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Walter Eucken Institut
Goethestraße 10
79100 Freiburg
www.eucken.de
wei-freiburg@eucken.de

universität freiburg

Albert-Ludwigs-Universität Freiburg
Institut für Wirtschaftswissenschaften
Abteilung Wirtschaftspolitik und
Ordnungsökonomik

Institutional Rules and Biased Rule Enforcement*

Simon Columbus[†‡] Lars P. Feld[§,¶] Matthias Kasper[¶]
Matthew D. Rablen[‖]

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Abstract

This study investigates how institutional rules and fairness in enforcement affect cooperation and compliance in heterogenous groups. In a preregistered online experiment ($n = 1,254$), we vary both the existence of a rule governing contributions to a public good as well as whether enforcement of the rule is biased against some players. We find that merely stating a rule has a stronger effect on behaviour than rule enforcement. Specifically, institutional rules promote cooperation by strengthening personal and social norms, which in turn sustains contributions over time. In contrast, in the absence of a rule, norms are weaker and contributions decline. Fair rule enforcement reduces free-riding and increases compliance, but it also crowds out full cooperation. Finally, we find no evidence that biased rule enforcement erodes norms, reduces cooperation, or diminishes rule compliance. Our findings highlight the crucial role of institutional rules in strengthening norms and sustaining cooperation in heterogeneous groups, even in the absence of enforcement or when rule enforcement is biased.

JEL Classification: H41; C72; C91; C92
Keywords: public goods; rule compliance; rule enforcement; social norms.

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Columbus, Kasper, and Rablen contributed equally and share first authorship.
[†]Massachusetts Institute of Technology, Cambridge, MA, USA.
[‡]University of St Andrews, St Andrews, UK.
[§]Albert-Ludwigs-Universität Freiburg, Freiburg, Germany. Corresponding author: feld@eucken.de.
[¶]Walter Eucken Institut, Freiburg, Germany.
[‖]University of Sheffield, Sheffield, United Kingdom.

1 Introduction

Rules are a central element of human civilisation, needed to preserve social order and cohesion, and as the basis for any form of large-scale cooperation (e.g. Hayek, 1973; Bicchieri, 2006; North, 1990). Laws prescribe formal sanctions in order to deter rule violations and early economic analyses of the law assumed that the expected cost of such formal sanctions needed to outweigh the benefits of breaking the law to be deterrent (Becker, 1968). However, laws also have an "expressive function" (Sunstein, 1996), signalling or establishing social norms about what is considered appropriate and what is not (Benabou and Tirole, 2011; Lane et al., 2023; Sunstein, 1996). Consequently, even laws prescribing weak or infrequent formal sanctions may deter noncompliance by signalling social norms (Dal Bó et al., 2010; Markussen et al., 2014; Tyran and Feld, 2006). Conversely, sanctioning institutions may fail to signal, or even undermine, cooperative social norms if they are perceived as biased (Nosenzo et al., 2024; Spadaro et al., 2023; Radkani et al., 2025). In this study we examine the causal effects of institutional rules on norms and cooperation in heterogenous groups and whether their effects are buttressed by fair enforcement and undermined by biased enforcement.

Biased rule enforcement can manifest as unequal punishment for identical rule violations, or even punishment in the absence of any violation. Alternatively, bias may primarily affect the likelihood that a rule violation is detected in the first place. In the Dutch childcare benefits scandal, for instance, thousands of parents were falsely accused of benefits fraud. Claimants with a foreign nationality were disproportionately affected, as they were up to 16 times more likely to be audited than Dutch citizens (College voor de Rechten van de Mens, 2022). More recently, the U.S. Internal Revenue Service has been accused of disproportionately targeting Black taxpayers for audits compared to non-Black taxpayers (Elzayn et al., 2025). These cases are notable because they involve accusations of bias in who is audited for potential rule violations. However, despite the apparent significance of these cases, we know of few systematic studies of the effects of bias in the auditing or monitoring of rule violations.[1]

[1]It is appropriate to acknowledge that biased rule enforcement could also have upsides. In particular, institutional bias might—in some instances—be economically efficient. For example, predictive policing may be more efficient than random monitoring (Persico and Todd, 2006; Perry et al., 2013). Similarly, in the tax context, audits targeted at individuals with a high propensity for evasion induce stronger compliance responses than random audits (Kasper and Rablen, 2023) and recent studies present evidence that the returns from tax audits are substantially higher at the upper end of the income distribution (Beer et al., 2024; Boning et al., 2025). Our study, however, investigates institutional bias that is not

We study the effects of rules and rule enforcement on cooperation in heterogenous groups. Our experimental design is based on the standard public goods game. We introduce heterogeneity by establishing minimal group identities (Chen and Li, 2009)—that is, we randomly assign players to either 'red' or 'blue' subgroups. We then vary the presence of a contribution rule and its enforcement, and observe the effects on costly contributions to the public good, rule compliance, and both personal and social norms. First, we introduce a non-binding rule prescribing public good contributions of at least 50% of each player's endowment. Comparing treatments with and without this rule allows us to estimate the signalling—or expressive—function of non-binding rules. Second, we introduce non-deterrent sanctions for rule violations. In the *fair* audit treatment, all players are audited with the same probability and fined if found in violation of the rule. This allows us to distinguish the effect of sanctions from the signalling effect of the rule itself. Finally, in the *biased* audit treatment, 'red' players are three times more likely to be audited than 'blue' players, but all players face the same fine if found in violation of the rule. Comparing treatments with fair and biased audits then allows us to estimate the effect of bias in rule enforcement on public good contributions as well as rule compliance.

We find that heterogeneity alone does not undermine rule compliance. Within heterogeneous groups, the presence of a minimum contribution rule is associated with a substantial increase in contributions to the public good. Moreover, the presence of a rule has a strong and positive effect on personal and social norms—consistent with the expressive function of rules—sustaining contributions over time. Introducing sanctions for rule violations further increases compliance, but does not carry over into an increase in average contribution levels. Instead, the positive effect of rule enforcement on the compliance of free-riders is almost perfectly offset by a reduction in "excess" contributions—above the level stipulated by the rule—of unconditional cooperators. Finally, biased audits do not undermine rule compliance or contributions to the public good. While biased audits initially decrease compliance relative to fair audits, this difference diminishes over time. Thus, our results suggest that the expressive function of rules is remarkably robust to biases in how rules are enforced.

The plan of the paper is as follows: The next section discusses our contribution to the literature. Section 3 describes the experimental parameters and treatments, Section 4 presents the results, and Section 5 concludes with some policy implications.

rooted in such efficiency considerations. Instead, our focus is on the effects of arbitrary, or taste-based, bias in the auditing of rule violations.

2 Related literature

Our study contributes to several strands of the economic literature. First, we contribute to the literature on institutional bias in rule enforcement. Bias may undermine both the deterrent and the expressive function of rules (Nosenzo et al., 2024; Radkani et al., 2025). Corrupt institutions—which apply rules unequally or not at all—are associated with decreased trust and lower cooperation (Gächter and Schulz, 2016; Spadaro et al., 2023; Martinangeli et al., 2024). The evidence on biased rule enforcement is less clear. Riedel and Schildberg-Hörisch (2013) study a public goods game with unequal minimum contribution rules for different members of the same group and find that players comply with the given rule, even if it is unequal. Similarly, Keser et al. (2017) present evidence that unequal minimum contribution rules for rich and poor players increase cooperation. In contrast, Kogler et al. (2023) find that different penalty rates for high- and low-endowment players reduce the richer players' compliance when they were aware that poorer players faced a lower penalty rate. van Prooijen et al. (2008) show that when some players are immune from punishment, cooperation declines significantly—falling even below levels observed in a game without any sanctions. Other studies investigate audits that fail to accurately assess compliance and find that such flawed audits negatively affect compliance (Kasper and Alm, 2022a; Lancee et al., 2023).

Our study differs from existing literature in that we vary the audit rate between subgroups, but assess the same fine if rule violations are detected. We find that biased rule enforcement initially reduces compliance compared to fair enforcement, but this effect dissipates over time. This result suggests that institutional rules shape social norms that sustain cooperation and remain largely resilient to bias in rule enforcement.

Second, we contribute to the broader literature on compliance with non-binding rules. While laws are typically backed up by sanctions, rules may be non-binding in practice because the state lacks the capacity to monitor and punish rule violations (Ambrus and Greiner, 2012). In other cases, rule violations may only be punished if they exceed some severity threshold (Kasper et al., 2024). Still, the mere presence of a rule may affect behaviour by signalling a social norm (Benabou and Tirole, 2011; Gächter et al., 2023; Sunstein, 1996). For example, Lane et al. (2023) show large discontinuities in social norms around legal thresholds. In laboratory experiments, merely labelling public good contributions above a specific threshold as being "good" has a positive effect on cooperation (Barron and Nurminen, 2020). Similarly, Gächter et al. (2023) also find strong

rule-following effects absent any enforcement.

