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Power comes with responsibility—or does it?

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Abstract In a Public Good (PG) experiment, after playing it the standard way, one of the players (the allocator) is given power over the endowments of her co-players. Will the allocator show responsibility i.e., contribute most or all of her own as well as her co-players' endowments? Can we thus improve the suboptimal level of voluntary provisions of public goods? The result is that, on average, all players are better off than in the standard PG game. In repetitions of the procedure, however, selfish behavior (contributing mainly the others' endowments) becomes more and more frequent.

Keywords Responsibility · Public Good game · Experiments

JEL Classification D61 · H41

1 Introduction

"Great power comes with great responsibility" was the tagline for the 2002 Spiderman movie. Contrary to other superheroes, Spiderman realizes the corruptive potential of great power. Do powerful men and organizations in the real world realize this as well? *Social responsibility* has become a catch phrase during the last few years. More and more companies include statements about corporate responsibility or corporate citizenship in their mission statements. (In January 2008 The Economist issued a special report on this topic.) Widespread corruption has been identified as a main obstacle for the economic prosperity and the political stability of societies—and not only in the third world (Welsch 2008). The existence of corruption in all societies casts doubt on the assumption that people will use the power or authority they are given mainly for the public good. A Serbian proverb says: "If you wish to know what a man is, place him in authority." And that is what we did in an experiment, namely providing subjects with the power to allocate other people's resources and observing how they used their power. The assigned "allocator" could pursue selfish goals such as

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increasing her own income, or social goals such as increasing her group's income and/or creating a just income distribution. The moral meaning of responsibility requires a powerful person to pursue social goals.[1]

Why should we give power to some people at all? An apparent reason is the necessary coordination of actions for a common project, in particular within large groups and under time pressure. Our research, however, is motivated by another idea, which is initiated by the theoretical as well as empirical finding that voluntary contributions to a common project are inefficiently low. Can this problem be overcome by the determination of a leader/allocator or are all possible Pareto-improvements prevented by a lack of responsibility of the selected leader? Unrestricted self-interest will always motivate a leader to maximize his own income without taking into account the income of others. Game Theory and Public Choice Theory usually analyze the behavior of powerful subjects (Rasmusen and Ramseyer 1994). Under such an assumption moral and ideologically influenced preferences, however, are sometimes also used to explain patterns of corruption (Kelman 1988; Mikva 1988). Experimental economics strongly support the existence of social preferences. Thus there is a chance that leaders of teams show enough responsibility to establish Pareto-improvements. A leader can be installed informally (based on her general reputation or on her expertise in the relevant field), she may be appointed by outside forces, or she may be formally elected by her fellow group members. Is the selection mechanism important?

The experiments we conducted capture the following situation. Imagine a research group of three persons. In one case, they voluntarily contribute time to their joint project; in the other case, one of the three is a senior researcher (the allocator) who is able to determine the contributions (working time on the project) of the two other. The fruits of the joint project are a public good for the group; time which is not allocated to the joint project can be used to produce private goods (writing research papers with sole authorship or simply enjoying leisure). We think that such situations are frequent, not only in academia but also in firms and government, and in other hierarchical settings (groups or institutions which cooperate). The larger the group is, the more important the quality and quantity of the leader's (allocator's) input usually is, and the larger her share of the joint output is compared with that of the other group members. Therefore we think that the allocator's incentive structure in small and "medium sized" groups is not as different as it seems to be at first glance.

In our study, the results of a "normal" PG game are compared with an adjacent game where one group member (the allocator) has been chosen to decide on how much all members contribute to the public good. The initial PG game served three purposes. First, the subjects became familiar with the game and learned to understand the competing goals of socially optimal maximum contributions and individually optimal free riding. Second, they got to know the subjects of their group with respect to their contribution behavior. Third, the contributions in the PG game established the behavioral benchmark for the adjacent Allocator game, and it is this comparison we are interested in.

