results extend to environments where leaders are determined by consensus defines an additional profitable direction for additional investigations.

Another area of great interest that our study has not explored is the connection among gender, willingness to follow one's own messages and willingness of others to follow. Key gender differences in economic behavior have been documented in a great number of environments. In view of this, it is to us surprising that links between gender and leadership remain largely unexplored. We intend to do so in future research.

This paper offers a step toward a better understanding of the effects that institutions and environment on leadership effectiveness. For leadership to be a more effective tool for social improvement, the relation between leaders and institutions should be further studied. In particular, it would be profitable to investigate the impact of allowing transparency to be determined endogenously by either leaders or their groups.

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Table 1: Censored regression analysis of group-level contributions from round 6 to round 15

	Dependent variable: Mean contribution of each group in each round	
Independent variables	Including the leader	Not including the leader
Transparent Leader (=1 if in transparent treatment; =0, o.w.)	19.10** (2.563)	20.20** (3.106)
Opaque Leader (=1 if in opaque treatment; =0, o.w.)	9.177** (1.796)	9.152** (2.147)
Noise Leader (= 1 if in noise treatment; =0, o.w.)	16.86** (2.112)	18.85** (2.565)
Round • Transparent Leader	-0.790** (0.172)	-0.844** (0.207)
Round • Opaque Leader	-0.375** (0.112)	-0.368 (0.131)
Round • Noise Leader	-0.819** (0.137)	-0.983 (0.163)
	Wald Chi-Squared (6) = 148.86 Prob > Chi-Squared = 0.0000	Wald Chi-Squared (6) = 115.74 Prob > Chi-Squared = 0.0000

Notes:
Dependent variables are calculated as the average of group members' contribution (including or excluding the leader) in each round.
Numbers in parenthesis are standard errors.
** indicates $p<0.01$, * indicates $p<0.05$ two-tailed test.

Table 2: Censored regression analysis of leaders' contribution suggestion (message) from round 6 to round 15

	Dependent variable: Contribution level suggested by each leader in each round
Independent variables	Coefficient
Transparent Leader (=1 if in transparent treatment; =0, o.w.)	16.38** (6.167)
Opaque Leader (=1 if in opaque treatment; =0, o.w.)	18.26** (3.755)
Noise Leader (= 1 if in noise treatment; =0, o.w.)	11.44** (3.928)
Round • Transparent Leader	0.439 (0.534)
Round • Opaque Leader	-0.618* (0.261)
Round • Noise Leader	0.401 (0.311)
	Wald Chi-Squared (6) = 76.12 Prob > Chi-Squared = 0.0000

Notes:
The dependent variable is the contribution level suggested by each leader in each round.
Numbers in parentheses are standard errors.
** indicates $p<0.01$, two-tailed test.

Table 3: Censored regression of the mean absolute deviation from the leader's suggested contribution

	Dependent variable: Mean Absolute Deviation from Suggestion
Independent variables	Coefficient
Transparent Leader (=1 if in transparent treatment; =0, o.w.)	-10.11** (2.448)
Opaque Leader (=1 if in opaque treatment; =0, o.w.)	1.050 (1.634)
Noise Leader (=1 if in noise treatment; =0, o.w.)	-7.584** (2.025)
Round • Transparent Leader	0.833** (0.175)
Round • Opaque Leader	0.162 (0.114)
Round • Noise Leader	0.822** (0.144)
	Wald Chi-Squared (6) = 64.29 Prob > Chi-Squared = 0.0000

Note:
The dependent variable is calculated by taking the average of absolute difference between the group leader's suggested contribution and each member's actual contributions (including the leader) in each group in each round.
Numbers in parentheses are standard errors.
** indicates $p<0.01$, * indicates $p<0.05$, two-tailed test.

Table 4: Comparisons of mean absolute deviations between treatments

	Opaque vs. Transparent	Noisy vs. Transparent	Opaque vs. Noisy
Leaders and Non-leaders	3.05 vs. 1.30 (0.0443)	2.37 vs. 1.30 (0.2590)	3.05 vs. 2.37 (0.4751)
Non-leaders only	3.01 vs. 1.42 (0.0860)	2.54 vs. 1.43 (0.5189)	3.01 vs. 2.54 (0.7751)
Leaders only	3.16 vs. 0.92 (0.0431)	1.83 vs. 0.92 (0.5058)	3.16 vs. 1.83 (0.1526)

Notes:
Each mean reported is the average of absolute difference between group members' actual contribution and the amount suggested by the group leader in rounds 6 to 15 and all groups in a particular treatment.
Numbers in parentheses are p-values of Mann-Whitney tests. We treat each group as an independent variable.

