Robustness of conditional cooperation in public goods experiments[*]

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Abstract: The existence of conditional cooperation has been identified as one of the important reasons of why people contribute positive amounts in linear public goods games. We present two experimental tests that analyze the robustness and stability of conditional cooperation. Both show that previous results are highly robust against changes of the experimental setup and the elicitation method. The claim that conditional cooperation is a widespread behavioral regularity in public goods games appears to be consistent with the evidence.

JEL classification: C72, C91, H41

Keywords: conditional cooperation, public goods, experiment

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[*] I would like to thank Simon Gächter, Elke Renner, Matthias Sutter and participants at the Economic Science Association Meeting in Amsterdam as well as research seminar participants in Innsbruck and Jena for many suggestions and comments on the paper. Julius Pahlke, Sabine Strauss and Verena Waldner were extremely helpful in conducting the experiment. Financial support by the Center for Experimental Economics at the University of Innsbruck (sponsored by the *Raiffeisen-Landesbank Tirol*) is gratefully acknowledged.

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1 Introduction

There are several possible explanations of why people cooperate much more in social dilemmas such as the prisoners' dilemma or the provision of public goods than predicted by the Nash equilibrium under the assumption of rationality and selfishness. Conditional cooperation – defined as a positive correlation between the willingness to contribute to a public good with the (expected) contribution of others – has long been among them.[1] Recently, the argument that conditional cooperation is one of the most important driving forces that are able to organize behavioral observations in the voluntary contribution mechanism has gained considerable momentum in economics (Gächter, 2007).

A conditional cooperation motive is, however, not easy to distinguish from other contribution motives when using field data.[2] Unfortunately, standard public goods games in laboratory experiments suffer from a similar problem, although contribution motives can be inferred from behavior at least to a certain extent (e.g., Keser and van Winden, 2000; Brandts and Schram, 2001; Croson, 2002; Gunnthorsdottir et al., 2006, among many others). In order to be able to directly assess contribution motives and to specifically target the prevalence of conditional cooperation Ockenfels (1999) and Fischbacher et al. (2001) developed similar experimental methods. While the amount of evidence on the existence and importance of

[1] The conditional cooperation argument can be traced back to Buchanan (1967) and has been formalized by Cornes and Sandler (1984). It has also been discussed in the psychological literature (e.g., Kelley and Stahelski, 1970).

[2] A notable exception is Frey and Meier (2004). They test for conditional cooperation and the effects of social comparison in a field experiment on charitable giving. Other recent field experiments with a similar idea are Heldt (2005), Shang and Croson (2005) as well as Alpizar et al. (2007).

conditional cooperation based on such explicit tests is mounting, there are almost no results on the stability, robustness and persistence of conditional cooperation.

Exceptions to a certain extent are Herrmann and Thöni (2008) and Kocher et al. (2008), who both study possible cross-cultural differences in conditional cooperation, as well as Muller et al., (2008), who investigate robustness of strategies in a cooperation game. The current paper adds to these studies by analyzing robustness aspects of the experimental protocol that lately has been used most frequently to elicit conditional cooperative preferences.

This protocol applies an incentive-compatible mechanism whose details will be described in the following section. The mechanism involves asking experimental participants to indicate how much they are willing to contribute to the provision of a public good for each possible average contribution of the other group members. However, one obvious and, therefore, often raised concern with such a procedure is that if somebody is asked to condition one's contribution on others' contributions, she will actually do so. In other words, the protocol involves a possible experimenter demand effect towards conditional cooperative preferences and away from the dominant selfish strategy.

We test whether such an experimenter demand effect actually exists by running two separate experiments as robustness tests. Whereas the first introduces a small change to the standard experimental environment used in all related papers so far, the second puts the existing results to a stronger test (at the cost of slightly changing the nature of the game, however). Both experiments show that the existing findings on conditional cooperation are very robust to the implemented changes even on a quantitative basis of comparison.

The remainder of the paper is laid out as follows: Section 2 describes the first experiment and presents its results. In Section 3, our second experiment is laid out in greater detail, and Section 4 discusses our results and concludes briefly.

2 Experiment One: Order of presentation

Our first experiment introduces a simple variation of the experimental setup for testing conditional cooperative motives. It is able to examine to what extent subjects in the laboratory could be influenced by one important aspect of the presentational frame when their cooperation preferences are elicited.

