ELSEVIER

Journal of Economic Behavior & Organization
Vol. 62 (2007) 293–303

JOURNAL OF
Economic Behavior
& Organization

www.elsevier.com/locate/econbase

Self-centered and other-regarding behavior in the solidarity game

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Received 1 December 2003; received in revised form 29 November 2004; accepted 2 December 2004
Available online 20 December 2005

Abstract

This paper revisits the experiment on the solidarity game by Selten and Ockenfels [Selten, R., Ockenfels, A., 1998. An experimental solidarity game. Journal of Economic Behavior and Organization 34, 517–539]. We replicate the basic design and extend it to test the robustness of the 'fixed total sacrifice' effect and the applied strategy method. Our results only partially confirm the validity of the fixed total sacrifice effect. In a treatment with constant group endowment rather than constant winner endowment, the predominance of 'fixed total sacrifice' behavior is replaced by 'fixed relative gift' behavior. We do not find correlations between actual gift behavior and measures of empathy-driven pro-social behavior used in social science.

JEL classification: C91; D3

Keywords: Experimental economics; Game theory; Fixed total sacrifice; Solidarity

1. Introduction

Solidarity behavior has been studied in experimental economics introducing a particular type of 'solidarity game' based on conditional gifts (Selten and Ockenfels, 1998; Ockenfels and Weimann, 1999). In this game, each of three participants has a two-thirds probability of winning a fixed

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doi:10.1016/j.jebo.2004.12.006

amount of money and a one-third probability of ending up with nothing. Before knowing the result of the random draw, each participant must indicate the amount of money (gift) she would like to hand over in case she is going to be a winner; that is, she has to specify the gift that she would dispense in the case of one loser and in the case of two losers in the group. The total gift can be any amount between zero and the total amount she might win. This procedure corresponds to the 'strategy method' introduced by Selten (1967). 'Solidarity' in this context means voluntary gift giving by lucky winners to needy losers in a group. The interaction is characterized by an unfavorable situation that could potentially affect everybody but will eventually affect only one part of the population, the needy person(s).

The results of Selten and Ockenfels (1998) and Ockenfels and Weimann (1999) show two major features: first, the fact that the majority of subjects give positive gifts,[1] and second, the predominance of a behavior the authors call 'fixed total sacrifice' (the total gift of the most subjects is independent of the number of losers). In this paper, we test the robustness of these results.

Selten and Ockenfels argue that it is the reciprocal element of the strategy method that makes the solidarity game different from simple dictator games, but that it is different from pure reciprocity because gifts cannot be reciprocated over time. Deciding how much to give before knowing the result of the random draw may induce empathy, forcing the subject to 'put herself in the shoes' of the loser.[2] In this sense, we talk about implicit reciprocity as the positive effect of giving, considering that we might be in the recipient's situation.

Our first Hypothesis follows Selten and Ockenfels stating that:

Hypothesis 1. The strategy method induces a context in which solidarity based on implicit reciprocity might be generated increasing gift giving.

In order to test this hypothesis, we introduce a treatment involving a partial play method (PPM) where people decide *after* learning that they are a winner, but still do not know if they will be matched with 0, 1 or 2 other winners (losers, respectively) in the group. This is analogous to a dictator game with prior random entitlement. The act of giving is free from any reasoning based on reciprocity. If Hypothesis 1 is true and implicit reciprocity generated by the strategy method plays a role, we should observe a higher level of gift giving in the original solidarity game than in our PPM treatment.

The second feature observed by Selten and Ockenfels is the 'fixed total sacrifice' effect. Subjects of their experiments seem to use a two-stage reasoning in which they first determine the amount they want to keep for themselves and then distribute the remaining amount (if any) among the needy person(s), which has to be classified as purely 'self-centered fairness' behavior. Selten and Ockenfels indicate that this type of behavior is inconsistent with the maximization of a standard altruistic utility function that includes payoffs of other individuals.