Table 5: Frequencies of individual deviations (followers only) when suggested contribution level is less than 10E$

Treatment	Total # of obs.	Contribution > Suggestion	Contribution = Suggestion	Contribution < Suggestion
Transparent Leader	12	2	6	4
Opaque Leader	81	3	30	48
Noisy Leader	45	12	10	23
Total	138	17	46	75

Note:
This table reports the number of individual decisions for which the condition indicated in the column header was true. We include only the followers here.

Figure 1: Timeline of the experiments

Timeline		
Stage 1	Round 1~5	In each round: Simultaneous contribution choices in a standard public goods game.
	At the end of round 5	↓ Each group member writes a message. ↓ Messages distributed among group's members. ↓ Members vote on which message they prefer. ↓ Memebers are informed whether their own message wins.
Stage 2	At the begining of round 6	The computer randomly selects a leader in each group.
	Round 6~15	In each round: ↓ The leader sends a messsage that suggests a contribution amount. ↓ All group members receive the message and simultaneously and independently decide their respective contribution amounts. ↓ InTransparent and Noisy treatments: each group member receives information about the leader's contribution at the end of the round.

Figure 2: Mean contribution to group account (incl. leader)

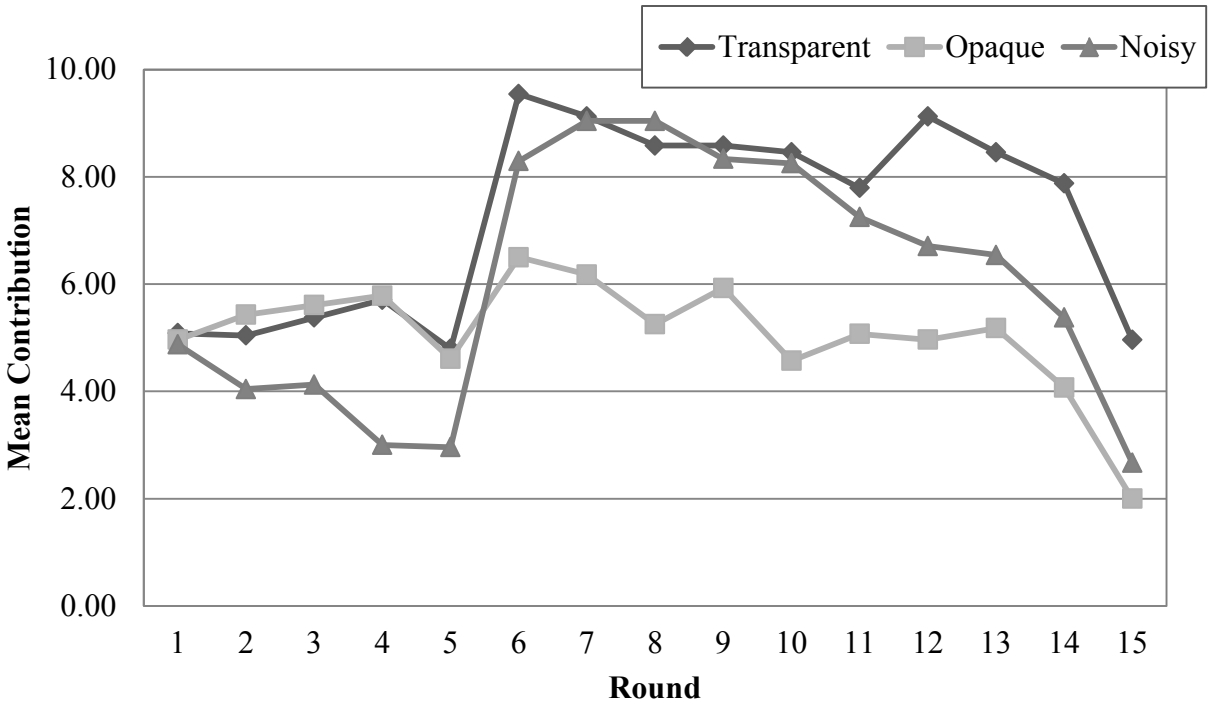

Figure 3: Mean suggested contribution (message)