Our experiment is most closely related to studies that set non-binding contribution rules for public goods (Croson and Marks, 2001; Marks et al., 1999). For example, Galbiati and Vertova (2014) and Silverman et al. (2014) present evidence that non-binding rules increase contributions in public goods games. In both studies, contributions are further increased by the threat of sanctions, even if audits are too infrequent to make sanctions deterrent. Other studies, however, have documented a crowding-out effect where non-deterrent sanctions may fail to increase compliance and may even backfire (e.g. Gneezy and Rustichini, 2000; Slemrod et al., 2001; Mendoza et al., 2017). We add to this literature by studying non-binding rules in heterogeneous groups, in which social norms may be more diffuse. We find that non-deterrent sanctions weakly increase rule compliance, but do otherwise not promote cooperation. Instead, our results suggest that crowding-out effects among unconditional cooperators attenuate the otherwise positive effects of rule enforcement on cooperation.

Finally, we contribute to the literature on social heterogeneity and cooperation. In surveys, ethnic heterogeneity is associated with lower trust (Alesina and La Ferrara, 2002; Dinesen et al., 2020; Putnam, 2007). However, the mechanisms underlying this association remain unclear. For example, Abascal and Baldassarri (2015) argue that it is a compositional artifact of the overrepresentation of ethnic minorities—which report lower trust—in heterogeneous communities. Some experimental studies have varied the ethnic composition of groups to study the effect of ethnic heterogeneity on norm compliance and contributions to public goods (Castro, 2008; Habyarimana et al., 2007; Alexander and Christia, 2011; Drouvelis et al., 2021; Mantilla et al., 2021). In general, this literature tends to find that heterogeneous groups are less cooperative than homogeneous groups.

Our study extends prior work examining the effect of heterogeneity with induced minimal identities on contributions in a public good game (Chen and Li, 2009; Drouvelis and Nosenzo, 2013). Most closely related to our work, Chakravarty and Fonseca (2014) find no effect of heterogeneity on contributions, whereas Aksoy (2015) presents evidence that homogeneous groups are more cooperative than heterogeneous groups, but only when they receive feedback across rounds. Our study differs from the prior literature on group heterogeneity and cooperation in that we study the effect of heterogeneity on compliance with an explicit, but non-binding contribution rule. In this setting, we find that heterogeneity does not undermine cooperation or rule compliance, even when institutional rules are enforced in an overtly biased way.

3 Experimental Design

Our experimental design seeks to understand the impact of institutional rules, $R \in \{0, 1\}$, and institutional bias in rule enforcement, $B \in \{0, 1\}$, on cooperation, rule compliance, and norms (both personal, $N_{personal}$, and social, N_{social})—controlling for group heterogeneity effects, $H \in \{0, 1\}$, and the deterrent effects associated with (fair) rule enforcement, $E \in \{0, 1\}$.[2] To capture these determinants, our experiment comprises three stages: First, participants receive instructions for a public goods game, are assigned a colour tag (in the four treatments with heterogeneous groups), and are informed about the contribution rule for the public goods game (in the four treatments with a rule); second, they play ten rounds of a public goods game; third, we elicit personal and social norms.[3] Compliance outcomes in the public goods game are determined by the level of contributions, g. To organise ideas, we may represent the outcome variables as a system

$$g := g\left(\mathbf{\Gamma}; \mathbf{\Phi}_g\right); \tag{1}$$

$$N_z := N_z\left(\mathbf{g}, \mathbf{\Gamma}; \mathbf{\Phi}_z\right) \qquad z \in \{\text{personal,social}\}; \tag{2}$$

where $\mathbf{\Gamma} = \{B, E, H, R\}$ is a vector of the treatment variables; and $\mathbf{g}$ is a vector of realised compliance outcomes g in the initial public goods game. Thus, norms can depend on multiple characteristics of the distribution of compliance outcomes, not just its mean. In each equation (1)-(2) $\mathbf{\Phi}$ is a vector of all other determinants. In particular, the elements of $\mathbf{\Phi}_g$ include kindness or other prosocial "warm glow" motives, which may interact negatively with monetary incentives (e.g., Gneezy and Rustichini, 2000). While norms may be impacted by the elements of $\mathbf{\Gamma}$ directly, as well as indirectly via $\mathbf{g}$, our interest here is in the total effect on norms, not its decomposition.

We now describe the three experimental stages in detail (see Figure 1): In the public goods game we implement a between-subjects design with five experimental treatments. Specifically, we introduce variation in the group composition (*homogeneous* versus *heterogeneous groups*), the absence or presence of a contribution rule (*rule* vs. *no rule*), the

[2] As rule enforcement can only be relevant when there is a rule, we suppose $R = 0 \Rightarrow E = 0$. As, similarly, bias in rule enforcement can only be relevant for norms when a rule exists and it is enforced we suppose $R = 0 \Rightarrow B = 0$ and $E = 0 \Rightarrow B = 0$.

[3] After the norm elicitation, participants also played a series of trust games. We report the procedures and results for these games in Appendix C.

absence or presence of audits (*no audits* versus *audits*), and the fairness of audits (*random audits* versus *biased audits*). This results in five treatments:

1. BaseHet: Heterogeneous groups without rule ($H = 1$, $B = E = R = 0$);
2. RuleHom: Homogeneous groups without audits ($R = 1$, $B = E = H = 0$);
3. RuleHet: Heterogeneous groups without audits ($H = R = 1$, $B = E = 0$);
4. AuditHet: Heterogeneous groups with random audits ($E = H = R = 1$, $B = 0$);
5. BiasedHet: Heterogeneous groups with biased audits ($B = E = H = R = 1$).

3.1 Public Goods game

Our experimental design is based on a standard public goods game with ten rounds. Participants are assigned randomly to groups of $n = 6$ members, which remain fixed for the duration of the experiment. In every round each player receives an endowment of $\Psi = 10$ points. Each player decides independently how to allocate these points between a private account and a group account. Points allocated to the private account yield one point each for the player. Points allocated to the group account are tripled and redistributed equally across all players, so that every point contributed to the group account, $g_i \in \{0, 1, \ldots, 10\}$, yields $\mu = 0.5$ points for every group member. Thus, individual payoffs, π_i, are determined by

$$\pi_i = \Psi - g_i + \mu \sum_{j=1}^{n} g_j. \tag{3}$$

3.1.1 Group composition

First, we introduce variation in the group composition across treatments. In the treatment with *homogeneous* groups (RuleHom), players are indistinguishable. In contrast, in the treatments with *heterogeneous* groups (BaseHet, RuleHet, AuditHet, BiasedHet), each group of six players is partitioned into 'red' and 'blue' subgroups, with three players assigned to each subgroup. In all treatments the (sub-)group composition remains constant between rounds and each player knows the colour of their subgroup. As the presence of subgroups is the only difference between the RuleHom and RuleHet treatments, a pure heterogeneous group membership effect can be inferred from this contrast.

3.1.2 Contribution Rule

Second, we introduce a *contribution rule*. In the BaseHet treatment, players are given no indication how much to contribute to the public good. In all other treatments, participants are told that they must make a minimum contribution, $\underline{g}$, of five points, or half of their endowment, to the group account. However, participants are informed that a contribution of any amount $\{0, 1, \ldots, 10\}$ is possible, and that each group member has the same choice to make.

3.1.3 Audits

Finally, we introduce variation in the *audit* mechanism, i.e., the institutional mechanism which checks contributions to the group account. In the BaseHet, RuleHom and RuleHet treatment, there are no audits; i.e., the rule is non-binding. In the audit treatments (AuditHet and BiasedHet) players face a probability $p \in (0, 1)$ of being audited, an event indicated by $a \in \{0, 1\}$. If a player is audited and the audit reveals that the contribution in this round is below the required minimum contribution of five points, the player pays a fine f that is $s = 2$ times the difference between the player's contribution and the required minimum contribution, or $f_i = s(\underline{g} - g_i)$.