The observation of 'fixed total sacrifice' behavior might reflect the fact that in case of two winners (one loser) and in case of one winner (two losers) the total group gain varies; it is equal to 20 DM in the first case and 10 DM in the second. The subjects might have found an 'internal justification' for giving the same amount to one loser as to two losers, considering that in the second case the total group endowment is reduced by half. In order to test this possible effect, we

[1] Ockenfels and Weimann additionally observe that East German subjects give significantly less than West German subjects.

[2] For an argument in a similar vein, see Stahl and Haruvy (2006).

introduce a treatment with a constant group endowment (CGE) for each random move outcome with at least one winner.

Hypothesis 2. In a treatment with a constant group endowment, we observe a 'fixed total gift' behavior rather than the 'fixed total sacrifice' effect.

To sum up, the main goal of our study is to test (1) the robustness of gift giving with regard to the strategy method involved and (2) the robustness of the fixed total sacrifice effect with regard to the individual endowment of winners and the group endowment. Additionally, in order to check whether the extent of gift giving and the types of solidarity behavior classified by Selten and Ockenfels correspond to measures used in social science, we introduce a structured questionnaire on personality characteristics of pro-social behavior corresponding to the interpersonal reactivity index, IRI (Davis, 1980, 1983). The IRI is in common use in sociopsychological studies on pro-social behavior, that is behavior that is intended to benefit other people (Carlo et al., 1999).

Our replication of Selten and Ockenfels' experiment and the introduction of the partial play method reproduce the original results, indicating that the strategy method plays no role for gift giving in the solidarity game. In contrast, in the treatment with constant group endowment, we find that most subjects give the same relative gift to one loser as to each of the two losers. In other words: the predominant behavior switches from a self-centered type in the replication treatment to an other-regarding type in a treatment with constant group endowment. We do not find any correlation between the IRI and the actual gifts. Our extensions of the original solidarity game yield a better understanding of gift behavior and of the source of 'fixed total sacrifice' behavior.

2. Experimental design and procedures

Our design consists of three treatments. The first (SO-R, 'S–O Replication') is a replication of the original solidarity game of Selten and Ockenfels with some variations in the experimental procedures. Subjects participate in a three-person game where each subject has the same probability (2/3) of winning €10. Without knowing whether they are a winner and how the group is matched, participants are asked to specify the amount of money they are willing to hand over to each loser in case they are a winner and with one loser or two losers in the group.[3] Treatment SO-R serves as a baseline for the other two treatments.

In our second treatment (PPM), we introduce a partial-play method of the SO-R design. The subjects know before deciding whether they are winners or losers, and only the winners decide how much they are willing to give to one or two possible losers in the group.

Our third experimental treatment ('constant group endowment') controls for group endowment effects. We vary the individual lottery prize conditional on the cases in which there are three, two or one winners in a group. The prize is €6.70 if the group consists of three winners, €10 for two winners and €20 for a single winner in a group. These parameters keep the ex-ante expected group and individual endowments of the SO-R treatment (approximately) constant. Table 1 summarizes the design parameters.

In each of the three treatments, we ask subjects to answer an IRI questionnaire with 28 randomly ordered items. The questionnaire has four components: perspective taking (PT), empathic concern

[3] Of course, they had nothing to specify for the case of no or three losers in the group.

Table 1
Experimental treatments and parameters

Treat		Winners				Ea. exp.	Sess.	Part.	Mon.	Ind. Ob
		3	2	1	0					
SO-R	Ind. End.	10	10	10	–	6.66	2	15	1	30
	Gr. End.	30	20	10	0	20				
PPM	Ind. End.	10	10	10	–	6.66	2	15	1	20
	Gr. End.	30	20	10	0	20				
CGE	Ind. End.	6.7	10	20	–	6.43	2	15	1	30
	Gr. End.	20.1	20	20	0	19.29				

Note: 'Ind. End.' indicates 'individual endowment for each winner', 'Gr. End.' indicates 'group endowment', 'Ea. exp.' means 'ex-ante expected', 'Mon.' means 'monitors' and 'Ind. Ob' stands for 'independent observations'.

