

JENA ECONOMIC RESEARCH PAPERS



2011 – 047

Unravelling conditional cooperation Reciprocity, inequity aversion, and anchoring in public goods provision

by

Dominique Cappelletti
Werner Güth
Matteo Ploner

www.jenecon.de

ISSN 1864-7057

The JENA ECONOMIC RESEARCH PAPERS is a joint publication of the Friedrich Schiller University and the Max Planck Institute of Economics, Jena, Germany. For editorial correspondence please contact markus.pasche@uni-jena.de.

Impressum:

Friedrich Schiller University Jena
Carl-Zeiss-Str. 3
D-07743 Jena
www.uni-jena.de

Max Planck Institute of Economics
Kahlaische Str. 10
D-07745 Jena
www.econ.mpg.de

© by the author.

Jena Economic Research Papers 2011 - 047

Unravelling conditional cooperation

Reciprocity, inequity aversion, and anchoring in public goods provision

Dominique Cappelletti ♠* Werner Güth ♣ Matteo Ploner ♠

♠ *University of Trento, CEEL, Italy*

♣ *Max Planck Institute of Economics, Strategic Interaction Group, Jena, Germany*

September 2011

Abstract

Extensive research on human cooperation in social dilemmas has shown that individuals condition their behaviour upon the behaviour of others. However, few attempts have been made to disentangle the motivations backing conditional cooperation. We try to assess the relative importance of three motives – namely reciprocity, inequity aversion, and anchoring – in a non-linear voluntary contribution experiment. We find that, for those conditionally cooperating, both reciprocity and inequity aversion represent relevant motivational factors, but the impact of inequity aversion is stronger than that of reciprocity. In contrast, anchoring plays only a marginal role. Compared to what previously found in linear voluntary contribution games, overall we find much less conditional cooperation. In a control treatment with a less complex design, conditional cooperation is higher but still comparatively low.

JEL Classification: H41, C91, C72

Keywords: Conditional cooperation, Experimental Economics, Public Goods, Social Preferences.

*Corresponding author. E–mail address: dcappelletti@unitn.it

1 Introduction

A robust finding in the literature on human cooperation is that many people cooperate in a conditional manner, that is cooperate more the more they know or expect others to cooperate. Several aspects of conditional cooperation have been investigated, both in laboratory and in field experiments. However, few attempts have been made to investigate the motivational heterogeneity behind this kind of behaviour. The literature usually views reciprocity as most decisive when explaining conditional cooperation in social dilemma games. However, there are several other motives, such as inequity aversion, normative conformity, informational conformity, and anchoring. We implement a novel design that allows us to distinguish among three different motives, namely reciprocity, inequity aversion, and anchoring. Reciprocity implies kind responses to actions that are deemed kind mainly on the basis of the intentions backing these actions; inequity aversion triggers attempts to reduce differences in outcomes, and anchoring leads people to stay close to an anchor value.

In our experiment, participants interact in pairs in a sequential public goods game implemented in normal form, i.e., the second mover chooses her reactions before knowing the decision of the first mover. Specifically, the second mover is asked to provide a reaction to each possible contribution of the first mover. To disentangle the motivation that is intention-based (i.e., reciprocity) from those that are not (i.e., inequity aversion and anchoring), we manipulate the intentionality of the first mover's action, which can be determined either intentionally by the first mover or randomly by the computer. The second mover is asked to react to both kinds of first mover's actions. To control for distributional concerns (inequity aversion), we manipulate the payoff rules so that the second mover either can or cannot control the inequity of the final outcomes.

Unlike previous studies on conditional cooperation, we implement a non-linear public goods game in which both the opportunistically dominant and the efficient contributions are interior choices. This allows us to avoid biases in the estimation of actual preferences potentially present when benchmark choices are at the boundaries of the choice interval. Moreover, we can study behaviour in contribution regions that are both individually and collectively sub-optimal.

We find that, for those conditionally cooperating, both reciprocity and inequity aversion are important motives, with inequity aversion having a stronger impact than reciprocity. In contrast, anchoring plays only a marginal role in explaining conditional cooperation.

Compared to previous studies, which employed linear voluntary contribution games, we find much less conditional cooperation: the large majority are unconditionally opportunistic. To investigate whether the low levels of condi-

tional cooperation are due to the non-linearity of the contribution game or to the complexity of the design, we implemented a less complex control treatment and registered a much higher share of conditional cooperators, which remains however lower than those reported by previous studies. It seems that both non-linearity and complexity of the design impair conditional cooperation.

The remainder of the paper is organised as follows. Section 1.1 reviews previous lab and field studies on conditional cooperation. Section 1.2 discusses possible motives for contributing in a conditional manner. Section 2 describes the experimental design and procedures and outlines our behavioural predictions. Section 3 presents the results of the experiment, mainly focusing on the second mover, who is the one that can contribute conditionally. Section 4 reports on the less complex treatment, implemented to shed light on what causes the low levels of conditional cooperation observed in the experiment. Section 5 concludes.

1.1 Conditional cooperation in the lab and in the field

Extensive research on human cooperation in social dilemmas has demonstrated that *(i)* people contribute more than what a rational and selfish agent would do; *(ii)* a substantial proportion of those who contribute condition their contributions on those of others. Several studies invoked conditional cooperation as a possible explanation for the observed contribution patterns (e.g., Sonnemans *et al.*, 1999; Keser and van Winden, 2000). In one of the first experimental studies directly eliciting conditional cooperation, Fischbacher *et al.* (2001) asked participants to provide, in addition to an unconditional contribution, a contribution decision for each possible (rounded to integers) average unconditional contribution of the other group members. It emerged that conditional cooperation accounts for about 50% of the contribution patterns observed.

Without utilizing the strategy method, other studies documented conditional cooperation by detecting a significant positive relationship between one's own contribution and the others' contributions in the previous period (Croson *et al.*, 2005; Falk *et al.*, forthcoming) or one's expectations of the others' contributions (Croson, 2007; Neugebauer *et al.*, 2009). Conditional cooperation was also found in sequential public goods games, where a leader decides first and the other group members simultaneously react to the leader's choice (e.g., Güth *et al.*, 2007; Levati *et al.*, 2007; Gächter *et al.*, 2011). The contributions of leaders and followers are highly positively correlated, although followers conditionally contribute in a self-serving manner.

Conditional cooperation was also documented in several field experiments, which showed that information about others' contributions influences the propen-

sity to contribute (Frey and Meier, 2004) and the size of contributions (Alpizar *et al.*, 2008; Croson and Shang, 2008; Martin and Randal, 2008; Shang and Croson, 2009; Chen *et al.*, 2010). Laboratory and field experimental research also demonstrated that conditional cooperation is constant across cultures (Kocher *et al.*, 2008; Herrmann and Thöni, 2009) and robust to framing. For example, in a field experiment investigating the influence of social information on charitable giving among university students, Meier (2006) provided subjects with social information that was either positively framed (i.e., share of student population who contributed) or negatively framed (i.e., share of student population who did not contribute) and did not find any significant effect of this framing manipulation on the probability to contribute.