Thus, in the audit treatments, payoffs are determined by

$$\pi_i = \begin{cases} \Psi - g_i + \mu \sum_{j=1}^{n} g_j & \text{if } g_i \geq R; \\ \Psi - g_i + \mu \sum_{j=1}^{n} g_j - \mathbf{1}_{a=1} \times f_i & \text{if } g_i < R. \end{cases}$$

In expectation, this simplifies to

$$\mathbf{E}(\pi_i) = \Psi - g_i + \mu \sum_{j=1}^{n} g_j - ps \max\{\underline{g} - g_i, 0\}. \tag{4}$$

In the treatment with *random audits* (AuditHet), all players are audited with probability $p = .2$. In contrast, in the treatment with *biased audits* (BiasedHet), players in one subgroup are audited with a low probability of $p = .1$ (BiasedHetL), whereas players in the other subgroup are audited with a high probability of $p = .3$ (BiasedHetH). The audit probabilities (of both subgroups) are common knowledge in all audit treatments and are fixed for the length of the experiment. We design the audit mechanism so that sanctions are imperfect, i.e., breaking the rule pays in expected monetary terms (Engel, 2013; Tyran and Feld, 2006).

3.2 Social Norms

After participants have completed the public goods game, we elicit social norms by adapting methods from Bicchieri and Xiao (2009) and Dimant (2023). Specifically, we first assess personal normative beliefs $N_{personal}$ by asking participants, "*Personally, how many points do you think would be the appropriate contribution to the group account?*" Participants use a slider with range 0–10 to indicate their personal normative beliefs.

Subsequently, we elicit normative expectations in the form of expectations about the distribution of responses to the above question. To this end, we ask participants to indicate how many out of ten participants in the same treatment $n \in \{0, 1, \ldots, 10\}$ they believe stated each possible level of personal normative belief $N_{personal} \in \{0, 1, \ldots, 10\}$. Participants must allocate exactly ten points (one for each other player) across the eleven possible responses for the appropriate contribution to the group account.[4]

3.3 Experimental procedure

Figure 1 illustrates the structure of the experiment. After entering the experiment, all participants receive detailed instructions on the public goods game. Participants in the *heterogeneous* treatments are informed about the existence of two subgroups within their group and the colour tag they have been assigned. Subsequently, all participants must correctly answer four comprehension questions on the rules of the public goods game and the computation of their payoffs to move on. Participants in the treatments without audits continue directly to the first contribution decision. Participants in the audit treatments receive additional instructions on the audit mechanism and must pass another set of comprehension questions to move on. Specifically, players have to answer four questions on the audit probabilities in both subgroups as well as the fines for noncompliance. Subsequently, participants are randomly assigned to groups of six players. The groups do not change throughout the public goods game.

Participants then proceed to the first contribution decision, where they decide how much of their endowment of $E = 10$ points (1 point = £0.10) they want to contribute to the public good. After each contribution decision, participants in the *non-audit* treatments learn the contributions of the other players as well as their earnings before advancing to the next round. In the *audit* treatments participants are selected for an audit with

[4]We do not incentivise the elicitation of normative expectations as we are not aware of a scoring rule that allows incentive-compatible elicitation of beliefs about distributions of ordinal variables.

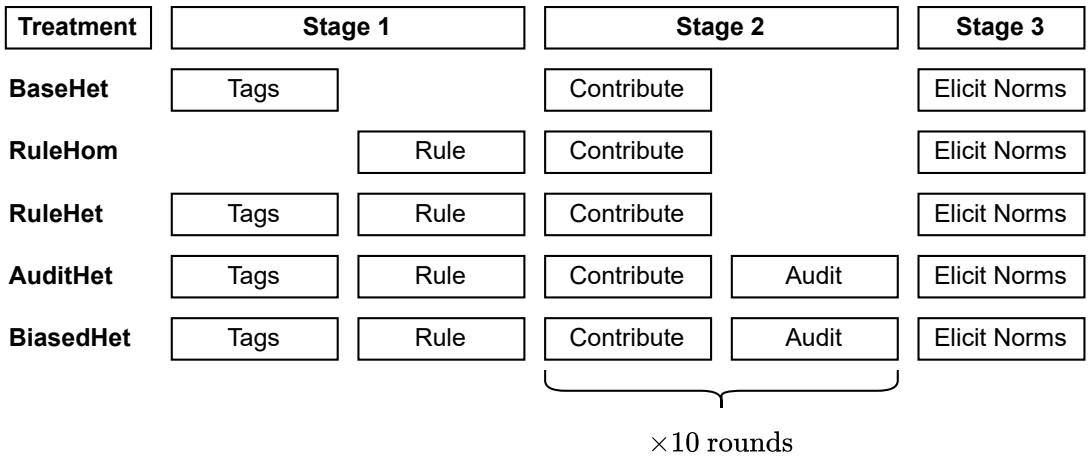

Figure 1: The experimental setup.

probability p. If an audit occurs and the player contributed less than five points to the group account, the player receives a fine f that is deducted from the earnings in that round. All players are informed about whether they were audited or not, whether the audit resulted in a fine, and how much they earned in this round. Participants also receive information about the contributions, audits, and fines of all other group members. In the treatments with *heterogeneous* groups this information is presented together with the colours of the other players. Players' IDs are randomised each round to prevent individual reputation building. This procedure is repeated for ten rounds, though participants do not know the number of rounds.

Once participants have completed the final round of the public goods game, one round is randomly selected and the players' earnings in this round are converted to Pounds Sterling and paid out to the participants. The maximum bonus payment for the public goods game is £2.

After the end of the public goods game, all players indicate their personal normative beliefs with respect to their group. Then, the players indicate their normative expectations for ten other players in their treatment as described above.

3.4 Data

The procedure and key hypothesis tests were preregistered on the Open Science Framework (https://osf.io/wthm7/?view_only=fe3eafaf2d7b47789389817a9434aa8b).[5] We ran the experiment on Prolific (https://prolific.co) in April and December 2023. On average, the study lasted between 15 minutes (in the treatments *without audits*) and 20 minutes (in the treatments *with audits*). Participants were paid the equivalent of £9.00 per hour (£2.25–£3.00) as fixed compensation. Additionally, participants received bonus payments of up to £4.00 (up to £2.00 from the public goods game and up to £2.00 from the trust games).

We aimed to recruit 408 participants, or 68 sets of six players, in the treatment with *biased audits* (BiasedHet). In all other treatments, we aimed to recruit 204 participants per treatment. The aspired sample size of $n = 1,224$ is substantially larger than the average sample size in prior experimental work studying public good games ($n_{mean} = 146$, Spadaro et al., 2022) or tax compliance games ($n_{mean} = 235$, Alm and Malézieux, 2021). Our final sample consists of $n = 1,254$ participants (209 groups). We exclude participants who failed to pass either comprehension check or who did not complete all ten rounds of the public goods game. Table A.1 shows the effective sample sizes per treatment. Participants are from the UK and balanced in terms of gender. The mean age is 40 years ($SD = 13.6$).

We take a host of measures to ensure confidence in the quality of our data. First, we rely on Prolific, which is considered to produce high-quality data compared to other online platforms (Peer et al., 2022; Douglas et al., 2021).

Second, we implement a generous incentive structure that places emphasis on variable compensation. In particular, sanctions in the public goods game are imperfect, i.e., self-interested participants have a financial incentive to ignore the contribution rule and free-ride, even in the treatments with rule enforcement.

Third, we implement a series of carefully designed comprehension checks to ensure participants have understood the rules of the public good games, including the contribution rule, the computation of their payoffs, as well as the composition of the (sub-)groups in their treatments. Moreover, participants in the treatments *with audits* answer additional questions on the audit probability in their group (respectively the audit probability in each subgroup), the fines for noncompliance, and the effects of fines on their earnings

[5] We describe all preregistered hypotheses, deviations from the preregistration, and hypothesis tests in Appendix B.

before they can proceed to the first contribution decision of the experiment. Participants who fail to answer the comprehension check questions are returned to the instructions page until they answer the questions correctly or drop out of the experiment. Table A.2 provides information on comprehension check performance. Among participants who passed the comprehension checks, the median number of attempts to complete the check questions is 1, suggesting that participants who contributed in the experiment understood the instructions well.

Fourth, all instructions are adapted from prior work with only minimal modifications (Bicchieri and Xiao, 2009; Thielmann et al., 2021; Dimant, 2023).

4 Results

This section presents our results on the effects of institutional fairness on public good contributions, rule compliance, personal normative beliefs (personal norms) and normative expectations (social norms). All treatment comparisons are based on Wald tests with robust standard errors clustered at the group level.

Table 1 presents estimated marginal means with cluster-robust standard errors for all outcome variables. It reveals three important results. First, the contribution rule induces a strong social norm, increasing the rate of rule compliance by one third and raising overall contributions by 15%. Second, although non-deterrent sanctions for rule violations further increase compliance, this does not translate into higher overall contributions. Third, compared to fair audits, biased audits do not undermine contribution or compliance rates. We elaborate on these results in the following sections.