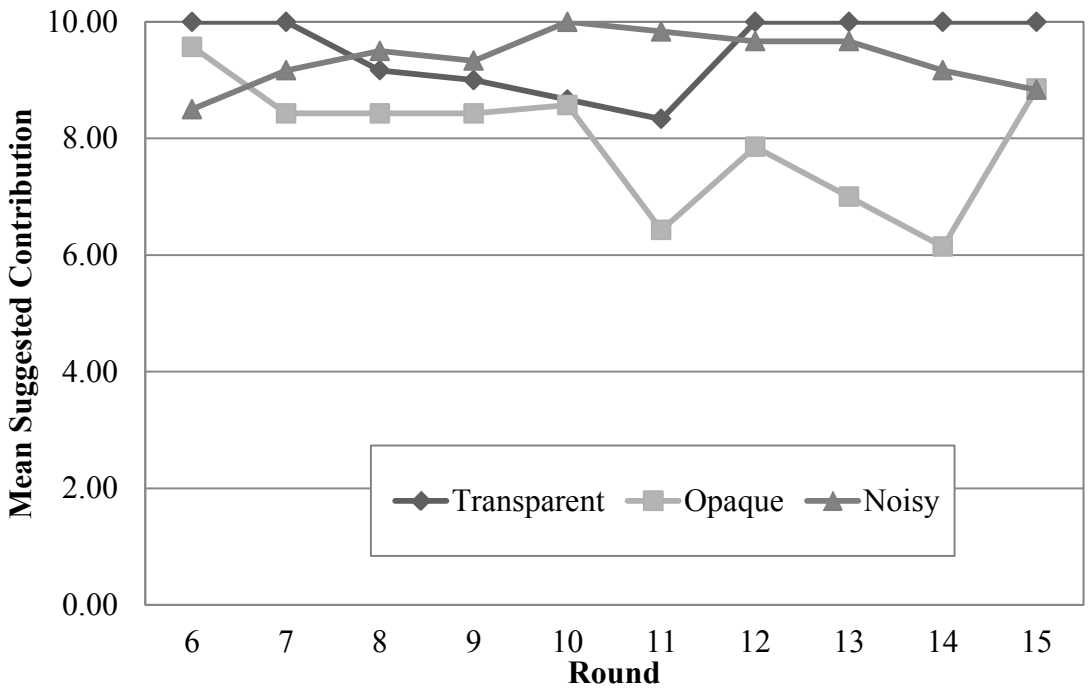

Figure 4: Mean absolute deviations from suggested contribution (incl. leader)