Conditional cooperators have been found to condition their choices on several kinds of information about others' choices that they receive in the experiment, typically the average or the median contribution, but also the contribution of a specific person (e.g., Shang and Croson, 2009). Kurzban and DeScioli (2008) documented that, when allowed to choose a piece of information on others' contributions (i.e., the lowest, the median, or the highest contribution), conditional cooperators tend to select the median contribution and, when information is costly, are more willing to pay for information than other participants.

1.2 Motives behind conditional cooperation

So far, the relative importance of the motives driving individuals to contribute in a conditional manner have largely been disregarded. One important motive is reciprocity, a norm that leads people to react kindly to a kind action and, conversely, unkindly to an unkind action of the counterpart. In the context of public goods provision, contributing beyond what is individually optimal is a kind action. Therefore, reciprocity suggests to contribute more the more others contribute. For reciprocity concerns, the intention behind others' actions matters. In a recent public goods experiment in which one group member has a higher marginal per capita return than the others, Glöckner *et al.* (2011) found that the other group members cooperate more when contributing represents a sacrifice for the special member than when contributing is in her private interest. Reciprocity has recently received much attention in the economic literature (e.g., Sugden, 1984; Rabin, 1993; Falk and Fischbacher, 2006) as an explanation for individual behaviour not only in public goods provision but also in bargaining (Hoffman *et al.*, 1994), labour market (Fehr *et al.*, 1997), tax evasion (Bordignon, 1993), and donation (Falk, 2007).

Another important motive may be inequity aversion, which is purely consequentialist, ignoring intentions behind actions. Models of inequity aversion

assume that individuals are sensitive to differences in their own and others' outcomes (Bolton and Ockenfels, 2000) and dislike more disadvantageous differences – i.e., when own payoff is lower than others' payoffs – than advantageous differences – i.e., when own payoff is higher than others' payoffs (Fehr and Schmidt, 1999). In a symmetric public good situation, where endowments and marginal per capita returns are equal for all group members, individuals averse to inequity can try to reduce differences between theirs and others' payoffs by choosing the contribution amount they expect the others to choose.

Conditional cooperation may also be motivated by the wish to conform to the prevailing behaviour in the reference group: people may perceive the prevalent behaviour as the appropriate one and conform to it in order to fulfil a social norm. Bernheim (1994) assumes that people care for social status, identified with popularity, esteem, or respect, and conform to a social norm in order not to impair their social status. Alternatively, cooperating in a conditional manner can be interpreted in terms of informational conformity, i.e., as a way to exploit the information of others (e.g., see Bikhchandani *et al.* (1998) on information cascades and Vesterlund (2003) on quality signals in fundraising).

A further reason for conditional cooperation is cognitively grounded and related to the concept of anchoring. It has been observed that people tend to anchor on a value to which they have been exposed and adjust it to reach the final decision; the adjustment is usually small so that the final decision is heavily influenced by the starting point (Tversky and Kahneman, 1974). In a public good situation, people may take the others' contributions as a starting point and adjust it. This can be especially the case when people have this information before making their contributions or are asked to fill in a contribution table in which the first column contains the others' average contribution.

These motives have been proposed in the literature, but their relative importance has largely been disregarded. An attempt to disentangle two of these possible motives, namely conformity and reciprocity, was made by Bardsley and Sausgruber (2005). Under the assumption that the effects of reciprocity and conformity are additive, it turned out that one third of conditional cooperation is accounted for by conformity and the remaining two thirds by reciprocity.

Here we investigate the relative importance of three possible motives behind conditional cooperation, namely *reciprocity*, *inequity aversion*, and *anchoring*. In our experiment, participants interact anonymously with complete strangers, so that motivation for social status seeking and strategic cooperation (or other repeated game motivations) are ruled out. In addition, information is symmetric, leaving no room for informational conformity. Finally, the small group size (two persons) renders normative conformity an unlikely explanation for conditional cooperation in this context, since the behaviour of a single person may

not be seen as representative.

Unlike previous studies that consistently used a linear public good, we implemented a non-linear public goods game in which both the individual optimum and the social optimum contributions are interior. This allows us to avoid biases in the estimation of actual preferences due to decision errors[1] and to check for under- as well as overshooting behaviour.

2 Experimental Design

2.1 Interaction Setting

We implemented the normal form of a sequential non-linear public goods game with 2-person groups. Player 1 contributes first and Player 2 reacts to every possible contribution of Player 1. Each player i is provided with an endowment E that must be allocated between a private and a public account (defined as project in the instructions). Let $c_i \in \{c_i \in \mathbb{N} : 0 \leq c_i \leq E\}$ denote the contribution of player $i = 1, 2$ to the project.

The payoff of each player i is determined by the following quadratic function

$$\pi_i = \alpha(E - c_i) - \beta(E - c_i)^2 + m(c_1 + c_2) \tag{1}$$

with $\beta > 0$ and $\alpha > m > 0$. The reward of the private account is $\alpha(E - c_i) - \beta(E - c_i)^2$, and the reward of the project is $m(c_1 + c_2)$. We set the parameters so that both the dominant individual contribution $c_i^* = E + \frac{m-\alpha}{2\beta}$ and the social optimum $c_1^+ = c_2^+ = E + \frac{2m-\alpha}{2\beta}$ are in the interior of the strategy space, i.e., $0 < c_i^* < c_i^+ < E$ for $i = 1, 2$. Specifically, $\alpha = 41$, $\beta = 1$, and $m = 15$.[2] The individual endowment E amounts to 20 tokens. With these parameters, the individual optimum is $c_i^* = 7$. Decreasing the contribution from this level, i.e., selecting any value in the interval 0–6, is both individually and socially damaging. Increasing the contribution above this level is not in the self-interest of the player, but is socially improving up to $c_i^+ = 15$. Symmetric contributions in the interval 7–15 are Pareto-rankable, with the individual optimum providing the lowest efficiency levels in the interval. This contribution interval grasps the tension between efficiency and selfishness that characterizes standard linear voluntary contribution games over the whole action range. Increasing the contribution above the social optimum, i.e., selecting any value in the interval

[1] In the linear setting, the selfish and the social optimum contributions are at the lower and the upper bounds of the choice interval, respectively. When allowing for errors in choices (e.g., McKelvey and Palfrey, 1995), the extreme benchmark predictions have implications for the error structure that is truncated to the left (right) for the selfish (cooperative) behaviour. Thus, preferences for moderate cooperation may be, without further specification of the error structure, overestimated since errors point only in one direction.

[2] These parameters are those used by Keser (1996).

16–20, is both individually and socially damaging. Thus, when observing a deviation of Player 1 from the individual optimum, only choices between 7 and 15 should be interpreted as truly cooperative. Also for Player 2 the interval 7–15 represents the only truly cooperative interval. Conditional contributions of Player 2 in the intervals 0–6 and 16–20 could be explained by extreme equality seeking or by anchoring, whereas concerns for reciprocity can be ruled out.