4.1 No Effect of Heterogeneity on Contributions

First, we consider the effect of mere heterogeneity in group composition given a common contribution rule (i.e., RuleHet - RuleHom). We observe no effect of heterogeneity on contributions, rule compliance, or personal and social norms (all $p > .1$, Wald tests). Indeed, contrary to our expectation that heterogeneity would undermine cooperative norms and cooperation, the estimates are descriptively positive.

	Contribution	Compliance	Personal Norm	Social Norm
BaseHet	5.29	0.61	5.54	4.98
	(0.36)	(0.04)	(0.30)	(0.30)
RuleHom	6.16	0.77	6.23	5.53
	(0.27)	(0.03)	(0.31)	(0.25)
RuleHet	6.30	0.80	6.29	5.70
	(0.24)	(0.03)	(0.23)	(0.19)
AuditHet	6.22	0.88	6.23	5.66
	(0.21)	(0.02)	(0.21)	(0.18)
BiasedHet	6.02	0.84	6.11	5.50
	(0.16)	(0.01)	(0.15)	(0.14)
R^2	0.87	0.89	0.85	0.89
Adj. R^2	0.87	0.89	0.85	0.89
Statistic	739.65	1455.72	807.20	815.95
P Value	0.00	0.00	0.00	0.00
DF Resid.	208.00	208.00	208.00	208.00
Obs	1254	1254	1254	1254
RuleHet - RuleHom	0.14	0.03	0.07	0.17
	(0.36)	(0.04)	(0.38)	(0.32)
RuleHet - BaseHet	1.00*	0.19***	0.76*	0.72*
	(0.43)	(0.05)	(0.38)	(0.35)
RuleHet - AuditHet	0.07	-0.08*	0.06	0.04
	(0.32)	(0.03)	(0.31)	(0.27)
RuleHet - BiasedHet	0.28	-0.04	0.18	0.19
	(0.29)	(0.03)	(0.28)	(0.24)
AuditHet - BiasedHet	0.21	0.05†	0.12	0.15
	(0.27)	(0.02)	(0.26)	(0.23)

Table 1: Top: Estimated marginal means and cluster-robust standard errors. Bottom: Wald tests for treatment comparisons. $^{\dagger}p < .1$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

4.2 A Non-Binding Rule Increases Contributions

Second, we estimate the effect of a non-binding contribution rule (i.e., RuleHet - BaseHet). Introducing such a rule has a large and significant effect on contributions: in the absence of a rule, players contribute on average 5.29 points—with the rule, they contribute on average 6.30 points ($p = .021$). This reflects an increase in compliant contributions, i.e., contributions of at least five points, which increase from 61% to 80% ($p < .001$). As shown in Figure 2, the contribution rule specifically increases exactly compliant contribu-

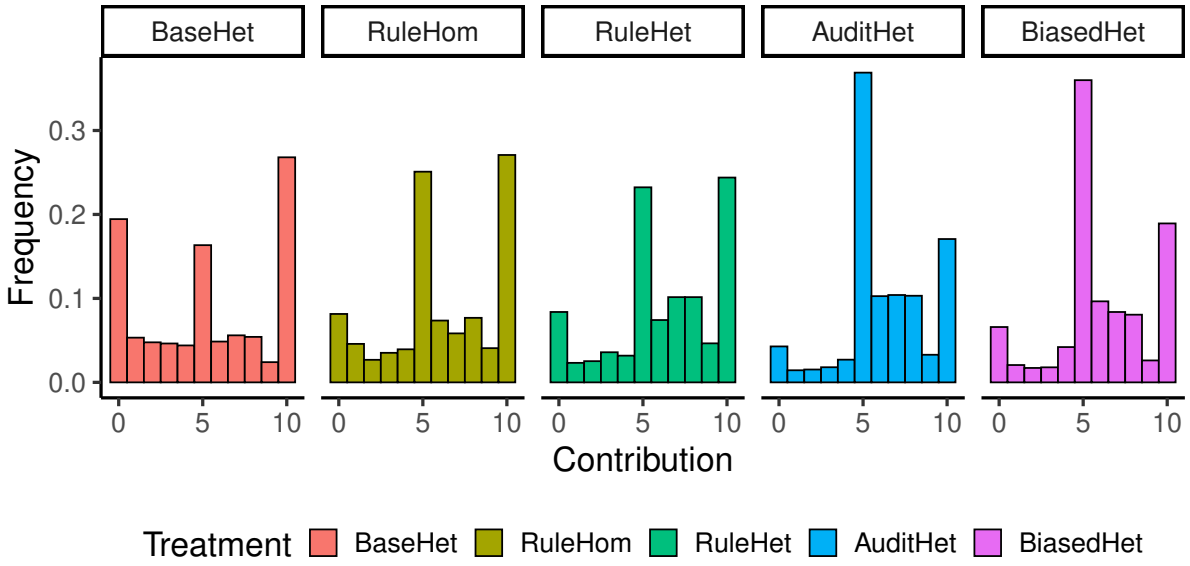

Figure 2: Distribution of contribution decisions by treatment.

tions (i.e., contributions of exactly five points), which increase by 6.9% points ($p = .020$), whereas it more than halves free-riding (i.e., contributions of exactly zero points), which declines from 19.4% to 8.4% ($p = .002$).

Importantly, the rule did not increase contributions by setting an initial norm. Figure 3 shows mean contributions by round. Initial contributions are similar with and without a rule, but decline over time when the rule is absent. Figure D.1 shows the distribution of contributions by round. From this, it is clear that in the absence of the contribution rule free-riding increases over time, while contributions at the level of the rule—which are initially frequent—decline. This suggests that the rule does not *set* norms so much as *strengthen* them.

Results from the norm-elicitation task are consistent with this finding. The introduction of a non-binding contribution rule has a positive effect on personal and social norms. Average personal normative beliefs increase from 5.54 points without a rule to 6.29 points with a rule ($p = .047$); average normative expectations increase from 4.98 points to 5.70 points ($p = .043$). As depicted in Figures D.2 and D.3, changes in contributions follow a similar pattern: introducing a non-binding contribution rule increases the personal and social normativity of exact rule-following while it undermines the normativity of free-riding.

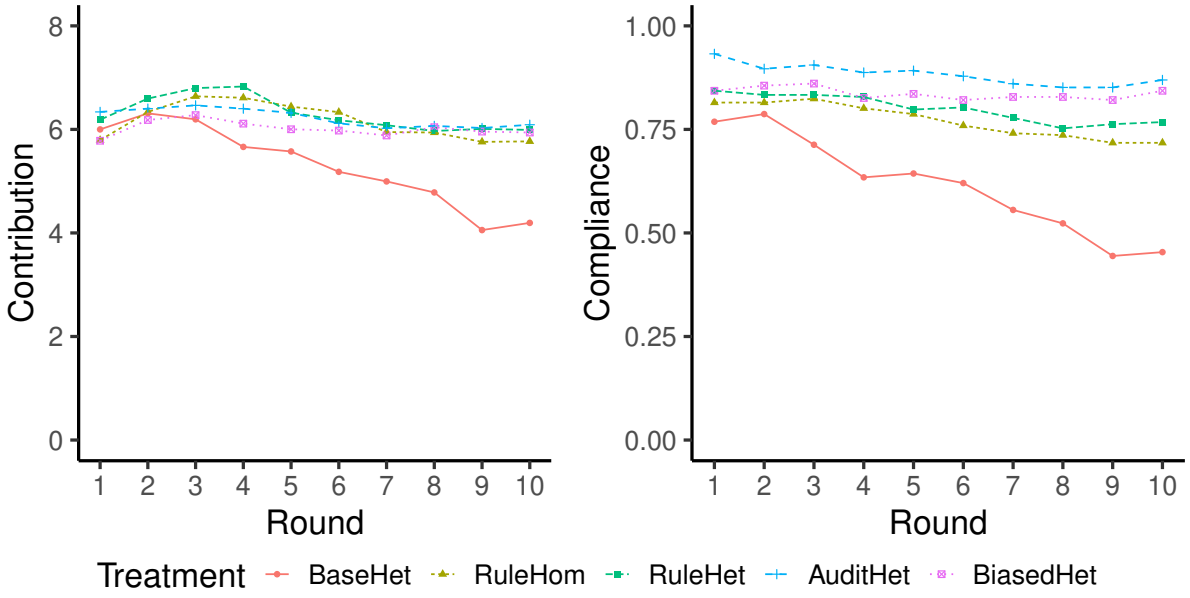

Figure 3: Left: Mean contribution by round. Right: Proportion of compliant players by round.