2.1 Experimental Design

Our experimental design uses the standard social dilemma in public good provision with the following linear technology:

$$\pi_i = 20 - g_i + 0.4\sum_{j=1}^{4} g_j \ . \tag{1}$$

where g_i denotes the contribution of subject i to the public good and g_j denotes the contributions to the group account. As can be discerned from equation (1), participants received an endowment of 20 tokens, groups consisted of 4 subjects, and the marginal per capita return (MPCR) from the public good was 0.4. The endowment could be spent on an alternative X, which was described to the subjects as a group account in the experimental instructions[3], or an alternative Y, which was described as a private account. Subjects were required to allocate the whole endowment.

Assuming that participants are selfish payoff maximizers, any MPCR < 1 yields a dominant strategy for every group member to free ride, i.e. to contribute nothing to the group

[3] The instructions that we used were very similar to those by Fischbacher et al. (2001). They can be downloaded at [URL will be announced].

account. From a social or efficiency perspective, it is optimal to contribute the whole endowment because MPCR•*n* > 1, where *n* denotes the number of group members.

The procedure we used closely followed the one in Fischbacher et al. (2001) and subsequent papers. First, each subject had to indicate an integer unconditional contribution to the public good $g_i \in [0,20]$. Then, without knowing anything about the decisions of group-mates, subjects are asked to insert 21 potential conditional contributions to the public good (one for each average group contribution level rounded to integer numbers), which corresponds to a contribution vector with 21 elements. Subjects were instructed that this does not imply that they have to insert 21 *different* contributions, i.e. more than one element of the contribution vector can take on the same value. This elicitation of choices is closely related to the strategy vector method.

Whereas in all papers that we are aware of the input fields for the 21 conditional contributions are presented in an ascending order ("How much would you contribute if the average contribution of the other group members were 0, 1, 2,…?"), we simply reversed the order ("How much would you contribute if the average contribution of the other group members were 20, 19, 18,…?"). The two treatments are referred to as STANDARD and REVERSE, respectively.

In order to make all decisions incentive-compatible, in each group, first, the average contributions of three randomly selected unconditional contributors were determined. Then, the corresponding conditional contribution of the fourth group member was added to calculate the sum of contributions and per-round payoffs. The somewhat complicated payoff determination procedure was made clear to subjects in great detail. We also used some examples (that did not include any focal points) in order to ensure that subjects fully understood how payoffs were determined and which consequences their choices had.

Participants of the experiment were randomly assigned subject numbers and seated in cubicles which separated subjects from each other. They got written instructions that were read aloud by the experimenter. The instructions were phrased in neutral terms and contained screenshots and an extensive description of every step of the game. After reading the instructions aloud, remaining questions were answered privately. Participants knew the exchange rate of tokens into euro, and we told them that there would be no repetitions and that their decisions as well as their final payment would remain confidential.

The experiment was run computerized (using z-Tree by Fischbacher, 2007) and lasted about 45 minutes per session, including a post-experimental questionnaire on individual socio-economic variables and one-at-a-time, private payment. In total, we had 48 student participants in two sessions. The exchange rate was set at 0.30 € for 1 token. The average payoff amounted to 7.50 € per subject (not including a show-up fee of 4.00 €).

2.2 Experimental Results

The unconditional contribution to the public good is, on average, 6.8 tokens in the STANDARD treatment, and 8.7 tokens in the REVERSE treatment. They are not significantly different across the two conditions (two-sided Mann-Whitney-U-test; $p > 0.2$). Our focus, however, is on the conditional contributions, i.e. on what we call the contribution schedule. We follow convention by defining four general types of players: *Conditional cooperators* submit a contribution schedule that is monotonically increasing with the average contribution of the other group members (with one strict increase).[4] *Free riders* contribute nothing for any average group contribution. *Hump-shape contributors (*also called *triangle contributors)* submit a monotonically increasing contribution schedule up to an average contribution of others of $x < 20$. Above x contributions are monotonically decreasing. The type *Others* refers to the remaining subjects. Table 1 reports the distribution of players for our two treatments.

Tab. 1: Distribution of player types

	STANDARD		**REVERSE**	
	Distribution	*Av. uncond. contrib.*	*Distribution*	*Av. uncond. contrib.*
Conditional cooperators	33.3% [8]	8.9	54.2% [13]	9.8
Free riders	12.5% [3]	0.0	20.8% [5]	7.0
Hump-shape contributors	16.7% [4]	2.0	8.3% [2]	10.0
Others	37.5% [9]	9.3	16.7% [4]	6.5

Note: Av. uncond. contrib. = average unconditional contributions; absolute numbers in brackets (out of 24 in each condition).

The distribution of types is not significantly different ($p > 0.2$; Chi²-test) between the two conditions. Results of the two treatments appear even less different if one excludes the players in the category "Others", who at least in part might be confused players.

A percentage of 30 to 55 of conditional cooperators is well in line with all other studies that use the same design. Thus, reversing the presentation order does not seem to influence results dramatically. In our case it even increased the number of conditional cooperators (although not significantly).