The allocator was determined either randomly or was elected by the group. Election took place either *with* or *without announcing* the election before the PG game's start. Selection by outside forces (random selection) describes the case of a boss in economic, clerical, or bureaucratic hierarchies. Allocator choice by election describes a situation of informal

[1] All of these expressions, power or authority as well as responsibility, have informal meanings which are (or seem to be) well understood by most people, though it is nearly impossible to provide a general and precise definition. A major distinction is responsibility for oneself and responsibility for others. The former plays an important role in criminal punishment, in (the rejection of) paternalism, and also for the definition of equality-of-opportunity. We are concerned with responsibility for others.

leadership by reputation, expertise in a special field, or acclamation (in small groups), or a situation of formal leadership by an elected politician (in larger groups). All these variants are present in real-world groups and are therefore important to investigate, at least with respect to the impact of the fundamental distinction of outside (random) determination versus election.

The results of our experiment are used in order to test seven hypotheses. Our main expectation was that an allocator would usually show enough responsibility to increase the income of all group members compared with the preceding PG game. This expectation is (by and large) fulfilled. This means that allocating power to just one person leads to less inefficient contributions in the PG game than the voluntary mechanism. Two unexpected results were the independence of responsibility of the mode of transfer of power (random or by election) and the vanishing of responsibility in the course of time (repetitions of situations and decisions). In addition to these main results we tested several hypotheses which we derived from general regularities found in experimental economics. Among these are reward and punishment hypotheses which are important also for real-world groups if members know one another, for example in temporary task force groups which are selected from a common pool of specialists.

To the best of our knowledge there are no other experiments with such a framework. Experiments on corruption are concerned with the abuse of power too, but they concentrate on bribery (Abbink et al. 2002; Cameron et al. 2009) where individual reciprocity relations are accompanied by large negative externalities for the public. Closest to our experiment are "normal" PG experiments (naturally) and (with respect to power and responsibility) Dictator experiments as well as the second stage of Investment and Trust experiments. The main difference in our experiments is, from a logical point of view, the option of non-Pareto-optimal allocations[2] in the Allocator game. Different frames, however, may be decisive (Gächter et al. 2009).

Section 2 describes the experiment in more detail. Section 3 motivates the hypotheses and Sect. 4 presents the results and the tests concerning the hypotheses. Section 5 is a discussion of what we have learnt from the experiment and a short conclusion.

2 Experimental design

The experiments consisted of three phases. The subjects were divided randomly into groups of six from which then, in every phase, different groups of three were selected. In each phase, these groups of three first played 10 rounds of a PG game. In the PG game, every group member had 20 tokens to invest in a public project. Each token invested resulted in a return of 0.5 (for all players), and each token kept was worth 1. After every round the participants were informed about the contributions of the other group members in the previous round. After the PG game, one member in each group was chosen as the allocator who determined the two other group members' contributions to the public project. There was only one round in the Allocator game, but each member was holding 100 tokens, which the allocator could contribute to the project.

The participants repeated these two games two further times with newly selected groups. The repetitions were called Phases 2 and 3. There were two different treatments. In the Random treatment, the allocator was chosen randomly in each phase. In the Election treatment,

[2] Although allocators should not choose these allocations, in our experiment they do so with high frequencies.

Table 1 The experimental design

	Phase 1		Phase 2		Phase 3	
	Group of 3		New group of 3		New group of 3	
	PG game	Allocator game	PG game	Allocator game	PG game	Allocator game
Allocator determination in random treatment	–	random	–	random	–	random
Allocator determination in election treatment	–	random	–	election without announcement	–	election with announcement

the procedure for identifying the allocator differed each time. In Phase 1, the allocator was chosen randomly. In Phase 2, the members of the group voted at the beginning of the Allocator game in order to select their allocator. When there was a tie, the allocator was chosen randomly. In Phase 3, the procedure was the same as in Phase 2, but before starting the PG game the participants were informed about the election taking place in the Allocator game.

One hundred and twenty undergraduate students at the European University Viadrina took part in a laboratory experiment[3] in the winter term 2007/2008. Exactly 50% were business and economics students, the other 50% came from the faculties of law and cultural sciences. 42% of subjects were male. Ages ranged from 18 to 29 years (mean = 22.05, standard deviation = 2.32). Subjects were invited from a pool of students who had declared their general interest in participating in economic experiments. In the Election (Random) Treatment, there are 28 (12) independent observations in the first phase and 14 (6) independent observations, each consisting of two data points, in the second and third phase. The nonparametric tests reported below are based on these independent observations. After reading the instructions the participants had to answer control questions. Those who had problems received individual advice.