2.2 Treatments

The experiment has a 2×2 design, with *Intentionality* (Intentional vs Random) as a within-subjects treatment variable and *Asymmetry* (SymmPay vs AsymmPay) as a between-subjects treatment variable.

In the within-subjects manipulation, there are two conditions. In the *Intentional* condition, the contribution c_1 of Player 1 is intentionally chosen by Player 1. Let c_1^I denote this choice. Before knowing the actual contribution of Player 1, Player 2 is asked to report her reaction to every possible contribution c_1^I of Player 1. Let $c_2(c_1^I)$ denote this Player 2's reaction funtion. The reaction profile consists of an $n-$tuple, where $n = 21$.

In the *Random* condition, the contribution c_1 of Player 1 is randomly chosen by the computer from the set $\{x \in \mathbb{N} : 0 \leq x \leq 20\}$. Let c_1^R denote this random choice. Before knowing this value, Player 2 is asked to report her reaction, via an $n-$tuple with $n = 21$, to each possible value drawn by the computer. Let $c_2(c_1^R)$ denote this Player 2's reaction function. Thus, the choice data are composed of

- Player 1's choice of c_1^I and
- Two Player 2's reaction functions $c_2(c_1^I)$ and $c_2(c_1^R)$.

The between-subjects manipulation is also composed of two conditions. In the *SymmPay* condition, the type of contributions (I vs R) relevant for Player 1's payoff is *always* the same as that for Player 2's payoff. Specifically, the payoffs of both players are calculated considering either the two $I-$contributions c_1^I and $c_2(c_1^I)$ (payoff mode II) or the two $R-$contributions c_1^R and $c_2(c_1^R)$ (payoff mode RR). Each of the two payoff modes has 50% probability of being applied.

In the *AsymmPay* condition, the type of contributions (I vs R) relevant for Player 1's payoff *can* differ from that relevant for Player 2's payoff. Specifically, either the two $I-$contributions c_1^I and $c_2(c_1^I)$ are relevant for both players' payoff (payoff mode II) or the two $I-$contributions c_1^I and $c_2(c_1^I)$ are relevant only for Player 1's payoff and the two $R-$contributions c_1^R and $c_2(c_1^R)$ are relevant for Player 2's payoff (payoff mode IR). Each of the two payoff modes has 50% probability of being implemented. Unlike in the other modes, in the payoff

mode IR Player 2 cannot control the distance between her own and Player 1's payoff.

Combining the two treatment variables (*Intentionality* and *Asymmetry*), we obtain four experimental conditions, which are summarized in Table 1.

[Table 1 about here]

The experiment is composed of 8 rounds, of which only one, randomly selected, is relevant for payment. Players keep their role (either Player 1 or Player 2) fixed throughout the experiment, but they are matched with a different partner in each round in a perfect stranger design. This rules out repeated interaction effects, like "tit for tat", and reputation concerns. At the end of each round, both players are informed about the actual choices c_1^I, c_1^R, the two c_2 reactions to the actual choices c_1^I and c_1^R, the payoff mode selected, and the payoffs of both players.

2.3 Behavioural Predictions

To disentangle the motives behind conditional cooperation we compare Player 2's choices across treatments.

Two classes of motivations for conditional cooperation are investigated: social concerns in the form of reciprocity and inequity aversion, and cognitive motivations in the form of anchoring to the other's contribution. Reciprocity predicts Player 2 to match Player 1's contribution only when it is intentional. Moreover, intentions should be reciprocated only when they represent a reliable signal of cooperation, i.e., reciprocity-based conditional cooperation can be observed only over the contribution interval 7–15. Thus, positive correlation due to reciprocity can be observed in conditions *SymmPay/Intentional* and *AsymmPay/Intentional*, but only over the contribution interval 7–15. In contrast, no correlation due to reciprocity is expected in conditions *SymmPay/Random* and *AsymmPay/Random*.

Inequity aversion leads Player 2 to choose her contribution close to that of Player 1 as long as this reduces the payoff distance in the pair. This is the case in conditions *SymmPay/Intentional*, *SymmPay/Random*, and *AsymmPay/Intentional*. A positive correlation due to inequity aversion might be found over the whole contribution interval, although correlation outside the interval 7–15 would require extreme equality seeking. Instead, no correlation due to inequity aversion should be found in condition *AsymmPay/Random*, in which payoff mode IR is implemented: Player 1 is paid on the basis of the $I-$choices, while Player 2 is paid on the basis of the $R-$choices. Thus, not knowing the intentional and the random contributions of Player 1, Player 2 cannot control

inequity of the final outcome by appropriately reacting to the random choice of Player 1.[3]

Finally, anchoring predicts Player 2 to match Player 1's contribution independently of its intentionality and the payoff mode implemented. This means that positive correlation due to anchoring should be found in all the four experimental conditions and over the whole contribution interval.

To summarize, positive correlation of Player 1's and Player 2's contributions is compatible with

- reciprocity, inequity aversion, and anchoring in conditions *SymmPay/Intentional* and *AsymmPay/Intentional*;
- inequity aversion and anchoring in condition *SymmPay/Random*;
- anchoring in condition *AsymmPay/Random*.

2.4 Participants and Procedures

One hundred and ninety-two undergraduate students at the Friedrich Schiller University in Jena (Germany), recruited through the on-line recruitment system ORSEE (Greiner, 2004), took part in the experiment. They were randomly assigned either to treatment *SymmPay* or to treatment *AsymmPay*. Thus, in each treatment we collected the choices of 96 subjects. Half of the participants were randomly assigned the role of Player 1 and the other half the role of Player 2.

The experiment was programmed and conducted using z-Tree (Fischbacher, 2007). Participants were seated in computer-equipped cubicles that do not allow communication or visual interaction among participants. They received the same written instructions,[4] which were read aloud by a German-speaking collaborator to establish common knowledge. Three tables were included in the instructions: the first illustrates the returns of each token allocated to the private account; the second illustrates the returns of each token allocated to the public account; finally, the last table has a two-way structure defining the returns associated to each possible combination of tokens allocated to the private (public) account by the decision maker and the interaction partner.[5]

Full understanding of the instructions was checked through an on-screen questionnaire. The experiment started after all the participants had answered

[3] The reaction of an inequity averse Player 2 to the random choice c_1^R would depend on what c_1^I Player 2 expects Player 1 to choose, an issue we do not address here.

[4] The instructions are available upon request from the authors.

[5] This table is reported in the Appendix. The lines separating the three contribution intervals in the table have been added here for readability purposes. No separating line was present in the table contained in the instructions.

all the questions correctly. The game was played over 8 rounds and subjects were matched with a different partner in each round. This perfect strangers design was implemented within matching groups of 16 subjects. Including payment, the sessions lasted for about 80 minutes. Choices and earnings in the experiment were expressed in tokens. At the end of the experiment, one of the 8 rounds was randomly selected for payment and each token earned in that round was converted in 2 Euro cents. Participants earned, on average, €12.61 (including a show-up fee of €2.50).