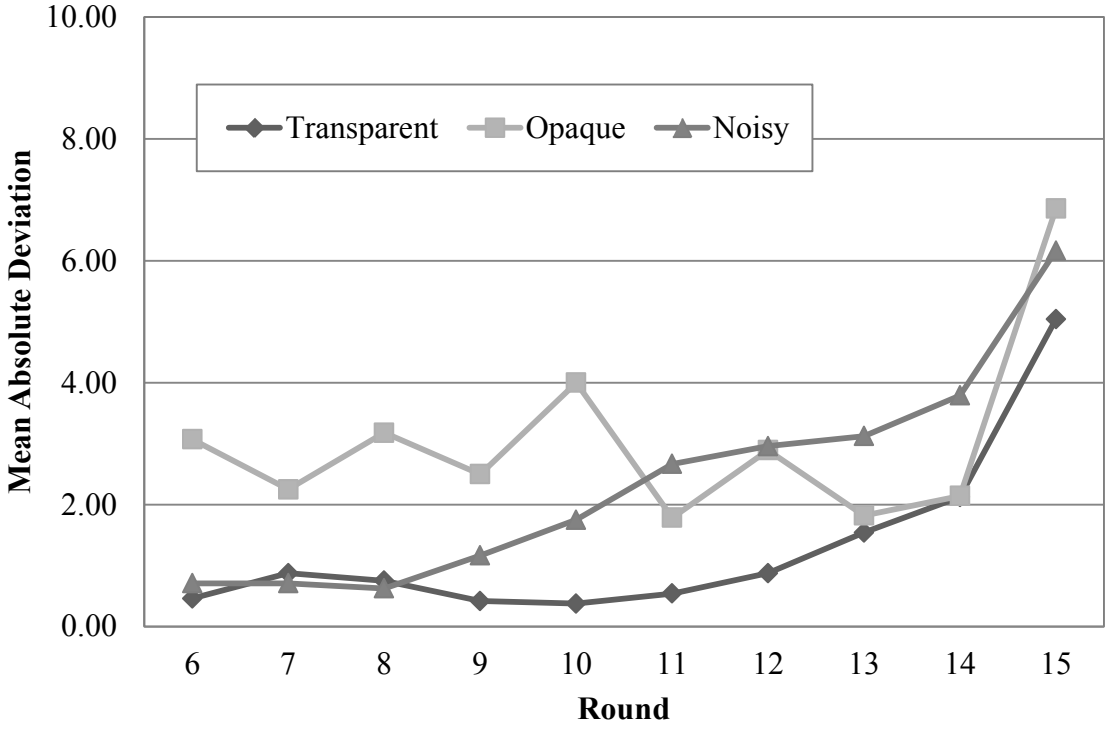

Figure 5: Mean absolute deviations from suggested contribution (followers only)

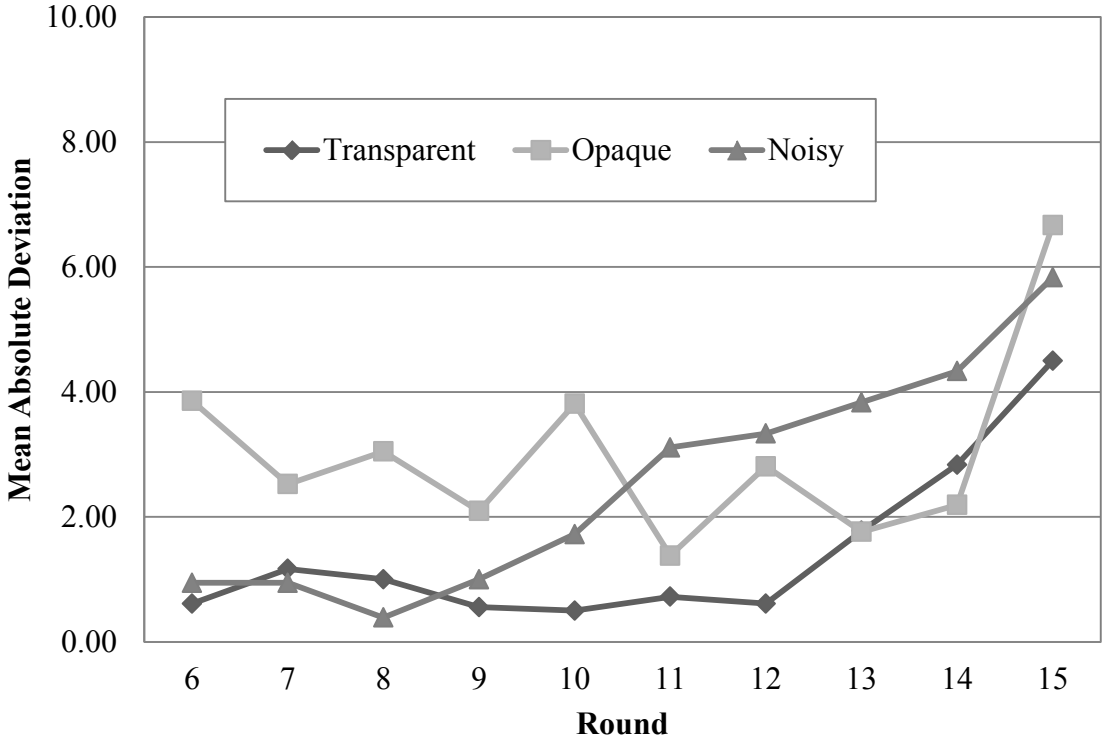

Figure 6: Mean absolute deviations from suggested contribution (leaders only)