The experiment lasted about one hour. After finishing their decision tasks, the participants were asked to fill out a questionnaire about their voting behavior and their motives in the role of the allocator. Each token earned in the experiment was worth €0.015. The earnings of all rounds were added up and the participants received an average payment of €16.56.

3 Hypotheses

The literature on responsibility is mainly normative and in search of reasonable and applicable definitions for a theoretical discussion of the implications of normative requirements. Although this literature has fascinating aspects we cannot rest behavioral hypotheses on such work. Instead we are guided by the large amount of literature on social preferences and social interactions whose empirical results stem mainly from economic and psychological experiments. The central insights are: (i) There is much variance in individual social preferences. (ii) Pure distribution experiments such as the basic Dictator experiment (where the sum of incomes is constant) show that altruism exists. (iii) If the sum of incomes is not constant then many subjects exhibit a tendency to make efficient (group income maximizing) choices (Kritikos and Bolle 2001;

[3]The experiments were programmed using Z-Tree by Urs Fischbacher (1999). The English translation of the instructions can be requested from the authors.

Engelmann and Strobel 2004). Note that efficiency seeking can be interpreted as altruism where the income of others is worth as much as own one's income. (iv) Reciprocity is generally assumed to be fundamental for human societies and, as Trust/Investment experiments (Berg et al. 1995), efficiency wages (Fehr et al. 1997) and other dynamic settings show, subjects have a strong tendency to act reciprocally. (v) Non-free riding behavior in Public Good experiments may be best explained by subjects wishing to cooperate conditionally (Fischbacher et al. 2001). (vi) Direct reciprocity in the PG game is investigated by giving the participants options to punish and/or reward their co-players (Fehr and Gächter 2000; Houser et al. 2008; additional literature is cited below).

In the PG game, the responsibility for an efficient result is spread amongst all members of a society or group. Conditional cooperation i.e., contributing about as much as others contribute, may be difficult to realize, however. Within a round, contributions are chosen at the same time and thus conditional cooperation is endangered by the fear that one's own high contributions are not met by one's co-players. After the bundling of power and responsibility, the allocator need not fear exploitation. Comparing the Prisoners' Dilemma game with the Sequential Prisoners' Dilemma (SPD) game (Clark and Sefton 2001) shows that this rationale seems to apply: cooperation rates are higher in the SPD. Are Allocator game contributions therefore also higher than PG game contributions?

A second reason for higher contributions in the Allocator game rests on reciprocity which may "activate" or strengthen altruism or a preference for efficient results. Reciprocity is a reaction to the transfer of power by chance (God), by a boss, or by one's fellow group members. As even indirect reciprocity exists,[4] but as it is usually weaker than direct reciprocity, we expect the transfer of power to be always efficiency enhancing, but more so if allocators are elected. This hypothesis needs testable specifications, which are supplemented by Hypothesis 1b which concerns own-interest or, taken together with 1a and 1c, Pareto-efficiency.

Hypothesis 1 The transfer of responsibility activates social preferences.

(1a) *Weak Responsibility*: An allocator allocates no lower percentage of her own endowment when she is responsible for the group (Allocator game) than during the normal Public Goods Game.
(1b) *Own interest*: An allocator allocates no lower percentage of her group's members' endowment when she is responsible for the group than she did during the normal PG game.
(1c) *Relative responsibility*: On average, allocator contributions are as high as forced non-allocator contributions.
(1d) *Voting*: An allocator's contributions are larger when she has been elected than when not.

The next two hypotheses relate to individual differences in allocators' and their co-players' behavior. In the normal PG game a subject likewise has (though not sole) responsibility for the joint production of the public good. It is plausible that subjects in this situation should also contribute more as an allocator. Reciprocity should induce a positive reaction of the allocator to her co-players' contributions in the previous PG game. In Hypothesis 3 these conjectures are transferred to the level of differences of allocator and non-allocator contributions.