4.3 Fair Audits Increases Compliance, but Not Overall Contributions

Economic theory predicts that enhancing the incentives for rule compliance will lead to greater rates of compliance. The results in Table 1 bear this out: the introduction of random audits between the RuleHet and AuditHet treatments increased the compliance rate from 80 percent to 88 percent ($p = .012$). This increase in compliance did not, however, translate into an increase in overall contributions, which were essentially unchanged ($p = .825$). Consistent with the null effect on overall contributions, the introduction of fair audits is not associated with a change in either personal or social norms (both $p > .10$).

Figure 2 illustrates why increased compliance was not associated with higher overall contributions. First, the introduction of audits reinforced the effect of the contribution rule by increasing exactly compliant contributions (i.e., contributions of exactly five points), which rose by 13.7% points ($p < .001$; Table E.4). Introducing audits also reduced free-riding (i.e., contributions of exactly zero points), which declined from 8.1% to 4.3% ($p = .052$; E.5). However, audits also had an ironic effect, reducing unconditional (full) cooperation (i.e., contributions of exactly 10 points) by 7.3% points ($p = .118$; E.9). In other words, audits pulled both under- and over-contributors towards the stated minimum contribution rule. Taken together, these results suggest that audits induce exact

compliance with rules by, on the one hand, deterring free-riding and, on the other hand, crowding out unconditional contributions, i.e., decisions that maximise social welfare. Such backfiring effects from increasing the audit probability have been discussed in prior work (Slemrod et al., 2001; Mendoza et al., 2017) and are consistent with crowding out of intrinsic prosocial motivations by extrinsic (material) incentives (Bénabou and Tirole, 2006; Frey and Oberholzer-Gee, 1997).

4.4 Biased Audits Do Not Undermine Contributions

In the BiasedHet treatment, we introduced variability in the audit probability such that players in the 'red' subgroup were three times as likely to be subject to an audit as players in the 'blue' subgroup. Contrary to our expectations, such bias in audit rates does not undermine the effectiveness of audits. In particular, compliance decreased marginally in this treatment, by 3.6% points ($p = .237$), while contributions only dropped by 0.2 points ($p = .432$).

To explain why biased audits did not undermine rule-compliance, we explored how contributions changed over time. Figure 3 shows that first-round contributions are significantly lower under biased audits than under fair audits ($p = .009$). This reflects a 5.1% higher rate of free-riding ($p = .001$) at the expense of an 8.9% lower compliance rate ($p = .002$) in first-round decisions in the biased audit (BiasedHet) treatment. However, this difference becomes non-significant as the two conditions converge over time. Thus, while biased audits weaken initial norm compliance, this effect is not strong enough to offset the norm-strengthening effect of the contribution rule.

While we expected biased audits to undermine contributions across the board, members of relatively advantaged and disadvantaged subgroups may have opposite responses to such unfairness. This was not the case: Players who face a high audit probability of 30% contribute only non-significantly more (6.12) than players who face a low audit probability of 10% (5.91, $p = .305$). This pattern is consistent across all rounds.

These analyses yield two insights. First, contrary to our expectations that blatant bias in the auditing process would undermine the compliance-enhancing effect of non-deterrent sanctions, players contributed at similar levels as under fair audits. One reason may be that while the probability of being audited was unfairly distributed, the fines themselves were fair; i.e., rule-compliant players in either subgroup need not have feared being fined. This contrasts with recent studies of corrupt or self-serving institutions, which may be expected to issue fines unfairly or not at all (Lancee et al., 2023).

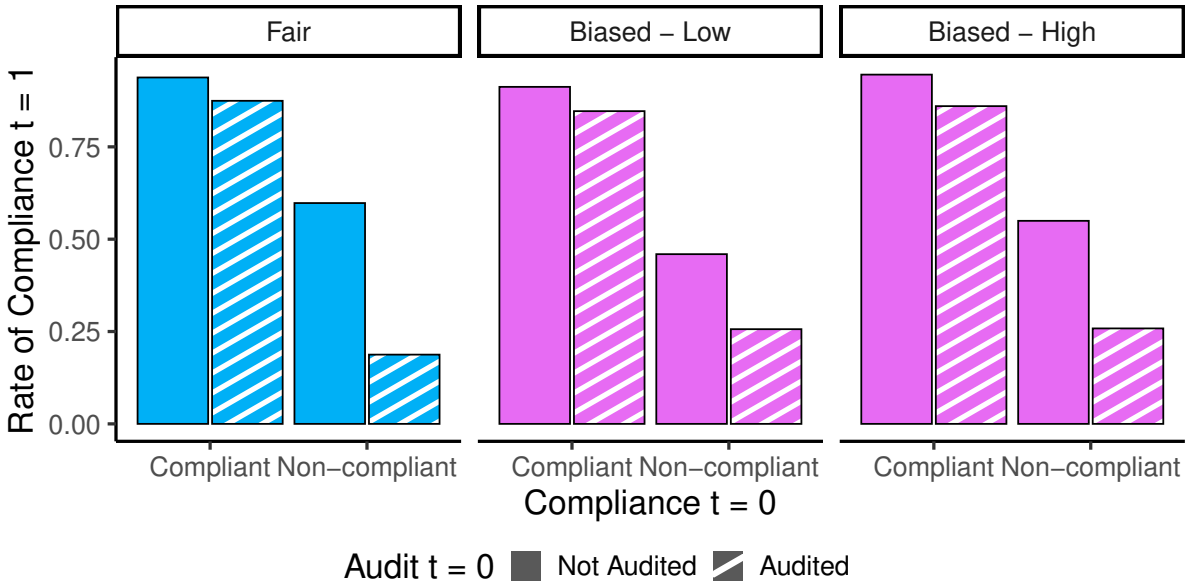

Figure 4: Post-audit compliance by initially compliant and initially non-compliant players.

Second, within the biased audit treatment, players did not respond to differences in the audit probability. As such, this result may appear surprising. However, recall that sanctions were non-deterrent even for players facing the high audit probability of 30%. Whereas some models posit that non-deterrent sanctions stack with social preferences (Engel, 2014), our results suggest that non-deterrent sanctions may primarily serve a norm-setting function (Lane et al., 2023).

Our results on personal and social norms elicited after ten rounds of the public goods game are consistent with this interpretation. While both personal norms and social norms are somewhat lower under biased audits, these differences are non-significant (both $p > .10$). This is not due to heterogeneous effects on advantaged and disadvantaged subgroups: players facing a higher audit probability expressed only non-significantly higher personal and social norms (both $p > .10$). In summary, these findings suggest that the expressive function of institutional rules is remarkably robust to biases in rule enforcement.

4.5 Audits Reduce Subsequent Rule Compliance

To further investigate how audits affect contribution decisions, we explore the effect of audits on subsequent compliance. We regress compliance in round $t = 1$ on a dummy indicating whether a player was audited in the previous round ($t = 0$), a dummy indicating

whether the player was compliant in that round, and their interaction. To identify the within-person effect, we include player, round, and treatment fixed effects. Standard errors are clustered at the group level.

Figure 4 shows the effects of experiencing an audit on subsequent compliance for compliant and non-compliant players. On average, audited players reduce their compliance in the subsequent round. However, this aggregate result varies considerably between compliant and non-compliant players and across treatments. First, we find that when compliant players are audited (but do not receive a fine), their average compliance rate decreases slightly in the subsequent round (by 6.6% points, $p < .001$). In contrast, when non-compliant players are audited and fined, their subsequent compliance rate decreases substantially, by 23% points ($p < .001$). These results are inconsistent with a bomb-crater effect (Guala and Mittone, 2005; Kasper and Alm, 2022b), but consistent with the motivation to make up for losses incurred as a result of the audit (Andreoni et al., 1998).

Compliant players respond similarly to audits across treatments. In contrast, for non-compliant players, the reduction in compliance is twice as large under fair audits (34.8% points) as under biased audits (18.6% points). Surprisingly, under biased audits, advantaged (20.6% points) and disadvantaged players (17.2% points) do not differ in their response to being audited and fined.

These results refine prior work on the effects of audits on subsequent compliance. While prior studies find that audits undermine subsequent compliance when they over- or underestimate the player's true income (Kasper and Alm, 2022a; Lancee et al., 2023), our results suggest that fairness in audit selection moderates subsequent compliance—a result that warrants further investigation.

5 Concluding discussion

While laws are typically enforced with the threat of formal legal sanctions, the law also has an expressive function by shaping and communicating informal social norms. A large body of research investigates the effects of rule enforcement and social norms on social behaviour. However, this literature has largely focused on unbiased enforcement of rules in homogeneous populations. In reality, many populations are heterogeneous, and rules are not always enforced in an unbiased way across different social groups.