One could, however, argue that the requirement to fill in a table itself biases subjects towards conditioning their contributions. What if they can choose between the option to condition their contributions on the group average and can simply submit an unconditional contribution? Experiment 2 provides an experimental test along those lines.

[4] Fischbacher et al. (2001) and Fischbacher and Gächter (2006) also count subjects without a monotonically increasing schedule as conditional cooperators in case they have a highly significant (at the 1%-level) positive Spearman rank correlation coefficient between own and others' contributions.

3 Experiment Two: Choice between Options

Our second experiment takes the robustness test one step further. It introduces a *deliberate* choice between an unconditional contribution and a conditional contribution, which means that players can avoid making conditional choices at all if they want. In order to be able to test for potential dynamic effects such as learning, experiment 2 comprises several repetitions of the stage game.

3.1 Design

All basic features of the design – such as the public goods game, group size, instructions, framing, computerization etc. – are identical to experiment 1. The distinctive feature of experiment 2 is that participants are asked before the contribution decision whether they deliberately want to submit a conditional contribution[5] or not, after they have learned about both possibilities in an extensive instruction.[6] Contingent on this decision a new screen appeared in the experiment, either with a single decision field for inserting the unconditional contribution, or 21 decision fields for inserting 21 conditional contributions to the public good (one for each average group contribution level rounded to integer numbers). The stage game was played for ten rounds in a partner design.

Note that getting rid of the possibly biasing requirement to fill in a contribution table comes at a cost, since conditional choices alone cannot be matched. We chose the following

[5] Notice the difference between 'conditional *contribution*' (choosing to submit a contribution vector) and 'conditional *cooperation*' (submitting a contribution vector that shows increasing contributions with increasing group averages).

[6] Instructions can be downloaded at [URL will be announced; for referees' convenience they are provided in the Appendix].

procedure that we believe minimizes this cost.[7] In each group, first, the average contribution of unconditional contributors was determined. Then, the corresponding conditional contributions of all those who decided to condition their contribution were added to calculate the sum of contributions and per-round payoffs.

The fewer subjects decide to submit an unconditional contribution, the more the group's result hinges on them, because their average contribution drives the realized conditional contributions of the remaining group members and, hence, the group result.[8] While this feature of our design could have an impact on the dynamics of contributions, there is no apparent reason why it should distort contributions vectors, which will be at the heart of our analysis. Note further that subjects did not receive feedback information on whether the other group members decided to submit an unconditional or a conditional contribution. They were only informed on actual contribution choices at the end of each round and not on contribution vectors. Information conditions were common knowledge. Hence, strategic teaching or signaling through contribution vectors was impossible.

Note that the extent of cooperation, the decay of contributions over time and other data show that behavior in our public goods environment are in accordance with existing results and, therefore, do not seem to be strongly influenced by the special features of our design. More details to corroborate this claim will be presented in the next section. We emphasize that from a theoretical perspective the repeated game in this experiment is a different one from the preference elicitation in experiment 1 due to the existence of strategic aspects (and

[7] The differences in design to Fischbacher et al. (2001) and Fischbacher and Gächter (2006) as well as their consequences will be highlighted in section 4.

[8] In case nobody decided to submit an unconditional contribution the reference point for the group, i.e. the average group contribution, was determined randomly, where each of the 21 possible average contribution levels was chosen with equal probability. This happened for 15 out of 150 observations. Dropping these observations would not change our results.

different equilibrium predictions, once one gives up the assumption of common knowledge of selfishness). Behaviorally, however, there does not seem to be a strong impact of these differences. More details are provided in the following sections.

Decisions on contributions could only be linked to single group members through their anonymous subject number. The experiment was run computerized (using z-Tree by Fischbacher, 2007) and lasted about 60 minutes per session, including a post-experimental questionnaire on individual socio-economic variables and one-at-a-time, private payment. In total, we had 60 student participants in three sessions. The exchange rate was set at 0.03 € for 1 token (in order to keep the per-round payoff constant across the two experiments). The average payoff amounted to 7.00 € per subject.

3.2 Results

3.2.1 Option choice

We start by investigating the question whether subjects – when having the opportunity to choose deliberately – prefer to submit an unconditional contribution or to condition their contribution on the average group contribution. In 56% of all possible cases (336 out of 600) subjects chose to submit a conditional contribution schedule. This percentage remains quite stable over the course of the ten rounds (see Figure 1 and Table 2). Hence, choosing the conditional contribution option seems to be a rather persistent behavioral phenomenon, despite the usual decay of actual average contributions that also took place in our experiment. On the individual level, there are, of course, participants who switch between the two options.

