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What exactly is public in a public good game? A lab-in-the-field experiment*

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Abstract

Are public good games really capturing individuals' willingness to contribute to real-life public goods? To answer this question, we conducted a lab-in-the-field experiment with communities who own collective goods. In our experiment, subjects voluntarily contribute to a common pool, which can either be subdivided in individual vouchers, as in standard public good games, or used to acquire collective goods, as it happens for real-life public goods. We show that participants' contributions are larger when the voucher is paid individually, suggesting that individuals' willingness to contribute to public goods may be overestimated when based on results from laboratory experiments.

Keywords: Public goods, lab-in-the-field experiment, cooperation, group behavior, community, indivisibility.
JEL classification: H41; C92; D79

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1 Introduction

Public good games (PGGs henceforth) are a workhorse of experimental and behavioral economics. The baseline game follows an invariable script: (i) each subject in a group is endowed with a private good in the form of money or tokens; (ii) each subject decides independently how much of this private endowment to transfer to a common pool; (iii) the experimenter increases this common pool according to a known multiplier, and (iv) the augmented common pool is distributed among the subjects, usually following an equal split. In PGGs, subjects begin with a private endowment and then end the game with some private endowment, thus enjoying (or suffering) a change of utility from their increased (or decreased) private wealth. So, what exactly is public in a PGG?

The voluntary provision of real-life public goods seems to work in a rather different way from PGGs. As in PGGs, (i) each member of a *community* owns a certain amount of private wealth and (ii) decides how much of this wealth to transfer to a common pool; (iii) the common pool is then used to buy/build a non-excludable and indivisible public[1] good, and (iv) this good remains shared among members of the *community*, leading to familiar social dilemmas. In other words, in real-life public goods, subjects who belong to a community of people, who share interests and goals, begin owning private endowments but end up enjoying a combination of the utility from their private wealth (if any is left) and the utility of sharing the consumption of the good which, however, remains indivisible.

To see what we have in mind, consider an academic department whose members want to buy a fridge for their common room. They collect the money on a voluntary basis, knowing that no member will be excluded from use of the fridge, irrespective of their contribution. The fridge is an indivisible good, and no member of the department can privatize the good or its use. Note that without the faculty, there would be no demand for a fridge to be shared. Given that *indivisibility* is a fundamental feature of real-life public goods, the existence of a *community* – the academics in our example – is a prerequisite for their existence.

However, communities are usually absent in laboratory experiments. Experimental subjects cannot collectively consume indivisible public goods, so researchers take the shortcut of splitting the augmented common pool among the subjects. When using a PGG design, researchers assume that shares of the augmented common pool generate, for each individual, a utility equivalent to that generated by the joint consumption (i.e., within a community) of a public good that could be bought with the augmented common pool. This assumption, however, always remains implicit. Is individual willingness to contribute to a common pool the same

[1] An indivisible good is a good that cannot be divided among different individuals, be it due to physical reasons (e.g., a swimming pool) or agreed norms (e.g., a public library). The degree of indivisibility of a good may vary, but it is a qualifying characteristic of public goods (Sutter, 1996; Cornes and Sandler, 1996). Non-excludability distinguishes public goods from club goods, and it is the crucial feature of the goods we are dealing with in the present context. In fact, if these were club goods, the right to use them would be dependent on an individual's contribution.

if the common pool is split among group members to buy a private good for each of them (we call this situation a *divided* common pool), or if it is used to buy a public good to be shared by all group members (i.e., an *undivided* common pool)? We designed our experiment to address this question.

In our lab-in-the-field experiment, implemented with scout groups during their summer camps, we proposed a two-subjects linear voluntary contribution mechanism (VCM) in which contributions to a common pool are first augmented by a factor of 1.5 and then paid out in vouchers. The scout patrols we analyze are naturally occurring communities, and this allows us to account for the sense of belonging and identity that have been shown to affect contribution in PGGs (e.g., Charness et al., 2014; Li et al., 2017). More importantly for our research question, as part of their activities, patrols engage in fundraising campaigns and collectively purchase and use indivisible public goods. The extent to which each patrol member can benefit from such goods is independent of the individual contribution – be it monetary or not – to their acquisition (non-excludability). These characteristics make the patrol goods in all respect public goods.