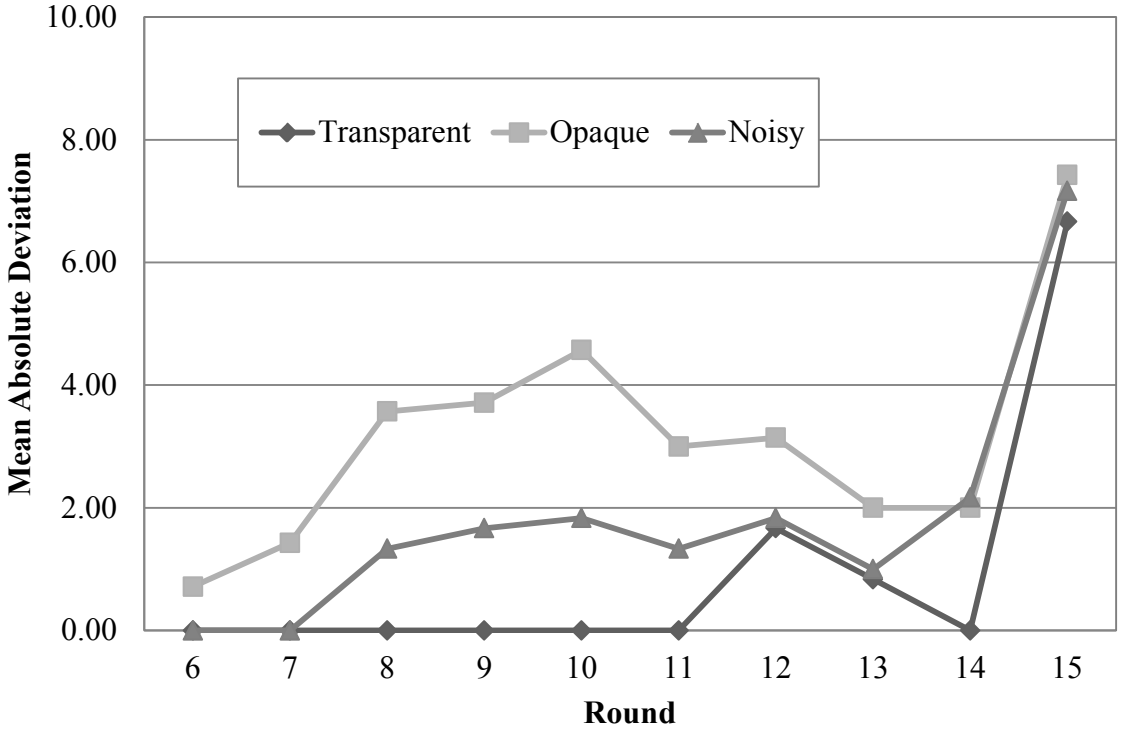

Figure 7: Contributions vs. Suggested Contributions (including leaders and followers)

Contribution	0	1	2	3	4	5	6	7	8	9	10
10									**5**	**5**	402
9									**1**	12	12
8									13	1	12
7						**1**	**2**	3	2	6	4
6							3	1		3	1
5	**1**					17	1	5	2		11
4			**1**		4	2	1	2	2		6
3				2				1	2	1	6
2		**1**	3	1		2	1	2	3		9
1	**1**	8	1		1	3			1		9
0	10	7	7	5	3	11		6	5		104

Suggested Contribution

Note: the number in each cell is the number of observations

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. **This message is written by the person who was randomly selected from your group**. 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.

(Opaque Treatment Only:
All messages will have this form:

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

The value X will be a number between 0 and 10.)

(Transparent Treatment Only:
All messages will have this form:

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

Last Period the Message Writer wrote
"Let's contribute Y E$ to the group account."
The Message Writer's actual contributed to the group account was Z E$.

The value X will be a number between 0 and 10. Y will be last rounds contribution amount and Z will be the message writer's actual contribution.)

(Noisy Treatment Only:

All messages will have this form:

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

Last Period the Message Writer wrote
"Let's contribute Y E$ to the group account."
The Message Writer may have contributed Z E$ to the group account.

The value X will be a number between 0 and 10. Y may be the last round's contribution amount. Z will have a probability of being the message writer's actual contribution. More will be said about this on the next page of instructions.

The Message Writer's previous contribution to the group account may or may not be their actual contribution. The contribution amount attributed to the message writer has a 50% chance of being the Message Writer's actual contribution.
The message has a 50% chance of being wrong. If it is wrong, then half the time the reported amount will be one unit greater than the actual amount, and half the time the reported amount will be two units greater.

Example A:
The message will say the contribution was 8 E$ when the actual contribution was 7 E$.