3 Results

After briefly looking at the choices of Players 1, we focus the analysis on the choices of Players 2, who can make conditional contributions. Data are first presented and commented using some descriptive statistics and non-parametric tests. We concentrate on the choices made in the first round, when Players 2 have not yet learned about Players 1's contributions and, thus, their choices are mutually independent. This improves the power of the statistical analysis. However, the analysis conducted on the other rounds (not reported here) shows that the pattern over rounds is quite stable and the conclusions based on the first round can be extended, in qualitative terms, to the other rounds. The analysis is complemented by a regression analysis employing all the choices in the rich dataset.

3.1 Descriptive Statistics

3.1.1 Player 1

Players 1 were asked to make a single unconditional contribution c_1^I in each round. The median value of the distribution of choices is close or equal to 7, i.e., the opportunistically rational contribution, in all rounds and for both experimental conditions. The average values are slightly higher in the first round and tend to decrease as the experiment progresses. However, when taking individual averages over all experimental rounds, choices in both experimental conditions are statistically different from 7 (Wilcoxon Signed Rank Test, both p-values < 0.001).

3.1.2 Player 2

In each round, Player 2 provides two strategy profiles, one as a reaction to each possible intentional contribution of Player 1 and one as a reaction to each possible random contribution of Player 1. Looking at the individual average

contributions, which are obtained by taking the average of the 21 contributions stated by each Player 2 as a reaction to each potential contribution of Player 1, it is observed that in each round the median values of the distribution are equal to 7 (i.e., the opportunistically rational contribution), irrespectively of the experimental condition.

Figure 1 illustrates the behaviour of Players 2 in the first round. For each potential contribution of Players 1, the boxplots represent the distribution of Players 2' choices. It can be noticed that the median contribution of Players 2 is equal to the individual optimum value in each experimental condition and for each potential amount contributed by Player 1. However, when the contribution of Player 1 is chosen intentionally, reactions of Player 2 are less concentrated on the individual optimum value and, on average, slightly higher. Average contributions tend to increase with the contributions of Player 1 over the interval 7-15 and, quite surprisingly, continue to increase even over the inefficient interval 16-20.

[Figure 1 about here]

The behavioural predictions formulated in Section 2.3 refer explicitly to the correlation between the choices of the two players in a pair. For Players 2 who do not stick to the same contribution level over all levels of contribution of Player 1, a Spearman's rank correlation rho is computed. Then, Players 2 are classified according to the sign and the statistical significance of the correlation. Table 2 reports the percentage of positive, not different from zero, and negative correlation indexes, for each experimental condition in the first round of play.[6] The correlation indexes are reported for the whole choice interval and for the three choice intervals identified according to their interpretation in terms of individual and collective interests.

[Table 2 about here]

As shown by the frequencies for $\rho \approx 0$ and $sd = 0$, the large majority of Players 2 did not condition their contributions on the contribution of the other, even for the interval 7–15. In each of the four experimental conditions, most of the participants stuck to the same contribution for any potential contribution of the other.

Table 3 classifies Players 2 into three categories, namely dominant-strategy contributors, conditional cooperators, and other types, on the basis of their

[6] Like previous studies assessing the nature and relevance of conditional cooperation, we employ a classification based on the Spearman's rank correlation ρ (e.g., Fischbacher *et al.*, 2001). When performing the same classification with a Kendall's rank correlation τ, the results do not change substantially. In particular, the frequencies for the whole interval are the same as those reported in Table 2. Some marginal changes are observed in the other choice intervals, with slightly more matching choices classified as independent.

strategies over the interval 7–15 in the first round of play. *Dominant-strategy contributors* contribute 7 for all possible contributions of Player 1. *Conditional cooperators* are those Players 2 whose strategies have a significant and positive Spearman's rank correlation ρ. Finally, the category *Other types* includes Players 2 who contribute the same amount (other than 7) for all possible contributions of Player 1, Players 2 whose strategies have a negative Spearman's rank correlation ρ, and Players 2 whose contribution behaviour is not readily interpretable. As shown in Table 3, in all the experimental conditions the majority of Players 2 behave optimally, while the share of conditional cooperators varies from 10.4% to 16.7%.

[Table 3 about here]

Result 1 *Only a minority of Players 2 condition their contribution on their partner's choice. The large majority of Players 2 unconditionally adopt the self-maximising strategy already in the first round of play.*

Next, we compare the frequencies of positive correlation across experimental conditions to analyse the relative influence of reciprocity, inequity aversion, and anchoring on conditional cooperation. In condition *SymmPay/Intentional* all the three motivational factors are free to operate, whereas in condition *SymmPay/Random* reciprocity considerations should not apply as intentionality is removed. The frequency of positive correlation is lower in the latter than in the former, for the whole choice interval and for each of the three subintervals (see Table 2). For example, the frequency decreases from 25% in *SymmPay/Intentional* to 16.7% in *SymmPay/Random*, when considering the whole choice interval. The reduction in positive conditional cooperation is even stronger when comparing to the *AsymmPay/Random* condition, where only anchoring may drive conditional cooperation. The frequency of $\rho > 0$ is lower in this condition than in *SymmPay/Intentional*, for each of the choice intervals reported in Table 2. This suggests that anchoring alone cannot explain conditional cooperation in our setting.

Indicating in parentheses the motivational factors (denoted by their initials) potentially operating in each experimental condition, the pattern of conditional cooperation in the four experimental conditions over the interval 7–15 can be summarized as follows:
$SymmPay/Intentional(R+I+A) > AsymmPay/Intentional(R+I+A) \geq SymmPay/Random(I+A) > AsymmPay/Random(A)$

Result 2 *The highest frequency of positive conditional cooperators is registered in the condition allowing for both reciprocity and equity considerations, while the lowest is registered when only anchoring can be at work.*

3.2 Regression Analysis

The regression analysis focuses on the impact of Player 1's choices on Player 2's choices, across the four experimental conditions and the eight experimental rounds. A summary of the estimation of a mixed-effects linear model is reported in Table 4.[7] The following model equation represents the fixed effects in the estimation: $c_2 = \beta_1 Cons + \beta_2 c_1 + \beta_3 SymmInt + \beta_4 AsymmInt + \beta_5 SymmRand + \beta_6 Round + \beta_7 SymmInt \times c_1 + \beta_8 AsymmInt \times c_1 + \beta_9 SymmRand \times c_1 + \beta_{10} Round \times c_1$. The fixed effects are given by c_1, a vector of all the potential contributions of Player 1, by three dummy variables capturing the impact of the corresponding experimental condition, and by *Round*, which measures the progression of rounds in the experiment. In addition, the interactions between each experimental condition dummy and c_1 and between the variable *Round* and c_1 are included. Given this specification, the baseline in the regression analysis is given by the condition *AsymmPay/Random*. Random effects are estimated both for the matching groups and for the individuals nested within the groups,[8] allowing us to control both for potential dependence in the data due to repeated interactions within the matching groups and for potential dependence due to repeated choices of the individuals. The identification strategy adopted provides us with a large number of observations in the regression analysis.[9] The analysis is complemented by some F-tests for linear combinations of the estimated parameters. Specifically, the comparisons of the estimated coefficients for *SymmInt*$\times c_1$ and for *SymmRand*$\times c_1$ and of the estimated coefficients for *AsymmInt*$\times c_1$ and for *SymmRand*$\times c_1$ test the statistical significance of the relative contribution of reciprocity and inequity aversion in explaining conditional cooperation.