Most of the subjects, however, show a clear preference for one of the two options and seem to switch only for the sake of experimentation.[9]

Fig. 1: Choice of options

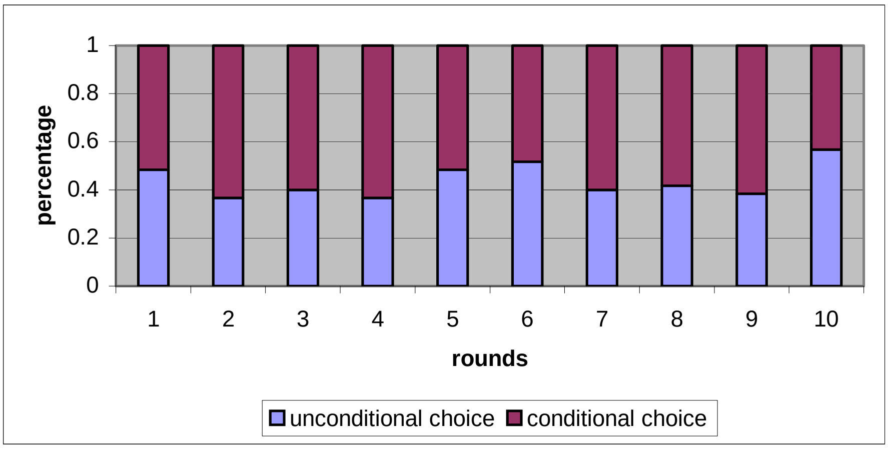


Table 2 provides an overview of the absolute frequencies of choosing the unconditional contribution within a group. In the majority of groups, there were two unconditional and two conditional contributors (63 out of 150 cases). Having only unconditional (one case) or only conditional contributors (15 cases) in a group is a comparatively rare event.

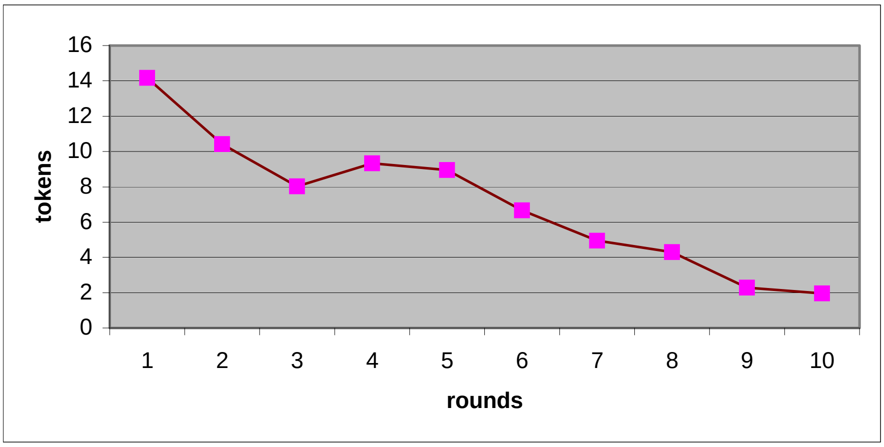
Tab. 2: Absolute frequency of choosing the unconditional contribution over time

Unconditional contribution chosen …	**Rd. 1**	**Rd. 2**	**Rd. 3**	**Rd. 4**	**Rd. 5**	**Rd. 6**	**Rd. 7**	**Rd. 8**	**Rd. 9**	**Rd. 10**	**Total**
0 times within a group	1	1	2	4	0	0	4	1	2	0	*15*
1 times within a group	4	8	5	2	4	3	3	5	4	2	*40*
2 times within a group	6	4	5	7	8	8	3	7	8	7	*63*
3 times within a group	3	2	3	2	3	4	5	2	1	6	*31*
4 times within a group	1	0	0	0	0	0	0	0	0	0	*1*

[9] Note also that for those switching there is not a clear trend, meaning that about half of the participants, who switched only once during the experiment, switched from unconditional choices to conditional choices in the course of the game and the other half switched vice versa. Detailed results are available upon request.

As already mentioned, average contributions decay over time similar to the vast majority of experimental public goods games with a boundary Nash equilibrium in dominant strategies. Figure 2 displays average actual contributions over the ten rounds, regardless of whether they have been made by unconditional contributors or by conditional contributors. Starting out from an average contribution of about 70% of the endowment to the public good in the first round, average contributions go down to about 10% in the very last round.