(EC), personal distress (PD) and fantasy (FS), each composed of seven items for which the subjects have to indicate how a statement describes them on a five-point scale.[4]

The six sessions with 16 participants (15 subjects plus a monitor) each were conducted at the experimental laboratory of the Max Planck Institute in Jena, Germany, with undergraduate students from the local Friedrich Schiller University. The average age of the 90 active participants (without the monitors) was 23 years, 51 (39) were female (male). The experimental sessions lasted on average 1 h, with an average earning of €9.73 including a show-up fee of €2.50.

Like Selten and Ockenfels, we used a double-blind procedure (i.e. neither the experimenter nor the other subjects could deduce the identity of the correspondent decision maker from a decision), but contrary to them we conducted the experiment in the laboratory rather than in the students' restaurant, used a monitor for the double-blind procedure, and payed subjects immediately after the experiment.

After subjects entered the laboratory, were randomly seated, read the instructions and were allowed to ask clarifying questions, they were asked to draw an envelope from a box containing 16 'big' envelopes. Inside each envelope, except one, was a card with a code number and three small colored envelopes containing the forms. In a single envelope, there was a card marked with 'monitor' instead of a code number. The monitor did not participate in the game and had to guarantee the 'active' subjects that the experiment was conducted according to the rules stated in the instructions.

The three 'small' envelopes, a blue (decisions), a green (expectations) and a red (IRI and personal data questionnaire) one, were opened sequentially on the experimenter's request. After filling in a form, subjects had to put it back into the corresponding envelope, and the monitor collected them before the next envelope was opened. Amounts of gifts had to be stated for the one loser and the two losers case in 10-cent steps, and subjects could not discriminate between two losers. For expectations, subjects got one extra Euro if one of the amounts specified differed less than 50 cents or two extra Euros if both amounts differed at most 50 cents from the average amount of gifts.

Treatments SO-R and CGE followed the same protocol and involved parallel instructions, differing only with respect to the numbers in the decision and expectation forms. In treatment

[4] Instructions, a more detailed description of the procedures, decision forms including the complete IRI questionnaire and the data set including type classification can be downloaded from http://experiment.uni-koeln.de/~bgreiner/supplements/.

Table 2
Descriptive statistics: average gifts and expectations in euro (S–O and O–W results relying on a pie of 10 DM = €5.11 calculated with the official exchange rate €1 = 1.95583 DM), standard deviations in brackets

	N	g_1	g_2	e_1	e_2
SO-R	30	1.39 (1.30)	0.96 (0.82)	1.87 (1.33)	1.34 (1.01)
PPM winners	20	1.53 (1.47)	1.05 (0.86)	2.09 (1.51)	1.38 (0.92)
PPM losers	10			2.75 (1.21)	1.37 (0.76)
CGE	30	1.62 (1.40)	2.84 (2.31)	1.79 (1.04)	2.99 (1.79)
S–O (West)	118	1.26	0.80	1.26	0.78
O–W (East)	58/56	0.83	0.52	0.82	0.55

PPM, at the top of the decision form players were informed whether they were winners (10 envelopes) or losers (5 envelopes, empty decision form), while in the other treatments the lottery outcome for the envelopes was determined, after completion of all forms, by the monitor's throw of a dice.

At the end of the experiment, the monitor drew the decision envelopes randomly from a box to match subjects in groups. The experimenters opened the envelopes and calculated the payoffs. Payment envelopes marked with the code numbers were distributed by the monitor after the experimenters left the room. When leaving the laboratory, subjects had to sign a list of all payoffs confirming that they had received money in cash under one of the code numbers printed above. In this way, their payoff was kept anonymous.

3. Results

3.1. Gift behavior

In the description of the results, we denote g_1 as the gift to one loser and g_2 as the gift to *each one* of two losers, e_1 as subjects' expectation of the average g_1 and e_2 as subjects' expectation of the average g_2. Table 2 reports the mean absolute monetary values of conditional gifts, the mean absolute values of the expectations, and the corresponding values from Selten and Ockenfels (S–O) and Ockenfels and Weimann (O–W).