In our design, we manipulate (i) the divisibility of the augmented common pool and (ii) subjects' membership to the same community. Treatment (i) is implemented by paying subjects with either individual vouchers (*divided* common pool) or collective vouchers (*undivided* common pool) to be spent at the local scouting equipment store. This is a specialized store that sells individual equipment (e.g., boots, uniforms, backpacks, mess kits) and patrol equipment (e.g., screw pickets, field lamps, tents, stoves, woodworking tools). The fact that scouts regularly buy both individual and patrol goods from the same scout store allows us to have a comparable payment across the two treatment conditions.

Treatment (ii) allows us to dig deeper into the indivisibility dimension of the public good and into the role of the underlying community. The two subjects matched in the VCM could belong either to the same patrol (*same* community) or to different patrols (*other* community). Note that the potential value of the common pool and the marginal per capita return (MPCR) of the contribution do not depend on whether the subjects belong to the *same* or to the *other* community.

In our two-by-two design, we have a real-life public good only at the intersection between the *same* and *undivided* conditions. At the intersection between the *other* and *divided* conditions, we have a standard PGG.

In sharp contrast with the limited literature on the topic (Alfano and Marwell, 1980), our results show that contributions to a common pool are higher when the pool is divided and privatized rather than when it is undivided and shared. This suggests that the high contribution rates typically observed in PGGs are partially due to having no real public goods in PGGs. Indeed, when using a more realistic design, contributions decrease to a level closer to the theoretical prediction of zero.

With this paper, we add to the literature studying determinants of voluntary contributions to public goods, reviewed by Chaudhuri (2011). These determinants include, among others, identity (e.g., Charness et al., 2014; Li et al., 2017) and group membership (e.g., Andreoni and Croson, 2008; Grund et al., 2018). On the role of community, our second treatment manipulation, an extensive literature shows the positive effects of in-group matching on solving social dilemmas (Goette et al., 2006) and other pro-social behaviors (Chen and Li, 2009; Balliet et al., 2014). This literature also shows that, at least among children, group attachment is associated with higher contributions to PGGs (Harbaugh and Krause, 2000). A growing literature also shows that geographic differences in economic outcomes can be related to a population's underlying behavioral characteristics, such as cooperation in PGGs (Ockenfels and Weimann, 1999; Bigoni et al., 2016; Battiston and Gamba, 2016; Bigoni et al., 2017) or trust games (Bigoni et al., 2016, 2017). This paper differs from the latter literature in that it focuses on communities, that is, groups that share a sense of belonging, a common culture, the same geographic origin, and, crucially, that own and maintain public goods.

With respect to the role of indivisibility (our first treatment manipulation), PGG designs that envisage a divided common pool became the gold standard very early on,[2] yet we are aware of only one paper that discusses this issue explicitly. Alfano and Marwell (1980)[3] studied the effect of the indivisible nature of public goods on contributions to common pools in PGGs. In an effort to find an experimental population that was a real group yet had no prior interactions, they ran the experiment with incoming students who would be residents of the same dormitory floor the following semester. Their results were quite unexpected: students contributed more to the common pool when it was used to buy an indivisible good for the dorm floor than when it was divided evenly among them. We bring a fundamental innovation to this early contribution. While Alfano and Marwell strove to neutralize the community dimension of their sample by recruiting experimental subjects among first-year students,[4] we deliberately chose our subjects because they were members of established communities (patrols) with a history of regular interactions. This, we claim, makes our design much more similar to real-life public goods. Other papers have used indivisible payments but have not focused on the design choice of indivisibility *per se*: see, among others, Bohm (1972) and Milinski et al. (2008).