Fig. 2: Average contributions over time



3.3 Conditional cooperation

For the sake of succinctness we focus in the following on subjects who submitted a conditional contribution schedule and do not analyze behavior of subjects who chose the unconditional option. It can be discerned from Table 3 that there are between 16 and 25 conditional cooperators (out of 60 subjects) in each round. This amounts to 35.3% of all choices (including unconditional contributors). In comparison to that figure, other player types are relatively rare.[10]

Tab. 3: Conditional contributions split up

	Round											
	1	2	3	4	5	6	7	8	9	10	*Σ*	*%*
conditional cooperators	20	23	25	24	19	18	24	21	22	16	*212*	*35.3*
hump-shape contributors	3	3	2	2	3	2	2	3	3	3	*26*	*4.3*
free riders	2	3	2	3	3	3	5	7	6	6	*40*	*6.7*
other contributors	6	9	7	9	6	6	5	4	6	1	*58*	*9.7*
total	*31*	*38*	*36*	*38*	*31*	*29*	*36*	*35*	*37*	*26*	*336*	*56.0*
Total (excluding free riders)	*29*	*35*	*34*	*35*	*28*	*26*	*31*	*28*	*31*	*20*	*296*	*49.3*

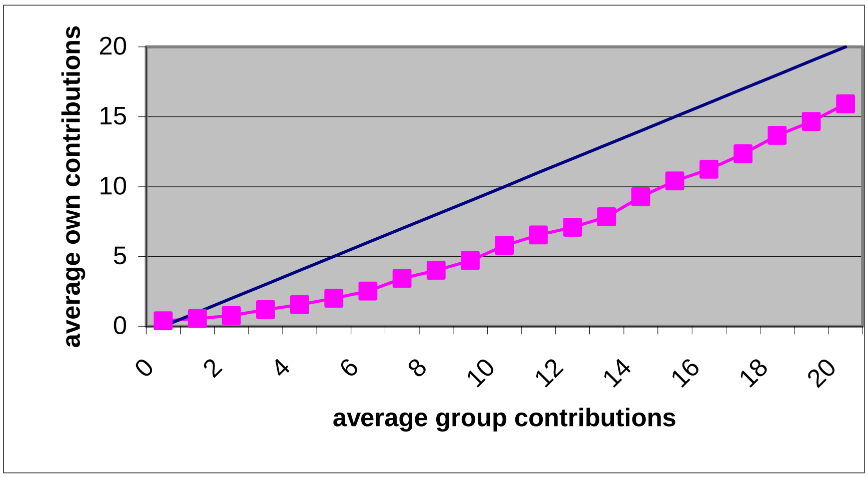
In order to obtain a better impression of the structure and extent of conditional cooperation we calculate average contributions only for those participants that have been classified as conditional cooperators. Average contribution vectors of conditional cooperators are very similar across rounds, although group contributions show the usual decay, indicating that the preferences underlying the chosen contribution vectors seem quite stable. For instance, the average contributions in the contribution schedules for an average group

[10] For subjects that always contribute zero, submitting a contribution vector is weakly dominant in our design over submitting an unconditional contribution of zero if one expects positive contributions of other group members, because the conditional contribution option does not drag the averages of the unconditional contributors down and, hence, payoff-dominates the unconditional option for free riders. A few subjects seem to have noticed that consequence of our design, since we have a small but persistent number of free riders that go through the procedure of filling in 21 fields instead of submitting an unconditional choice. Note, however, that the overall picture of Figure 1 would not change qualitatively if free riders that have chosen the conditional contribution option were assigned to the category of unconditional contributors.

contribution of 0, 10 and 20 were 0.4, 6.5 and 16.1 for conditional cooperators in the first round and 0.2, 3.6 and 16.6 in the final round.[11]

As can be seen in Figure 3, where we display overall results[12], average own conditional contributions are strictly monotonically increasing with average group contributions, but always below the 45 degree line that indicates perfect conditional cooperation. The only exception is an average group contribution of zero, where average own conditional contributions amount to 0.38.

Fig. 3: Average conditional contributions of conditional cooperators



It is also worthwhile to classify conditional cooperators according to their contribution vector because of the variety of possible contribution schedules that are subsumed under this category. Most of the 212 contribution schedules that have been submitted by conditional cooperators show a self-serving or self-centered bias, meaning that people contribute less than the group average. Perfect conditional cooperators are defined as contributing exactly the

[11] If we consider all types of players we obtain averages of 1.6, 5.6 and 12 in the first round and 0.3, 3.2 and 11 in the last round.

[12] Results for single rounds are available from the author upon request.

same amount of tokens as the group average. We have 17 such cases (8%) that are quite evenly distributed over all rounds. 12 cases (5.7%) show an even more than perfect conditional cooperation pattern in the sense that they contribute more than the group average, for at least one element of the contribution vector.