In this study, we examine experimentally how institutional rules and fairness in their enforcement affect cooperation, rule compliance, and personal and social norms. Con-

sistent with our expectations, raising the expected costs to breaking a rule by imposing monetary sanctions improves compliance with the rule. Contrasting with earlier work on institutional punishment (Balliet et al., 2011), however, we do not find that random audits increase contribution rates in the public goods game. Instead, the introduction of rule enforcement induces more exact rule following. Specifically, audits reduce free-riding, but they also reduce full contributions. Therefore, our study is the first to provide causal evidence on crowding-out effects of audits (Beer et al., 2020).

Importantly, we find no evidence the institutional bias erodes norms, reduces cooperation, or diminishes compliance. Rather, the strong effect of rule setting on norms rendered the effects of bias in rule enforcement too small to be statistically discernible. These results align with recent work highlighting the expressive function of laws (Lane et al., 2023), but add that even unfair application of the law may not undermine this function.

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Appendix A: Sample Sizes

1,871 participants began the experiment, of whom 1,349 passed all comprehension questions and started the public goods game. $n = 1,254$ participants (i.e., 209 groups) completed all rounds of the public goods game and are included in the final data set. Table A.1 shows effective sample sizes for all outcome variables.

Table A.1: Effective sample sizes for contributions and compliance (public goods game—PGG), personal and social norms, and trust (trust game—TG).

Treatment	Started	Passed	PGG	Norms	TG
BaseHet	300	221	216	216	216
RuleHom	311	228	216	216	216
RuleHet	292	222	198	198	196
AuditHet	358	252	222	222	220
BiasedHet	610	426	402	402	400

Table A.2: Mean and median number of comprehension check attempts among participants in the final sample.

	PGG		Audits	
Treatment	Mean	Median	Mean	Median
BaseHet	3.54	1.0		
RuleHom	3.56	2.0		
RuleHet	4.07	1.5		
AuditHet	3.55	1.0	1.96	1.0
BiasedHet	4.04	1.0	1.88	1.0

Appendix B: Preregistered Hypothesis Tests

The procedure and key hypothesis tests were preregistered on the Open Science Framework. We initially collected data on the four treatments with a contribution rule in February 2023 (preregistration: https://osf.io/qaedu/?view_only=262ca0dcde3e41ad98778c2bb1141be5). We added the BaseHet treatment in December 2023 (preregistration: https://osf.io/wthm7/?view_only=fe3eafaf2d7b47789389817a9434aa8b). The experimental files, data, and code are available at https://osf.io/6by3c/?view_only=aa1919f1dbab427b97a94f5a26934041. All analyses were conducted using R 4.3.1 (R Core Team, 2023) and tidyverse (Wickham et al., 2019). Regression analyses were conducted using the estimatr package (Blair et al., 2022).

We preregistered a total of 33 hypotheses. Below, we list each hypothesis as stated in the preregistration, declare any deviations from the preregistration, and provide the key statistical test of the hypothesis.

> H1: Random audits increase contributions to the public good compared to no audits (due to the higher audit probability). (AuditHom + AuditHet > RuleHom + RuleHet)

Due to a coding error, data from the AuditHom treatment were not usable. We therefore only compare AuditHet with RuleHet. The difference is not significant (Wald test, $B = .07$, $SE = .32$, $p = .825$; Kruskal-Wallis test, $\chi^2(1) = .07$, $p = .791$).

> H2: Biased audits increase contributions to the public good compared to no audits (due to the higher audit probability), or decrease contributions compared to no audits (due to lower legitimacy). (BiasedHet $\neq$ RuleHet)

The difference is not significant (Wald test, $B = .28$, $SE = .29$, $p = .331$; Kruskal-Wallis test, $\chi^2(1) = .93$, $p = .335$).

> H3: Biased audits decrease contributions to the public good compared to random audits (due to lower legitimacy). (AuditHet > BiasedHet)

The difference is not significant (Wald test, $B = .21$, $SE = .27$, $p = .432$; Kruskal-Wallis test, $\chi^2(1) = .49$, $p = .482$).

> H4: Under biased audits, a higher individual audit probability increases contributions to the public good (BiasedHetL < BiasedHetH)

The difference is not significant (Wald test, $B = .21$, $SE = .20$, $p = .305$).

> H5: Random audits increase personal normative beliefs compared to no audits. (AuditHom + AuditHet > RuleHom + RuleHet)

Due to a coding error, data from the AuditHom treatment were not usable. We therefore only compare AuditHet with RuleHet. The difference is not significant (Wald test, $B = .06$, $SE = .31$, $p = .838$; Kruskal-Wallis test, $\chi^2(1) = .42$, $p = .517$).

> H6: Biased audits reduce personal normative beliefs compared to no audits. (RuleHet > BiasedHet)

The difference is not significant (Wald test, $B = .18$, $SE = .28$, $p = .361$; Kruskal-Wallis test, $\chi^2(1) = .84$, $p = .361$).

> H7: Biased audits reduce personal normative beliefs compared to random audits. (AuditHet > BiasedHet)

The difference is not significant (Wald test, $B = .12$, $SE = .26$, $p = .653$; Kruskal-Wallis test, $\chi^2(1) = .09$, $p = .762$).

> H8: Under biased audits, a higher individual audit probability reduces personal normative beliefs. (BiasedHetL < BiasedHetH)

The difference is not significant (Wald test, $B = .34$, $SE = .22$, $p = .131$).

> H9: Random audits increase average normative expectations compared to no audits. (AuditHom + AuditHet > RuleHom + RuleHet)

Due to a coding error, data from the AuditHom treatment were not usable. We therefore only compare AuditHet with RuleHet. The difference is not significant (Wald test, $B = .04$, $SE = .27$, $p = .877$; Kruskal-Wallis test, $\chi^2(1) = .04$, $p = .841$).

> H10: Biased audits increase average normative expectations compared to no audits (due to higher rates of cooperation) or decrease average normative expectations (due to lower legitimacy). (BiasedHet ≠ RuleHet)

The difference is not significant (Wald test, $B = .19$, $SE = .24$, $p = .426$; Kruskal-Wallis test, $\chi^2(1) = .78$, $p = .377$).

> H11: Biased audits reduce average normative expectations compared to random audits. (AuditHet > BiasedHet)

The difference is not significant (Wald test, $B = .15$, $SE = .23$, $p = .512$; Kruskal-Wallis test, $\chi^2(1) = .40$, $p = .526$).

> H12: The individual audit probability does not affect normative expectations. (BiasedHetL = BiasedHetH)

The difference is not significant (Wald test, $B = .12$, $SE = .16$, $p = .447$).

> H13: Biased audits increase the within-person variance in normative expectations compared to random audits. (Var(AuditHet) < Var(BiasedHet))

For ease of interpretation, we report the within-person standard deviation rather than the variance. The difference is not significant (Wald test, $B = .12$, $SE = .10$, $p = .221$; Kruskal-Wallis test, $\chi^2(1) = 1.22$, $p = .270$).

> H14: Audits increase trust (compared to no audits), because audits signal that the institution aims to deter noncompliance and higher compliance levels result in higher levels of trust. (AuditHom > RuleHom)

Due to a coding error, data from the AuditHom treatment were not usable. We therefore compare AuditHet with RuleHet. The difference is not significant (Wald test, $B = -.10$, $SE = .23$, $p = .684$; Kruskal-Wallis test, $\chi^2(1) = .03$, $p = .865$).

> H15: Biased audits decrease trust (compared to no audits), because unfair treatment reduces trust relative to fair treatment. (BiasedHet < RuleHet)

The difference is not significant (Wald test, $B = -.06$, $SE = .23$, $p = .796$; Kruskal-Wallis test, $\chi^2(1) = .00$, $p = .976$).

> H16: Biased audits decrease trust (compared to random audits), because unfair treatment reduces trust relative to fair treatment. (BiasedHet < AuditHet)

The difference is not significant (Wald test, $B = .04$, $SE = .20$, $p = .853$; Kruskal-Wallis test, $\chi^2(1) = .01$, $p = .914$).

> H17: Participants show in-group favouritism: In heterogeneous groups, there is more trust within subgroups (i.e., between pairs of 'red'-'red' and 'blue'-'blue' players) than across subgroups (i.e., between pairs of 'red'-'blue', respectively 'blue'-'red' players).

The difference is significant in the expected direction (Wald test, $B = .62$, $SE = .10$, $p < .001$).

> H18: Unfair treatment increases in-group favouritism. (BiasedHet > AuditHet)

The interaction between subgroup (in-group vs. out-group) and treatment was not significant ($B = .22$, $SE = .16$, $p = .173$).

> H19: Tag-based heterogeneity reduces overall contributions to the public good. (RuleHom > RuleHet).

