
# Not Just Like Starting Over: Leadership and Revivification of Cooperation in Groups

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# LEADERSHIP AND REVIVIFICATION OF COOPERATION IN GROUPS[◊]

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**ABSTRACT**

We conduct a laboratory experiment to study how, after a history of decay, cooperation in a repeated voluntary contribution game can be revived in an enduring way. Simply starting the repeated game over - a simple fresh start - leads to an initial increase of cooperation, but to a subsequent new decay. Motivated by cooperation decay in organizations we study the potential of three interventions of triggering higher and sustained cooperation, which take place at the same time as a restart. Surprisingly, we find that the detailed explanation of the causes of the decay in cooperation of Fischbacher and Gaechter (2010) combined with an advice on how to prevent decay do not have an effect beyond that of just starting over. In contrast, a one-way free form communication message sent by the leader to the followers strongly revives cooperation. We find evidence that *repeated* free form communication by the leader further strengthens the reviving effect on cooperation. Combining the two previous interventions does not outperform the pure effect of communication. Our content analysis reveals that leader communication is more people oriented than the expert advice.

KEYWORDS: leadership, cooperation, communication, experiments

JEL CLASSIFICATION NUMBERS: C71, C73, C92, D83, J63, L20

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## 1. INTRODUCTION

A common observation in experimental studies of public goods games is that, in environments with a finite horizon, cooperation levels are initially rather high but then decrease steadily over time.[1] The question we study in this paper is which instruments can be used to revive cooperation effectively after such a history of decay. Salient temporal landmarks, like the start of a new week or a new season, may create a sense of a new beginning in a natural environment and allow for the revivification of cooperation. Dai, Milkman and Riis (forthcoming) discuss in detail how such temporal landmarks can affect individual behavior, like eating more healthy or saving money. Our focus is on whether such salient temporal landmarks also affect the behavior of groups and whether their effects can be reinforced through some additional interventions. Our motivation for studying these issues comes from the analysis of organizations and the need to find ways to combat organizational decadence.

Our laboratory experiment builds on two important results of earlier experimental work related to the effects of a fresh start in the context of cooperation. First, it has been shown that in fixed groups the level of cooperation can be driven up again by simply restarting the game after the initially announced horizon has been reached. In the experiments reported in Andreoni (1988) participants play the voluntary contribution game in the finitely repeated form. After the initially announced ten rounds are over, they are informed that there will be some additional rounds of the same game. Here the re-initiation of play allows for a fresh start. Contributions go up again after the prolonged experiment is announced. In Andreoni's (1988) experiment play was suspended after three additional rounds and during these rounds the cooperation level stayed up. This effect is called the "restart effect," and it is the first of two results on which we build.

The second regularity we build on is reported in Croson (1996) who follows up on Andreoni (1988). In her public goods experiment, ten additional rounds are announced after the initial ten rounds are over. The results confirm that the restart leads to an initial increase of cooperation in fixed groups. However, after the initial increase in cooperation, the decline in cooperation begins again and play ends up at an even lower level than at the end of the first ten rounds. That is, cooperation can be revived by starting over, but the effect is short-lived.

In this paper we use a lab experiment to study how cooperation in groups can be revived *in an enduring way* by using various managerial strategies that come along with a

[1] See Davis and Holt (1994) and Ledyard (1995) for reviews and Fischbacher and Gächter (2010) for a recent analysis of cooperation decay.

fresh start. As discussed above, a positive reaction to a fresh start seems to be a widespread behavioral regularity. Our focus is on studying whether humans' spontaneous tendency to react to a fresh start can be reinforced by some additional intervention.

We study this issue in the context of a public goods game involving a leader. We choose such a structure, because we are mostly motivated by issues of successful teamwork in organizations.[2] Almost all types of institutions, firms, departments and (sport) teams are organized in some kind of hierarchical structure and guided by a leader. When cooperation failure has occurred it is one of leaders' natural roles to take action to reinforce a new beginning.

In our set-up, leadership takes the form of leading-by-example used in the studies by Güth et al. (2007), Rivas and Sutter (2011), Gächter et al. (2010) and Potters et al. (2007) among others. The question we ask is whether in a leading-by-example environment leaders can take advantage of the tendency of human cooperation to react positively to exogenously set landmarks by taking deliberate action precisely at the natural landmark. Here we study three interventions that can potentially lead to a stronger revivification of cooperation than that following a pure restart and that are interesting from a managerial point of view.[3]

The participants play the public goods game with leading-by-example in fixed groups and repeatedly in 36 rounds. The 36 rounds are divided into three parts with 12 rounds each. In the first part of the experiment we let participants play the game without any intervention. The purpose of the first part is to create the experience of decreasing cooperation in the group and to provide an interesting situation for a restart. The second (third) part serves to measure the short- and long-run effect of a (repeated) restart.

We have four treatments, which all involve a restart in the sense that, after a number of experimental rounds, additional rounds are played. The first is the *pure restart* treatment, a control treatment in which the restart is not accompanied by any other change in the environment and which is meant to establish a baseline. The three remaining treatments involve additional elements that go beyond the pure restart. Our second treatment is the *comprehension/advice* treatment, where the restart is combined with the provision of a detailed explanation of the causes of the decrease in cooperation and of advice on how to prevent a decay. Our third treatment is the *communication* treatment, where the restart is accompanied by a one-way free form message sent by the group leader to the followers. In the

[2] Leadership can also be studied experimentally without a leading-by-example structure. See, for example, Brandts, Cooper and Weber (forthcoming).

[3] In Boulou-Reshef et al. (2014) leaders move first by sending message to followers but they can not make moves in ways that set an example.

fourth treatment, the *comprehension/advice/communication* treatment, we combine the second and third treatment.

Our contribution to the existing literature on cooperation is fourfold: First, we analyze the pure restart in a voluntary contribution game with two new features: the game is sequential and, in contrast to the surprise restart in Andreoni (1988) and Croson (1996), participants in our experiment know that there will be a restart. Second, we study the effect of communication *after* having possibly experienced cooperation failure. Third, "expert" advice in the context of a voluntary contribution game has to our knowledge not been studied before. Fourth, the repeated restart allows us to study whether, if the first effect is positive, repeated interventions can further strengthen the initial reaction and lead to sustained cooperation levels.

We find that the leader's communication with the followers revives cooperation significantly compared to the pure restart and the comprehension/advice treatment. There is evidence that the *repeated* communication by the leader (without the expert explanation and advice) further strengthens the positive effect on cooperation. The effect of comprehension and advice is not beyond that of just starting over.

## 2. EXPERIMENTAL DESIGN

In section 2.1., we present the sequential voluntary contribution game used in our experiment. In section 2.2 we provide some general information on the procedures of the experimental sessions. In section 2.3., the control treatment and the intervention treatments are discussed.

### 2.1.The game

In the leading-by-example setting we study, a voluntary contribution game is played repeatedly by fixed groups of four participants. Group members are matched randomly at the beginning of the experiment. There are two roles: one leader and three followers. The role of the leader is randomly assigned to one of the group members at the beginning of the experiment and the remaining group members are followers. Participants keep their role throughout the entire experimental session.

The payoff function is the same for leaders and followers measured in Experimental Currency Units (henceforth, ECU). The individual endowment is $E = 40$, the return rate of the private good is $r_P = 1$, and the return rate of the public good is $r_V = 0.5$ yielding the following payoff function of individual $i$ in round $t$, where an individual $i$'s contribution in

round $t$ to the public good is denoted by $h_{i,t}$, the contributions by all group members are denoted by $h_{j,t}$ with $j=1,\ldots,4$.:

$$\pi_{i,t} = \underbrace{\left(40 - h_{i,t}\right)}_{\text{Payoff from private good}} + \underbrace{0.5 \cdot \sum_{j=1}^{4} h_{j,t}}_{\text{Payoff from public good}}$$

The game has three stages. In the first stage of the game, the leader of each group decides how much of the endowment to contribute to the public good. In the second stage, followers are informed about their leader's decision and decide each of them independently how much of their individual endowment to contribute to the public good.[4] In the third stage, all players are informed about the average contribution by the other group members, the sum of contributions by all group members and the individual payoff. The game is played repeatedly in 36 rounds.

## 2.2. Procedures

At the beginning of an experimental session the general instructions are handed out to the participants on paper and then read aloud by one of the experimenters. In the general instructions (see appendix A.1), the chronological order of an experimental session and the three stages of each round are represented graphically. The general instructions are the same for the control treatment and the three intervention treatments. Before the experiment starts participants are informed that there will be 36 rounds of the voluntary contribution game (divided into three parts with twelve rounds each) and that they will get part-specific instructions at the beginning of each part.

Additional part-specific instructions (see appendix A.2 through A.5) are shown on the computer screen just before the corresponding part starts and also announced aloud by one of the experimenters. They include the information that the group composition would remain the same over the twelve rounds of the subsequent part. The restart and the interventions take place at the beginning of part 2 (before round 13) and part 3 (before round 25). A twelve-round part can be seen as a work-period (week, month, quarter, year), a season, the time a

[4] Assuming rationality, selfish preferences and common knowledge of rationality the equilibrium contribution of leaders and followers in the sequential structure of the game is the same as in the simultaneous game, i.e. zero (individual payoff of 40 ECU). This holds for the stage game as well as for the finitely repeated game, which can be shown by backward induction. The socially optimal solution is just the same as in the finitely repeated simultaneous game: Each group member contributes in each round the entire individual endowment to the public good leading to a total contribution of 160 (individual payoff of 80 ECU).

particular project lasts or any other length of time after which there is a natural break in the interaction.

The experimental sessions were conducted at the Universitat Autònoma de Barcelona (UAB, Spain) and programmed with the experimental software z-Tree, Fischbacher (2007). Participants were mainly undergraduate students from the UAB and were recruited using the online recruitment system ORSEE, Greiner (2004). A total of 208 participants took part in twelve experimental sessions composed by 123 women and 85 men. The conversion rate was 150 ECU to 1 Euro. The average earnings per person were 19.70 Euro (including a show-up fee of 5.00 Euro). The average duration of a session was 2 hours 30 minutes. After the experiment had finished, participants were asked to fill out a questionnaire and were paid their earnings in private.

### 2.3. Treatments

As mentioned above, the first twelve rounds were identical across treatments. Our conjecture here was that contributions would decrease over time with no difference across treatments.

In the *pure restart* treatment, participants are informed before the start of part 2 and part 3, respectively, that during the subsequent twelve rounds they will continue playing under the same conditions and in the same group composition as before.[5] They do not get any additional information and do not have to take any new type of action in the second or third part.

In the *comprehension/advice* treatment, we add to the information on the fix group composition an explanation and advice text displayed on the computer screens. We explain to participants, before the start of part 2, how contributions usually evolve in related experiments and give an explanation of why they typically decline, following the findings of Fischbacher and Gächter (2010). Then we give advice on what to do to avoid the decline and to reach and maintain high earnings from the public good. The idea behind this treatment is that of a working group receiving external expert analysis, explanation and advice. McDonald and Westphal (2003) for instance find that CEOs tend to seek advice when performance deteriorates, which in our context corresponds to decreasing cooperation. The evidence about the effect of external consultancy and advice on performance is however rather inconclusive

[5] Note that Andreoni (1988) and Croson (1996) studied the effects of a pure restart in a simultaneous voluntary contribution game and the restart was a surprise for participants. Hence, our control treatment is an extension and not a pure replication of previous work. To our knowledge, the restart effect as such has not yet been studied in a sequential form of the game and without it being a surprise.

as a number of field experiments with micro-, small, and large organizations in developing countries obtain different results.[6]

The content of the explanation given to subjects at the beginning of part 2 is the following: We first tell participants that we observed a decline in average contributions over part 1 in previous sessions driven by followers undercutting previous contributions on average. We then explain to them that a study showed that the decline in contributions in the repeated simultaneous game occurs because participants are on average imperfect conditional contributors (Fischbacher and Gaechter, 2010). Finally, we state that it is recommendable that followers contribute at least as much as the leader of their group to reach and maintain high group earnings from the public good.[7] Before part 3, we give a short reminder of the explanation and the recommendation. The full text of the comprehension/advice instructions for part 2 and part 3 can be found in the appendix. It was important for us that participants understood the game well and were given a clear comprehensive recommendation of how to prevent the decline.[8]

The fact that the message is repeated is an important element of our design.[9] Repetition of the message has been analyzed in the psychological literature which suggests that extended effects on attitude can occur when the initial information on which judgment was based is retrieved (Wood, 2000). Moreover message repetition provides more chances to scrutinize the message.