4 Discussion and Conclusion

One can interpret our two experiments as a stress-test of the findings in Fischbacher et al. (2001), in Fischbacher and Gächter (2006) and in several other related papers. All of them use a design that is identical to our STANDARD treatment in experiment 1. According to our results we may conclude that their general findings remain robust to quite profound changes of the setup such as those that we implemented especially in experiment 2. If we take into account the small difference in classification of player types between Fischbacher et al. (2001) and our paper, the percentage of conditional cooperators are very close even quantitatively. Details are provided in Table 4.

Our experiment also resembles some features of the experiment conducted in Muller et al. (2008). They let participants submit a plan of action for a twice-played public goods game that includes specifying a contribution for the first interaction (game 1) and a response to any possible number of aggregate game-one contributions by other group members. The response schedule is then matched with the other group members to determine actions in the second public goods game (game 2). While Muller et al.'s research focus is mainly on disentangling confusion and conditional cooperation, some of their results can be compared to ours.

As can be seen in Table 4, our results regarding the distribution of player types match those of Muller et al. (2008), who use exactly the same classification rules as we do, quite closely. The comparatively very low number of free riders in our experiment 2 is due to the fact that free riders almost exclusively chose the unconditional option. As Muller et al. (2008) we can also conclude that the distribution of types is fairly stable over time (in their case, the basic game was repeated five times in a stranger design).

Tab. 4: Distribution of player types in different studies

	Fischbacher et al. (2001)	*Fischbacher/ Gächter (2006)*	*Muller et al. (2008)*	*Experim. 1 STANDARD*	*Experim. 1 REVERSE*	*Experim. 2 Averages*
Conditional cooperators	50%	55%	38%	33%	54%	35%
Free riders	30%	23%	35%	13%	21%	4%
Hump-shape contributors	14%	12%	15%	17%	8%	7%
Others	7%	10%	12%	37%	17%	10%

Note: Experim. = Experiment. Percentages do not add up to 100% in "Experim. 2 – Averages" because 44% chose the unconditional option.

In contrast to Fischbacher et al. (2001) and subsequent papers it is noteworthy that the design of our second experiment creates relatively stronger incentives not to submit contribution vectors, even for participants that actually would be conditional cooperators. First of all, it is quite tedious to fill in 21 fields instead of one single field on the screen. Secondly, it is easy in our repeated game for conditional cooperators to adjust one's unconditional cooperation level in round t+1 depending on the cooperation level of the other group members in round t. Obviously, many subject, however, have a preference for conditioning their contributions on the decisions of other group members right away and not ex post. One possible explanation for the observed behavior is that choosing the conditional contribution may serve as a kind of insurance for subjects that are both inequity averse and betrayal or exploitation averse (Bohnet and Zeckhauser, 2004).

We already emphasized that from a theoretical perspective our second experiment actually uses another game than Fischbacher et al. (2001). While Fischbacher et al. (2001) developed an incentive-compatible mechanism to elicit conditional cooperation *preferences*, our repeated interaction situation features a *game* with several strategic aspects. Especially if one deviates from standard game-theoretic assumptions such as egoistic preferences and rational decision-making, equilibria of the two experiments can be quite different. While this is an important concern theoretically, it is not reflected in the data. Not only that the main results concerning conditional cooperation of our two experiments are very similar, also last round behavior in experiment 2 – in which strategic concerns should not play a role anymore – is very similar to the behavior in earlier rounds. This holds for option choices as well as for the submitted contribution schedules. Hence, from a behavioral perspective, there does not seem to be much of a difference between the elicitation procedure in the first experiment and the strategic game in the second experiment.

Our results corroborate the claim that conditional cooperation is a widespread behavioral regularity in public goods games that could have important policy implications, e.g., for charities or tax authorities (see Gächter, 2007). It seems to be a robust and persistent regularity, although its preference foundation is still a bit unclear. Recall that the vast majority (more than 70%) of the elements in the contribution vectors is below the group average and that conditional cooperation almost inherently involves 'splitting' of the endowment. The former empirical fact is difficult to assess by standard models of inequity aversion (e.g., Bolten and Ockenfels, 2000; Fehr and Schmidt, 1999), unless one relaxes the assumption of linearity. The reason is that if conditional cooperators were inequity-averse, they could easily choose to create an equal distribution of profits among group members by submitting a contribution vector, in which own contributions exactly match average group contributions[13],

[13] Obviously, they have to neglect the fact that the other group members might submit different contributions.

but the majority apparently does not. A similar problem arises for simple linear models of altruism, which would either predict zero contribution or full contribution, depending on the size of the altruism parameter (e.g., Holt and Laury, 2008).