Concerning the experimental population, other social science studies have exploited the patrol-based organization of scout groups as an observation unit: see, for instance, early contributions in sociology (Hare, 1952; Kelley and Volkart, 1952) and more recent work in development psychology (Sharp et al., 2011). To the best of our knowledge, we are the first to study social dilemmas with this population. Finally, this paper also contributes to the literature on young individuals' behavior in PGGs (Zelmer, 2003; Harbaugh and Krause, 2000).

[2]See Marwell and Ames 1979 and Isaac et al. (1985) for early examples and (Ledyard, 1995) for an early survey of the literature.

[3]Note that the same experiment was presented in Marwell and Ames (1981).

[4]This choice might be due to the limitation of having only one experimental group for treatment, and hence trying to minimize the problem of interdependencies. In our experiment, we have 31 different groups.

2 Theoretical framework

Our starting point is a standard VCM. Each individual in a group of N members is endowed with w_i and can contribute x_i to a common pool. The overall utility of the i subject is:

$$u_i(x_i) = w_i - x_i + \alpha G \tag{1}$$

where $G := \sum_{i=1}^{N} x_i$ is the contribution of all subjects to the common pool, and αG describes the individual utility enjoyed when the total contribution is G.[5] The MCPR from contributing to the common pool is then simply $u_i'(x_i) = \alpha - 1$ (the fact that it is independent from x_i being an immediate consequence of the linearity of the mechanism).

Under-provision of public goods arises if:

(i) $\alpha \in \left(\frac{1}{N}, 1\right)$, and

(ii) subjects do not internalize other group members' utility.

With regard to condition (i), $\alpha > \frac{1}{N}$ implies that the contribution to the common pool is socially efficient, whereas $\alpha < 1$ (negative MCPR) implies that a contribution to the common pool is individually inefficient. Indeed, contributing to the common pool is a dominated strategy (Isaac and Walker, 1988), as $u_i(x_i) = w_i - x_i + \alpha G < w_i = u(0)$. Together with (ii), this condition entails that individuals will prefer not to contribute to the common pool.

The parameter α can be thought of as capturing two different characteristics of public goods. On one hand, a single collective good can be more efficient than a set of individual goods. We denote these scale effects in the production or purchase of the good with a multiplier $\sigma > 1$. On the other hand, public good G is shared among N subjects, and hence a single individual does not extract its entire benefits – because individuals do not internalize other members' utility from it – but only a share η. Of course, both characteristics can coexist, and thus we can decompose α as $\sigma\eta$. Given this decomposition of α, Equation (1) becomes

$$u_i(x_i) = w_i - x_i + \sigma\eta G \tag{2}$$

and the condition $\alpha < 1$ corresponds to $\eta < \frac{1}{\sigma} < 1$ – that is, the share of benefits the individual extracts is too small to make the contribution individually efficient despite the scale effect.[6]

The model can be used to describe both a common pool divided among subjects, as happens in PGGs, and a common pool left undivided and used to acquire

[5] The assumption that the individual utility from G is proportional to the total contribution is made for simplicity of exposition; our analysis is compatible with any strictly increasing function.

[6] The decomposition of α into two factors σ and η which are, in principle, empirically indistinguishable is motivated by our ability to manipulate them individually in our experimental design.

a public good to be shared by the subjects. In the case of the divided common pool, implemented in PGGs, the multiplier effect is determined by fixing $\sigma > 1$ and $\eta = \frac{1}{N}$. Indeed, in PGGs the experimenter augments the common pool by σ and then divides it among the N members in equal parts. What is called a "public good" is actually an amount of money directly subdivided among subjects.

When the common pool is used to acquire a real public good, the multiplier effect of αN will typically originate from both $\sigma > 1$ and $\eta > \frac{1}{N}$, although neither of the two conditions is strictly necessary.