[Table 4 about here]

The first column of Table 4 reports the estimation outcome for the whole choice interval. The regression analysis shows that in the baseline condition (i.e., *AsymmPay/Random*) contributions start, on average, slightly above the rational selfish equilibrium outcome (i.e., 7) and tend to decrease over rounds.

[7] In a voluntary contribution game with interior solution, fewer values are expected to lie at the extremes of the choice interval than in a standard linear voluntary contribution game. In this light, the adoption of a linear model seems to be justified by the fact that censoring represents a marginal event in the data collected. In the regression sample, indeed, only 2.3% and 1.1% of the data are left and right censored, respectively.

[8] Pinheiro and Bates (2000) provides a detailed presentation of the computational methods employed in the estimation. The analysis was conducted in the *R Environment* (R Development Core Team, 2010).

[9] For example, the 32256 observations of the first column of Table 4 are obtained from 96 participants choosing a vector of 21 reactions to other's contributions over 8 rounds in 2 treatments.

Concerning conditional cooperation, the other's choice has a statistically significant positive impact, which in the baseline condition can be explained only by anchoring (see the coefficient of c_1). The effect tends to slightly increase as the experiment progresses.

Both inequity aversion alone (see the coefficient of $SymmRand \times c_1$), and inequity aversion and reciprocity together (see the coefficients of $SymmInt \times c_1$ and $AsymmInt \times c_1$) have a positive and statistically significant impact on conditional cooperation. However, the F-tests reported in Table 4 show that when comparing $SymmInt \times c_1$ with $SymmRand \times c_1$ and $AsymmInt \times c_1$ with $SymmRand \times c_1$ no significant difference is observed at 5% level. Thus, the increase in conditional cooperation observed in the presence of intentionality of the contribution and/or symmetry in payments is mainly, even if not entirely, due to inequity aversion.

Result 3 *For the whole choice interval, inequity aversion positively affects conditional cooperation, while reciprocity does not seem to have an additional effect.*

The second column in Table 4 reports the regression estimate for the interval 0-6. Over this interval the choice of the other has no impact in the baseline condition, where only anchoring can be at work. Conditional cooperation is positively affected by inequity aversion alone and inequity aversion and reciprocity together. However, the F-tests reported in Table 4 show that reciprocity does not have a statistically significant additional impact on conditional cooperation.

Result 4 *Equity concerns support conditional cooperation even for the choice interval 0–6, where conditioning on other's behaviour is detrimental in terms of own and collective outcomes.*

The third column in Table 4 contains the regression estimate for the choice interval 7–15. For this interval the intercept is, in qualitative terms, slightly higher than those of the other choice intervals.

Anchoring does not appear to be an explanation of conditional cooperation in this interval, while both inequity aversion alone and inequity aversion and reciprocity together positively influence conditional cooperation. However, also for this interval the F-tests of Table 4 do not detect any additional effect of reciprocity at the 5% level of significance.

Result 5 *Choices in the "truly cooperative" interval 7–15 show that conditional cooperation requires inequity aversion to emerge. Reciprocity has a positive but not significant additional impact on conditional cooperation.*

Finally, the regression for the interval 16–20 (fourth column in Table 4) does not reveal any relevant significant effect. Over this interval of Players

1's potential choices, Players 2 generally choose the selfish rational value (i.e., 7) without showing anchoring or being influenced by reciprocity and equity considerations.

4 A less complex treatment

Compared to previous studies that employed linear voluntary contribution games, we found much less conditional cooperation. Considering the whole choice interval, the share of conditional cooperators varied from 12.5% to 25% in the four experimental conditions, while for the interval 7–15, which is comparable with the linear voluntary contribution game, the share of conditional cooperators varied from 10.4% to 16.7%.

To investigate whether the low levels of conditional cooperation in our experiment are mainly due to the non-linearity of the contribution game or to the complexity of the experimental design, we implemented a less complex control treatment in which the random choice of Player 1 was removed from the design, so that in each round Player 2 submitted a single reaction function. Specifically, Player 1 chose c_1^I and Player 2 chose $c_2(c_1^I)$ for each possible c_1^I of Player 1. This treatment is, thus, comparable with the *SymmPay/Intentional* experimental condition.

Sixty-four undergraduate students took part in the experiment, and the procedures were the same as in the main experiment, described in Section 2.4.

Table 5 reports the frequencies of positive, non different from zero, and negative correlation between Player 1's and Player 2's contributions in the first round of play.

[Table 5 about here]

As Table 5 shows, a considerable share of Players 2 condition their contributions on the contributions of Players 1. The comparison between these data and those of Table 2 reveals that the simpler design generated more conditional cooperation. Compared to the condition *SymmPay/Intentional*, the share of conditional cooperators increases from 25% to 37.5% over the whole interval (0–20) and from 16.7% to 31.3% over the interval 7–15. These figures are more in line with previous results,[10] although that of the interval 7–15 remains slightly lower.

On the basis of their strategies (over the interval 7–15) in the first round of play, 53.1% of the participants in the less-complex treatment are classified as

[10] Just to report some, 41.7%, 44.4%, and 80.6% found by Kocher et al. (2008) in Japan, Austria, and US respectively; 50% by Fischbacher et al. (2001); 55% by Fischbacher & Gächter (2010); 55.6% by Hermann & Thöni (2009).

dominant-strategy contributors, 31.3% as conditional cooperators, and 15.6% as other types.

Table 6 reports the outcome of a regression analysis of the choices of Players 2 in condition *SymmPay/Intentional* and in the less-complex treatment. The variable *Less-complex* is a dummy identifying choices in the less-complex treatment.

[Table 6 about here]

The regression shows that in the less-complex treatment a significantly higher degree of conditional cooperation is present (see the coefficient of *Less-complex* $\times c_1$). Interestingly, this does not hold for the "uncooperative" intervals 0–6 and 16–20.

Result 6 *Reducing complexity leads to a considerable increase in conditional cooperation, which almost doubles over the "truly cooperative" interval 7–15.*

5 Concluding remarks

To understand what motivates people to condition their contributions on those of others, we implemented a non-linear voluntary contribution game that allowed us to distinguish the impact of three motivational forces, namely reciprocity, inequity aversion, and anchoring.