Our conditional cooperators do also not exhibit significant warm glow (e.g., Andreoni, 1988, 1990; Palfrey and Prisbey, 1997). Warm glow preferences imply that the act of contributing or giving increases a subject's utility by a fixed amount. This would predict for conditional cooperators that they contribute more than zero for a group average of zero. Only 24 out of 212 conditional contribution schedules (11.3%) show such a characteristic (with very low contributions for a group average of zero) or for other types.

Note that our results do not rule out that linear inequity aversion, altruism or warm glow are important determinants of behavior for *unconditional* contributors.

Most probably, conditional cooperation is a consequence of the almost ubiquitous social norm of reciprocity, however with a self-serving bias. Still, more research is needed to corroborate our conclusions regarding the behavioral foundations of conditional cooperation. One line of future studies would be to analyze in greater detail whether insurance motives play an important role for subjects when choosing the conditional contribution option.

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APPENDIX: **Instructions for experiment 2**[14] **(originally in German; not necessarily for publication – can be made available on an author's website)**

Welcome to the experiment und thank you for your participation.
Please do not talk to other participants from now on.

This experiment analyzes economic decision-making. You can earn 'real' money, which is paid to you in cash at the end of the experiment.

During the experiment you and all other participants are asked to make decisions. Your own decisions as well as decisions of other players determine your final payment according to the rules in the instructions.

The experiment lasts for about 45 minutes. At the beginning you receive detailed instructions. If you want to ask questions after reading the instructions, please raise your hand. An experimenter will, then, come to you and answer your questions privately.

During the experiment our currency unit is not the euro, but experimental points (EP). Your earning during the experiment will be calculated in EP. At the end of the experiment the sum of the earned EP will be converted into euros. The exchange rate is:

1 EP = 3 euro-cent

Groups

Before the experiment starts, groups consisting of four participants are formed; assignment is random. You will know neither during the experiment nor after it with whom you have formed a group. Your decisions therefore remain **anonymous.**

The experiment lasts for 10 rounds. During the whole experimental session group composition remains constant. Group members receive a member number that remains constant over the 10 rounds.

Initial endowment and alternatives

Each participant receives an initial endowment of **20 tokens** at the beginning of each round. These tokens can be allocated to two alternatives, **X** and **Y**:

1. You can give 0 to 20 tokens into **pot X**. The sum of all contributions within your group to pot X will be multiplied by 1.6 and, then, equally distributed among group members. This means that for any token in pot X you receive 0.4 (=1.6/4) EP. For example, if the sum of tokens in pot X in your group is 60, each group member receives 60 • 0.4 = 24 EP out of pot X. If all group members together contribute 10 tokens to pot X, you and all other group members receive 10 • 0.4 = 4 EP from pot X.
2. You can give 0 to 20 tokens into **pot Y**. Your individual tokens in pot Y are directly added to the sum of EP that finally determines your profit. If you, e.g., contribute 6 tokens to pot Y, you receive 6 EP.

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[14] Note that the instructions for experiment 1 are almost identical to the ones used in Fischbacher et al. (2001).

Your profit per round is the sum of the earnings from pot X and from pot Y.
Mathematically:

Profit (for group member i) = (20-x)+(S*1.6)/4

x ... contribution of member i in pot X

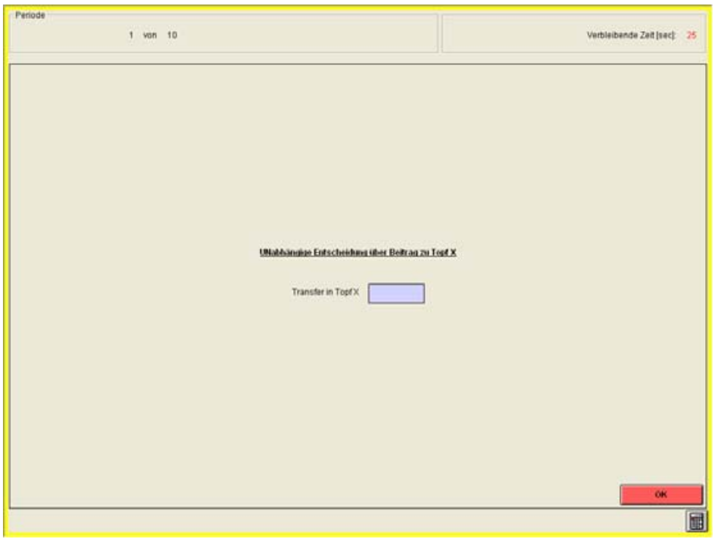
S ... sum of contributions of *all group* members in pot X

On the screen, you will be asked how many tokens you want allocate to pot X. The rest of the tokens will automatically be contributed to pot Y. Saving tokens for later rounds is therefore impossible. You can only choose integer numbers between and including 0 and 20 tokens.