Example B
The message will say the contribution was 8 E$ when the actual contribution was 6 E$.

The message writer's revealed contribution will never exceed 10 E$ even in a round where there could be an increase of 1 E$ or 2 E$. You will never see a revealed contribution above 10.)

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.

Individual Account (I)

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.

Group Account (G)

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.

Table A: Messages from Opaque (Veiled) Leader Treatment*

Group	Messages
1	**If we all invest $10, we make $20 per round – the optimal gain. Why is it optimal? Because I', not going to keep contributing $10 if you don't reciprocate. If I see another $0, I'm at 0 for the next round. Otherwise, I'm at average for you three. We can get $20 per round, or we can get $10 – the choice is yours. BTW, I'll assume we're going to play nice now, and stater with $10. Don't disappoint, please.** Let's contribute $10.00 to the Group Account so that everybody's earning is guranteed to be $20.00/ each person. If you contribute more to the Individual Account and less to the group account, you probably can earn more than $20.00 in the best situation, (e.g. IA = $5, GA = 5, Total GA = 35, then you earn 5 + 35/2 = $22.5) But it's not guranteed and other group members may contribute less and less to the Group Account. Later if they feel unfair. I think 7 individual, 3 Group works Best. We have the most to gain from total investment but that can hardly be expected either. 5-5 even split get more, risk less. (Picture: Stick figure flying kite on sunny day)
2	**Hey yall It seems were being Rats again but this time its serius so I say lets get the hang of this and make some Money…. Oh and help the cause. Right.** Put 8 E in the group account. 2 $ into Group Account Plz invest All 10 E into the group account in round 6,7,8, and 5E for round 9,10.
3	**Guys, it's only logical that everyone puts in $10 each time to the group account, this way everyone will get $20 out each time. It is guaranteed that you will make the most money this way.** Heres how to make the most money: Everyone invest all ten in the group account that way everyone will get 20e$ back after the round. If you don't believe me then look at this chart. Individual Acct Group account E$ *0 10 =40:5 = 20 1 9 =36:5 = 19 2 8 =32:5 = 18 3 7 =28:5 = 17 4 6 =24 = 16 5 5 =20 = 15 6 4 =16 = 14 This way to get 20E$ every round is to invest everything in group act. There is no other way to make more than 20. Let's contribute 10E$ to the group account.
4	**Please listen. If everyone puts all 10E$ into the group fund, we can all share the same profit (20.00 E$) if everyone enters 10.00 E$. Thats 40.00 E$ for the group, x 2 (40.00 E$ X 2) equals 80.00 E$'s, then divide by group member (80.00E$'s/4) = 20.00. We could all make over a dollar per round! Do it!** Enter all your Endowment E$'s into Group Account. Iof all the group members enter 10 E$ in group account your earnings will be 20 E$. ((10x4)x0.5 = 20) Let's put at least E$ 4 in the group account so that everybody get something. Good luck everybody!

	Lets all invest $10 to the group. Or I will stop investing to the group and soon we will only make $10 E$ per round. Just because you can screw other people over now won't mean we will return the favor for the next 10 rounds.
5	**Let us put 7 E$ each round towards the group account.** Investing more in our Individual accounts gives us more earnings and it everyone else goes between 6-8 for the group. We might make more in the end. Each person, one time bids a high amount while others do middle or low. Let's Invest 8 E$ into the group's account. Everyone do a 5/5 split everytime!
6	**Give all 10 E dollars to group account** I am here to make money as are you. If we all put E$ in the group account we all walk out with more real dollars than if we try to do this on our own. Make money, that's all. If we can be smart about it and make more, why not? Put more into individual account… thats what seems to be the pattern so far. Everyone should invest all $10 into the group account. If everyone does this, we will all make more money.
7	**We should all throw in all 10 fro the next 10 rounds. We would make $20 per round and maximize w/o getting screwed over.** Please contribute all of us money to the group account. because we can earn double (20 each round). Every round, I contribute more than 5 to our group however some guy only contribute 2! Stop contribute only 2! Because you never earn more than $20 each round. In order to get max money. Please contribute all money to group account!! Let's invest 7$ in round 6 and increase it by 1 until in the next round then start investing ½ for the rest of the rounds. If we all invest a good amount of money into the group, the avg. group investment goes up, and we could make more money. That's what I've noticed so far. Let's work together!