[4] After A did B a favor, B is more ready to do C a favor than otherwise (see Güth et al. 2001).

Hypothesis 2 The allocator's own contribution y_A

(2a) increases with her contribution x_A in the PG game
(2b) increases with the non-allocators' average contribution x_{nA} in the PG game

Hypothesis 3 The difference between the forced contribution of non-allocators and the allocators' contribution $y_{nA} - y_A$

(3a) decreases with the allocator's contribution x_A in the PG game
(3b) decreases with the non-allocators' average contribution x_{nA} in the PG game

In experimental economics, direct punishment has most frequently been investigated in PG games where it is called "altruistic punishment" because punishers incur costs in order to make a free rider contribute (Fehr and Gächter 2000, 2002; Egas and Riedl 2005; Boyd et al. 2003). There is overwhelming evidence that such punishment is beneficial for society as a whole. It is no wonder that cheap punishment is more easily used and is more effective than expensive punishment. Punishment usually works better than rewards (Gürerk et al. 2009); but in repeated play under partner conditions (the same players interact) Rand et al. (2009) find rewards to be superior. If subjects have the choice between societies with or without a punishment option, a majority first decide for the non-punishment society but in the course of time they switch to the more efficient punishment regime (Irlenbusch et al. 2006). In investment games, the threat of punishing trustees helps investors to get back (moderate) returns (Houser et al. 2008). In our experiment, only indirect punishment was possible; we nevertheless expected it to occur.

Hypothesis 4 *Allocators punish free riders.* They require a higher contribution from the non-allocator who had contributed less in the PG game.

Who is going to be elected? If subjects believe that Hypothesis (2a) applies then they should elect high contributors. If subjects expect high contributors to be elected then they should campaign for votes.

Hypothesis 5 *Elected allocators have contributed more in the PG game.*

Hypothesis 6 *Group members campaign for votes.* An indication for campaigning for votes would be higher contributions in the PG game of the third phase of the Election treatment compared with those in the second phase of the election treatment or in the third phase of the Random treatment.

Does an allocator's behavior influence the others' contributions in the PG game of the next phase? Reciprocity could be the reason for a positive correlation. And does an allocator's behavior influence the allocator of the next phase? Again could reciprocity or, alternatively, imitation or norm orientation be a motive?

Hypothesis 7 *Carry-over from previous phase allocator behavior.*

(7a) The contributions in phases 2 (3) of the PG game from non-allocators of the phase 1 (2) are positively correlated with the allocator's contributions in phase 1 (2).
(7b) If she had not been an allocator in the first (second) phase then the allocator's own contribution in the second (third) phase is positively correlated with "her" allocator's own contribution in the previous phase.

Table 2 Results from the PG game

	Random treatment			Election treatment		
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Av. contribution (% of endowment)	28.7	28.8	35.2	34.9	29.8	30.1
Standard deviation	15.1[ab]	22.6	29.3	20.5[ab]	21.5	26.3
Av. contribution in first round (%)	42.6[c]	42.4[c]	39.6[c]	41.2[c]	40.1[c]	39.4[c]
Av. contribution in last round (%)	15.1	13.5	14.9	16.6	8.2	10.2
% zero contributors in first round	6[c]	17[c]	17[c]	7[bc]	11[c]	17[c]
% zero contributors in last round	53	58	69	48	74	80
% full cooperators in first round	8	11	11	7	10[c]	8
% full cooperators in last round	3	6	8	2	1	7

[a]Significantly different from second phase

[b]Significantly different from third phase

[c]First Round significantly different from last round. Test for average contributions: Two-sided Wilcoxon test based on averages in the independent groups, $p = .05$

4 Results

4.1 Overview and Hypothesis 1

In the PG game of each phase we expected the "normal results" (Ledyard 1995) i.e., we expected the contributions to start with 1/3 to 1/2 of the endowment and to decrease over time with a significant end-game effect. Starting a new phase with a newly selected group should result in higher contributions (re-start effect), which then decrease again. As we see in Table 1, the results of the PG games are not at all surprising. Also the rising share of zero contributions and the decreasing share of full contributors from round 1 to round 10 also is the same as in other PG games.