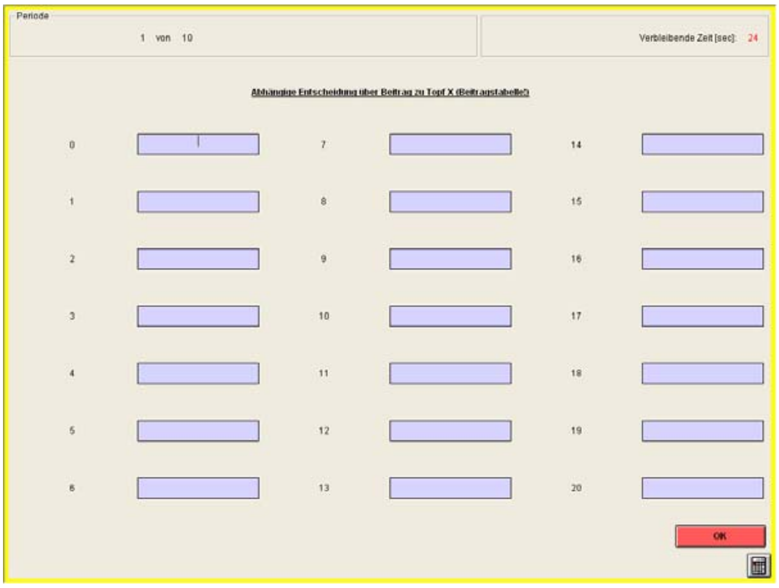
Procedures

Before your decision on the contribution to pot X you will be asked in any round, whether you want to fix your contribution to pot X **unconditional on the decisions of the other group members** (option 1) or whether you want to make it **conditional on the average contribution of the other group members** (option 2).
What does that mean exactly?

1. **Option 1**: If you decide to submit an **unconditional** contribution, then you have to insert your desired contribution into pot X on the subsequent screen, which is pictured below (it contains a symbol of a calculator; if you click on it, a calculator window will open, in case you want to make some calculations).



2. **Option 2**: If you decide to submit a **conditional** contribution, then you have to insert several possible contributions, contingent on the average contribution of the other group members. Since you do not know the average, you will insert decisions for any possible average contributions between and including 0 and 20 on the subsequent screen, which is pictured below (it contains a symbol of a calculator; if you click on it, a calculator window will open, in case you want to make some calculations).



The average contribution of the other group members will be rounded to integer numbers. You have to insert your decision for any possible average contribution. However, your contributions do not have to differ for every possible average contribution of the other group members.

Furthermore, we ask you to estimate the average contribution in your group, regardless whether you choose option 1 or 2.

After each round you receive information on the contributions of your group members (ordered by member numbers (which remain constant during the whole experiment). Furthermore, you will see your profit and the profit of other group members in EP. You, however, do not receive information on the options chosen by the other members in your group.

Exact calculation of the earning from pot X:

First, the average contribution of those members will be calculated who opted for option 1. Then, the relevant conditional contribution of the other group members that opted for option 2 will be added. For example: Group members 1 and 2 have opted for option 1 and contributed 3 and 9 tokens in pot X, respectively. 3 + 9 = 12; that means the average is 6 tokens. Assume that group members 3 and 4 opted for option 2. In this case their contributions for a hypothetical average group contribution of 6 will be chosen and added to the contributions of group members 1 and 2. Assume further that group member 3 wants to contribute 0 tokens for a group average of 6 tokens; group member 4 wants to contribute 20 tokens for a group average of 6 tokens. The sum of contributions in pot X is then: 3 + 9 + 0 + 20 = 32; 32 • 1.6 = 48; 48 ÷ 4 = 12 EP. Thus, each group member receives 12 EP from pot X, plus what they left for pot Y. Overall in this round, group member 1 earns a profit of 29 EP (12 from pot X and 17 from pot Y); group member 2 earns 23 EP (12 from pot X and 11 from pot Y); group member 3 earns 32 EP (12 from pot X and 20 from pot Y); and group member 4 earns 12 EP (12 from pot X and 0 from pot Y).

In case no member of a group opts for option 1, then it is of course impossible to calculate an average on which contributions of other group members can be conditioned on. In this special case the computer randomly and with equal probability chooses a value between and including 0 and 20 as a reference point.

End:

After 10 rounds, the experiment ends. Experimental points from all rounds will be added and converted into euros.

Anonymity:

You will not know during and after the experiment with whom you are/were interacting with. Other participants will also not know your identity and how much you earned in the experiment. Data from the experiment will only be used on the aggregate level.