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Conditional cooperation on three continents ☆

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ABSTRACT

We show in a public goods experiment on three continents that conditional cooperation is a universal behavioral regularity. Yet, the number of conditional cooperators and the extent of conditional cooperation are much higher in the United States than anywhere else.

1. Introduction

Even when it is not in their monetary interest, many subjects contribute voluntarily to the provision of public goods. Conditional cooperation has been invoked as one important explanation of these voluntary contributions (see, e.g., Keser and van Winden, 2000; Brandts and Schram, 2001; Fischbacher et al., 2001; Croson, 2002; Fischbacher and Gächter, 2006; Gächter, 2007). The widespread behavioral regularity of conditional cooperation is defined in these studies as a subject's willingness to contribute to a public good when others also contribute or are expected to do so.

The existence and the extent of conditional cooperation are well documented in the economics literature on public goods provision. Early evidence arose with reports of cooperative behavior being greater when people interacted repeatedly with the same group members than when they were repeatedly introduced to new group members (Keser and van Winden, 2000). Other studies provided evidence by showing that people contribute more to a public good when they expect others to contribute more as well (Kachelmeier and Shehata, 1997; Croson, 2002). Eliciting beliefs, however, fails to distinguish between free riders and "pessimistic conditional cooperators" (i.e., people that contribute nothing *and* believe others will also contribute nothing and people that contribute nothing *because* they believe others will contribute nothing).

Recent work provides a more direct examination of conditional cooperation by eliciting individual contribution preferences as a function of others' contributions through the use of the strategy vector method (e.g., Fischbacher et al., 2001; Fischbacher and Gächter, 2006; Kocher, 2007). These studies, which can distinguish between free riders and pessimistic conditional cooperators, report that about half of the population in experiments exhibits conditional-cooperation preferences, typically with a self-serving bias, such that subjects increase their contributions with the others' contributions, but fall short of matching them.

While the existence and extent of conditional cooperation appear robust, the experimental evidence using the direct elicitation through the strategy vector method is quite concentrated among Western countries (mainly Austria and Switzerland). A number of related

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Table 1
Distribution of player types

	U.S.		Austria		Japan	
	Distribution	Av. uncond. contrib.	Distribution	Av. uncond. contrib.	Distribution	Av. uncond. contrib.
Conditional cooperators	80.6% [29]	9.0 (5.6)	44.4% [16]	8.9 (7.6)	41.7% [15]	9.2 (7.7)
Free riders	8.3% [3]	0.0 (0.0)	22.2% [8]	2.9 (7.0)	36.1% [13]	3.5 (6.3)
Hump-shape contributors	0.0%	–	11.1% [4]	7.0 (7.7)	11.1% [4]	11.0 (4.7)
Others	11.1% [4]	7.8 (8.4)	22.2% [8]	8.4 (7.6)	11.1% [4]	10.8 (8.3)

Note: Av. uncond contrib.=average unconditional contributions; absolute numbers in brackets (out of 36 in each location); standard deviations in parentheses.

studies provide insights on the generality of conditional cooperation, but none provides a direct cross-country test by eliciting individual contributions to a public good as a function of others' contributions.[1]

In this paper, we attempt to fill this void by investigating the existence and extent of conditional cooperation across three countries on three different continents. By running identical public goods experiments in North Carolina (United States), Tyrol (Austria), and Tokyo (Japan), we test for the ubiquity of conditional cooperation and possible cultural differences.

Our results indicate that conditional cooperation is prevalent on all three continents. The distribution of player types such as conditional cooperators and free riders as well as the extent of conditional cooperation, however, differs across countries. There are more conditional cooperators and fewer free riders among subjects in the U.S. location than in the Austrian and Japanese location. Also, the extent of conditional cooperation is stronger, on average, in the United States than in the two other countries, even though unconditional contributions to a public good do not differ across continents (as, for instance, already established by Brandts et al., 2004[2]).

2. Experimental design and procedure

Our experimental design builds upon the standard voluntary contribution mechanism with the following linear payoff function:

$$\pi_i = 20 - g_i + 0.6 \sum_{j=1}^{3} g_j, \quad (1)$$

where g_i denotes the contribution of subject i to the public good. Each group consists of $n=3$ randomly assigned subjects, and each subject receives an endowment of 20 tokens. The marginal per capita return (MPCR) from investing in the public good is 0.6.