To account for the positive contributions commonly observed in the experimental literature on public goods, we can relax condition (ii) and enrich Equation (2) by including an altruistic component:[7]

$$u_i(x_i) = w_i - x_i + \sigma\eta G(1 + (N-1)\beta); \tag{3}$$

where $\beta > 0$ means each subject values positively the contribution of the public good to the utility of another participant: individuals will want to contribute to the public good if $\sigma\eta(1+(N-1)\beta) > 1$. In particular, if $\beta = 1$, then $\sigma\eta(1+(N-1)\beta) = \sigma\eta N$. Each individual is now internalizing the full social welfare, and thus the level of contribution is optimal.

In our experiment, we compare the standard PGG design, in which the common pool is divided ($\sigma > 1$, $\eta = \frac{1}{N}$), with a case in which, for the same value of σ, G is used to provide a real public good. In other words, we are able to directly test whether $\eta > \frac{1}{N}$. That is, we test the attractiveness, for subjects, of the positive spillovers resulting from a public good, while accounting for (i) altruism (β) and (ii) scale effects (σ). Indeed, if $\eta > \frac{1}{N}$, then, controlling for scale effects, individuals prefer to acquire a public good, because they enjoy more utility from sharing the good than they loose due to it being a collective property. If the opposite is true, individuals are willing to acquire private ownership.

3 Experimental Design

We conducted six paper-and-pencil sessions during the summer camp of scout troops from Trentino-Alto Adige, a region in Northeast Italy. Each troop was composed of 24 to 32 adolescents, grouped into 4 to 6 patrols, for a total of 31 patrols and 160 subjects evenly distributed by gender (51% males and 49% females), resulting in 640 observations.[8] Each experimental session lasted about

[7] The distinction between pure and impure altruism (Andreoni, 1990) is beyond the scope of both the present paper and our experiment. Given that utility is transferred to other members by virtue of a voluntary contribution, β will in principle include both aspects.

[8] We ran one pilot session previously in another troop, and one last session was discarded because the summer camp involved only two patrols that were formed ad hoc and did not reflect actual patrols operating during the year.

two hours.[9] Subjects earned, on average, €5.11 from this experiment and €10.50 from the entire session.

Patrols are gender-based, naturally-occurring communities that perform activities together during the whole year and especially during summer camp. Each patrol is equipped with public goods such as tents, stoves, and other camping equipment. These public goods can be expensive (like a tent) or relatively cheap (such as bags for poles or stakes). During the year, patrols organize several fundraising activities in order to purchase the public goods necessary for their scouting activities. For these activities, each scout individually owns private goods, such as backpacks, boots, and mess kits. Scout patrols share social norms, and they involve clearly identified individual roles within the patrol.

In the experiment, subjects are matched to play a two-player linear VCM. Each subject is given €5 of windfall money and has to decide how much of this initial endowment to transfer to a common pool. The experimenter increases the value of the common pool by a multiplier ($\sigma = 1.5$, see Equation (1)) known to subjects.

We implemented two treatments, with two conditions each, in a two-by-two within-subject factorial design. The first treatment concerns the divisibility of the common pool. In the first condition (*divided* common pool), the augmented common pool is evenly divided between the two matched subjects. The total individual payoff, paid out with individual vouchers, is thus the sum of the amounts subjects have kept for themselves, plus the share of the augmented common pool, as in any standard PGG. In the second condition (*undivided* common pool), the augmented common pool is evenly divided between the *patrols* of the two subjects, rather than between the subjects themselves. In the end, each patrol is paid a patrol's voucher, summing up all the individual shares of the different common pools, and subjects receive individual vouchers corresponding to the amounts they did not transfer to the common pool. The second treatment concerns how the two subjects are matched: in the first condition, they belong to the same patrol (*same* community); in the second condition, they belong to different patrols (*other* community). Both treatments are implemented within-subject – that is, each subject makes four separate choices.[10] Actual individual and patrol payoffs only depend on one of them. At the time they make their decisions, subjects know they are randomly matched in pairs, but they do not know whether their partner is a member of their patrol. They also do not know whether the *divided* or *undivided* condition will determine the payments, as this is decided by tossing a coin at the end of the experiment.

