



Public good provision in blended groups of partners and strangers



Christian Grund*, Christine Harbring, Kirsten Thommes

RWTH Aachen University, Germany

HIGHLIGHTS

- This experiment adds to the literature on public good provision.
- Behavior depends on player type and group composition (stranger vs. partner).
- Partners, who interact over several rounds, contribute more than strangers.
- Contributions increase in the number of group members of the same type.
- Results are robust considering for beliefs and the predisposition for conditional cooperation.

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ABSTRACT

We experimentally analyze cooperation in blended groups, where some group members stay together (partners) and others are switching groups (strangers). Our results reveal that teams consisting partly of members with strangers display a lower productivity compared to teams of permanent group members only. First, strangers cooperate less than partners in blended groups. Second, individual effort decisions increase with the number of group mates who are of the same type. This second effect holds for both strangers and partners and is neither driven by beliefs nor conditional willingness to cooperate. We argue that social identity plays a role here depending on group composition and the individuals' role in a group.

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1. Introduction

The strategic challenge of cooperation within groups can be well captured by a social dilemma which is characterized by individuals whose self-interest is at odds with the group's interest, and which results in cooperation levels that are inefficiently low (e.g. Andreoni, 1988). Due to the importance of cooperation in groups there is a vast experimental literature on particular levers of cooperation in groups stressing inter alia repeated interaction as one of the major determinants (e.g. Chaudhuri, 2011).

However, economic experiments on the duration of group membership have so far been limited to comparisons between homogeneous groups consisting of either temporary members

who all switch groups in each round (*strangers*) or permanent members staying in one group over repeated rounds (*partners*) and have shown rather mixed results (e.g. Andreoni, 1988; Fehr and Gächter, 2000). Though, the issue is highly relevant in practice as the duration of group membership may vary within work groups and these groups also rely on effective cooperation. For example, some employees may have temporary employment contracts or project members are only assigned to a work group for a specific period.

We close a gap in the literature by comparing blended groups consisting of different ratios of partners and strangers in a public good game with each other and the baseline setting with only partners and strangers.

2. Experimental design and procedure

We aim to explore the effects of blended groups with regard to the duration of group membership on cooperation by conducting

* Correspondence to: RWTH Aachen University, School of Business and Economics, Lehrstuhl für Personal, Templergraben 64, 52056 Aachen, Germany. Tel.: +49 0241 8093355; fax: +49 0241 8092356.

E-mail address: christian.grund@rwth-aachen.de (C. Grund).

URL: <http://www.hrm.rwth-aachen.de/team/grund/> (C. Grund).

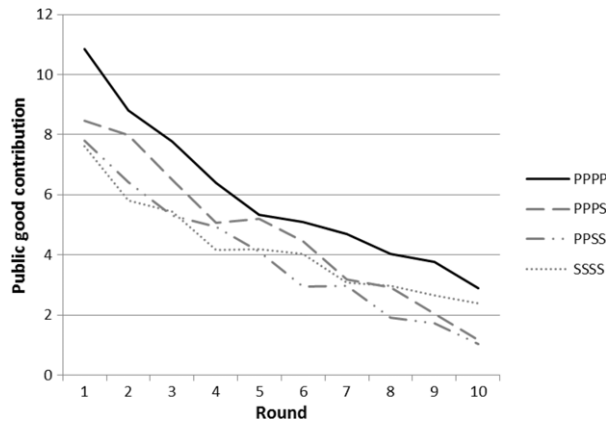


Fig. 1. Mean contribution over rounds in homogeneous and heterogeneous groups.

adapted versions of the public good game of Fehr and Gächter (2000). In the experimental design, subjects form groups consisting of four subjects each. Each subject has to individually decide how much of her 20 ECU endowment she wants to invest into the public good project and how much she wants to put aside into her private account. Investments into the public good project are multiplied by 1.6, and the resulting amount is equally re-distributed to each of the four subjects. Savings to the private account remain stable in value and are paid out only to the subject to whom the private account belongs.

In every session, 28 individuals participated. In the Partner setting (PPPP), all four subjects form a stable group over the course of the 10 rounds of the experiment. In the Stranger setting (SSSS), all subjects are re-allocated to new group members after each round. We introduce two new treatments with blended groups in which (i) one group member is re-allocated randomly to a new group after each round, while three subjects remain together over the 10 rounds (PPPS) and (ii) two subjects randomly and independently from one another switch (PPSS).

In order to understand how different predispositions to cooperate relate to actual behavior in our experiment, we conducted a *pre-test*. In this task, each individual was randomly assigned to a group and was asked to make a one-shot public good decision, as described above. Individuals were asked about their contributions conditional on each possible mean of the other three players' contribution given by integers from 0 to 20.