Our analysis shows that in the truly cooperative contribution interval, which is comparable with a linear voluntary contribution game, both reciprocity and equity considerations foster conditional cooperation. However, the additional effect of reciprocity is not significant. Thus, inequity aversion alone appears to explain conditionally cooperative behaviour in our setting. It could be argued that individuals fix a desired level of conditional cooperation and, once a motive suffices to reach the target, other motives potentially at play do not have a significant additional impact. This means that there could be situations in which reciprocity is the main motivational factor and allowing inequity aversion to come into play does not have any additional impact. However, the game employed here does not allow us to test for this conjecture.

Outside the truly cooperative interval, only equity considerations play a role in shaping conditionally cooperative behaviour in the interval below the individual optimum, while no conditional cooperation is found in the interval above the social optimum. The different impact of inequity aversion in the two intervals can be explained by the fact that pursuing equality in final payoffs over the interval above the social optimum comes at a higher individual cost. In addition, choosing the individual optimum instead of matching the other's

choice in the two intervals produces inequity that is disadvantageous in the interval below the individual optimum but advantageous in the interval above the social optimum. Previous studies (Fehr and Schmidt, 1999; Blanco *et al.*, 2011) showed that the psychological cost of inequality is higher in the former than in the latter situation and, thus, individuals may have a higher incentive to pursue equality in payoffs in the interval below the individual optimum.

Anchoring only plays a role in explaining conditional cooperation when considering the entire choice interval. The identified effect seems to reflect the behaviour of those blindly following the other, irrespectively of the experimental condition and the choice interval. This kind of behaviour may originate in a poor understanding of the interaction structure. In this perspective, anchoring could be seen as a heuristic that one applies when the situation is too complex to deal with.

Like previous studies, we document the existence of conditional cooperation in contributing to a public good. Unlike previous studies, which report shares of conditional cooperators generally ranging from about 40% to about 55% (e.g., Fischbacher *et al.*, 2001; Kocher *et al.*, 2008; Herrmann and Thöni, 2009; Fischbacher and Gächter, 2010), we show that only a minority of participants condition their choices on the choice of their partners. The large majority of participants unconditionally choose the selfish rational contribution already in the first round of the experiment. Moreover, in the population of conditional cooperators the impact of others' choices is quite small.

In a control treatment in which complexity was greatly reduced, we registered a considerable increase in conditional cooperation, suggesting that conditional cooperation can be context dependent. It may be that complexity requires higher cognitive effort and this "crowds-out" social considerations that underlie conditional cooperation. This is in line with the results of previous studies analysing the interplay between cognitive depletion and other-regarding concerns. For example, van den Bos *et al.* (2006) found that people are more satisfied with advantageous unequal outcomes when they are cognitively depleted than when they are not. The crowding-out of other-regarding concerns due to cognitive effort is also compatible with the results of Güth *et al.* (2008), who reported that, when evaluating prospects, people cease to show other-regarding concerns when situations become more cognitively demanding, e.g., when risk and delay of outcomes are involved. So far, the interplay between cognitive depletion and other-regarding concerns has not been thoroughly explored and represents a promising area for future research.

References

Alpizar, F., Carlsson, F., and Johansson-Stenman, O. (2008). Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in costa rica. *Journal of Public Economics*, **92**, 1047–1060.

Bardsley, N. and Sausgruber, R. (2005). Conformity and reciprocity in public good provision. *Journal of Economic Psychology*, **26**, 664–681.

Bernheim, B. D. (1994). A theory of conformity. *Journal of Political Economy*, **102**(5), 841–877.

Bikhchandani, S., Hirshleifer, D., and Welch, I. (1998). Learning from the behavior of others: Conformity, fads, and informational cascades. *Journal of Economic Perspectives*, **12**(3), 151–170.

Blanco, M., Engelmann, D., and Normann, H. T. (2011). A within-subject analysis of other-regarding preferences. *Games and Economic Behavior*, **72**, 321–338.

Bolton, G. E. and Ockenfels, A. (2000). ERC: A theory of equity, reciprocity and competition. *American Economic Review*, **90**(1), 166–193.

Bordignon, M. (1993). A fairness approach to income tax evasion. *Journal of Public Economics*, **52**, 345–362.

Chen, Y., Harper, F. M., Konstan, J., and Li, S. X. (2010). Social comparisons and contributions to online communities: A field experiment on MovieLens. *American Economic Review*, **100**(4), 1358–1398.

Croson, R. and Shang, J. Y. (2008). The impact of downward social information on contribution decisions. *Experimental Economics*, **11**, 221–233.

Croson, R., Fatas, E., and Neugebauer, T. (2005). Reciprocity, matching and conditional cooperation in two public goods games. *Economics Letters*, **87**, 95–101.

Croson, R. T. A. (2007). Theories of commitment, altruism and reciprocity: Evidence from linear public goods games. *Economic Inquiry*, **45**(2), 199–216.

Falk, A. (2007). Gift exchange in the field. *Econometrica*, **75**(5), 1501 – 1511.

Falk, A. and Fischbacher, U. (2006). A theory of reciprocity. *Games and Economic Behavior*, **54**, 293–315.

Falk, A., Fischbacher, U., and Gächter, S. (forthcoming). Living in two neighborhoods - Social interaction effects in the lab. *Economic Inquiry*.

Fehr, E. and Schmidt, K. M. (1999). A theory of fairness, competition and cooperation. *Quarterly Journal of Economics*, **114**, 817–868.

Fehr, E., Gächter, S., and Kirchsteiger, G. (1997). Reciprocity as a contract enforcement device: experimental evidence. *Econometrica*, **65**(4), 833–860.

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

Fischbacher, U. and Gächter, S. (2010). Social preferences, beliefs, and the dynamics of free riding in public goods experiments. *American Economic Review*, **100**(1), 541–556.

Fischbacher, U., Gächter, S., and Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters*, **71**, 397–404.

Frey, B. S. and Meier, S. (2004). Social comparisons and pro-social behavior: Testing "conditional cooperation" in a field experiment. *American Economic Review*, **94**(5), 1717–1722.

Gächter, S., Nosenzo, D., Renner, E., and Sefton, M. (2011). Who makes a good leader? Cooperativeness, optimism, and leading-by-example. *Economic Inquiry*.

Glöckner, A., Irlenbusch, B., Kube, S., Nicklisch, A., and Normann, H. T. (2011). Leading with(out) sacrifice? A public-goods experiment with a super-additive player. *Economic Inquiry*, **49**(2), 591–597.

Greiner, B. (2004). An Online Recruitment System for Economic Experiments. In K. Kremer and V. Macho, editors, *Forschung und wissenschaftliches Rechnen 2003*. GWDG Bericht 63, Göttingen : Ges. für Wiss. Datenverarbeitung.

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

Güth, W., Levati, M. V., and Ploner, M. (2008). On the social dimension of time and risk preferences: an experimental study. *Economic Inquiry*, **46**(2), 261–272.

Herrmann, B. and Thöni, C. (2009). Measuring conditional cooperation: a replication study in Russia. *Experimental Economics*, **12**, 87–92.