* Bolded messages are winning messages

Table B: Messages from Transparent Leader Treatment*

Group	Message
1	**Everyone has gotten less than $20 each time so far… If we all put 10 into the group account, we'll get 20 every time! If we end up each putting zero, we'll only get $10 per round!** Individual Account: 5 Group Account: 5 Ok, so theres 4 of us in total and we each get 10E$. If we all contribute all 10 E$ to the Group Account then it will be 40 E$ and we all get half of that which is 20 E$. That is more than the 10 E$ we have on our own if we just keep 10 E$ in the individual account and 0E$ in the Group. We can get the most if we all give everything to the Group because what we have essentially double to 20E$. Do it. The group should work together so that we can make the most money that we can. Try to at least put $5 in the group account.
2	**If we all continue to contribute 10, then the group as a whole will receive maximum profits. While one of us could put in only 9 and walk away with 20.50 this would create a fight to be that person, and we would all end up putting 9 and making less money.** Group, clearly putting all our money in the group investment is paying off because it's doubling our profit if we go it alone, Let's stick to putting all 10 E$ in the group account. Formula I + ½ TG, we make more money if we all invest 100% of our funds in the group. So keep investing all your money in the group, and we walk out of here with the maximum amount. I think this is a test to see how greedy we are. If we all keep putting in 10 dollars in the group per round, this will be the max we can get $20 per person per round x 15 rounds = 300 E$ I hope this is right. We should all contribute 10 each time. But it seems like when we sometimes put less (i.e. Round 2 & 4), we got. 50 more, so I 'm not sure how that works.
3	**Gus, the way for EVERYBODY to make the most money is for everyone to invest 10 to the group account. We will all make a dollar each time unless someone gets greedy. The only works if we all work together otherwise someone will get screwed.** Okay, It seems like people are somewhat intelligent in this group, so maybe I'm not the best one to do this, but it seems like when we each give at least some money to the group account we all make more money. Giving zero to the group isn't doing much to help the team at all. I feel that if we each give 5 and keep 5 it may work out better! We could just try this the first round see how it works! See ya all later! <Heart> <Picture of Traffic Signal> Go with your heart but stay smart!!! Dear group 3, In order to maximize our profits/gains, we should all put 10E$'s into Group account, that way all of us can earn 20E$'s each round. Which is the maximum gain we can achieve each round.
4	**Let's invest $10 in the group account so we al make the most money** Let's all invest more in the group account, we'll make more money Let's invest $6+ into the group Investment. The group investment is going to make you

more $ than the individual b/c it doubles your investment basically.
We should do 5 in indiv. And 5 in group each time. WE gain 5 extra by doing that… So I think I understood this correctly…

5 **Everyone in the group must work together so that we can gain the highest profit possible. We have been averaging around 15 per round that's 1 dollar in the end if we all put our whole Endowment into the Group account we will have 20 every time giving us more money come on guys its simple lets work together the Group account is what brings the money. Let's do this!**
(Put all our money in the "Group" account 40 x .5 = 20 per round max profit!)
If we divide our endowment in half (5 E$ in"I" and 5 E$ in "G") we will all have a higher individual yield in the end!
We need to put all 10 E$ of our money into the group account so that we can make the most money. We will each make 20 E$ a round instead of out normal 14 – 16E$.
Invest $8 in group and $2 in individual account

6 **Based on first 5 rounds, we didn't make a "big" deal because we are afraid that we will lose "money" if we put all money into group account. We also see somebody may invest little money to group account and win more. But h/she only can win one time, never win all the round. So stop "win-lose" model. In order to play well for the rest round, please use "win-win" model.**
Let's agree that put all money into our group account in each round. Be sure,, don't break the rule. Otherwise you only can play trick one time couldn't for the 10 rounds. Please honest follow this rule and make a "big" deal! Thanks
As you can see, the group account has a higher ROI (return on investment) by a factor of two. If we each invest completey to (I) we'd make $10 each per round. If we split it evenly 5/5 I/G then we'd each make 15 a round. And If we put all of our money in the group account we each make 20. There is no way to make more than or equal to 20 on your own. We each need to agree to donate all of our endowment into (G) and we will all be richer for it as we will maximize ALL of our profits.
The more $ we put into the group account, the more $E's we earn. Don't you see? Look at the first round compared to the last round. Let's make some money! Start putting ½ and ½ to see what happens.
I think we should give 5 E$ to the group account (20E$ total x .5) = 10E$