Psychologists have extensively studied attitude change and persuasion (see Petty and Wegener, 1998; Wood, 2000; Bohner and Dickel, 2011). Results of this research suggest that the effect of our comprehension/advice treatment could go both ways. On one hand, the better understanding provided by the message is directed to the desire for accuracy on the object and this could lead to participants changing their attitude and contributing more (Wood, 2000). In addition, persuasion effects increase when the message contains strong, cogent arguments (Wood, 2000). Finally, the origin of the message is important. Cialdini and Trost (1998) point

[6] See, e.g., Drexler et al. (2010), Karlan and Valdivia (2011), Bruhn and Zia (2011), Bruhn et al. (2012), Karlan et al. (2012), Bloom et al. (2013). Compared to the advice provided in Chaudhuri et al. (2006), where common knowledge advice comes from a *non-expert* participant from a *previous generation* increases cooperation, our advice has the nature of an *exogenous expert advice*.

[7] We formulated the advice in the comprehension/advice treatment in a clear and comprehensive way to avoid that participants interpreted it as an order.

[8] We thought carefully about the information we put in the explanation and advice and let non-economists proofread it for understandability. Also, we gave participants enough time to read the information again after we had read it out aloud and asked if anyone had a question before proceeding.

[9] All our treatments involve a repetition at stage 3.

out that legitimacy provides extreme influential capacity and expertise is one of the ways to acquire legitimacy. Our message stresses that the advice is based on expertise.

However, there are also reasons to think that the treatment will lead to low contributions, since the reaction to the comprehension/advice combination may be defensive. For example, Tycocinski et al. (1994) suggest that certain messages can elicit distress by identifying seemingly relevant goals that have not been adopted. Also, there is the possibility that our message is too complex, and this could weaken its positive effect (Petty and Wegener, 1998).[10]

In the *communication* treatment, the leader of a group sends a one-way free form text message to the followers before the start of part 2 and part 3, respectively. Except for standard rules for free form communication in experiments, leaders are free to write whatever they want. We are interested in studying behavior in the sequentially played voluntary contribution game and *after a decrease* in contributions; our emphasis is on reviving cooperation after it has died down. It is an interesting context because after a negative cooperation experience it is particularly crucial that leaders find the right words to get the group out of the trap. Given previous evidence on communication, on could conjecture that communication would increase cooperation by more than the pure restart.[11] However, some of the caveats presented for the comprehension advice treatment also apply to the communication treatment. In particular, depending on how leaders formulate their messages they can also elicit distress by focusing too much on some negative aspects of followers' past behavior.

Our communication treatment is related to some previous experimental work. In Isaac and Walker (1988) participants play the simultaneous public good game in two sequences of ten rounds with and without communication. Communication, which takes place among *all* group members and in *each* round, revives cooperation substantially after a sequence without communication. Koukoumelis et al. (2012) have shown that communication between group members *from the start* increases cooperation significantly. It is an open question whether the same is true for communication after participants have experienced decreasing cooperation.

In the *comprehension/advice/communication* treatment, all participants receive exactly the same explanation and advice as in the comprehension/advice treatment before the start of

[10] Bayer et al. (2013) study a repeated simultaneous public goods game. They include a treatment in which participants do not get initial information about the specifics of the game and its payoff structure and compare behavior in this case with that in a standard information condition. They find that after a few rounds, the rate of decline was much lower with no information so that in their framework confusion does not lead to a faster decline.

[11] Note that the informational content and understanding given to participants in the comprehension/advice treatment can be considered to be at least as precise and deep as in the communication treatment.

part 2 and part 3, respectively. On the subsequent screen, leaders can then send a one-way free form message to the followers exactly like in the communication treatment. Since this intervention is a combination of the other two our conjecture here is again open; both a positive and a negative effect could emerge.

[Table 1 approx. here]

In the following, we will denote the pure restart control treatment by "treatment PR," the comprehension/advice intervention by "treatment CA," the communication intervention by "treatment C," and the comprehension/advice intervention in combination with the communication by "treatment CAC." Table 1 provides a summary of the characteristics and the number of groups for each treatment. We have a total of fifteen (independent) group observations for treatment PR, thirteen group observations for treatment CA, twelve group observations for treatment C, and twelve group observations for treatment CAC.

## 3. RESULTS

Table 2 shows average contributions and corresponding standard deviations of all participants, leaders and followers in parts 1, 2 and 3. Figures 1, 2 and 3 show average contributions of group members, average contributions of leaders and average contributions of followers over the 36 rounds of the experiment.

Table 3 shows the results of pooled OLS regressions. The observations are those of all 208 participants. In all the regressions, we cluster by group to control for the correlation of contributions within a group. In regression models (1a), (1b), (2a), (2b), (3a), and (3b), observations are those from part 1 (rounds 1 through 12), part 2 (rounds 13 through 24), and part 3 (rounds 25 through 36), respectively. In models (1a), (2a), and (3a), individual contributions are regressed on a round variable taking values between 1 and 12 corresponding to parts 1, 2 and 3 respectively, and a dummy variable for each of the three interventional treatments CA, C, and CAC, with PR being the reference treatment. The regressions also include a dummy variable which takes the value one if the individual is a leader and zero if the individual is a follower. In models (1b), (2b), and (3b), an interaction term between the round variable and each of the three treatments CA, C, and CAC is added to the corresponding model.

Sections 3.1, 3.2, and 3.3 deal with the contribution levels of parts 1, 2 and 3 respectively. We focus on contributions of complete groups and where appropriate distinguish

between leaders and followers. Throughout the paper, we use (average) contributions on the group level as independent observations for the non-parametric tests. In section 3.4 we study the content of leader communication.

### 3.1. Part 1 (rounds 1 through 12)

Consider the information pertaining to part 1 in Table 2. Using average contributions on the group level as independent observations, we find that, as expected, the null hypothesis of no treatment differences in contributions in part 1 cannot be rejected ($p = 0.592$, Kruskal-Wallis test). Also the pair-wise comparisons of part 1 contribution distributions do not reveal differences between treatments PR, CA, C, and CAC ($p > 0.210$, pair-wise Mann-Whitney U test).[12]

[Table 2 approx. here]

Contributions in part 1 are also the same across treatments when analyzing leaders ($p = 0.708$, Kruskal-Wallis test; $p > 0.255$, pair-wise Mann-Whitney U test) and followers ($p = 0.573$, Kruskal-Wallis test; $p > 0.191$, pair-wise Mann-Whitney U test) separately. The absence of treatment differences is confirmed in regression model (1a), where the coefficient estimates of the treatment dummy variables CA, C, and CAC are all not significant at conventional levels.

[Figures 1, 2, 3 approx. here]

Figures 1, 2 and 3 show that cooperation declines in part 1 (rounds 1 through 12) and this is confirmed in regression models (1a) and (1b) in Table 3. The results for model (1a) in Table 3 show that the coefficient estimate for the round variable is negative and highly significant at the one percent level indicating that contributions decrease over the rounds of part 1 by 0.88 ECU per round on average. In model (1b) the dummy variables for the three treatments are again not significant at conventional levels. All three interaction terms of the treatment and the round variable are negative. For treatment C, the interaction term is significant at the five percent level in part 1. Compared to control treatment PR, contributions

[12] In what follows all pair-wise comparisons are based on two-sided tests.

start somewhat higher in treatment C in round 1 and the contribution decrease in part 1 is steeper by 0.63 ECU per round.[13]

[Table 3 approx. here]

Comparing leaders' and followers' contributions with the data of Table 2, we find that leaders contribute in part 1 significantly more than the followers of the corresponding group in each treatment ($p < 0.084$ for each treatment separately, Wilcoxon signed-rank tests). The larger contributions of leaders in part 1 are confirmed in regression models (1a) and (1b) in Table 3. This replicates an earlier finding by Gueth et al. (2007), Potters et al. (2007) and Gächter et al. (2012). In our data, leaders contribute on average 4.6 ECU more than followers.

Summarizing, in part 1 there are no treatment differences in contribution levels, which decline over the range of the twelve rounds. This result sets the stage for our analysis of the effects of the restarts in the different treatments.

### 3.2. Part 2 (rounds 13 through 24)

#### 3.2.1. The short-run effect of the first restart

The increase in group contributions from round 12 to round 13 is on average (with the corresponding standard deviation) 7.02 ECU (10.8), 18.13 ECU (9.8), 18.81 ECU (15.0), and 12.60 ECU (11.1) in treatments PR, CA, C, and CAC, respectively. The significance of these increases is confirmed by non-parametric tests ($p < 0.061$ separately for each treatment and for average group contributions, leaders' contributions, and average followers' contributions, Wilcoxon signed-rank test).[14]

Next we ask whether there are treatment differences in the first restart effect, i.e. in the contribution *increase*. The differences between the increases in contributions can be observed in Figures 1 to 3. The increase in treatments CA and C is significantly larger than the increase in the control treatment PR ($p = 0.015$ and $p = 0.038$, respectively, Mann-Whitney U test), while the difference is not significant for treatment CAC compared to PR.[15]

[13] The coefficient estimate of the treatment C dummy (4.4) has a p-value of 0.114. The difference in the slope seems to be a random effect since there are no design differences between the treatments in part 1.

[14] Also the highly significant coefficient estimate of the part 2-dummy in regression model (4a) in Table 3 confirms an average increase of 11.57 ECU from round 12 to round 13 (part 2-coefficient estimate: 12.37 ECU; marginal round change: -0.80 ECU).

[15] For treatment CAC the increase is not significantly higher than for treatment PR, although the average contribution level in round 13 for CAC is as high as for treatment C. The lack of significance can be attributed to the fact that the contribution level in treatment CAC (randomly) remained relatively high in round 12.

For treatment CA, the increase is significantly higher than in control treatment PR also for leaders and followers separately. For leaders the comparison between contribution increase in treatments CA and PR is 19.15 ECU vs. 8.73 ECU, ($p = 0.074$, Mann-Whitney U test); for followers, the comparison is 17.79 ECU vs. 6.44 ECU ($p = 0.020$, Mann-Whitney U test). For treatment C, the contribution increase is significant for followers (18.92 ECU vs. 6.44 ECU, $p = 0.043$, Mann-Whitney U test), but not for leaders.

What happens in the long-run in part 2, i.e. in rounds 13 through 24? In what follows we present two distinct comparisons. First, we compare the *contribution levels* in part 2 across treatments. Second, we look at differences-in-differences and see whether the *changes* in contribution levels between complete parts 1 and 2 are different across treatments.

### 3.2.2. Average contributions over all rounds of part 2 across treatments

Overall, contributions decline over the twelve rounds of part 2 in all four treatments, see regression models (2a) and (2b) in Table 3. The effect of the first restart is short-lived in all treatments. The next question is whether the decay is smaller in some treatments than in others.

We find that contributions in part 2 (rounds 13 through 24) are highest when the leader communicates with the followers (irrespective of the additional comprehension/advice text), whereas they are similar in the pure restart and the comprehension/advice intervention, see Figure 1 and Table 2. Contributions in either treatment with communication are significantly higher than in treatments PR and CA ($p < 0.045$, pair-wise Mann-Whitney U test), whereas there are no significant differences in the distribution of average group contributions between control treatment PR (18.20 ECU) and treatment CA (18.51 ECU) ($p = 0.695$, Mann-Whitney U test), or between treatment C (26.56 ECU) and treatment CAC (27.50 ECU) ($p = 0.773$, Mann-Whitney U test). That is, in the short-run the contribution increase in CA is large, but this does not prevent the long-run contribution level over all twelve rounds of part 2 to be lower in CA than in both C and CAC.