Hoffman, E., McCabe, K., Shachat, K., and Smith, V. (1994). Preferences, property rights, and anonymity in bargaining games. *Games and Economic Behavior*, **7**, 346–380.

Keser, C. (1996). Voluntary contributions to a public good when partial contribution is a dominant strategy. *Economics Letters*, **50**, 359–366.

Keser, C. and van Winden, F. (2000). Conditional cooperation and voluntary contributions to public goods. *Scandinavian Journal of Economics*, **102**(1), 23 – 39.

Kocher, M. G., Cherry, T., Kroll, S., Netzer, R. J., and Sutter, M. (2008). Conditional cooperation on three continents. *Economics Letters*, **101**, 175–178.

Kurzban, R. and DeScioli, P. (2008). Reciprocity in groups: Information-seeking in a public goods game. *European Journal of Social Psychology*, **38**, 139–158.

Levati, M. V., Sutter, M., and van der Heijden, E. (2007). Leading by example in a public goods experiment with heterogeneity and incomplete information. *Journal of Conflict Resolution*, **51**, 793 – 818.

Martin, R. and Randal, J. (2008). How is donation behaviour affected by the donations of others? *Journal of Economic Behavior & Organization*, **67**, 228–238.

McKelvey, R. D. and Palfrey, T. R. (1995). Quantal response equilibria for normal form games. *Games and Economic Behavior*, **10**, 6–38.

Meier, S. (2006). Does framing matter for conditional cooperation? Evidence from a natural field experiment. *The B.E. Journal of Economic Analysis & Policy*, **5**(2).

Neugebauer, T., Perote, J., Schmidt, U., and Loos, M. (2009). Selfish-biased conditional cooperation: On the decline of contributions in repeated public goods experiments. *Journal of Economic Psychology*, **30**, 52–60.

Pinheiro, J. C. and Bates, D. M. (2000). *Mixed-Effects Models in S and S-PLUS*. Springer.

R Development Core Team (2010). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0.

Rabin, M. (1993). Incorporating fairness into game theory and economics. *American Economic Review*, **83**(6), 1281 – 1302.

Shang, J. and Croson, R. (2009). A field experiment in charitable contribution: the impact of social information on the voluntary provision of public goods. *Economic Journal*, **119**, 1422–1439.

Sonnemans, J., Schram, A., and Offerman, T. (1999). Strategic behavior in public good games: when partners drift apart. *Economics Letters*, **62**, 35–41.

Sugden, R. (1984). Reciprocity: The supply of public goods through voluntary contributions. *Economic Journal*, **94**(376), 772–787.

Tversky, A. and Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, **185**, 1124–1131.

van den Bos, K., Peters, S. L., Bobocel, D. R., and Ybema, J. F. (2006). On preferences and doing the right thing: Satisfaction with advantageous inequity when cognitive processing is limited. *Journal of Experimental Social Psychology*, **42**, 273–289.

Vesterlund, L. (2003). The informational value of sequential fundraising. *Journal of Public Economics*, **87**, 627–657.

A Tables

Table 1: Treatments

	Intentional	Random
	II	RR
SymmPay	$\pi_1(c_1^I, c_2(c_1^I))$	$\pi_1(c_1^R, c_2(c_1^R))$
	$\pi_2(c_1^I, c_2(c_1^I))$	$\pi_2(c_1^R, c_2(c_1^R))$
	II	IR
AsymmPay	$\pi_1(c_1^I, c_2(c_1^I))$	$\pi_1(c_1^I, c_2(c_1^I))$
	$\pi_2(c_1^I, c_2(c_1^I))$	$\pi_2(c_1^R, c_2(c_1^R))$

Table 2: Classification by correlation between choices in the Pair (Round 1, Spearman's ρ)

% Frequency		Intentional				Random			
		0–20	0–6	7–15	16–20	0–20	0–6	7–15	16–20
SymmPay	$\rho > 0$	25.0	18.7	16.7	12.5	16.7	12.5	12.5	8.3
	$\rho \approx 0$	12.5	8.3	10.4	10.4	10.4	10.4	8.3	12.5
	$\rho < 0$	2.1	4.2	4.2	2.1	4.2	2.1	2.1	2.1
	$sd = 0$	60.4	68.8	68.7	75.0	68.7	75.0	77.1	77.1
AsymmPay	$\rho > 0$	18.8	10.4	12.5	8.3	12.5	16.7	10.4	2.1
	$\rho \approx 0$	16.7	20.8	16.7	12.5	14.6	12.5	16.7	16.7
	$\rho < 0$	6.2	4.2	8.3	0	8.3	6.2	4.2	2.1
	$sd = 0$	58.3	64.6	62.5	79.2	64.6	64.6	68.7	79.1

Table 3: Distribution of types in the four experimental conditions [Round 1, choice interval 7–15]

	Dominant-strategy contributors	Conditional cooperators	Other types
SymmPay/Intentional	60.4	16.7	22.9
AsymmPay/Intentional	50.0	12.5	37.5
SymmPay/Random	62.5	12.5	25.0
AsymmPay/Random	54.2	10.4	35.4

Table 4: Choices of Player 2 (Mixed-Effects Linear Model)

	Coefficient (Std. Err.)			
	Choice Interval			
c_2 (dep. var.)	0–20	0–6	7–15	16–20
Intercept	7.271 (0.214)***	7.256 (0.281)***	7.713 (0.314)***	7.284 (1.081)***
c_1	0.039 (0.006)***	0.0223 (0.029)	0.005 (0.018)	0.036 (0.056)
SymmInt	-0.464 (0.293)	-0.659 (0.384)*	-0.329 (0.393)	-0.800 (1.154)
AsymmInt	-0.124 (0.077)	-0.091 (0.106)	-0.461 (0.209)**	-0.242 (1.021)
SymmRand	-0.420 (0.293)	-0.604 (0.384)	-0.389 (0.393)	-0.801 (1.154)
Round	-0.102 (0.012)***	-0.111 (0.016)***	-0.141 (0.032)***	-0.035 (0.157)
SymmInt $\times c_1$	0.050 (0.007)***	0.111 (0.029)***	0.042 (0.019)**	0.066 (0.056)
AsymmInt $\times c_1$	0.044 (0.007)***	0.048 (0.029)	0.071 (0.019)***	0.052 (0.056)
SymmRand $\times c_1$	0.039 (0.007)***	0.105 (0.029)***	0.037 (0.019)**	0.058 (0.056)
Round $\times c_1$	0.004 (0.001)***	0.008 (0.005)*	0.007 (0.003)**	0.000 (0.009)
	F-test for linear combination (p-values)			
SymmInt$\times c_1$ vs AsymmInt$\times c_1$	0.375	0.033	0.115	0.811
SymmInt$\times c_1$ vs SymmRand$\times c_1$	0.085	0.835	0.784	0.897
AsymmInt$\times c_1$ vs SymmRand$\times c_1$	0.402	0.055	0.065	0.912
Obs$^+$	32256	10752	13824	7680