The absolute values of gifts and expectations for each of our treatments are higher than the ones observed by S–O and much higher than in O–W. Indeed, this may be due to the differences in the winner's endowment, which is €10 in our treatments SO-R and PPM and 10 DM = €5.11 in S–O and O–W. We did not observe any differences between the means and distributions of g_1 among our three treatments.[5] For the mean values of g_2, the Kruskall–Wallis test ($\chi^2 = 9.19$, $P = 0.010$) rejects the null hypotheses of the same mean among the three treatments, while pairwise two-tailed Mann–Whitney-U- and K–S tests indicate this to be true only for the comparisons of SO-R versus CGE and PPM versus CGE, while it is not true for a comparison of SO-R versus PPM (MW-U P-values 0.000, 0.000 and 0.799, and K–S P-values 0.000, 0.002 and 1, respectively).

Thus, the higher endowment of the winner in the case of two losers in CGE yields significant differences in gift behavior. However, if we consider the conditional gifts as a proportion of the

[5] Kruskall–Wallis test ($\chi^2 = 0.417$, $P = 0.812$), pairwise two-tailed Mann–Whitney-U-tests ($P > 0.1$ for all comparisons), two-tailed Kolmogorov–Smirnov goodness-of-fit tests (K–S) comparing pairs of samples (P-values equal to 0.997, 0.799 and 0.723, for the treatments SO-R versus PPM, SO-R versus CGE, and PPM versus CGE, respectively).

Table 3
Classification of behavioral types in our data

Type	Pattern
Egoistical	$g_1 = g_2 = 0$
$g_1 > 2g_2$	$g_1 > 2g_2$
Exact fixed total sacrifice	$g_1 = 2g_2 > 0$
Fixed total sacrifice up to rounding	$g_1 \sim 2g_2 > 0$
Intermediate	$g_1 > 2g_2 > 0$ and $2g_2 > g_1 > g_2 > 0$
Exact fixed gift to losers	$g_1 = g_2 > 0$
Fixed gift up to rounding	$g_1 \sim g_2 > 0$
$g_2 > g_1$	$g_2 > g_1$ (=0)

winner's own endowment, g_2 for CGE is still higher than for SO-R and PPM (0.142 versus 0.096 and 0.105, respectively), but we observe no significant difference among the three means and distributions of gifts.[6]

The aggregated data indicates the stability of the experimental procedure between the treatments SO-R and CGE, where the experimental procedure and the parameters for the one loser case were the same. In treatment SO-R, we replicated the findings of Selten and Ockenfels (1998) and Ockenfels and Weimann (1999) even though we introduced the following variations: laboratory pen and paper experiment, double-blind with a monitor, no lottery and instant payment.

Our results from the treatment PPM introducing a partial play method, which has no effects on gifts to losers in the group, shows that aggregate behavior in the solidarity game is robust against the strategy method. Thus, we have to reject our Hypothesis 1: implicit reciprocity generated by the use of the strategy method does not contribute to the explanation of gift giving in this game.

Indeed, positive gifts in the solidarity game are consistent with previous findings from dictator experiments. However, the evidence for the impact of the strategy method on behavior is mixed. Our results strengthen the view of no influence of the strategy method on behavior, similar to Brandts and Charness (2000) and others. The strategy method appears to be an innocent tool to study gift-giving behavior.

3.2. Behavioral types in individual data

For the classification of behavioral types, we use the same definitions as Selten and Ockenfels, but extend them by adding new characteristics of behavior we have observed. Like Selten and Ockenfels, we consider rounding of amounts up to a multiple of the prominence level of 1.00 for the types of 'fixed total sacrifice' and 'fixed total gift'. However, rounding the gift for 'fixed total sacrifice' can only be considered in treatments SO-R and PPM, because in treatment CGE (relative) 'fixed total sacrifice' would lead to specifying exactly the same absolute amount for one loser as for each of two losers. Analogously, rounding the 'fixed gift' can only be considered in our treatment CGE where a (relative) 'fixed gift' means that $g_1 = \frac{1}{2}g_2$.

We define eight types of behavior, which are listed in Table 3. One subject's behavior of $g_1 > 2g_2$ could not be classified as 'fixed total sacrifice up to rounding', such that we had to create a separate category for it. For relative gifts, we observed the pattern of $g_2 > g_1 = 0$ two times with

[6] Kruskall–Wallis test, $\chi^2 = 2.69$, $P = 0.26$; pairwise Mann–Whitney-U-tests and K–S tests with $P > 0.1$ for the comparisons SO-R versus CGE and PPM versus CGE.