Separate analyses for leaders and followers draw a similar picture; see also Figures 2 and 3 and Table 2. For leaders, contributions in treatment CAC are significantly larger than in treatment PR and CA ($0.014 < p < 0.041$, pair-wise Mann-Whitney U test) suggesting that leaders try to push contributions up in treatment CAC. Leader contributions in treatment C in part 2 are somewhat larger than in treatment PR and CA, but not significantly ($0.143 < p < 0.211$, pair-wise Mann-Whitney U test). Followers contribute significantly more in the communication treatments C and CAC than in treatments PR and CA ($p < 0.039$; for the four

pair-wise Mann-Whitney U tests). There are no differences between control treatment PR and treatment CA as well as treatment C and treatment CAC for leaders only (p = 0.982 and p = 0.339, pair-wise Mann-Whitney U test) and for followers only (p = 0.730 and p = 0.730, pair-wise Mann-Whitney U test).

The regression models (2a), (2b), (4a) and (4b) in table 3 confirm the effect of communication beyond the pure restart effect.[16] The dummy variables for treatments C and CAC are significant at the ten to one percent level and show that contributions in the communication treatments in part 2 are on average 8 ECU (treatment C) and 7-9 ECU (treatment CAC) larger than in the control treatment with pure restart, see models (2a) and (4b). The coefficient estimates of the dummy variable for the other intervention treatment CA are insignificant.[17] Note that, in model (2b), the coefficient estimates of the three interaction terms are insignificant; in part 2 cooperation declines over time similarly in all treatments.

Summarizing, communication by the leader does not prevent a decline of contributions over time, which also occurs in the pure restart and the external comprehension/advice interventions (see regression model 2b), but leads to an overall higher level of cooperation in part 2.[18]

### 3.2.3. Changes between parts 1 and 2 across treatments

From part 1 to part 2, average group contributions increase in treatment C (+6.94 ECU) and treatment CAC (+5.57 ECU), remain almost the same in treatment CA (+0.65 ECU), and decrease slightly in treatment PR (-1.08 ECU).[19] The rise in cooperation from part 1 to part 2 is significantly larger in treatments C and CAC than in control treatment PR (p=0.032 and p=0.017, respectively, Mann-Whitney U test), but not significantly larger than

[16] Note also that like in part 1 leaders contribute more then followers.

[17] We can also test for the differences of the coefficients in regression (4b). The only significant difference we find is between *(C)*(Part 2)* and *(CA)*(Part 2)* (p = 0.0876, Wald post estimation test).

[18] Throughout we have focused on average effects across all groups. To see if this hides differences between types of groups we also do the treatment-effect analysis separately for those groups who experience a decline (and those who do not). We define as groups who experience a decline those with a significant average decline per round in part 1 of at least 0.5 (p-value < 0.1 in Spearman rank correlation, Kendall rank correlation, OLS of average group contribution on round, and FE regression of individual contribution on round). This is in fact the case if, in the FE regression, the average decline per round in part 1 is at least 0.9 (p-value < 0.1), which corresponds to the average decline per round in regression models (1a) and (1b) in Table 3. Based on this procedure, we exclude 7 (treatment PR), 4 (treatment CA), 4 (treatment C), and 5 (treatment CAC) groups from the analysis. We repeat the regression analysis in Table 3 for the remaining groups and confirm overall the findings with all group observations underlining the robustness of our results. (We thank one of the reviewers for suggesting this interesting additional analysis).

[19] The rise in cooperation from part 1 to part 2 is only significant with communication; both without (p = 0.050, Wilcoxon signed ranks test) and with (p = 0.060, Wilcoxon signed ranks test) comprehension and advice. In both treatments, contributions increase by around 35%.

in treatment CA ($p = 0.135$ and $p = 0.115$, respectively, Mann-Whitney U test).[20] Cooperation changes in treatments CA and PR do not differ ($p = 0.596$, Mann-Whitney U test).

Looking at leaders only, there are no significant differences in the contribution reaction to any of the three interventions or to the pure restart ($p > 0.107$, pair-wise Mann-Whitney U test). The change in cooperation is significantly larger among followers in treatment C compared to treatments PR and CA ($p = 0.015$ and $p = 0.082$, respectively; Mann-Whitney U test). Adding communication (treatment CAC) to the comprehension/advice text (treatment CA) does not increase the followers' contribution significantly ($p=0.157$, Mann-Whitney U test) nor does adding the comprehension/advice text (treatment CAC) to the communication (treatment C) that followers receive from the leader ($p=0.954$, Mann-Whitney U test). These findings indicate that the effects of communication and comprehension/advice do not have an additive effect. Adding the comprehension/advice text to the communication opportunity seems to rather weaken the positive effect of communication on followers' contributions. There are no significant differences between treatment PR and CA among followers ($p = 0.461$, pair-wise Mann-Whitney U test).

In summary, comparing part 2 with part 1 as a whole we find that communication by the leader leads to a strong increase in cooperation in treatments C and CAC, i.e. communication is effective independently of the expert explanation and advice. The increase in contributions with the expert explanation and advice in treatment CA does not differ from the one in treatment PR.

### 3.3. Part 3 (rounds 25 through 36)

#### 3.3.1. The short-run effect of the second restart

The increase in group contributions from round 24 to round 25 is on average (with the corresponding standard deviation) 5.87 ECU (12.9), 13.54 ECU (12.3), 12.5 ECU (16.9), and 4.8 ECU (7.9) in treatments PR, CA, C, and CAC, respectively (see also Figures 1-3). In the control treatment PR, the increase is not significant ($p > 0.132$ separately for average group, leaders', and followers' contributions, Wilcoxon signed-rank test). In contrast, the augmentation is significant for the three intervention treatments CA, C, and CAC ($p < 0.084$ separately for each intervention treatment and for group, leaders', and followers' contributions, Wilcoxon signed-rank test), except for leaders in treatment CAC ($p = 0.652$, Wilcoxon signed-rank test).

[20] Note, however, that the increases are 9 to 10 times the one for treatment CA.

Comparing increases across treatments, the *increase* is significantly larger in treatment CA than in the control treatment PR ($p = 0.065$, Mann-Whitney U test), but not for treatments C and CAC compared to treatment PR ($p > 0.231$, Mann-Whitney U test). At the second restart, the comprehension/advice intervention leads to a new short-run reviving effect, while communication does not boost cooperation significantly, in contrast to what happened at the first restart. This is the only comparison, where we do not find superiority of communication over comprehension advice.

There are some differences for leaders and followers separately. For leaders, the short-run *change* is significantly smaller in treatment CAC than in treatments CA and C ($p < 0.081$, Mann-Whitney U test), which is partly due to the fact that contributions in treatment CAC decreased slightly less over part 2. Among followers, contributions in treatment CA (14.36 ECU) rise more than in control treatment PR (5.67 ECU) ($p = 0.029$, Mann-Whitney U test).

### 3.3.2. Average contributions over all rounds of part 3 across treatments

Figure 1 shows that in part 3 average contributions are highest in C, somewhat lower in CAC and lowest in both PR and CA. This impression is largely confirmed by our statistical tests. In treatment C, contributions in part 3 are significantly larger than in control treatment PR and treatment CA ($p < 0.009$; pair-wise Mann-Whitney U test). The differences between treatment CAC and treatments PR and CA are also positive, but not quite significantly though ($p < 0.107$; pair-wise Mann-Whitney U test). There are no significant differences in contributions between the control treatment PR (16.03 ECU) and treatment CA (17.12 ECU) nor are there differences between treatment C (29.31 ECU) and CAC (26.13 ECU) ($p = 0.908$ and $p = 0.453$, pair-wise Mann-Whitney U test). The regression models (3a) and (4b) in Table 3 confirm the results of the non-parametrics. In model (3a) the coefficients for C and CAC are highly significant and so are the coefficients for the interaction terms between part 3 and both C and CAC in (4b).[21]

Separate analyses for leaders and followers draw a similar picture, see also Figures 2 and 3 and Table 2. Contributions of leaders ($p < 0.074$, pair-wise Mann-Whitney U test) and followers ($p < 0.005$, pair-wise Mann-Whitney U test) are significantly higher in treatment C than in treatments PR and CA. The leaders' and the followers' contributions in treatment CAC move somewhere in between the contributions in treatments R and CA ($p < 0.200$, pair-

[21] Testing for differences of the interaction coefficients for part 3 in regression (4b) we find that *(C)*(Part 3)* is significantly larger than *(CA)*(Part 3)* ($p=0.0229$, Wald post estimation test). All other tests between the interaction terms in model (4b) are insignificant.

wise Mann-Whitney U test) and treatment C ($p > 0.462$, pair-wise Mann-Whitney U test). There are no significant contribution differences in part 3 between the control treatment PR and the treatment CA for leaders ($p = 0.963$, Mann-Whitney U test) and for followers ($p = 0.982$, Mann-Whitney U test).

The regressions also show that in the communication treatment C there is no decay in part 3. In model (3b) in Table 3 the coefficient estimate of the interaction term of the treatment C dummy and the part round variable is positive and significant at the ten percent level. Repeated communication prevents the decrease in contributions over time in part 3 to a large extent: in model (3b), the coefficient estimates of the part round variable and of the interaction term are -0.673 and +0.521, respectively.[22] In contrast, the coefficient capturing the interaction of round and CAC is not significant and the one corresponding to CA is significantly negative at the 10% level.

Fixed effects regressions to control for group effects (robust standard errors) of individual contributions on the round variable for each part and each treatment separately confirm that part 3 in treatment C is the only case where the contribution decay over rounds is not significantly different from zero (regressions not reported, available upon request). For all other cases, the decay is significantly different from zero on the 1% level (treatments R and CA separately for parts 1, 2, and 3; treatment C for parts 1 and 2; treatment CAC for part 1) and on the 5% level (treatment CAC for parts 2 and 3, $p = 0.051$ and $p = 0.047$, respectively).[23] Isaac and Walter (1988) find the same pattern though their experimental setup is somewhat different (simultaneous game form, communication by all group members in every round): after failure of cooperation without communication, contributions to the public good increase with repeated communication.

Summarizing, like in part 2 average contributions in part 3 are highest if the leader sends a communication message to the followers, whereas they are very similar with the pure restart and the comprehension/advice intervention. In addition, there is no decay over rounds in treatment C except in the last two rounds, due to the well-known end effect.

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[22] That the repeated effect is stronger in treatment C than in treatment CAC is also confirmed in the separate analysis for groups with declining cooperation in part 1. See footnote 18 for the definition of groups with declining cooperation.

[23] The positive effect of communication on contributions is to a large extent related to the following behavior of followers with respect to the group leader's contribution. The long-run cooperation reaction to the communication is particularly strong among followers. Leaders' contributions are in general significantly larger than followers' contributions except for treatment C in part 2 ($p = 0.170$, Wilcoxon signed-rank test). The average contribution gap is cut to more than half from 4.93 ECU in part 1 to 2.06 ECU in part 2 (Table 2) meaning that, with communication (in treatment C), leaders manage to bring followers' contributions closer to that of leaders.

### 3.3.3. Changes between parts 2 and 3 across treatments

The change in average contributions from part 2 to part 3 is negative in treatment PR (-2.17 ECU), in treatment CA (-1.39 ECU), and treatment CAC (-1.37 ECU) and positive in treatment C (+2.75 ECU). Comparing these changes across treatments (differences-in-differences analysis), we find significant differences only for treatment C compared to treatment PR ($p = 0.083$, Mann-Whitney U test). Leaders who communicate with the followers (treatment C) contribute slightly more than leaders in treatments CA ($p = 0.103$, Mann-Whitney U test). Followers react significantly more positively to the text message by the leader (treatment C) than to the pure restart ($p=0.054$, Mann-Whitney U test).

The lasting effect on cooperation of the leaders' (repeated) communication with the followers is also confirmed in regression models (4a) and (4b) where the coefficient estimates of the communication dummy (treatment C) and of the interaction term between the treatment C and the part 3 dummies are significant at the one percent level, respectively. The repetition of communication in part 3 does not only maintain the previous reviving effect of the text message, but reinforces it: compared to the pure restart, contributions in treatment C are on average 8 ECU higher in part 2, model (2a), and 13 ECU higher in part 3, model (3a) in Table 3.[24] The combination of "expert" explanation and advice and leader communication also increases cooperation compared to PR, but does not perform as well as communication by itself.