The difference is not significant (Wald test, $B = .14$, $SE = .36$, $p = .702$; Kruskal-Wallis test, $\chi^2(1) = .06$, $p = .806$).

> H20: Tag-based heterogeneity reduces personal normative beliefs. (RuleHom > RuleHet).

The difference is not significant (Wald test, $B = .07$, $SE = .38$, $p = .864$; Kruskal-Wallis test, $\chi^2(1) = .05$, $p = .815$).

> H21: Tag-based heterogeneity reduces average normative expectations. (RuleHom > RuleHet)

The difference is not significant (Wald test, $B = .17$, $SE = .32$, $p = .600$; Kruskal-Wallis test, $\chi^2(1) = .60$, $p = .438$).

H22: Tag-based heterogeneity increases the within-person variance in normative expectations. (Var(RuleHom) < Var(RuleHet))

The difference is not significant (Wald test, $B = -.15$, $SE = .13$, $p = .268$; Kruskal-Wallis test, $\chi^2(1) = 1.94$, $p = .164$).

H23: Tag-based heterogeneity reduces trust. (RuleHom > RuleHet)

The difference is significant in the expected direction (Wald test, $B = -1.47$, $SE = .27$, $p < .001$; Kruskal-Wallis test, $\chi^2(1) = 18.41$, $p < .001$).

H24: The introduction of a contribution rule increases contributions to the public good. (RuleHet > BaseHet)

The difference is significant in the expected direction (Wald test, $B = 1.00$, $SE = 0.43$, $p = .021$; Kruskal-Wallis test, $\chi^2(1) = 3.65$, $p = .056$).

H25: The introduction of a contribution rule increases personal normative beliefs. (RuleHet > BaseHet)

The difference is significant in the expected direction (Wald test, $B = 0.76$, $SE = 0.38$, $p = .047$; Kruskal-Wallis test, $\chi^2(1) = 5.14$, $p = .023$).

H26: The introduction of a contribution rule increases average normative expectations. (RuleHet > BaseHet)

The difference is significant in the expected direction (Wald test, $B = 0.72$, $SE = 0.35$, $p = .043$; Kruskal-Wallis test, $\chi^2(1) = 4.07$, $p = .044$).

H27: The introduction of a contribution rule decreases the within-person variance in normative expectations. (Var(RuleHet) < Var(BaseHet))

For ease of interpretation, we report the within-person standard deviation rather than the variance. The difference is not significant (Wald test, $B = -0.16$, $SE = 0.13$, $p = .226$; Kruskal-Wallis test, $\chi^2(1) = 1.44$, $p = .230$).

H28: The introduction of a contribution rule increases trust. (RuleHet > BaseHet)

The difference is not significant (Wald test, $B = 0.16$, $SE = 0.28$, $p = .581$; Kruskal-Wallis test, $\chi^2(1) = 0.85$, $p = .357$).

H29: The introduction of a contribution rule does not increase in-group favouritism. (RuleHet = BaseHet)

The interaction between treatment, trustor's group, and trustee's group is not significant (OLS regression, $B = 0.72$, $SE = 0.49$, $p = .142$).

Appendix C: Additional Results

Trust

In this section, we report additional treatment effects on average trust and on the extent of in-group favouritism in trust. When sanctioning institutions are corrupt or biased, this may undermine trust. For example, survey evidence and experiments show that exposure to a corrupt institution reduces trust towards other individuals (Spadaro et al., 2023). At a global level, weak institutions are associated with greater levels of dishonesty in individual interactions (Gächter and Schulz, 2016), and trust in institutions is causally linked to generalised trust in strangers (Sønderskov and Dinesen, 2016). Thus, the quality and impartiality of institutions may influence rule compliance not just through deterrence, but also by promoting or undermining trust among individuals.

Methods

We elicit trust towards other group members (in treatments with *homogeneous* groups), respectively towards members of both subgroups (in treatments with *heterogeneous* groups) through sender decisions in a trust game (Berg et al., 1995). In the first part of the game, all players receive an endowment of $E = 10$ points and act as a sender towards a randomly selected member of their group. They may send any amount $M \in \{0, 1, \ldots, 10\}$ to the receiver and the amount sent is tripled. The amount not sent remains in the sender's possession. In the treatments with *heterogeneous* groups we use the strategy method to elicit trust towards a randomly selected receiver from the 'red' and the 'blue' subgroups. In the second part, all players again receive a ten-point endowment and act as the receiver to decide how much, up to a maximum of $3M$, to return to the sender. The amount not returned remains in the possession of the receiver. We use the strategy method to elicit receivers' decisions for each $M \in \{0, 1, \ldots, 10\}$.

Participants play two trust games. First, all participants take the role of the sender and decide how many points M (1 point = £0.05) of their 10 point endowment to send to a randomly selected recipient from their group. In the treatments with *heterogeneous* groups we use the strategy method to elicit trust towards a randomly selected player from the 'red' and the 'blue' subgroups. Subsequently, all players, now taking the role of receivers and again endowed with ten points, can return any integer amount up to $3M$ to the sender they have been matched with. We use the strategy method to elicit receivers' decisions for each $M \in \{0, 1, \ldots, 10\}$. Once participants have made their decisions, one game is randomly selected (i.e., either the game in which the player was the sender, or the game in which the player was the receiver), players' earnings in this game are converted to monetary amounts and are paid out to the participants. The maximum bonus payment for the trust game is £2.

Results

Results from the trust games are shown in Tables C.1–C.3. First, we estimate the effect of heterogeneity on trust (RuleHet - RuleHom). Heterogeneous groups exhibit significantly less average trust (5.27 points) than homogeneous groups (6.75 points, $p < .001$). Part of this effect is due to in-group favouritism: in the RuleHet treatment, trustors give more points to trustees with the same colour (5.55 point) than to trustees with the other colour (4.99 points, $p = .001$). We observe a similar degree of in-group favouritism in trust across all heterogeneous treatments. Note, however, that trust towards in-group members

is still significantly lower than trust in the homogeneous treatment. This indicates that heterogeneity itself, and not just in-group favouritism, undermines trust.

Second, we estimate the effect of introducing a non-binding contribution rule (RuleHet - BaseHet). We find no evidence of spillovers from the contribution rule to trust ($p = .581$). Third, we estimate the effect of introducing non-deterrent sanctions on top of the contribution rule (RuleHet - AuditHet). We also observe no spillovers from the introduction of audits to trust ($p = .684$).

Finally, we examine whether biased audits undermine trust in subsequent, non-audited interactions (BiasedHet - AuditHet). Trust was only marginally lower under biased audits than under fair audits (0.15 points, $p = .512$). However, inequality within groups facing biased audits exhibited some spillovers, as players who had faced the higher audit probability transferred .51 points more as trustors in the trust game ($p = .051$). Compared to the treatment with fair audits, both subgroups adjust their behaviour: advantaged players were less trusting towards both in-group and out-group members, whereas disadvantaged players were more trusting towards both subgroups.

Table C.1: Full model results for estimated marginal means of trust. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	5.11	0.22	23.36	$< .001$
RuleHom	6.74	0.20	33.21	$< .001$
RuleHet	5.27	0.18	29.02	$< .001$
AuditHet	5.37	0.15	36.26	$< .001$
BiasedHet	5.33	0.13	39.65	$< .001$

Table C.2: Treatment comparisons for trust. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.16	0.28	1243	0.55	0.581	0.85	1	0.357
RuleHet - RuleHom	-1.47	0.27	1243	-5.41	$< .001$	18.41	1	$< .001$
RuleHet - AuditHet	-0.10	0.23	1243	-0.41	0.684	0.03	1	0.865
RuleHet - BiasedHet	-0.06	0.23	1243	-0.26	0.796	0.00	1	0.975
AuditHet - BiasedHet	0.04	0.20	1243	0.19	0.853	0.01	1	0.914

Table C.3: Test of in-group favouritism in trust across treatments all heterogeneous treatments (Model 1), moderation by treatment across treatments AuditHet and BiasedHet (Model 2), and moderation by audit probability in treatment BiasedHet. Model 1 includes treatment and participant fixed effects. In all models, standard errors are clustered at the group level.