Recall that, within this two-by-two design, the *real* public good is reproduced at the intersection of the *undivided* and *same* conditions: this is where subjects

[9]The experimental session included another experiment – see Battiston et al. (2018) – held before the one presented in this paper. Payments cumulated across the two experiments. Individuals knew from the beginning that they would perform two activities, but the rules for the second were explained only once the first was concluded. Subjects were told their cumulated gains, and paid with the vouchers, only at the end of the entire session.

[10]The order of the choices was randomized.

know their own patrol will receive the entire amount of the common pool. In other words, they know their contributions to the common pool will be used to acquire a public good to benefit their patrol. At the opposite end, where the *divided* and *other* conditions intersect, we find "public goods" as they are presented in standard PGGs – that is, a prisoner's dilemma game with purely private final payments. The two remaining combinations (*undivided, other* and *divided, same*) allow us to disentangle the effects of the different treatments.

4 Results

We first analyze subject behavior at the aggregate level.

Table 1: Summary statistics

Condition	Contribution (mean)	Std. Dev.	N
undivided	2.778	1.571	320
undivided, same	3.228	1.485	160
undivided, other	2.328	1.531	160
divided	2.926	1.567	320
divided, same	3.488	1.414	160
divided, other	2.364	1.515	160
same	3.368	1.453	320
Other	2.346	1.520	320
Total	2.852	1.570	640

Table 1 presents an overview of subjects' average contributions within each treatment, which are also plotted in Figure 1. Some results are in line with those generally found in the literature on PGGs: average contributions to the common pool are significantly different from zero. The data also present clear treatment effects. A paired t-test across the *other-same* treatment rejects the null of no difference, including when we restrict to the *divided* or *undivided* conditions (p=0.000 in all three cases). Similarly, a paired t-test across the *undivided-divided* treatment rejects the null of no difference (p=0.064), as it does when we restrict to the *same* condition (p=0.025); the null is not rejected in the *other* condition (p=0.744).[11]

These findings are confirmed by OLS regressions, presented in Table 2. The main explanatory variables include two dummies for the two treatments ("Divided" and "Other") and their interaction. To control for the strong inter-subject heterogeneity, we introduce subject fixed effects in columns (1) and (2). In columns (3) and (4), we control instead for a range of individual-level covariates originating from the questionnaire administered at the end of the experiment. These include age,[12] a dummy for being male, indicators of personality traits from the "Big Five"

[11] Non-parametric Wilcoxon signed-rank tests confirm these results.

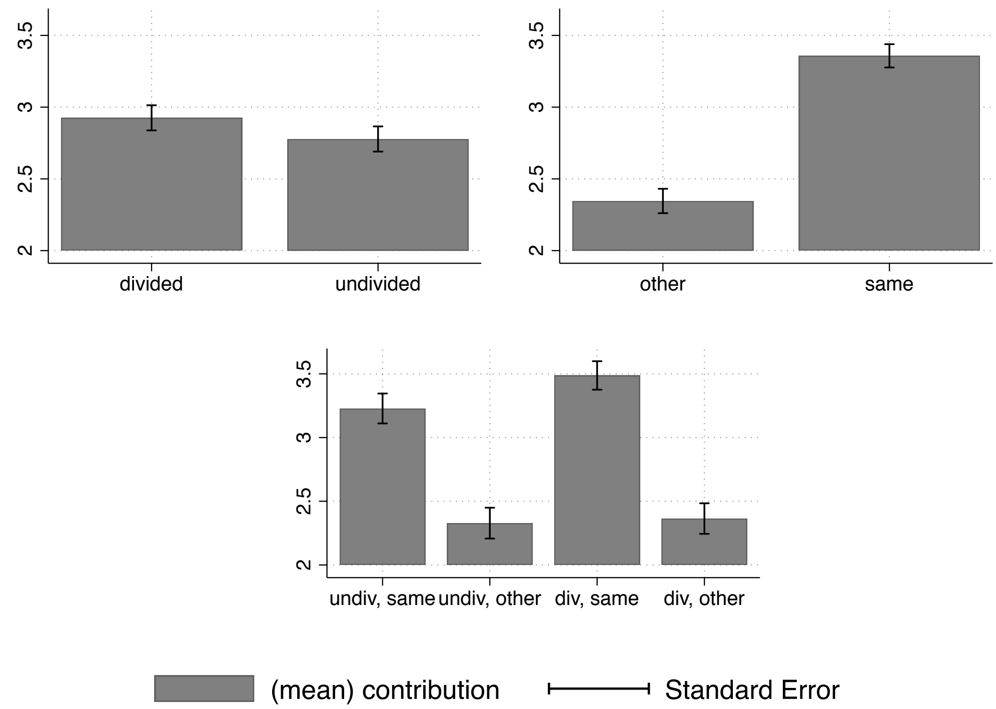
[12] Subjects were between 12 and 17 years old.