Summarizing part 3, we find that *repeated* communication (without the explanation and advice stage) *reinforces* the reviving effect of communication on cooperation. It is the only intervention that exhibits an increase of cooperation in part 3 compared to part 2. In the remaining treatments PR, CA, and CAC, average contributions do not change compared to part 2 and decrease over rounds.

## 3.4. Observations about the communication content

Since the communication is free-form, we can study what kinds of messages the leaders send and whether they differ between treatment C and treatment CAC. We therefore coded the text messages sent in rounds 13 and 25 to their followers. Table 4 summarizes the information about communication separately for rounds 13 and 25 and treatments C and

[24] A Wald post estimation test shows that the coefficient estimate of the interaction term *(C)*(Part 3)* is larger than the coefficient estimate of the interaction term *(C)*(Part 2)* though insignificantly, model (4b) of Table 3 ($p = 0.1254$). For the other two intervention treatments CA and CAC, there are clearly no differences between the coefficient estimates of the corresponding iteraction terms ($p > 0.774$, Wald post estimation test).

CAC, respectively. The first two rows refer to the time in seconds that leaders need until they enter the last part of their text message and to the average number of words per text message.

For the communication content analysis, we mostly adopted the coding categories from Koukoumelis et al. (2012) and added some categories that we thought would be important for our design.[25] The main code groups are described below. For a more detailed explanation of the coding categories, see section A.6 of the appendix.

[Table 4 approx. here]

The first five coding categories in Table 4 refer to communication content related to that of the (pre-determined) comprehension/advice message in treatment C (and CAC). The next six categories involve payoff-related arguments. The third group of coding categories encompasses social preferences, emotional expression, and own contribution behavior. The last group includes and the use of labor notions in the text messages.[26] The number of analyzed text messages in round 13 in treatment CAC is eleven, in all other cases twelve text messages were analyzed.[27]

The comprehension/advice categories are mentioned most frequently in treatment C in round 25. Whereas each of the five categories is mentioned between 17% and 58% of the times in round 13 in treatment C, the respective frequencies go up to 33% to 67% of the times in round 25. Some of the communication content in treatment C is thus similar to the content of the expert explanation and recommendation in treatment CAC.

Note that in the comprehension/advice communication text, we only recommend conformity to reach high earnings, but no particular contribution level. Under payoff-related argument one can see that both in treatments C and CAC, 83% to 91% (67% to 83%) of the leaders make a contribution suggestion in round 13 (25). However, the suggestion to contribute the full endowment is much less frequent in round 13, with only 36% to 42% of the leaders suggesting that everybody contributes the entire endowment. The monetary benefit of cooperating is however stressed by almost all leaders (group payoff maximization and satisfaction).

For the "strategy" category we find some suggestive differences between treatment C and treatment CAC. In treatment C, leaders propose more often less forgiving strategies, in particular when communicating for the first time in round 13. Three leaders announce the tit-

[25] One of the co-authors did the coding of the text messages as objectively as possible.
[26] Labor notions refers to the leader using the words: worker, manager, firms.
[27] Due to technical problems, the message of one leader was not saved.

for-tat, two leaders the grim trigger, and one leader the random strategy in treatment C compared to two tit-for-tat announcements in treatment CAC in round 13. The gap becomes closer in round 25 (one tit-for-tat, one two-tit-for-tat, two grim trigger in treatment C; two tit-for-tat, one grim trigger and one random strategy in treatment CAC).

Moving to the last set of categories one can see that the reference to fairness and the expression of emotions in form of complaint or praise is more frequent without the expert analysis and advice. With communication only, leaders refer more often to fairness reasons (50% and 58% of the cases in rounds 13 and 25, respectively) compared to treatment CAC (18% in round 13 and 25% in round 25). The differences in announced strategies and fairness considerations lead us to conjecture that leaders are more pro-active in their communication in treatment C than in treatment CAC. It is notable that half of the leaders in treatment C praise the observed contributions in round 25 whereas only 17% of the leaders in treatment CAC do so even though the contributions in part 2 are similar in both treatments. This might be the result of the leader's cooperation expectations in treatment C being positively confirmed or outperformed or leaders feeling more responsible for the motivation in treatment C. Even though, in round 13, leaders complain more often about the followers previous contributions in treatment C (25% compared to 9% in treatment CAC), the overall mood in the text messages is more positive in both rounds.

Compared to none of the leaders in treatment CAC, some leaders leave the contribution choice explicitly to the followers (17% in round 13 and 25% in round 25) or express the willingness to contribute more than the followers (25% in round 13 and 17% in round 25) when they are not influenced by the expert analysis and advice. Leaders express clearly more emotional closeness and voluntariness in treatment C than in treatment CAC.

Summarizing the communication content, we find that the expression of emotions in form of complaints or praise is more frequent in treatment C than in treatment CAC. In particular before the second restart, leaders praise more often the observed contributions. They also leave more autonomy to followers and stress more often fairness considerations. The comprehension/advice categories are mentioned frequently in treatment C, in particular when leaders communicate a second time. The announced punishment strategies are stronger in treatment C than in treatment CAC.

## 4. CONCLUSION

Our results show that leader communication with the followers is by far the most effective intervention for increasing cooperation in the long-run. The effect on cooperation is

significantly larger than the effect of a pure restart driven mainly by increased contribution of followers. The effect is also larger compared to an external expert explanation and advice based on the study by Fischbacher and Gaechter (2010).

A combination of the expert explanation and advice together with the leaders' communication with the followers increases cooperation, but does not outperform the pure effect of communication on cooperation. In addition, *repeated* communication (without the expert explanation and advice) *reinforces* the reviving effect of communication on cooperation. After the leader sends a second text message to the followers, contributions increase immediately and barely decay over time. Repeated communication after the comprehension/advice intervention does not have a similar reinforcing effect, but maintains high contribution levels.

The expert consultancy does not show an effect that goes significantly beyond that of a restart in our experiment nor does it improve the effect of the leader's communication with the followers. What our results show is that the effect is short-lived and that even the short-run effect does not go beyond that of a pure restart. We believe that these negative results are as important as the positive one mentioned above. It is perhaps most surprising that the comprehension/advice treatment has no additional effect, since it would seem that an analysis of the causes of cooperation decline and a clearly formulated advice are the best starting point for not running into the same problem as before. However, as discussed in section 2.3, the information provided in the comprehension/advice may cause distress and trigger a defensive reaction.

One explanation for our finding may be that what matters for cooperation is not *production oriented communication*, as contained in the comprehension/advice intervention and mostly in the communication following the expert explanation and advice, but *people oriented communication* as in the communication only intervention. In a similar vein, one could think about the formal, production oriented expert analysis and advice from an external human resource consulting firm as a way to create a short-run restart in the firm. Whether the external expert advice has an effect beyond the restart may depend on the content of the analysis, the advice, and the communication form.

As to the content of the communication from leader to followers, we do not have enough observations to do a thorough analysis (nor is it the purpose in this study). However, the most commonly mentioned categories are the monetary benefit from cooperation and requesting conditional contribution. Some leaders also threaten to decrease their contribution if the followers do not cooperate at the same level, create a feeling of relationship closeness

and/or mention the previous decrease in cooperation and possible reasons thereof. The communication content is thus partly quite similar to the external “expert” explanation and advice we give to the participants adding a personal nuance, which could be important.

It could make a big difference whether the information is transmitted from within the group or from outside the group (Mackie et al. 1992). Based on the results of a field experiment on information provision on people’s earnings, Chetty and Saez (2013) for instance conclude that knowledge transfer through peer networks among others could have a larger impact on people’s behavior than simple information provision by experts. Also, the content of the “expert” explanation and advice is purely informative (production oriented) while the leaders can evoke feelings and emotions such as identity, solidarity, or guilt for letting others down and praise the observed cooperation behavior (people oriented), which they do more often when they are not influenced by the expert explanation and advice. Another possibility could be that too much information is not good for changing individuals’ behavior. Also the leader can target the previous cooperation in the own group with the free form communication, while the comprehension/advice text is a general statement. It would be interesting to analyze in future work what kind of communication leaders can use to restore cooperation in organizations.

## REFERENCES


Andreoni, J. (1988), Why free ride? Strategies and Learning in Public Goods Experiments, *Journal of Public Economics*, 37, 291-304.

Bayer, R., E. Renner and R. Sausgruber (2013), Confusion and learning in the voluntary contributions game, *Experimental Economics*, 16, 478-496.

Bloom, N., B. Eifert, A. Mahajan, D. McKenzie, J. Roberts (2013), Does management matter? Evidence from India, *Quarterly Journal of Economics*, Vol. 128(1), 1-51.

Bohner, G. and N. Dickel (2011), Attitudes and Attitude Change, *Annual Review of Psychology* 62, 391-417.

Boulou-Reshef, B., C. Holt and M. Thomas-Hunt (2014), Organization Style, Leadership Strategy and Free-Riding, working paper, University of Virginia.

Brandts, J. and D. Cooper (2007), It's What You Say, Not What You Pay: An Experimental Study of Manager-Employee Relationships in Overcoming Coordination Failure, *Journal of the European Economic Association* 5, 1223-1268.

Brandts, J, D. Cooper and R. Weber (forthcoming), Legitimacy, Communication and Leadership in the Turnaround Game, *Management Science*.

Bruhn, M. and B. Zia (2011), Stimulating Managerial Capital in Emerging Markets: The Impact of Business and Financial Literacy for Young Entrepreneurs, *World Bank Working Paper 5642*.

Bruhn, M., D. Karlan, and A. Schoar (2012), The Impact of Offering Consulting Services to Small and Medium Enterprises, *Mimeo World Bank*.

Chaudhuri, A., S. Graziano and P. Maitra (2006), Social Learning and Norms in a Public Goods Experiment with Inter-Generational Advice, *Review of Economic Studie*s, 73, 357-380.

Chetty, R. and E. Saez (2013), Teaching the tax code: Earnings responses to an experiment with EITC recipients, *American Economic Journal: Applied Economics* 5, 1-31.

Cialdini, R. B. and M. R. Trost (1998), Social influence: Social norms, conformity and compliance, in: Gilbert, D.l T. (Ed); Fiske, S. T. (Ed); Lindzey, G. (Ed), (1998). The handbook of social psychology, Vols. 1 and 2 (4th ed.) , (pp. 151-192). New York, NY, US: McGraw-Hill, x, 1085 pp.

Croson, R.T.A. (1996), Partners and strangers revisited, *Economics Letters*, Vol. 53, 25-32.

Dai, H., K.L. Milkman and J. Riis (forthcoming), The Fresh Start Effect: Temporal Landmark Motivate Aspirational Behavior, *Management Science*.

Davis, D and C. Holt (1994), *Experimental Economics*, Princeton University Press, Princeton, NJ.

Drexler, A., G. Fischer, and A. Schoar (2010), Financial Literacy Training and Rule of Thumbs: Evidence from a Field Experiment, MIT, *Working paper*.

Fischbacher, U. (2007), z-Tree: Zurich Toolbox for Ready-made Economic Experiments, *Experimental Economics*, 10(2), 171-178.

Fischbacher, U. and S. Gächter (2010), Social Preferences, Beliefs, and the Dynamics of Free Riding in Public Good Experiments, *American Economic Review*, Vol. 100, 541-556.

Fischbacher, U., S. Gächter and E. Fehr (2001), Are People Conditionally Cooperative? Evidence from a Public Goods Experiment, *Economics Letters*, 71(3), 397–404.

Gächter, S., D. Nosenzo, E. Renner and M. Sefton (2012), Who makes a good leader? Cooperativeness, optimism, and leading-by-example, *Economic Inquiry*, 49: 953-967.

Greiner, B. (2004), The Online Recruitment System ORSEE 2.0 – A Guide for the Organization of Experiments in Economics, University of Cologne, *Working Paper Series in Economics*, 10.

Güth, W., M. Levati, M. Sutter and E. van der Heijden (2007), Leading by example with and without exclusion power in voluntary contribution experiments, *Journal of Public Economics*, 91, 1023–1042.

Isaac, R. and J. Walker (1988), Communication And Free-Riding Behavior: The Voluntary Contribution Mechanism, *Economic Inquiry*, 26(4), 585-608.