Table 4
Relative frequencies of types of behavior

Types	Egoistical	$g_1 > 2g_2$	Fixed total sacrifice		Intermediate	Fixed gift to loser		$g_2 > g_1$
			Exact	Up to round		Exact	Up to round	
SO-R	0.27	0.03	0.20	0.23	0.07	0.13		0.07
PPM	0.25		0.15	0.20	0.15	0.25		
CGE ab	0.30					0.07		0.63
CGE rel	0.30		0.07		0.23	0.30	0.07	0.03
S–O	0.21		0.36	0.16	0.11	0.16		
O–W	0.47		0.26	0.09	0.05	0.14		

Entries for treatment 'CGE ab' and 'CGE rel' consider the absolute conditional gift and the conditional gift in proportion of the winner's own endowment, respectively.

$g_2 = 1$ in SO-R, and one time with $g_2 = 2.5$ in CGE. This behavior may be explained by taking over responsibility when being the only winner in the group while letting the other winner pay in the case of two winners in the group.

Table 4 reports the relative percentage of types of behavior, resulting from a decomposition of conditional gift giving, for our treatments as well as for the original S–O solidarity game. Note that for our treatment CGE, we report both classification types based on absolute gifts and on relative gifts. The 7 percent 'fixed total gift' behavior in treatment CGE with absolute values can be called 'fixed *relative* sacrifice' behavior as well.

If we consider absolute gifts, we have to classify 63 percent of the behavior in treatment CGE as giving more to each of the two losers than to one loser in the group. This is not in line with the evidence from our other sessions and from S–O and O–W, while if one considers the conditional gifts relative to winners' endowment, this portion shrinks to 3 percent. In the following, we consider results only on a relative basis.

Throughout the experiment, we observe 27 percent of egoistical behavior. This proportion is analogous to the results of Selten and Ockenfels, who reported 21 percent egoistical behavior, and significantly less than the result of Ockenfels and Weimann, 47 percent. However, the proportion of egoistical behavior is highest in CGE and lowest in PPM.

Overall, we observe an amount of 43 percent of fixed total sacrifice behavior in our replication treatment SO-R, compared to 52 percent in the original S–O game. Note that in the latter the portion of classification in this category due to rounding is about 31 percent, while it is 53 percent in our data. Without rounding, most of these data points would belong to intermediate behavior. Despite this, we can say that in SO-R we have replicated the S–O game also in the observed types of behavior. In the PPM treatment, we observe 8 percent less fixed total sacrifice and more intermediate behavior, but these changes are rather small.

In treatment CGE, the distribution of behavior changes completely. Only 7 percent of our participants exhibit the fixed 'relative' sacrifice behavior as suggested by Hypothesis 2. The proportion of intermediate behavior rises to 23 percent, and about 37 percent of the subjects give a fixed relative gift (i.e. the same share of their endowment to one loser as to each of the two losers).

Table 5 reports a Chi-Square Test for differences in distribution of behavioral types on a relative base between our three treatments and the data from S–O and O–W. We excluded the three observations from $g_1 > 2g_2$ and $g_2 > g_1$ and formed four groups of behavioral types: 'egoistical behavior', 'fixed total sacrifice' (including rounding), 'intermediate' and 'fixed gift' (including

Table 5
Results from Chi-square tests for differences in distribution of behavioral type groups 'egoists', 'fixed total sacrifice', 'intermediate' and 'fixed gift' based on conditional gifts relative to winner's endowment between treatments SO-R, PPM and CGE and the data from S–O and O–W

χ^2	Expected				
	S–O	O–W	SO-R	PPM	CGE rel
Observed					
S–O	–	–	–	–	–
O–W	22.928** (<0.0001)	–	–	–	–
SO-R	1.321 (0.747)	3.404 (0.318)	–	–	–
PPM	2.487 (0.488)	7.553 (0.056)	3.820 (0.280)	–	–
CGE rel	25.700** (<0.0001)	40.317** (<0.0001)	31.687** (<0.0001)	8.552* (0.036)	–

Significance values in brackets.
* Significant on the 5 percent-level.
** Significant on the 0.1 percent-level.

rounding). As can be seen, we cannot reject the null hypotheses of the same distribution of behavioral types for our treatments SO-R and PPM compared to S–O and O–W, while the S–O and O–W distributions differ. The observed distribution of behavioral types in our treatment CGE is different from the observed distributions of all other treatments and experiments.