Table 2: OLS results

	(1)	(2)	(3)	(4)
Divided	0.148*	0.259**	0.169*	0.288**
	(0.088)	(0.115)	(0.092)	(0.123)
Other	-1.012***	-0.900***	-1.016***	-0.897***
	(0.094)	(0.116)	(0.097)	(0.123)
Interaction		-0.223		-0.238
		(0.141)		(0.156)
Male			-0.022	-0.022
			(0.186)	(0.186)
Age			0.240***	0.240***
			(0.089)	(0.089)
Household size			-0.081*	-0.081*
			(0.043)	(0.043)
Extraversion (big_1)			-0.065*	-0.065*
			(0.033)	(0.033)
Agreeableness (big_2)			0.002	0.002
			(0.039)	(0.039)
Conscientiousness (big_3)			-0.006	-0.006
			(0.040)	(0.040)
Neuroticism (big_4)			0.018	0.018
			(0.037)	(0.037)
Openness to experiences (big_5)			0.092**	0.092**
			(0.043)	(0.043)
Trust in patrol			-0.094	-0.094
			(0.104)	(0.104)
Trust in troop			0.249**	0.249**
			(0.099)	(0.099)
General trust			0.068	0.068
			(0.064)	(0.064)
Constant	3.284***	3.228***	-1.642	-1.701
	(0.062)	(0.072)	(1.562)	(1.564)
Fixed effects	YES	YES	NO	NO
N	640	640	584	584

Note: Independent variable is *individual contribution*. Standard errors clustered at the individual level are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Figure 1: Individual contribution (Mean)



in the revised Italian version of the Ten-Item Personality Inventory (Chiorri et al., 2015),[13] household size, and three measures of trust: trust in troop, trust in patrol, and generalized trust. This slightly reduces the sample size because of some missing answers in 14 questionnaires.

The coefficient for *other* is negative and strongly significant in columns (1) and (3), showing that being members of the same patrol has an effect on contributions. Specifications (2) and (4) allow us to evaluate this effect conditional on the *divided*/*undivided* dimension. In particular, the effect in the *divided* case is highlighted by a Wald test on the sum of the coefficients for *other* and the interaction term (p=0.000 in both specifications), and the effect in the *undivided* case is highlighted by the significance of the "Other" coefficient. This is in line with results from the t-test and allows us to state the following:

Result 1. *Subjects contribute significantly more to a common pool when they belong to the same community, regardless of whether the common pool is divided or undivided.*

The coefficient for *divided* is also statistically significant in all specifications.

[13]In the Ten-Item Personality Inventory, possible answers to each question range from 1 (*completely disagree*) to 7 (*completely agree*); we measure each personality trait as the score of a question directly asking about the trait, minus the score of a question asking about the opposite trait.