Karlan, D. and M. Valdivia (2011), Teaching Entrepreneurship: Impact of Business Training on Microfinance Clients and Institutions, *Review of Economics and Statistics*, 93, no. 2, 510–527.

Karlan, D., R. Knight, and C. Udry (2012), Hoping to Win, Expected to Lose: Theory and Lessons on Microenterprise Development, *NBER working paper 18325*.

Koukoumelis, A., M. V. Levati, and J. Weisser (2012), Leading by words: A voluntary contribution experiment with one-way communication, *Journal of Economic Behavior and Organization*, 81(2), 379-390.

Ledyard, J. (1995), Public goods: A survey of experimental research, in: Kagel, J. and A. Roth (eds.), *The handbook of experimental economics*, Princeton University Press, Princeton, NJ.

Mackie, D.M., M.C. Gastardo-Conaco, and J.J. Skelly (1992), Knowledge of the advocated position and the processing of in-group and out-group persuasive messages, *Personality and Social Psychology Bulletin*, 18(2), 145-151.

McDonald, M. L. and J. D. Westphal (2003), Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance, *Administrative Science Quarterly*, 48, 1-32.

McGuire, W. J. (1985). Attitudes and attitude change. In *Handbook of Social Psychology*, ed. G. Lindzey, E. Aronson, 2:233-346. New York: Random House. 3rd ed.

Olson, J.M. and M.P. Zanna (1993), Attitudes and attitude change, *Annual Review of Psychology* 44, 117-54.

Petty, R.E. and D. T. Wegener (1998), Attitude change: multiple roles for persuasion variables. In *Handbook of Social Psychology*, ed. D. Gilbert, S.T. Fiske, G. Lindzey, pp 323-390. New York: McGraw-Hill.

Potters, J., M. Sefton and L. Vesterlund (2007). Leading-by-Example and Signaling in Voluntary Contribution Games: An Experimental Study, *Economic Theory*, Vol. 33, 169–82.

Rivas, M. F., and M. Sutter (2011), The benefits of voluntary leadership in experimental public goods games. *Economics Letters* 112: 176-178.

Tycocinski, O., E.T. Higgins and S. Chaiken (1994), Message framing, self-discrepancies, and yielding to persuasive messages: the motivational significance of psychological situations. *Pers. Soc. Psychol. Bull.* 20: 107-115.

Wood, W. (2000), Attitude change: Persuasion and Social Influence. *Annual Review of Psychology* 51: 539-570.

**FIGURES**

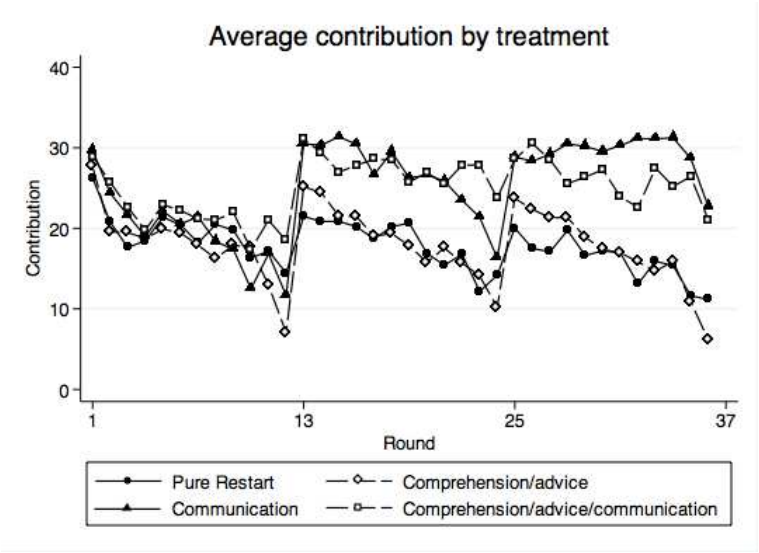



***Figure 1****: Average contributions in control treatment PR and treatment CA, C, and CAC (round 1 through 36).*

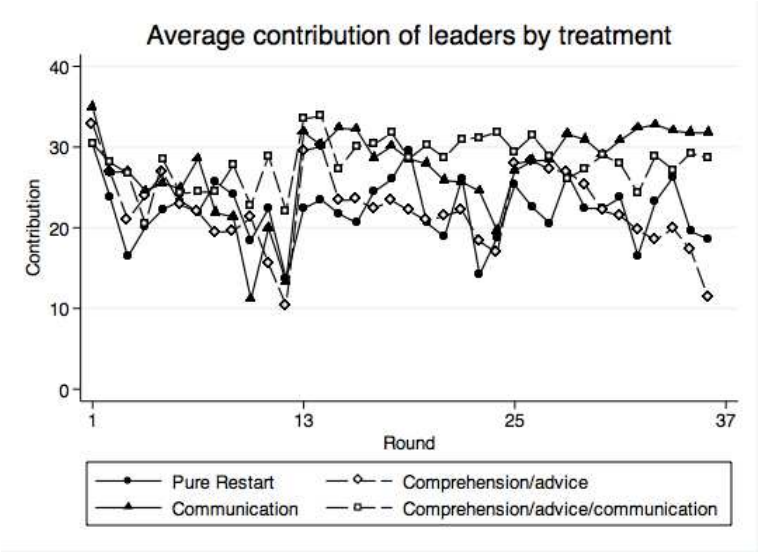



***Figure 2****: Average contributions of leaders in control treatment PR and treatment CA, C, and CAC (round 1 through 36).*

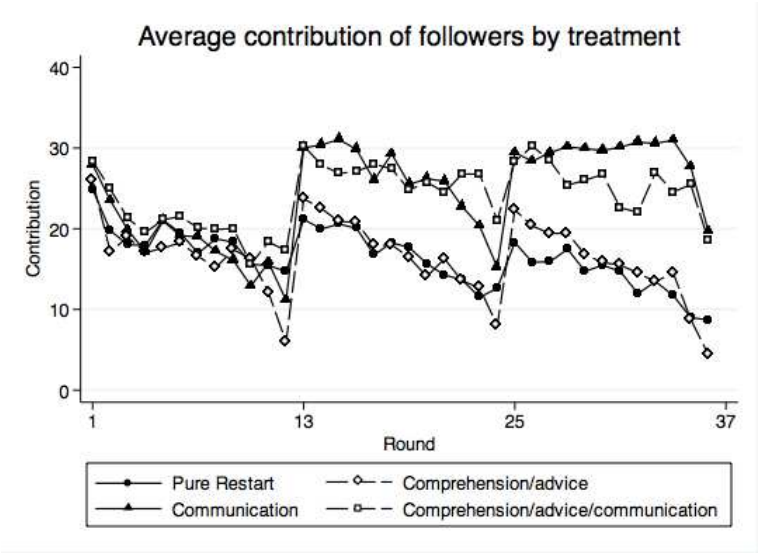



***Figure 3**: Average contributions of followers in control treatment PR and treatment CA, C, and CAC (round 1 through 36).*

## TABLES

| Treatment | Characteristics | Intervention | Repetitions | Observations |
|---|---|---|---|---|
| *(Control) Treatment PR* | Restart | Before parts 2 and 3 | 36 rounds | 15 groups |
| *Treatment CA* | Restart & Comprehension and advice text | Before parts 2 and 3 | 36 rounds | 13 groups |
| *Treatment C* | Restart & One-way free form communication from leader to followers | Before parts 2 and 3 | 36 rounds | 12 groups |
| *Treatment CAC* | Restart & Comprehension and advice text and subsequently one-way free form communication from leader to followers | Before parts 2 and 3 | 36 rounds | 12 groups |

***Table 1**: Overview over treatments.*

| | | Group | | Leaders | | Followers | |
|---|---|---|---|---|---|---|---|
| **Average contributions** | **N** | **Mean** | **(sd)** | **mean** | **(sd)** | **mean** | **(sd)** |
| *Treatment PR* | | | | | | | |
| Part 1 (round 1-12) | 15 | 19.28 | (7.442) | 21.86 | (9.557) | 18.41 | (7.334) |
| Part 2 (round 13-24) | 15 | 18.20 | (7.588) | 22.24 | (9.443) | 16.85 | (7.847) |
| Part 3 (round 25-36) | 15 | 16.03 | (9.769) | 22.31 | (10.47) | 13.94 | (10.03) |
| *Treatment CA* | | | | | | | |
| Part 1 (round 1-12) | 13 | 17.86 | (7.086) | 21.86 | (7.321) | 16.53 | (7.106) |
| Part 2 (round 13-24) | 13 | 18.51 | (9.675) | 22.83 | (9.919) | 17.07 | (9.886) |
| Part 3 (round 25-36) | 13 | 17.12 | (10.97) | 22.15 | (11.78) | 15.44 | (11.48) |
| *Treatment C* | | | | | | | |
| Part 1 (round 1-12) | 12 | 19.62 | (6.068) | 23.32 | (6.770) | 18.39 | (6.414) |
| Part 2 (round 13-24) | 12 | 26.56 | (8.364) | 28.10 | (9.810) | 26.04 | (8.108) |
| Part 3 (round 25-36) | 12 | 29.31 | (10.32) | 30.56 | (11.01) | 28.89 | (10.24) |
| *Treatment CAC* | | | | | | | |
| Part 1 (round 1-12) | 12 | 21.93 | (6.714) | 25.73 | (7.316) | 20.67 | (7.642) |
| Part 2 (round 13-24) | 12 | 27.50 | (9.725) | 30.69 | (9.814) | 26.44 | (10.68) |
| Part 3 (round 25-36) | 12 | 26.13 | (12.16) | 28.18 | (11.40) | 25.44 | (12.84) |

Group contributions are the average over the contribution of all four member of a group in the twelve corresponding rounds. For leaders, the part contributions are calculated taking the average over the contributions in the twelve rounds of a part on the individual level. For followers, the average part contributions are calculated over the average of the three group followers in the twelve rounds of a part.

***Table 2**: Descriptive statistics of contributions by treatment and on the group, leader and follower level.*

| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |
|---|---|---|---|---|---|---|---|---|
| | Dependent variable: Contribution | | | | | | | |
| VARIABLES | (Part 1) | (Part 1) | (Part 2) | (Part 2) | (Part 3) | (Part 3) | (Part 1-3) | (Part 1-3) |
| Part round (1-12) | -0.882*** | -0.594*** | -0.848*** | -0.754*** | -0.679*** | -0.673** | | |
| | (0.137) | (0.220) | (0.167) | (0.251) | (0.148) | (0.261) | | |
| Round (1-36) | | | | | | | -0.803*** | -0.803*** |
| | | | | | | | (0.101) | (0.101) |
| Part 2 | | | | | | | 12.37*** | 8.557*** |
| | | | | | | | (1.721) | (2.018) |
| Part 3 | | | | | | | 21.35*** | 16.03*** |
| | | | | | | | (3.005) | (3.985) |
| Comprehension/advice | -1.413 | 1.924 | 0.311 | 2.886 | 1.086 | 5.288 | -0.00513 | -1.413 |
| | (2.676) | (2.604) | (3.233) | (4.385) | (3.846) | (5.146) | (2.675) | (2.676) |
| Communication | 0.345 | 4.405 | 8.358*** | 10.68** | 13.28*** | 9.895** | 7.328*** | 0.345 |
| | (2.529) | (2.743) | (3.020) | (4.282) | (3.793) | (4.923) | (2.390) | (2.528) |
| Comp./advice/communication | 2.658 | 3.107 | 9.305*** | 6.849* | 10.10** | 9.089* | 7.353** | 2.658 |
| | (2.653) | (2.858) | (3.323) | (3.827) | (4.197) | (4.807) | (2.910) | (2.653) |
| (CA)*(Part round) | | -0.513 | | -0.396 | | -0.646* | | |
| | | (0.335) | | (0.380) | | (0.368) | | |
| (C)*(Part round) | | -0.625** | | -0.357 | | 0.521* | | |
| | | (0.299) | | (0.534) | | (0.308) | | |
| (CAC)*(Part round) | | -0.0691 | | 0.378 | | 0.155 | | |
| | | (0.426) | | (0.368) | | (0.449) | | |
| (CA)*(Part 2) | | | | | | | | 1.723 |
| | | | | | | | | (2.801) |
| (CA)*(Part 3) | | | | | | | | 2.499 |
| | | | | | | | | (4.196) |
| (C)*(Part 2) | | | | | | | | 8.013** |
| | | | | | | | | (3.007) |
| (C)*(Part 3) | | | | | | | | 12.94*** |
| | | | | | | | | (4.382) |
| (CAC)*(Part 2) | | | | | | | | 6.647** |
| | | | | | | | | (2.741) |
| (CAC)*(Part 3) | | | | | | | | 7.440* |
| | | | | | | | | (3.936) |
| Leader | 4.631*** | 4.631*** | 4.453*** | 4.453*** | 5.107*** | 5.107*** | 4.730*** | 4.730*** |
| | (0.804) | (0.805) | (0.928) | (0.929) | (0.960) | (0.961) | (0.768) | (0.768) |
| Constant | 23.85*** | 21.98*** | 22.60*** | 21.99*** | 19.17*** | 19.13*** | 20.27*** | 23.31*** |
| | (1.952) | (2.047) | (2.336) | (2.929) | (2.809) | (3.507) | (1.932) | (1.935) |
| Observations | 2,496 | 2,496 | 2,496 | 2,496 | 2,496 | 2,496 | 7,488 | 7,488 |
| R-squared | 0.073 | 0.077 | 0.129 | 0.134 | 0.157 | 0.165 | 0.110 | 0.128 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Pooled OLS (clustering for group), observations from rounds 1-12 (regression models 1a and 1b), rounds 13-24 (regression models 2a and 2b), rounds 25-36 (regression models 3a and 3b), rounds 1-36 (regression models 4a and 4b)

Dependent variable (contribution) takes values between 0 and 40.