There are no significant differences in the contributions between the phases. Therefore Hypothesis 6 (campaigning for votes) cannot apply. Another interesting attribute of the PG results is the significant increase from phase 1 to later phases in the standard deviation of the contributions within groups.

In the Allocator game, the differences between phases and treatments (see Table 2) seem to be based more on allocators' own contributions than on forced non-allocators' contributions. The allocators' own contributions decrease from phase to phase, but not significantly. The decrease is partially caused by a significant increase in the fraction of allocators who maximize their own profit.

In order to investigate the question whether the transfer of responsibility activates social preferences (Hypothesis 1) we differentiate between (later) allocators' contributions in the PG game and those of (later) non-allocators (Table 3). Comparing the results of the PG game and the Allocator game we find higher average contributions and higher standard deviations in the latter. All of these differences are significant ($p = .05$) in every phase, except for the comparison of allocators' contributions in the Random treatment where only the pooled data are significantly different. This supports Hypotheses 1a and 1b. Hypothesis 1c is apparently rejected as forced non-allocator contributions are significantly larger than the allocator's own

Table 3 Average contributions and extreme allocations in the Allocator game

	Random treatment			Election treatment		
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Allocators' average contribution (% of endowment)	44.67	46.17	28.00	65.15	55.89	42.57
Standard deviation	31.89	37.60	36.70	37.24	43.53	44.07
Non-allocators' forced contribution (% of endowment)	63.13	76.17	84.13	80.37	86.68	91.61
Standard deviation	31.89	29.23	29.35	23.40	22.38	20.14
% equal forced contributions of non-allocators	42	58	75	59	68	79
% of allocators maximizing their own profit	8[a]	17	50	4[a]	22	32
% of allocators maximizing the group's welfare	8	0[b]	8	26	29	18

There are no significant differences between average contributions

[a]Significant difference between first and third phase

[b]Significant difference between same phases of treatments

Tests: See Table 1. Test for percentages: In each of the 14 independent groups, there are two yes/no-decisions. The numbers of "two times no" are counted and compared in a two sided Fisher test with $p = .05$ (14 observations seem to be too small for a χ^2 test)

Table 4 Testing Hypothesis 1 and the dynamics of Allocator behavior

	Random treatment			Election treatment		
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
(1) contribution (%) by the allocator in PG game	25.67[a]	26.83	36.50	37.46[a]	32.36[a]	30.25[a]
(2) contribution (%) by the allocator in Allocator game	44.67	46.17	28.00	65.15	55.89	42.57
(3) contribution (%) by non-allocators in PG game	30.25[a]	29.71[a]	34.58[a]	33.68[a]	28.46[a]	30.02[a]
(4) forced contribution (%) by non-allocators in Allocator g.	63.13	76.17	84.13	80.37[c]	86.68	91.61
(5) = (1) − (3)	−4.58	−2.88	1.92	3.79[a]	3.89[a]	0.23[a]
(6) = (2) − (4)	−18.46	−30.00	−56.13	−15.22[bc]	−30.79	−49.04

[a]Significant difference between (1) and (2) or between (3) and (4) or between (5) and (6) (Mann-Whitney test, 5% level, $p = .05$). For the election treatment, (6) is significantly different from 0

[b]Significantly different from second phase (Wilcoxon test, $p = .05$)

[c]Significantly different from third phase (Wilcoxon test, $p = .05$)

contributions. Hypothesis 1d is weakly supported by, on average, higher allocator contributions in the election treatment and one significant comparison of the percentage of allocators maximizing the group's income (Table 2).

Table 5 Average income (percentage of endowment)

	Phase 1	Phase 2	Phase 3
Average income in the PG game	116.2	114.5	115.8
Allocators' income in the Allocator game	142.7	156.9	170.3
Non-allocators' income in the Allocator game	129.5	126.7	119.1
Average income in the Allocator game	133.9	136.8	136.2

In terms of income, allocators as well as the non-allocators are, on average, better off in the Allocator game than in the PG game (Table 4). While the advantage of the allocator increases from phase to phase, the non-allocators' advantage more or less vanishes. Average income is, in both games, nearly constant, but significantly higher in the Allocator game. Note that the maximum possible average income is 150.