A Wald test on the sum of the coefficients for *divided* and the interaction term, however, yields a non-significant result in specifications (2) (p=0.745) and (4) (p=0.674), confirming that the type of public good (divided or undivided) is significant only for subjects belonging to the same patrol. This is again in line with evidence from the t-test and supports our next result:

Result 2. *When matched to a member of their same community, individuals contribute more to a divided common pool than to an undivided common pool.*

This latter finding represents the core contribution of this paper. We refer the reader to the final section for a more exhaustive discussion of the economic meaning of this result.

Turning to the coefficients of the covariates, we see that contributions are significantly related to openness (positively), extraversion (negatively), and family size (negatively). Importantly, scouts showing higher trust in their patrol contribute more to the public good, suggesting that willingness to contribute to the public good is strongly related to a sense of belonging. Older scouts also contribute more: the age variable is strongly correlated with years of permanence in the patrol, so this finding could reflect a general age effect and a stronger sense of belonging. Still, if we replicate the analysis independently on each cohort, we find that the coefficient for *divided* is always positive (although not significant – note that the sample size is dramatically reduced). This suggests, at the very least, that our main effect of interest is robust to differences in a sense of belonging.

5 Discussion and conclusions

The etymology of the word *community* goes back to two Latin words (*cum-munis*) that, combined, mean "to have rights and duties together". Public goods motivate the rise of communities and bond them together, inasmuch as communities regulate contributions to and rules of use of public goods. If divisibility and community membership are characterizing elements of real public goods, they should also be central to the study of public goods in experimental contexts. However, standard PGG experiments study contributions to perfectly divided common pools by subjects who belong to minimal groups that do not share any sense of community outside the lab. Real public goods differ from the ones studied in PGGs in at least these two dimensions (indivisibility and community belonging), and the treatment variations of our experiment follow these two lines.

Result 1 confirms previous findings that there is a strong difference in willingness to contribute to public goods when subjects belong to the *same* community (in-group) versus when they belong to *other* communities (out-group), as was the case, for instance, in Harbaugh and Krause (2000).

Result 2 highlights that willingness to contribute to the common pool is lower when the augmented common pool is used to acquire publicly shared goods, and it is higher when such a pool is redistributed privately to subjects, in sharp contrast with Alfano and Marwell (1980). In other words, individuals' willingness to contribute to real public goods may be well below results found in standard PGG experiments – including those involving real groups.

One may object that the groups used in this study are small compared to real-life communities (e.g., members of a research team in an academic department), and thus they oversimplify the coordination problems that typically emerge in larger groups. If this is true, our results overestimate voluntary contributions to real-life public goods, which could, therefore, be even closer to the theoretical prediction of zero.

One might also attribute our participants' lower willingness to contribute to contingent factors such as product availability: simply put, there are way more private goods to buy than public ones. Note, however, that (i) scouts need both public and private goods to perform their activities, and (ii) our experiment vouchers could only be spent at the scout store, where the menu of goods was relatively limited. Indeed, when looking at how the vouchers were actually spent, we found that subjects purchased both public (first aid kits, bags for poles, stakes) and private (T-shirts, hats, compasses) goods. For both types of goods, the cost varied from €0.80 to €100.[14]

Finally, one could argue that the fact that subjects remain in a troop for only four years might reduce the appeal of public goods – but this is not consistent with our finding that *older* scouts tend to contribute more.

The strength and the weakness of our design lie in the choice of the experimental population. For PGGs to be representative of real-life public goods, a community is required. In this respect, scouts represent an ideal population: patrols are organized communities in which each subject continuously benefits from the patrol's goods and, at the same time, from their own private goods. All scouts know the importance of both collective and private goods for daily scout activities, and thus they are aware of the trade-off in obtaining one additional unit of a private versus a public good. Recreating a group with these characteristics in a standard laboratory experiment is arguably impossible. At the same time, our experimental subjects are a highly select population: they experience life in close-knit groups, and they are observed in a specific period – adolescence – in which the sense of belonging to a community can play a very strong role, affecting the desire to contribute to a public good. And yet there exists a contribution gap between the standard PGG design and real-life public goods. This gap might represent a lower bound: in other environments, the perceived utility of real public goods could be even lower. Future research should test our findings in different contexts.