***Table 3**: Pooled OLS regression (Data: treatments PR, CA, C, and CAC).*

| | Round 13 | | Round 25 | |
|---|---|---|---|---|
| | *Treatment C* | *Treatment CAC* | *Treatment C* | *Treatment CAC* |
| **Summary statistics** | | | | |
| Time for message (in sec.) | 303.1 | 264.2 | 220.8 | 192.8 |
| Number of words | 72.6 | 55.1 | 79.4 | 72.5 |
| **Content of comprehension/advice message** | | | | |
| Observation of decline (0=no, 1=yes) | **25.0%** | **9.1%** | 41.7% | 25.0% |
| Observation of followers undercutting (0=no, 1=yes) | 25.0% | 18.2% | 41.7% | 50.0% |
| Undercutting reasons (e.g. selfishness) (0=no, 1=yes) | 16.7% | 18.2% | **50.0%** | **8.3%** |
| Consequences (Future repercussions of actions) (0=no, 1=yes) | 16.7% | 18.2% | 33.3% | 33.3% |
| Conformity (0=no, 1=yes) | 58.3% | 72.7% | 66.7% | 75.0% |
| **Payoff-related arguments** | | | | |
| Suggestion (0=no, 1=yes) | 83.3% | 90.9% | 66.7% | 83.3% |
| Efficient suggestion (0=no, 1=yes) | 41.7% | 36.4% | 33.3% | 33.3% |
| Payoff calculation (0=no, 1=yes) | 41.7% | 36.4% | 25.0% | 41.7% |
| Group payoff maximization (0=no, 1=yes) | 66.7% | 72.7% | 50.0% | 66.7% |
| Satisfaction (e.g. benefit for each) (0=no, 1=yes) | 75.0% | 81.8% | 66.7% | 66.7% |
| Strategy (the entries present the number of times a strategy was mentioned for each treatment) | **3 tit-for-tat, 2 grim trigger, 1 random** | **2 tit-for-tat** | 1 tit-for-tat, 1 two-tit-for-tat, 2 grim trigger | 2 tit-for-tat, 1 grim trigger, 1 random |
| **Social preference. emotions, and willingness to contribute** | | | | |
| Fairness (0=no, 1=yes) | **50.0%** | **18.2%** | **58.3%** | **25.0%** |
| Team spirit (0=no, 1=yes) | 33.3% | 27.3% | **25.0%** | **50.0%** |
| Notification of low contributors (0=no, 1=yes) | **33.3%** | **18.2%** | 50.0% | 58.3% |
| Praise (0=no, 1=yes) | 0.0% | 0.0% | **50.0%** | **16.7%** |
| Complaint (0=no, 1=yes) | **25.0%** | **9.1%** | 33.3% | 25.0% |
| Mood (-1=bad, 0=neutral, 1=good) | **0.33** | **0.18** | **0.33** | **0.17** |
| Leave contribution decision to followers (0=no, 1=yes) | **16.7%** | **0.0%** | **25.0%** | **0.0%** |
| Promise (0=no, 1=yes) | 25.0% | 18.2% | 25.0% | 16.7% |
| Willingness to contribute more than followers (0=no, 1=yes) | **25.0%** | **0.0%** | **16.7%** | **0.0%** |
| **Other** | | | | |
| Labor notion (0=no, 1=yes) | 33.3% | 36.4% | **16.7%** | **41.7%** |
| Strange/nonsense (0=no, 1=yes) | **25.0%** | **9.1%** | **8.3%** | **25.0%** |

*Notes.* The number of analyzed text messages in round 13 in treatment CAC is 11 (due to technical problems, the message of one leader was not saved). In all other cases, 12 text messages were analyzed, respectively. The bold value pairs show a considerable difference in communication between the two treatments (circa 50% or more).

***Table 4**: Average of coded values for each summary statistic and communication category in treatments C and CAC in rounds 13 and 25.*

## APPENDIX

## Instructions

### *A.1. Instructions at the beginning of the experiment*

**General information**

Thank you for coming to the experiment. You will receive 5 Euro for the participation in the experiment. You will be assigned to a group and depending on your and your group members' decisions you can earn additional money during the experiment. It is important that you do not talk to any of the other participants until the experiment is over. You can ask questions at any time. If you have a question, please raise your hand and one of us will come to your place to answer.

**Role and group matching**

You will be randomly assigned to one of two roles: (1) director or (2) employee. This role will be the same throughout the entire experiment.
Participants will be randomly split in groups with 4 members, each composed by 1 director and 3 employees. At no time during the experiment you will know whom you are matched with and your decisions will be anonymous.

**Task and stages of each of the 36 rounds**

There will be 36 separate rounds. In each round, each group works on a joint project whose payoff will depend on the hours dedicated by all group members. In each round, every participant has an endowment of 40 hours and decides how many of the 40 hours to dedicate to the project. The remaining hours will be automatically dedicated to a private activity.

Each round is independent from the others and develops in the following way:

Stage 1:
Directors: The director of each group decides how many of the 40 hours to dedicate to the project. The rest will be automatically dedicated to the private activity. There will be a simulation area on the lower part of the screen where directors can calculate earnings choosing different hours dedicated to the project by themselves and by the other group members on average (see "Decision screen director"). The calculations are absolutely private. In the upper part of the screen, directors enter the hours that they want to dedicate to the project in the corresponding round.
Employees: The employees do not have anything to do in this stage and wait until the director of their group have taken a decision.

Stage 2:
Directors: The directors do not have anything to do in this stage and wait until the employees of their group have taken a decision.
Employees: The employees of each group are informed about the hours that the director of their group decided to dedicate to the project and decide how many of their own 40 hours to dedicate to the project. The rest will be automatically dedicated to the private activity. There will be a simulation area on the lower part of the screen where employees can calculate earnings choosing different hours dedicated to the project by themselves and by the other group members on average (see "Decision screen employee"). The calculations are absolutely private. In the upper part of the screen, employees enter the hours that they want to dedicate to the project in the corresponding round.

Stage 3:
Directors and employees: All participants are informed about the average hours dedicated to the project by the other group members, the sum of hours dedicated to the project by all group members and about their own earnings. Summaries of previous rounds will also be listed.

After stage 3, a new round starts which develops in the same way.

**Additional information**

The experiment is split in 3 parts and each part consists of 12 rounds. The specific instructions for each part will be shown on the screen before the corresponding part starts.

**Payoff**

Your earnings in Experimental Currency Units (ECU) for each round are given by the following function, which is the same for directors and employees:

$$Earnings_{Round} = \underbrace{\left(40 - Hours_{Project}\right)}_{\text{Earnings from private activity}} + \underbrace{0.5 \cdot \sum_{Group} Hours_{Project}}_{\text{Earnings from joint project}}$$

The earnings in ECU are composed by the earnings from the *hours* dedicated to the *private activity* by that person and the earnings from the *sum of hours* dedicated by *all group members* to the *joint project*. That means that each hour that you decide to dedicate to the project gives *each* of the group members (i.e. you and all other group members) an earning of 0.5 ECU. Analogously, each hour that another group member decides to dedicate to the project gives *each* of the group members (i.e. you and all other group members) an earning of 0.5 ECU. Each hour that you decide *not* to dedicate to the project (i.e. to dedicate to the private activity) gives you and only you an earning of 1 ECU.

150 ECU are worth 1.00 Euro. At the end of the session you will receive 5 Euro plus the sum of what you will have earned in all 36 rounds of the experiment. After the experiment finishes we will pay you the earnings in private.

**Example and test question**

So that everyone understands how decisions translate into earnings we provide an example and a test question. (The number of hours used for the example and test are simply for illustrative purposes. In the experiment the allocations will depend on the actual decisions of the participants.)

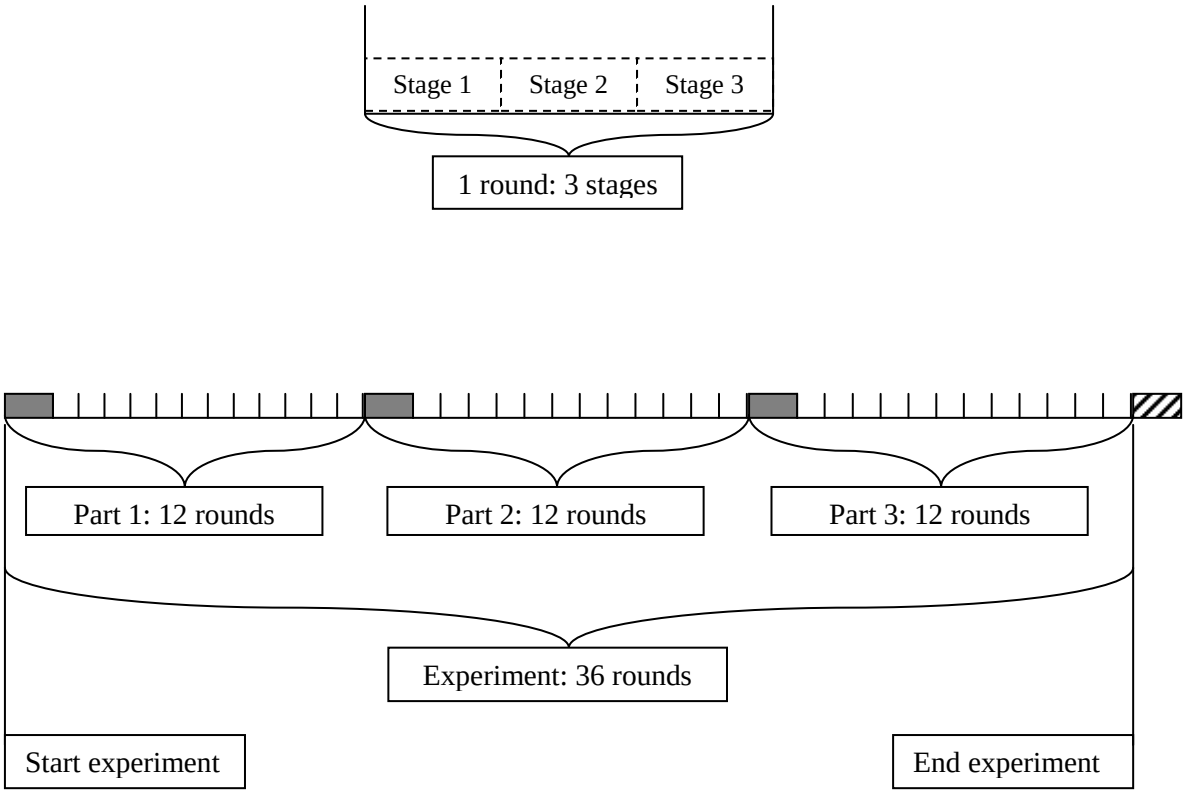
Example: Suppose that you decide to dedicate 31 hours to the project and the other group members decide to dedicate on average 33 hours to the project in one of the 36 rounds.