***(1%); **(5%); *(10%) significance level

$^+$ N(subjects)=96; N(groups)=12

Table 5: Classification by correlation between choices in the Pair – Less-complex treatment (Round 1, Spearman's ρ)

% Frequency		Intentional			
N=32		0–20	0–6	7–15	16–20
	$\rho > 0$	37.5	18.8	31.3	21.9
SymmPay	$\rho \approx 0$	9.4	16.6	6.2	12.5
	$\rho < 0$	0	0	0	0
	$sd = 0$	53.1	65.6	62.5	65.6

B Figures

Table 6: Choices of Player 2 – Less-complex treat. (Mixed-Effects Linear Model)

	Coefficient (Std. Err.)			
	Choice Interval			
c_2 (dep. var.)	0–20	0–6	7–15	16–20
Intercept	6.544 (0.250)***	6.267 (0.309)***	6.947 (0.305)***	6.551 (0.821)***
c_1	0.106 (0.005)***	0.171 (0.017)	0.078 (0.012)***	0.102 (0.036)***
Round	-0.043 (0.009)***	-0.038 (0.011)***	-0.044 (0.010)***	-0.050 (0.017)***
Less-complex	-1.040 (0.389)**	-0.547 (0.482)	-1.913 (0.477)***	0.037 (1.292)
Less-complex $\times c_1$	0.112 (0.007)***	-0.045 (0.027)*	0.188 (0.019)***	0.055 (0.057)
Obs$^+$	13440	4480	5760	3200

***(1%); **(5%); *(10%) significance level $^+$ N(subjects)=80; N(groups)=10

Figure 1: Choices of Players 2 (Round 1)

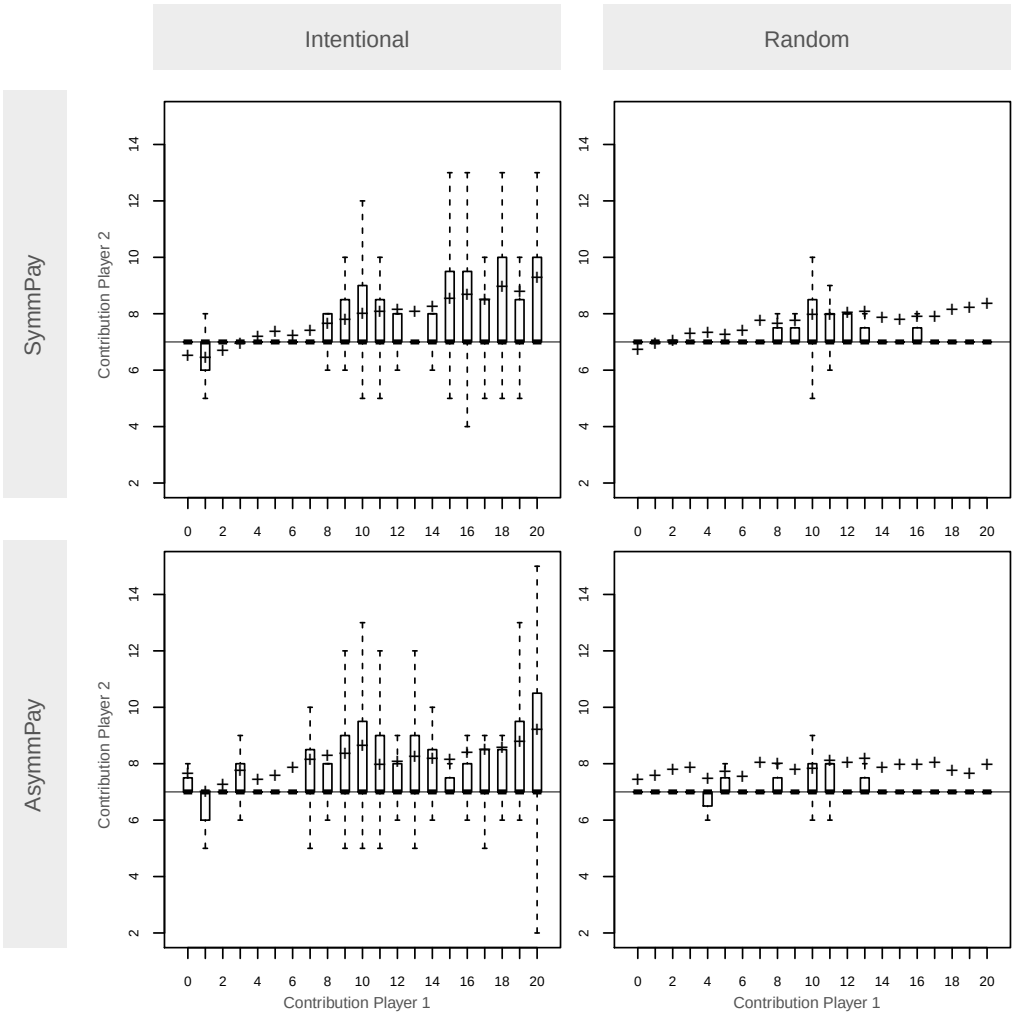

Table 7: Payoff Table

Own Contribution	Other's 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	420	435	450	465	480	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705	720
1	433	448	463	478	493	508	523	538	553	568	583	598	613	628	643	658	673	688	703	718	733
2	444	459	474	489	504	519	534	549	564	579	594	609	624	639	654	669	684	699	714	729	744
3	453	468	483	498	513	528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753
4	460	475	490	505	520	535	550	565	580	595	610	625	640	655	670	685	700	715	730	745	760
5	465	480	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705	720	735	750	765
6	468	483	498	513	528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753	768
7	469	484	499	514	529	544	559	574	589	604	619	634	649	664	679	694	709	724	739	754	769
8	468	483	498	513	528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753	768
9	465	480	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705	720	735	750	765
10	460	475	490	505	520	535	550	565	580	595	610	625	640	655	670	685	700	715	730	745	760
11	453	468	483	498	513	528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753
12	444	459	474	489	504	519	534	549	564	579	594	609	624	639	654	669	684	699	714	729	744
13	433	448	463	478	493	508	523	538	553	568	583	598	613	628	643	658	673	688	703	718	733
14	420	435	450	465	480	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705	720
15	405	420	435	450	465	480	495	510	525	540	555	570	585	600	615	630	645	660	675	690	705
16	388	403	418	433	448	463	478	493	508	523	538	553	568	583	598	613	628	643	658	673	688
17	369	384	399	414	429	444	459	474	489	504	519	534	549	564	579	594	609	624	639	654	669
18	348	363	378	393	408	423	438	453	468	483	498	513	528	543	558	573	588	603	618	633	648
19	325	340	355	370	385	400	415	430	445	460	475	490	505	520	535	550	565	580	595	610	625
20	300	315	330	345	360	375	390	405	420	435	450	465	480	495	510	525	540	555	570	585	600