Keeping the above in mind, our results nevertheless suggest that blind faith in PGGs as a method for eliciting the desire to contribute to public goods could lead to overestimated contribution rates. Contributions to public goods observed

[14]For example, our subjects bought a first aid kit (a public good usually shared within a patrol) for €13 and a front lamp (a private good usually used during night walks) for €12.50.

in the lab may not accurately reflect contributions to real-life public goods.

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A Experimental instructions

[Instructions are translated from Italian: they were included in the form distributed to each participant, and also read aloud. A "totem" is a traditional avatar for scouts, composed by an adjective and a name of animal or plant. Each participant was assigned randomly and anonymously a totem at the beginning of the session. In half of the sessions, the "Baden" activity appeared before the "Powell" one; in the other half the sessions, it was the opposite.]

In this second phase, you will take part in two activities: **Baden** and **Powell**. We will now read together the instructions of both activities. Afterwards, you will carry out the procedure individually, by following the instructions step by step.

Only one of the two activities will be paid. We will decide which one by tossing a coin at the end of this phase: if head comes out, the Baden activity will be paid; if tail comes out, we will pay the Powell activity. Euros gained in this phase will be added to those from the previous phase. We will link earnings in this phase to those from the previous phase thanks to the totem which was assigned to you.

It is very important that you write your assigned totem at the top of this sheet!

INSTRUCTIONS - BADEN

You have €5. You will have to indipendently decide how much to contribute to a common pool (between €0 and €5). The remaining of the €5 will be left to you. You have been paired randomly to another member of your troop – who may or may not be part of your patrol. He or she will also decide how much (between €0 and €5) to contribute to the common pool.

The euros put by you and the other participant in the common pool will be multiplied by 1.5 (that is, they increase in value by 50%).

If you are both part of the same patrol, all euros in the common pool (multiplied by 1.5) will be paid to your patrol. If you and the other participant are part of two different patrols, the euros in the common pool (multiplied by 1.5) will be subdivided in equal parts between your patrols.

- **Your earnings** in this case are given by the euros that you kept for you.
- The **other participant's earnings** are given by the euros he or she kept for him/her.
- If you are both members of the **same patrol**, the patrol earns the euros in the common pool (multiplied by 1.5).

- If you are members of two **different patrols**, each patrol will earn half of the euros in the common pool (multiplied per 1.5).

Example: Astute Marmot was paired with Roman Pine. Astute Marmot contributes €4 to the common pool, while Roman Pine contributes €2. Astute Marmot hence keeps €5-4=€1, Roman Pine keeps €5-2=€3. In the common pool there are €6 which, after being multiplied by 1.5, become €9. Hence, if both are members of the same patrol, their patrol receives €9, while if they are members of two different patrols, each of the two patrols receives €4.50.

What happens if Astute Marmot contributes €0 and Roman Pine €5?
What happens if Astute Marmot contributes €2.5 and Roman Pine €2.5?

Now please make your choice in each of the following cases:

	If the other participant is a member of **your patrol**	If the other participant is a member of **a different patrol**
Euros in the common pool		
Euros you keep for yourself		
The column must sum up to €5	€5	€5

["INSTRUCTIONS - POWELL" read as above with the following differences: the sentence in bold "If you are both part [...] between your patrols." was replaced with]

Euros in the common pool (multiplied by 1.5) will be subdivided in equal parts between you and the other partecipant.

[And the bullet points that followed were:]

- **Your earnings** in this case are given by the euros that you kept for you, plus half of those in the common pool (multiplied by 1.5).
- The **other participant's earnings** in this case are given by the euros he or she kept for him/her, plus half of those in the common pool (multiplied by 1.5).

[The same example as above was proposed, with its outcome modified accordingly]