Assuming that participants are rational and selfish payoff maximizers, it is obvious that any MPCR <1 yields a dominant strategy for every group member to free ride, i.e., to contribute nothing to the public good. From a social or efficiency perspective, it is, of course, optimal to contribute the whole endowment because MPCR$\cdot n>1$.

The details of the preference elicitation and the incentive mechanism in our experiment follow Fischbacher et al. (2001). Subjects are asked to make two types of decisions: an *unconditional contribution* to the public good, and a *conditional contribution*.

The unconditional contribution is a single integer number that satisfies $g_i \leq 20$. For the conditional contributions, subjects have to indicate how much they would contribute to the public good for any possible average contribution of the two other players within their group (rounded to integers). For each of the 21 possible averages from 0 to 20, subjects must decide on a contribution between and including 0 and 20. In the experimental instructions it is stressed that subjects are completely free in choosing their contribution levels and contributions do not need to vary for different averages.[3]

In order to ensure incentive compatibility, both the unconditional as well as the conditional contribution are potentially payoff relevant. For one randomly selected group member the conditional contribution is relevant, whereas the unconditional contributions are relevant for the other two group members. More specifically, the two unconditional contributions within a group and the corresponding conditional contribution (for the specific average of the two unconditional contributions) determine the sum of money contributed to the public good. Individual earnings can then be calculated according to Eq. (1).

The experiment was conducted with identical procedures at Appalachian State University (United States), the University of Innsbruck (Austria) and the University of Tokyo (Japan). At each location the experiment was run with paper and pen, subjects were seated far away from each other to guarantee privacy, and group composition was not revealed to the subjects. Subjects received written instructions that were read aloud by the instructor. In order to ensure that all participants understood the task completely, participants were given 10 control questions. After completion of the questionnaire, the questions were publicly solved. Any remaining questions were answered in private. The public goods game was only played once.[4]

To ensure comparability of the data, we implemented several safeguards. For example, we strictly followed a single fixed and written protocol that precisely dictated each step of the sessions. To ensure equivalence of instructions and to avoid unwanted language effects, instructions were first written in English, then translated into German and Japanese, and then translated back into English by another person and checked for possible disparities.[5]

The sessions involved 36 participants at each location and lasted about 70 min. We had participants from various fields of study, and their socio-economic characteristics were similar across countries. Subjects were informed that their decisions and their final payment would remain confidential. The average earnings of 14.6 euro were paid in cash immediately after the experiment.

3. Experimental results

The unconditional contributions are, on average, 8.11 tokens in the U.S.A, 7.53 tokens in Austria, and 7.22 tokens in Japan. They are not significantly different across the three countries, neither when using a Kruskal Wallis test ($p>0.6$), nor in any pairwise comparison (two-sided Mann–Whitney-U-tests; $p>0.1$ in each case). This null-result

[1] For instance, Croson and Buchan (1999) find similar gender-specific cooperative behavior in a trust game across the United States, China, Japan and Korea (see also the related studies by Buchan et al., 2004, 2006). Kachelmeier and Shehata (1997) report similar expectations of cooperation in a voluntary contribution game across Canada, Hong Kong and China. Henrich et al. (2005) analyze cross-cultural differences in cooperation within small-scale societies but they do not focus on conditional cooperation. The only exemption to our knowledge is a recent study by Herrmann and Thöni (2007), who conducted experiments in Russia based on the design by Fischbacher et al. (2001). They do not report any significant differences in behavior between Swiss and Russian subjects.

[2] Cason et al. (2002) provide evidence for a difference in public goods provision between the United States and Japan, but they use a somewhat more complicated game than the voluntary contribution mechanism.

[3] The instructions can be found on the following website: http://www.lrz-muenchen.de/~u516262/webserver/webdata/publications.html.

[4] The existing literature shows that one-shot and repeated games provide very similar results, i.e., conditional cooperation preferences are pretty robust with respect to design features such as the number of repetitions (compare Fischbacher et al., 2001 and Fischbacher and Gächter, 2006).

[5] Though safeguards were undertaken, there is always a residual potential for unobserved confounding effects across locations that influence results.