The sum of hours dedicated to the project by all group members is:
31 + 3*33 = 31 + 99 = 130 (hours)
Your earnings in that round are:
(40 – 31) + 0.5*130 = 9 + 65 = 74 (ECU)

Test: Suppose that you decide to dedicate 28 hours to the project and the other group members decide to dedicate on average 24 hours to the project in another of the 36 rounds.

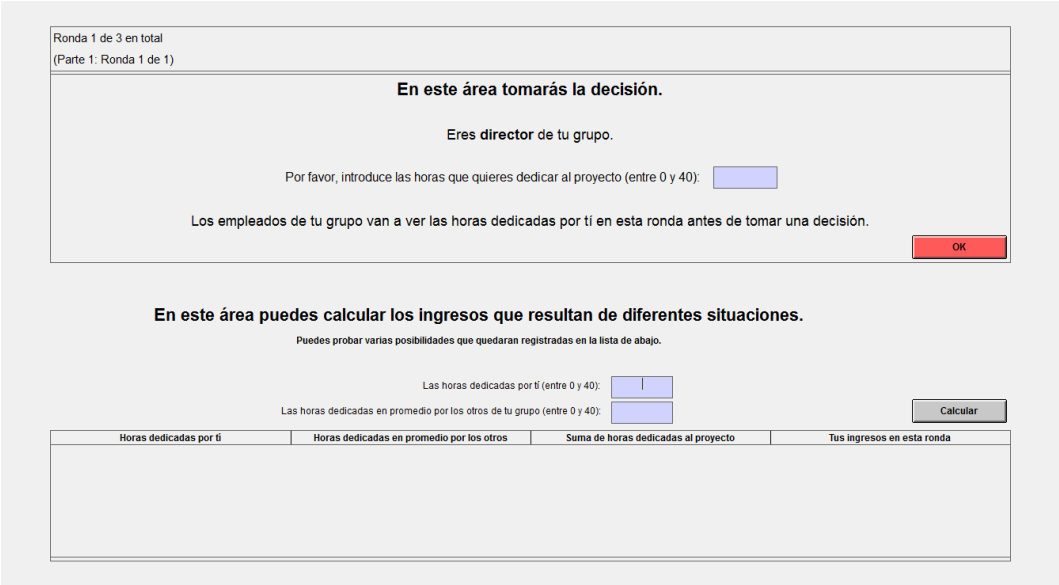
The sum of hours dedicated to the project by all group members is:
_____
Your earnings in that round are:
_____

**Graphical representation of the chronological order of the experiment**



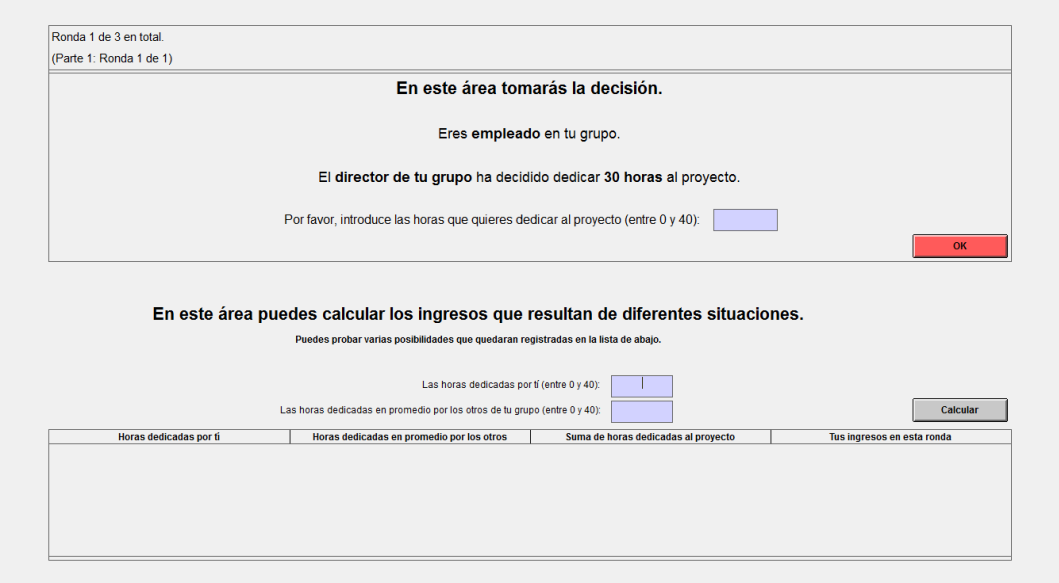
## Screenshots

Decision screen director

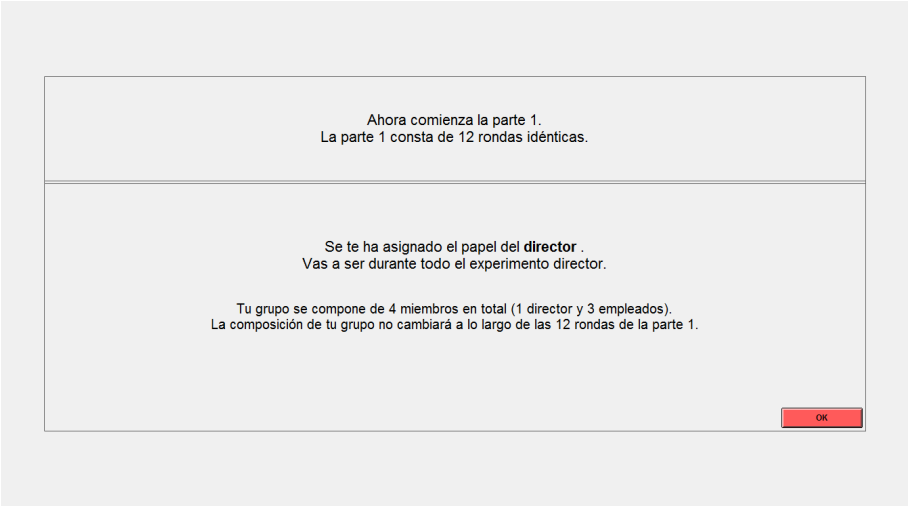


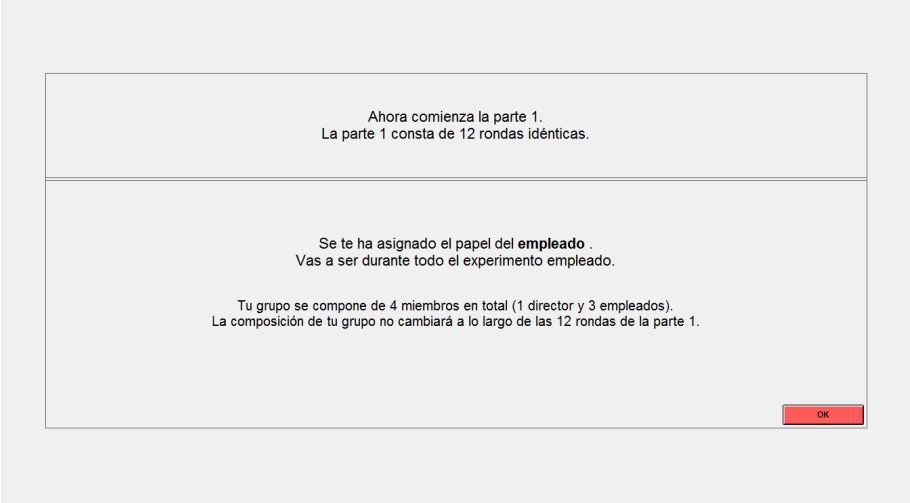

Decision screen employee

(The number of hours used for the example and test are simply for illustrative purposes. In the experiment the allocations will depend on the actual decisions of the participants.)

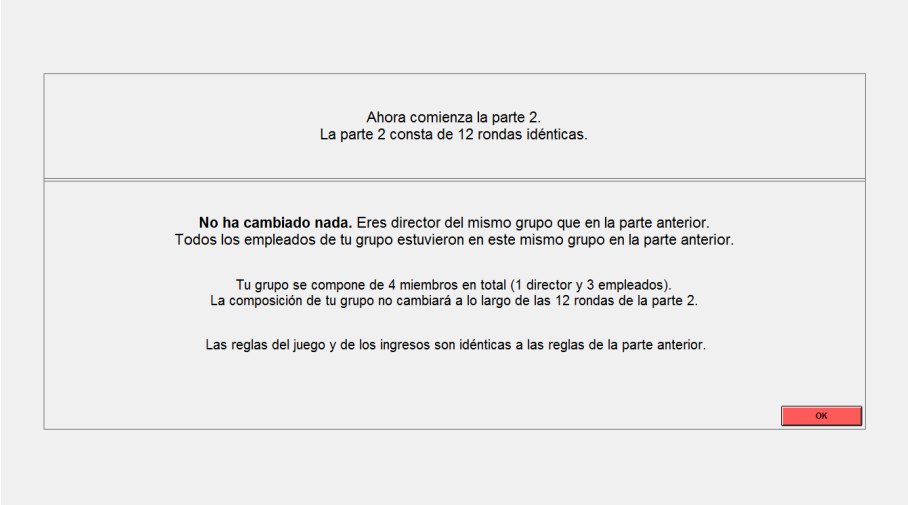


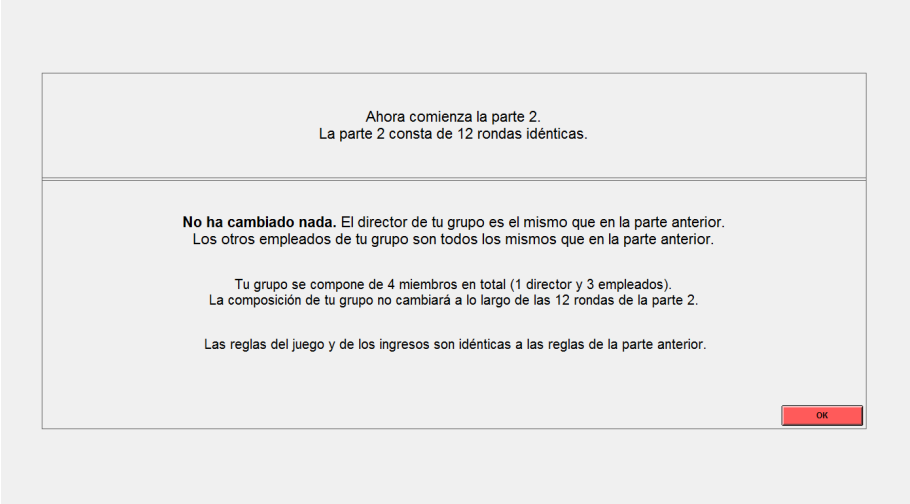
## *A.2. Instructions at the beginning of part 1 (all four treatments R, CA, C, and CAC)*



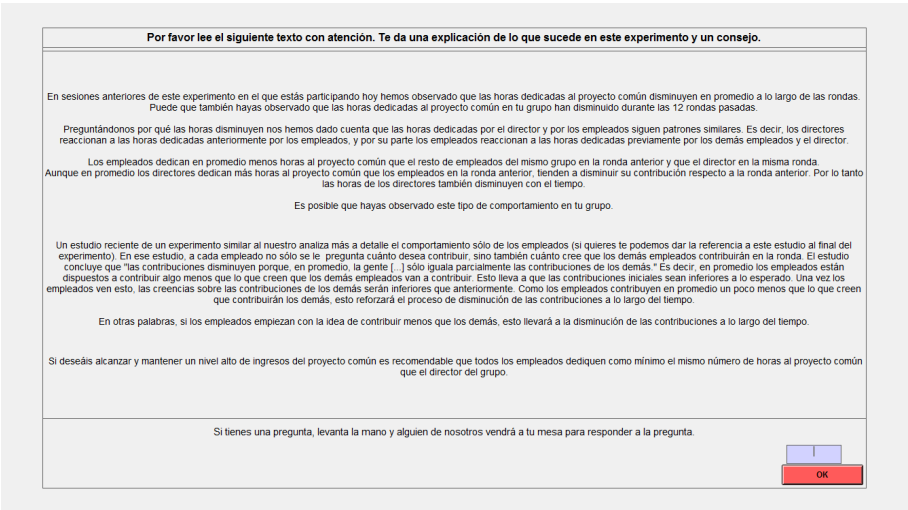

## *A.3. Instructions at the beginning of part 2 (treatments R, CA, C, and CAC)*






## ***A.4. Additional instructions at the beginning of part 2 and part 3 (treatment CA and CAC)***

Text at the beginning of part 2




Please read the following text carefully. It gives you some explanation about the game that you are playing in this experiment and some advice.