Our experimental analysis confirms that the fixed total sacrifice is the most common behavior in the solidarity game when the winner's endowment remains constant over all possible scenarios of the game (as in our treatments SO-R and PPM). However, in our treatment CGE the predominance of fixed total sacrifice behavior disappears and is substituted by fixed relative gift behavior. While the difference between both treatments is that the winner's endowment is doubled for the two losers case in CGE, subjects respond by quadrupling their total gift in the two losers case. Table 6 compares both predominant behaviors in treatments SO-R and CGE.

Selten and Ockenfels explain the fixed total sacrifice effect with a two-stage reasoning process: in a first step, dictators decide how much to keep for themselves, and in a second step, they

Table 6
Comparisons between the predominant behavior in treatment SO-R, 'fixed total sacrifice' and the predominant behavior in treatment CGE, 'fixed relative gift'; $0 < x \leq 5$

	Fixed total sacrifice in SO-R		Fixed relative gift in CGE	
	One loser	Two losers	One loser	Two losers
Group endowment	20	10	20	20
Individual endowment	10	10	10	20
Absolute gift to each loser	x	$\frac{1}{2}x$	x	$2x$
Relative gift to each loser	$x/10$	$\frac{1}{2}x/10$	$x/10$	$x/10$
Absolute total gift	x	x	x	$4x$
Relative total gift	$x/10$	$x/10$	$x/10$	$2x/10$
Absolute expected income of loser	$2x$	$\frac{1}{2}x$	$2x$	$2x$
Relative expected income of loser	$x/10$	$\frac{1}{2}x/10$	$x/10$	$x/10$
Absolute income of winner	$10-x$	$10-x$	$10-x$	$20-4x$
Relative income of winner	$10-x/20$	$10-x/10$	$10-x/20$	$10-2x/10$
Average x	2.24	2.74	2.17	2.21

The average x is calculated from the subjects showing this behavior including rounding.

distribute the remaining amount among potential receivers. This reasoning process is not visible in our data from treatment CGE. We cannot imagine such a cognitive process that could cover both types of behavior exhibited in the two treatments. Essentially, we find a shift from self-centered 'fixed total sacrifice' behavior in treatment SO-R to other-regarding 'fixed relative gift' behavior in treatment CGE. In the first case, winners keep their own (relative) income constant regardless whether there are one or two losers in the group. In the second case, winners give gifts in a way that the (expected) income of each loser is constant regardless whether there are one or two of them.

3.3. Expectations

Table 2 summarizes subjects' expectations e_1 and e_2 in the three treatments. Although very close, the values are slightly higher than the observed conditional gifts. Spearman rank tests ($\rho = 0.64$, for the g_1 and e_1, one-tailed $P < 0.01$; and $\rho = 0.653$, for the g_2 and e_2 proportional to winner's own endowment, one-tailed $P < 0.01$) show a high and significant correlation among choices and expectations. However, one-sided Wilcoxon Matched Pairs Signed Ranks tests show that in treatments SO-R and PPM subjects expect significantly higher gifts from others than they actually contribute themselves ($P < 0.05$ for CGE and PPM winners).

Indeed, this result is driven by a high number of low-contribution, higher-expectation data points compared to a low number of high-contribution, lower-expectation subjects, but the higher mean in expectations than in donations has a different source. To show this, we examine the expectations of subjects from all treatments giving a lower gift to one loser than the average of €1.51, compared to the expectations of gift givers that are above mean. The greedier part of our subject population ($N = 45$) with an average g_1 of 0.48 had an average expectation of 1.22 for the gifts of all subjects. The more generous subjects ($N = 35$) with an average g_1 of 2.83 expected all subjects to give 2.77 on average. This shows that while people who behave egoistical guess rightly that the average gift is higher than their own, altruists heavily underestimate the proportion of egoists in their peer group and are therefore more subject to the 'false consensus' effect (i.e. the general tendency to overestimate one's similarity to others).