4.2 Hypotheses 2 and 3: a regression analysis of allocator decisions

In the following regression analysis of the allocator's contributions y_A, we test in particular the Hypotheses 1d, 2a, 2b, 3a, 3b i.e., the influence of different variables on allocator contribution and on differences between contributions in the Allocator game. We did not provide hypotheses for the forced contributions of non-allocators y_{nA}. Neither is it obvious whether and how economists/non-economists and men/women should differ in their behavior. Nonetheless we carry out a regression analysis also for y_{nA}, and we enter the following explanatory variables: *econ* (= 1 if economists, = 0 if not), *male* (= 1 if yes, = 0 if not), *age* and *elec* (= 1 of allocator is elected by group members, = 0 if allocator is selected randomly). In the regression analysis for y_{nA}, we also include y_A (in the case that a sequential determination of y_A and y_{nA} takes place). In addition, we consider the possibility of an autonomous trend by *ph* = phase taking the values 1, 2, 3.

According to the regression analysis, allocators' contributions as well as the difference between non-allocators' and allocators' contributions are positively affected by the allocators' contributions in the PG game. The allocator's own contributions, however, deteriorate over the course of time (significantly negative coefficient of phase). Below we will see that it is not the disappointment from previous allocator decisions which makes responsibility vanish. Therefore it may be an autonomous process. The subjects may increasingly take the stance that there is *no obligation* for them to contribute and that there is *really no threat of being identified or punished*. With respect to our hypotheses, only Hypothesis 2a is confirmed while Hypotheses 1d, 2b, 3a, 3b are neither rejected nor supported.

4.3 Further hypotheses

Punishing free riders (Hypothesis 4) is defined as a higher forced contribution of the non-allocator who had contributed less in the PG game. We find *no tendency to punish free riders:* 16% of those non-allocators with the lower average contribution in the PG game are forced to contribute more, 15% have to contribute less than the non-allocator with the smaller contribution. Also when we differentiate with respect to the different PG games and treatments or use alternatives to average contributions, no significant differences arise.

Are allocators elected because they contributed more in the PG game (Hypothesis 5)? Because the last rounds in the PG game may be better remembered, we investigated whether the average of the last k contributions in the PG game are higher for elected allocators than

Table 6 Regression analysis of allocators' and forced non-allocators' contributions. p-values are displayed in brackets

Variable	const	x_A	x_{nA}	ph	elec	econ	age	male	y_A	adj R^2
y_A	**82.0**	**4.4**	−1.1	**−15.5**	11.8	−5.4	−.93	−12.2		.204
	(.003)	(.001)	(.392)	(.003)	(.162)	(.442)	(.349)	(.078)		
y_{nA}	**75.8**	**2.3**	−1.3	3.7	7.9	−0.5	2.8	3.4	−0.1	.109
	(.000)	(.005)	(.103)	(.247)	(.131)	(.492)	(.519)	(.419)	(.242)	
$y_{nA} - y_A$	1.1	2.0	0.4	**−19.1**	5.6	−0.1	−10.1	−14.1		.102
	(.974)	(.188)	(.811)	(.003)	(.591)	(.928)	(.240)	(.100)		

for the other group members. We obtained mixed results. Taking the average contribution over all rounds, the elected allocator contributed more in Phase 2 (6.41 vs. 5.64 tokens) than the non-allocators. In Phase 3 the opposite relation is observed (5.81 vs. 5.93). Taking the last 5, 4, 3, 2 rounds and the last round separately, the elected member contributed on average more than the non-elected in both phases. As all averages are not significantly different, this is only a weak confirmation of Hypothesis 5. Therefore, subjects might anticipate the low success of higher contributions for their chance of being elected. This might explain the missing campaigning for votes (Hypothesis 6).