We observed in previous sessions of this experiment in which you are participating today that the hours dedicated to the common project decrease on average over rounds in this part. You also might have observed that the hours dedicated to the common project in your group decreased over the previous 12 rounds.

We were wondering why contributions decrease and realized that the director's and the workers' hours dedicated to the common project follow similar patterns. That means that directors react to the workers' previous contributions and workers on their turn react to the other workers' and the director's previous contributions.
Workers contribute on average fewer hours to the common project than the other workers of the same group in the previous round and less hours than the director in the same round.

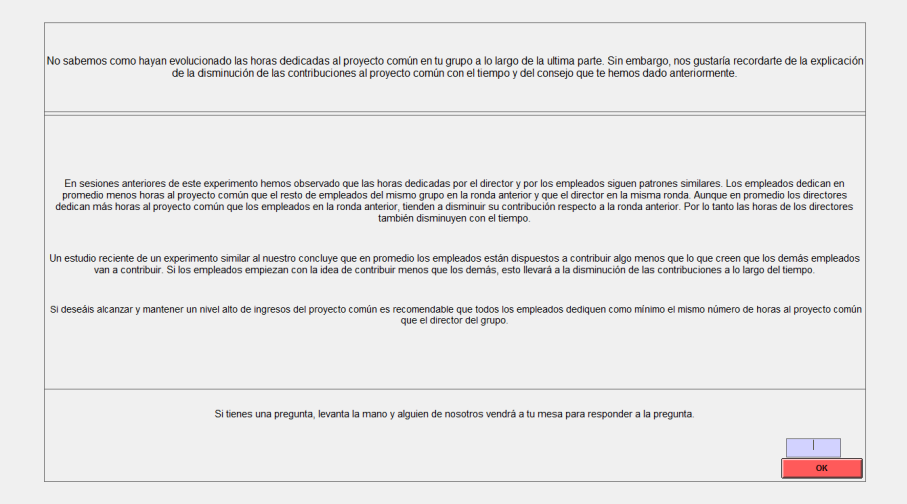
Even though the directors dedicate on average more hours to the common project than the workers in the previous round, they also tend to decrease their contributions compared to the previous round. Therefore, the hours of the directors also decrease over time.
You might have observed this contribution behavior in your group.

A recent study of an experiment similar to ours analyzes more in detail the behavior of the workers only in the experiment (if you want, we can provide you with the reference of the study at the end of the experiment). In that study, the workers are not only asked about how much to contribute, but also about what they believe the other workers will contribute. The study concludes, that "contributions decline because, on average, people […] match others' contributions only partly." That means that, on average, the workers are willing to contribute slightly less than what they believe the other workers will contribute. This leads to contributions being initially lower than expected. Once workers see this the beliefs about the others' contributions will be lower than before. Since the workers contribute on average slightly less than what they believe that the others contribute, this reinforces the process by which average contributions decrease over rounds.
In other words, if the workers start with the idea of undercutting others then others will follow and the contributions to the common project will fall over time.

If you wish to reach and maintain a high earnings level from the common project it is recommendable that all workers dedicate at least the same number of hours to the common project as the director of the group does.

If you have a question, raise your hand and someone of us will come to your place to answer the question.

<u>Text at the beginning of part 3</u>




We do not know how hours dedicated to the common project evolved in your group over the previous part. However, we would like to remind you of the explanation for the decline of contributions to the common project over time and the advice that we gave you previously:

We observed in previous sessions of this experiment that the director's and the workers' hours dedicated to the common project follow similar patterns. Workers contribute on average fewer hours to the common project than the other workers of the same group in the previous round and less hours than the director in the same round. Even though the directors dedicate

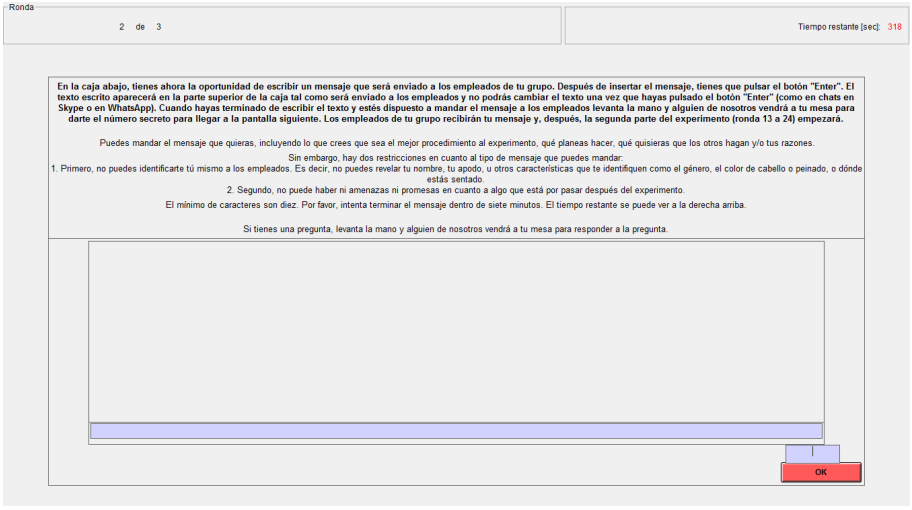
on average more hours to the common project than the workers in the previous round, they also tend to decrease their contributions compared to the previous round. Therefore, the hours of the directors also decrease over time.

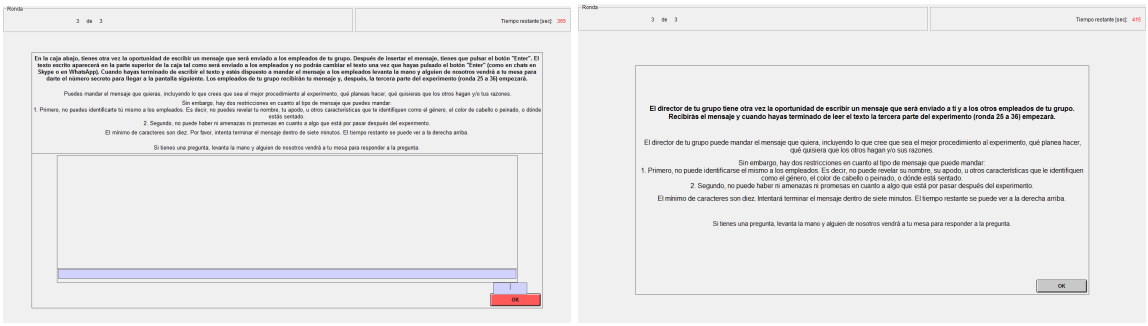
A recent study of an experiment similar to ours concludes that, on average, workers are willing to contribute slightly less than what they believe the other workers will contribute. If the workers start with the idea of undercutting others, this will lead to the decrease of contributions over time.

If you wish to reach and maintain a high earnings level from the common project it is recommendable that all workers dedicate at least the same number of hours to the common project as the director of the group does.

If you have a question, raise your hand and someone of us will come to your table to answer the question.

## ***A.5. Additional instructions at the beginning of part 2 and part 3 (treatment C and CAC after having received the comprehension and advice text)***



In the box on their screen, the directors have *now/again* the opportunity to write a message, which will be sent to the employees of their group. After entering the message, you - the director - need to press the Enter key. The written text will appear in the upper part of the box the way it will be sent to the employees and you won't be able to change the entered text once you press the Enter key (just like in chats in Skype or WhatsApp). When you have finished writing the text and are ready to send the message to the employees you may raise your hand and one of us will come to your table to give you the code to get to the next screen.[28] The employees will receive the message of the director of their group and, after that, the *second/third* part of the experiment (rounds *13/25* through *24/36*) will start.

You – the director - are free to send the message you like, including what you think is the best approach to the experiment, what you plan to do, and/or what you would like the others to do and/or why. However, there are two restrictions on the kind of messages that you can send:

1. First, you are not allowed to identify yourself to the others. Thus, you cannot reveal your real name, nicknames, or any other identifying feature such as gender, hair, or where you are seated.
2. Second, there must be neither threats nor promises pertaining to anything that is to occur after the experiment.

The minimum entry of characters is 10. Please, try to finish your message within seven minutes. The remaining time in seconds is shown on the upper right corner of the screen.

If you have a question, raise your hand and someone of us will come to your table to answer the question.

**Coding of communication**

***A.6. Description of coding categories***

The first five coding categories capture the content of the comprehension/advice message in treatment CA (and CAC). The intention is to see whether leaders mention an observed decline in previous contributions, whether they observed followers undercutting in general, whether they mention one or more possible explanation(s) such as selfishness and consequences of such an undercutting behavior, i.e. others may follow the example. Finally, we code a request

[28] A reviewer remarks that by rasing their hands leaders more or less had to identify themselves and that this could have affected behavior. Even though it may not be known which leader belongs to which group, this may have an effect. However, most often participants raised their hand in a rather unconspicouos way. We did not get the impression that subjects paid any attention to this, so that we are quite sure it had no effect. We did this to avoid unnecessary delays in the sessions which were already quite long.

for conformity, i.e. the leader's emphasis on the need that all group members conform to the leader's contribution.

The next six categories involve payoff-related arguments. In particular, they include the leader's suggestion (point or interval) of how much to contribute to the project; the suggestion, implicit or explicit, must be unambiguous. We code whether an implicit or explicit suggestion is that everybody in the group (including the leader) contributes the whole endowment. Furthermore, coding categories enclose whether the leader makes explicit payoff calculations associated with the proposal, whether he argues explicitly that the suggested amount maximizes the group payoff, or conjectures that participants are interested in maximizing the group payoff, as well as whether the leader mentions explicitly that the followers benefit from following his suggestion. Finally, the last category in the payoff-related group captures whether the leader announces punishment in reaction to followers defecting the suggested contribution level. The four mentioned punishment strategies were tit-for-tat, two-tit-for-tat, grim trigger, and random/reducing contribution if a follower defected.

The third group of coding categories encompasses social preferences, emotional expression, and own contribution behavior. With fairness, we refer to an explicit or implicit reference to fairness or just behavior, which also includes an explicit rejection of some group member contributing less than the others. Team spirit refers to a statement promoting the willingness to cooperate as part of a team or emphasizing the importance of cooperation in the group. Closely related is the notification of low contributors, implicit or explicit, of those who contributed less than suggested or who started decreasing their contributions. Here, leaders point to a particular group member undercutting the others' contributions (e.g. a statement like "there must be a group member undercutting the others' contributions"). Group leaders may conjecture this if for instance the average followers' contributions are 80 ECU (= 40 ECU + 40 ECU + 0 ECU as one option). Note that in the category "Observation of followers undercutting," the leader refers to the followers as a whole. We furthermore code whether the leader praises or complains about observed contributions. The mood of the communication is (mostly) independent from the leader's praise or complaint and gives an overall impression of bad, neutral, or positive vibes, which includes the use of "smileys," or other forms of creating a good or bad atmosphere. Furthermore, we code whether the leader leaves the contribution decision explicitly to the followers, promises to contribute some specific amount, or expresses the willingness to contribute more than the followers do.

The last group includes two coding categories. We code whether the leader uses the labor notion from the instructions, e.g. "director," "workers," or "firm," and whether the communication content is to some extent strange, wrong or does not make sense. The number of analyzed text messages in round 13 in treatment CAC is 11 (due to technical problems, the message of one leader was not saved). In all other cases 12 text messages were analyzed, respectively. We also coded whether the form of the text message is informal, neutral or formal (not reported in the table), but do not find significant differences.