* Bolded messages are winning messages

Table C: Messages from Noisy Leader Treatment*

Group 1	− **If we invest 40 total our earnings are $20** **40*.5=20** **Any less we lose 10 individual is worth less than 20.** **10*10=$100/15 = 6.6** **20*10=$200/15 = 12.6** **40 in group > 10 individual** **Everyone invest in group $10 we need to make some money.** **Ignore message at each round, give $10.** **Message is too fool us 50% of the time.** − If we all invest 10 in the group Account we can all make the maxuim amount of money. If we all invest 10 then we will make $20 a round − We should invest more in the group account so we can have a higher return. We should put 6 in Individual and 4 in group. That totals 16 and half is 8 so 8 + 6 = 14. WE make 14 each round. − Contribute 3 E$ to Group Account.
Group 2	− **If you all noticed we made more money when we added to the group fund. We have 10 rounds left if we put all our money into the "I" account we only get = 100E$. If we put all our money into the "group" fund we get = 200 E$. If you looked at the high/low contributions you would have seen a 10 every round, that was me. This is the only way to make money. We Must Work Together To Make The Most Money!!!** − **The Group Fund is the Best Way to Make Money!!!** − I guess we are doing good. There is more money if we contribute more in group than individual accounts I think. − Submit 10 $ each to the Group Account or a minimum of 5$. − Hey – Let's invest all the money to group account that's how we can make the most out of the experiment!! Don't be greedy k? If we all do so we can make 20 E$ every round for the next 10 rounds – Good Luck -
Group 3	− **Let's contribute more, like no less than 5. In that way all of us can earn more E$. If you invest all 10 to individual account you can only earn 10. But if put like half-half. Everybody can earn at least 15 E4 each round.** − Let's all contribute 6 E$ to the group account. − We could all then make 16 E$ per round which is more than $1 per round. − Try to keep group investment between 2 to 5. And don't select the same number consequetively or in sequence. − Let us contribute $5 to the individual account and $5 to the group account as this would maximize our earnings for each round. − $5 + 0.5 (4*5) = $ 15 (E dollars) ▪ = $ 1 (actual value) − This would help each one of us maximize our earnings
Group 4	− **Invest 10 E$ into the group account.** − Guys, Invest your amount to group account that would be the maximum everyone would be getting. All the best guys. − Everyone put $7 in the group pot consistently. Whoever has been holding out will see no additional returns if they continue.

- Dear group,
- While one may occassionaly earn E$ 20 a round, it is rare and requires a heavy investment from others in the group. If everyone were to contribute E$ 10 to THE group every round, we will earn E$ 20 each every round. This will maximize our communal earnings, and we will all walk out with at least $20 real cash. This , therefore, maximizes our beer purchasing power this weekend. So for personal account, 0, group account 10.
- Sincerely
- Group member who contributed 10

Group 5

- **If we all invest 10 E$ into the Group money, our total will be 40 E$ = 20 E$ to each member. This is the simplest way to double our money.**
- Profit is maximized when each member gives all 10 E$ to the Group.
- Earnings per round = I + 0.5*TG
  - = 0+ 0.5*(40)
  - = 20
- Please contribute to group account just like how I did in the first five rounds. At least E$ 7 Please this way we can make more money.
- Lets contribute $8 and try to work our way to $10 ($20 profit each). If anyone goes to 0 we should all match them the next round. If someone goes low we should match them the next round. Best outcome is we all contribute the max and get double profit.

Group 6

- **Guys, it would be beneficial for all of us if we invest all 10E$ in Group Account. Because, if we all invest 10 E$, then Total Group investment = 4 * 10 = 40 E$ and each of us would get 40/2 = 20 E$ which is 10 E$ more than what you are investing in group. We "ALL" could be "BENEFICIAL"**
- **Note: check the above I said with the formula keeping I = 0 E$ & TG = 40 E$**
- People, the only way we can make the most money is if we all put in at least $4 each into the group account, the rest into individual accounts. We will lose money if no money is put into the group account.
- Personal investment = 5
- Group investment = 5
- All members in the group should try and contribute more money into the group account as it doubles and helps each member to earn more.
- Vote for me ☺

* Bolded messages are winning messages