All sessions took place between October 2013 and July 2014 at the AIXperiment laboratory located at RWTH Aachen University, Germany. Recruitment was made via ORSEE (Greiner, 2004) and the experiment was conducted with z-Tree (Fischbacher, 2007). Before the experiment started, subjects were informed about their own type (P or S) and also about their group composition (PPPP, PPPS, PPSS or SSSS). After each round, all participants were informed about their earnings.

In total, 336 students participated in the experiment. One session lasted for about 1.5 h, and subjects earned about 12.64 Euros on average in addition to a show-up fee of 3 Euros. One round was randomly chosen to be relevant for the payoff.

3. Findings

Fig. 1 illustrates the development of mean individual contributions by treatment and round, revealing that contributions decrease in all treatments from round 1 to round 10.

Cooperation is significantly highest in the partner setting PPPP with 5.95 on average compared to other treatments ($p < 0.001$ for each pairwise test, Mann Whitney U-test is used for all treatment differences (two-tailed) while the Wilcoxon Signed rank test (also

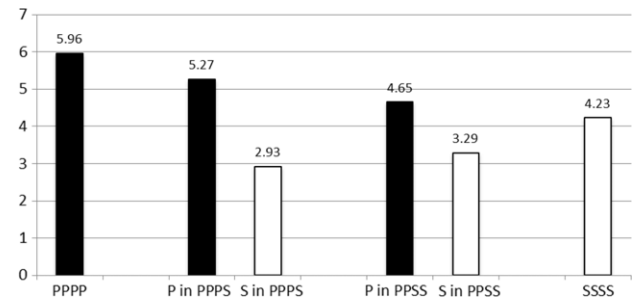


Fig. 2. Mean contribution by group composition and type of group membership.

two-tailed) is applied to check for significant differences within the treatments). Comparing blended groups cooperation decreases with the number of strangers, i.e., contribution is higher in PPPS with 4.68 than in PPSS with 3.97 on average ($p = 0.072$). Though, cooperation in blended groups does not significantly differ from the stranger setting SSSS, which yields an average of 4.23. All of these results are robust when only considering the first round of the experiment only.

When considering differences in types over all treatments together, we observe that strangers contribute on average less to the public good than partners do (mean of $P = 5.54$, mean of $S = 3.67$, $p < 0.001$). Comparing the decisions of strangers and partners within blended groups we find that strangers contribute significantly less than partners (P vs. S in PPPS, $p < 0.001$ and in PPSS, $p = 0.065$).

Fig. 2 displays the mean contributions for each treatment and partners and strangers separately. Interestingly, partners in blended groups cooperate less than in the homogeneous setting PPPP (PPPP vs. P in PPPS, $p = 0.067$ and PPPP vs. P in PPSS, $p = 0.085$). Moreover, we observe that strangers' contribution increases with the number of other strangers in the group. Strangers in SSSS contribute significantly more than in the blended groups (SSSS vs. S in PPSS, $p = 0.058$ and SSSS vs. S in PPPS, $p < 0.001$) and in the two blended groups, strangers' cooperation is higher in PPSS than in PPPS ($p = 0.030$). An equivalent result can be confirmed for partners who also contribute more the more partners are in the group (see results above and: P in PPPS vs. P in PPSS, $p = 0.084$). This behavior leads to payoff differences for subjects across treatments (highest in PPPP) and between types of players within blended groups (higher for S than P in PPSS ($p = 0.008$) and in PPPS ($p = 0.004$)).

In order to examine the various possible determinants of contributions together in a multivariate analysis, we apply tobit estimations and cluster at the group level. Table 1 shows the results of the analysis of individual contributions per round. We start by exploring differences in contributions by type (S or P) and by the number (0 to 3) of group members that are of the same type as oneself (results are robust to estimations with dummy variables). We confirm our above result that strangers contribute significantly less than partners. Besides, we find, also in line with our non-parametric results, that contributions increase in the number of group members of the same type as oneself (model I).

The additional models serve as robustness checks. Differences in contributions across treatments and types may also be caused by differences in individuals' predisposition to cooperate. We differentiate between predispositions of individuals by using their conditional contribution stated in the *pre-test*. We calculate Spearman rank correlations for each individual between the own contribution and the given contributions of others as a measure for the *conditional willingness to cooperate*. We recode insignificant correlations to zero. Average values of this measure vary (not significantly) from 0.530 to 0.667 across types and group compositions in our experiment. This measure is added

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