3.4. Demographic and personality characteristics

We observe an effect that one could call 'economist effect.' A two-tailed Mann–Whitney U-test for the relative gifts and expectations in all treatments yields that subjects studying economics and related studies come from a different population than subjects from other fields regarding actual gifts g_1 ($P = 0.047$) and g_2 ($P = 0.012$), while the same distribution of expectations e_1 ($P = 0.220$) and e_2 ($P = 0.227$) cannot be rejected. Overall, 40 percent of the economists are classified, as 'egoists' while this is true only for 20 percent of students from other fields. We observe neither a gender nor an age effect.

The fact that economists behave differently has also been found by other studies, including Selten and Ockenfels (1998) and Ockenfels and Weimann (1999). Marwell and Ames (1981) report that economics graduate students were much more likely to free ride than any other of their groups of subjects. Frank et al. (1993) show that economic majors are more likely to show self-interested behavior than other students.

These differences may be due to the education of subjects adopting the basic axioms of their studies. On the other side, the differences may be due to personal characteristics and self-selection into economics. In a study they did with freshmen, senior economists and non-economists, Carter

and Irons (1991) had to reject the learning hypothesis but could confirm the selection hypothesis. Thus, they argue, "Economists are born, not made."

We do not find a significant correlation among the scores on the interpersonal reactivity index and its components, on the one hand, and the individual conditional gifts and expectations in the solidarity game, on the other (except a positive non-parametric Spearman correlation between PD and e_2 at the 5 percent level with $P = 0.048$). A decomposition into types of behavior as classified above does not report any particular pattern of behavior related to any specific feature of the IRI.

The lack of correlation might indicate that while the IRI test measures (empathic) solidarity attitudes, the gift giving in the context of the solidarity game can be explained by fairness preferences, but not by empathy-driven solidarity. This coincides with our finding from treatment PPM in that implicit reciprocity induced by the use of the strategy method plays no role for the size of gifts.

4. Conclusions

From the results of SO-R and PPM, we conclude that the level and type of other-regarding behavior is analogous to the findings of Selten and Ockenfels (1998). Under these conditions, the modal individual behavior is the fixed total sacrifice. This behavior can be interpreted as self-centered, considering that the winners decide first the amount they want to keep independently from the number of recipients and then distribute the rest to the needy person(s).

The comparison between SO-R and PPM conditions suggests that empathy does not explain gift giving. Indeed, the level of gift giving does not decrease when the strategy method is removed. The independency of our results from empathy-driven behavior is confirmed by the comparison between the IRI and actual gift behavior. Indeed, subjects with a higher level of an empathy-driven pro-social predisposition do not show higher levels of gift giving or a more egalitarian type of behavior in the solidarity game.

By contrast, the findings from the CGE condition show a dramatic increase in other-regarding behavior of the egalitarian type. The winner keeps the amount of gift for each recipient in the one loser and two losers case constant. Therefore, when the subject is the only winner in the group, she exercises her responsibility by keeping the endowment to each one of the two losers at a fair level.

Comparing the three conditions of our experiment, we conclude that the nature of other-regarding behavior depends on donors' endowment; when it is kept constant between the two contingent cases, the donors behave in a self-centered way whereas when it increases from the one loser to the two losers case, they behave in a more egalitarian way.

Acknowledgement

We thank Werner Güth, Axel Ockenfels, Ro'i Zultan and participants at seminars in Jena and the 2003 ESA European Meeting in Erfurt for helpful comments and suggestions. We are indebted to Axel Ockenfels, Reinhard Selten and Joachim Weimann for providing us with their data for comparisons. Financial support by the Max Planck Society and Action Concertée Incitative, Systemes Complexes from CNRS is gratefully acknowledged.

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