The hypothetical tendency of the subjects to elect those members with higher contributions is, however, supported by the answers in our questionnaire: 55% of the subjects stated they voted for that member of the group who "acted in the best interest of the group" in the PG game, while 36% stated they were voting for themselves in order to become the allocator. On the other hand, we observe that the frequency of subjects voting for themselves is larger than 36% and that it increased slightly with repetition; the percentage rose from 56% in phase 2 to 69% in phase 3. On average, one member of a group did not vote for himself and this vote determined who became the allocator.

We have already seen from Table 1 that Hypothesis 6 does not apply. Hypothesis 7 suggests carry-over from the Allocator game to the PG game of the next phase. No significant correlations are to be found, however. An important consequence is that we cannot attribute the negative influence of "phase" in the regression analysis of the allocators' own contributions to his negative experiences from previous phases.

5 Discussion

There are four main (groups of) results: First, *on average the transfer of responsibility activates social preferences* in the following sense: An allocator contributes more of her endowment in the Allocator game (47.1%) than in the PG game (31.5%). On the other hand, she forces the other members of his group to contribute more (80.3%) than she does. (See Table 3.) Compared with the PG game, non-allocators' as well as allocators' incomes increase. Insofar as giving someone power over the resources of others helps (a bit) to cure the problem of inefficiently low voluntary contributions to public goods. The problem is not solved completely, however, and power is also used to create inequality.

The second main result of our experiment is the *deterioration of responsibility*. Repetition with newly selected groups leads to less absolute, as well as less relative allocator contributions. The explanation for this trend is an open question; it is not based on a self-enforcing process of unsatisfactory contributions on the part of previous allocators. Neither

is it clear whether the deterioration of responsibility is a necessary process. With other parameters of the game, convergence to full efficiency might be equally possible. An example of such a parameter-specific process is the repeated play of the Travelers' Dilemma (Capra et al. 1999).

The third main result is that, surprisingly, *responsibility is only slightly (if at all) enhanced by elections*. Is "democratic" legitimating of power really without major effects? In our experiment, larger responsibility of elected allocators can be expected because of stronger reciprocity feelings. In democracies, the desire to be re-elected also may make powerful leaders act more responsibly. In order to investigate the effect of possible re-elections new experiments are necessary.[5]

The fourth group of results is the identification of *some further influences (and non-influences) on allocator and (enforced) non-allocator contributions.* Allocator contributions in the previous PG game have a strongly positive influence, showing that contributions in both games seem to be based on similar individual motives. Allocator behavior is not influenced by the allocator's gender[6] or academic major. A punishment or reward motive derived from (un)satisfactory contributions in the PG game cannot be identified. Further negative results are the lack of campaigning for votes (i.e., contributing more in the preceding PG game when an election has been announced) and the absence of carry-over effects from one phase to the next.

Let us come back to the first result. In democracies as well as in dictatorships, in the family as well as in firms, a transfer of power is practiced. Does it work to the benefit of all? Our investigation shows that *such transfers can improve the provision of public goods*. Let us emphasize, however, that one experiment is not sufficient to draw far-reaching conclusions. Only after countless Dictator and Investment experiments with different frames and different parameters do we now have a good overview about typical results in these situations and about possible variations in outcomes.

Our experiments describe the transfer of power (to allocate effort) in small or medium-sized groups. Of course, we do not claim that, with our experiments, we can investigate responsible behavior of the president of a country or the CEO of a large firm. We are aware that power and responsibility can have completely different meanings and can show completely different structures. The advantage of our experiment is that it uses a familiar frame, namely PG experiments, and can thus be better compared with the existing experimental literature.

We think that our results are challenging enough to justify more experiments on responsibility where our first three main results should receive special attention. We are confident that at least our first and most important result can be replicated (with quantitative effects depending on parameters and frames). The customary transfer of power to a leader/allocator is not only beneficial under circumstances requiring coordination but also in order to improve the suboptimal voluntary provision of public goods.

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[5]We have meanwhile conducted such an experiment. Our preliminary analysis shows that the re-election rationale works.

[6]Dollar et al. (2001) find that governments (parliaments) with more women are less prone to corruption.

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