	Model 1		Model 2		Model 3	
Var	Est.	p	Est.	p	Est.	p
(Intercept)			5.43(0.24)	$< .001$	5.31(0.19)	$< .001$
Outgroup	-0.62(0.10)	$< .001$	-0.63(0.16)	$< .001$	-0.48(0.14)	0.001
RuleHet			0.13(0.31)	0.685		
BiasedHet			0.18(0.28)	0.514		
AuditHet			0.33(0.30)	0.260		
Outgroup:AuditHet			-0.16(0.21)	0.433		
Outgroup:BiasedHet			0.06(0.20)	0.749		
Outgroup:RuleHet			0.06(0.23)	0.785		
High Prob.					0.60(0.27)	0.030
Outgroup:High Prob.					-0.18(0.19)	0.371

Polarisation of social norms

Biased rule enforcement might contribute to polarisation in personal and social norms. When rules are enforced unfairly across social groups, individuals might develop diffuse or multi-modal empirical and normative expectations (Dimant et al., 2024), instead of coordinating on one normative standard (Krupka and Weber, 2013). More specifically, there are at least two channels by which biased rule enforcement may contribute to polarisation. First, unequal enforcement of rules may signal that one group's rule violations are more acceptable than another group's rule violations. Second, differences in the probabilities of sanctions for rule violations might induce group differences in rule compliance.People frequently infer social norms from observed behaviour (Li et al., 2021; Welch et al., 2005; Lindström et al., 2018; Tworek and Cimpian, 2016) and may thus conclude that groups whose members behave differently also vary in their normative beliefs. Thus, biased institutions may contribute to normative polarisation in heterogeneous populations.

We preregistered a series of hypotheses about the effects of rules, rule enforcement, and biased audits on polarisation of social norms. In line with Dimant (2023), we define normative polarisation through the dispersion of second-order normative expectations. Specifically, we say that a norm is more polarised the greater the within-person standard deviation of normative expectations.

Table C.4 shows the mean standard deviation of normative expectations in each treatment. We first test whether purely symbolic heterogeneity increases normative polarisation (RuleHet - RuleHom). This is not the case; social norms were similarly dispersed in homogeneous groups ($\bar{\sigma} = 2.27$) and heterogeneous groups ($\bar{\sigma} = 2.12$, $p = .267$; full details in Table C.5). Second, we test whether the introduction of a rule decreases normative polarisation (RuleHet - BaseHet). This is not the case; social norms were similarly dispersed without a rule ($\bar{\sigma} = 2.12$) and with a rule ($\bar{\sigma} = 2.29$, $p = .226$).

Table C.4: Full model results for estimated marginal means of within-person standard deviations of social norms. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	2.29	0.10	22.55	$< .001$
RuleHet	2.12	0.09	24.16	$< .001$
RuleHom	2.27	0.10	23.46	$< .001$
AuditHet	1.72	0.07	24.28	$< .001$
BiasedHet	1.84	0.07	27.95	$< .001$

Table C.5: Treatment comparisons for within-person standard deviations of social norms. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	-0.16	0.13	1249	-1.21	0.226	1.44	1	0.230
RuleHet - RuleHom	-0.15	0.13	1249	-1.11	0.267	1.94	1	0.163
RuleHet - AuditHet	0.40	0.11	1249	3.54	$< .001$	10.43	1	0.001
RuleHet - BiasedHet	0.28	0.11	1249	2.56	0.011	5.62	1	0.018
BiasedHet - AuditHet	0.12	0.10	1249	1.23	0.221	1.22	1	0.270

Next, we test whether auditing decreases normative polarisation (RuleHet - AuditHet). This is the case; players subject to fair audits ($\bar{\sigma} = 1.72$) expressed significantly less polarised social norms than players who were only subject to a non-binding contribution rule ($\bar{\sigma} = 2.27$, $p < .001$). We also test whether biased audits increase normative polarisation relative to a non-binding contribution rule (RuleHet - AuditHet) and to relative to fair audits (AuditHet - BiasedHet). This is not the case; in fact, biased audits ($\bar{\sigma} = 1.84$) decrease normative polarisation relative to a non-binding contribution rule ($\bar{\sigma} = 2.27$, $p = .018$), though not relative to fair audits ($\bar{\sigma} = 1.72$, $p = .270$). Under biased audits, players facing a high audit probability ($\bar{\sigma} = 1.89$) have similarly polarised normative expectations as players facing a low audit probability ($\bar{\sigma} = 1.79$, $p = .265$). In sum, we find that both fair audits and biased audits decrease normative polarisation relative to a non-binding contribution rule.

Peer effects

Peer effects refer to the effects of group members' behaviour on rule compliance, contributions, and personal and social norms. We operationalise peer effects as the effect of the number of rule-compliant group members in round 1 on players' compliance and contri-

Table C.6: Effects of peer compliance in round 1 on contributions and compliance in round 10, norms, and trust (Model 1), controlling for own compliance in round 1 (Model 2); replication in the BaseHet treatment (Model 3). $^{\dagger}p < .1$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Outcome	Predictor	Model 1	Model 2	Model 3
Contribution	Peer	0.45**	0.42**	1.09**
		(0.14)	(0.14)	(0.37)
	Self		2.49***	2.71***
			(0.27)	(0.50)
Compliance	Peer	0.04*	0.04†	0.12*
		(0.02)	(0.02)	(0.05)
	Self		0.35***	0.34***
			(0.04)	(0.07)
Personal Norm	Peer	0.22*	0.20†	0.53**
		(0.11)	(0.11)	(0.19)
	Self		2.26***	2.88***
			(0.21)	(0.50)
Social Norm	Peer	0.50***	0.49***	0.85***
		(0.09)	(0.09)	(0.20)
	Self		1.17***	1.47***
			(0.17)	(0.34)
Trust	Peer	0.28	0.23	0.27**
		(0.20)	(0.19)	(0.08)
	Self		1.95***	0.99***
			(0.39)	(0.23)

butions in round 10 and personal and social norms and trust measured after round 10. In each analysis, we control for players' own compliance in round 1 and cluster standard errors at the group level. Because players were randomly assigned to groups, this analysis identifies the effect of the group's composition — i.e., the peer effect — on each outcome.

We first explore peer effects in the four initial treatments (RuleHom, RuleHet, AuditHet, BiasedHet; Table C.6, Models 1–2). We then perform preregistered replications of each analysis in the additional treatment (BaseHet; Table C.6, Model 3).

Compliance and contributions

We first test whether there exists a peer effect on compliance, i.e., whether peers' initial compliance affects players' compliance in round 10 of the public goods game. In the exploratory analysis, each additional compliant peer increases the probability that the player will comply in round 10 by 3.5% points ($p = .058$). In the BaseHet treatment,

each additional compliant peer increases the probability that the player will comply in round 10 by 12.2% points ($p = .013$).

Second, we test whether there exists a peer effect on contributions, i.e., whether peers' initial compliance affects players' contributions in round 10 of the public goods game. In the exploratory analysis, each additional compliant peer increases the player's contribution in round 10 by 0.42 points ($p = .002$). In the BaseHet treatment, each additional compliant peer increases the player's contribution by 1.09 points ($p = .001$)

Because initial compliance was fairly high, there are few players with fewer than three compliant peers. Therefore, we repeat our analysis by considering only players who where exposed to either four or five compliant peers. That is, we test whether a single non-complying peer in round 1 decreases compliance and contributions by round 10. We do this separately for players who were themselves compliant or non-compliant in round 1. Because we did not preregister this analysis, we pool all treatments.

First, we consider players who did not comply in round 1. Exposure to one additional compliant peer increases their compliance in round 10 by 12.9% points ($p = .121$) and their contribution in round 10 by 0.40 points ($p = .436$). Second, we consider players who did comply in round 1. Exposure to one additional compliant peer increases their compliance in round 10 by 9.1% points ($p = .005$) and their contribution in round 10 by 1.04 points ($p < .001$). Thus, we observe strong peer effects on initially compliant players: exposure to even one non-compliant peer significantly decreases these player's rule-compliance and contributions to the public good. In contrast, the effects on initially non-compliant players are non-significant. However, because most players initially complied, we have significantly more power to detect peer effects on initially compliant players.

Personal and social norms

First, we test whether there exists a peer effect on personal norms. In the original four treatments, one additional compliant peer in round 1 increases personal norms by 0.20 points ($p = .058$). In the BaseHet treatment, one additional compliant peer in round 1 increases personal norms by 0.53 points ($p = .010$). Second, we test whether there exists a peer effect on social norms. In the original four treatment, one additional compliant peer in round 1 increases social norms by 0.49 points ($p < .001$). In the BaseHet treatment, one additional compliant peer in round 1 increases social norms by 0.85 points ($p < .001$). Thus, we find strong evidence for peer effects on social norms somewhat weaker evidence for peer effects on personal norms.

Trust

Finally, we test whether there exists a peer effect on trust. In the original four treatments, one additional compliant peer in round 1 increases trust by 0.23 points ($p = .250$). In the BaseHet treatment, one additional compliant peer in round 1 increases trust by 0.27 points ($p = .001$). Thus, find somewhat mixed evidence for peer effects on trust.

Appendix D: Additional Figures

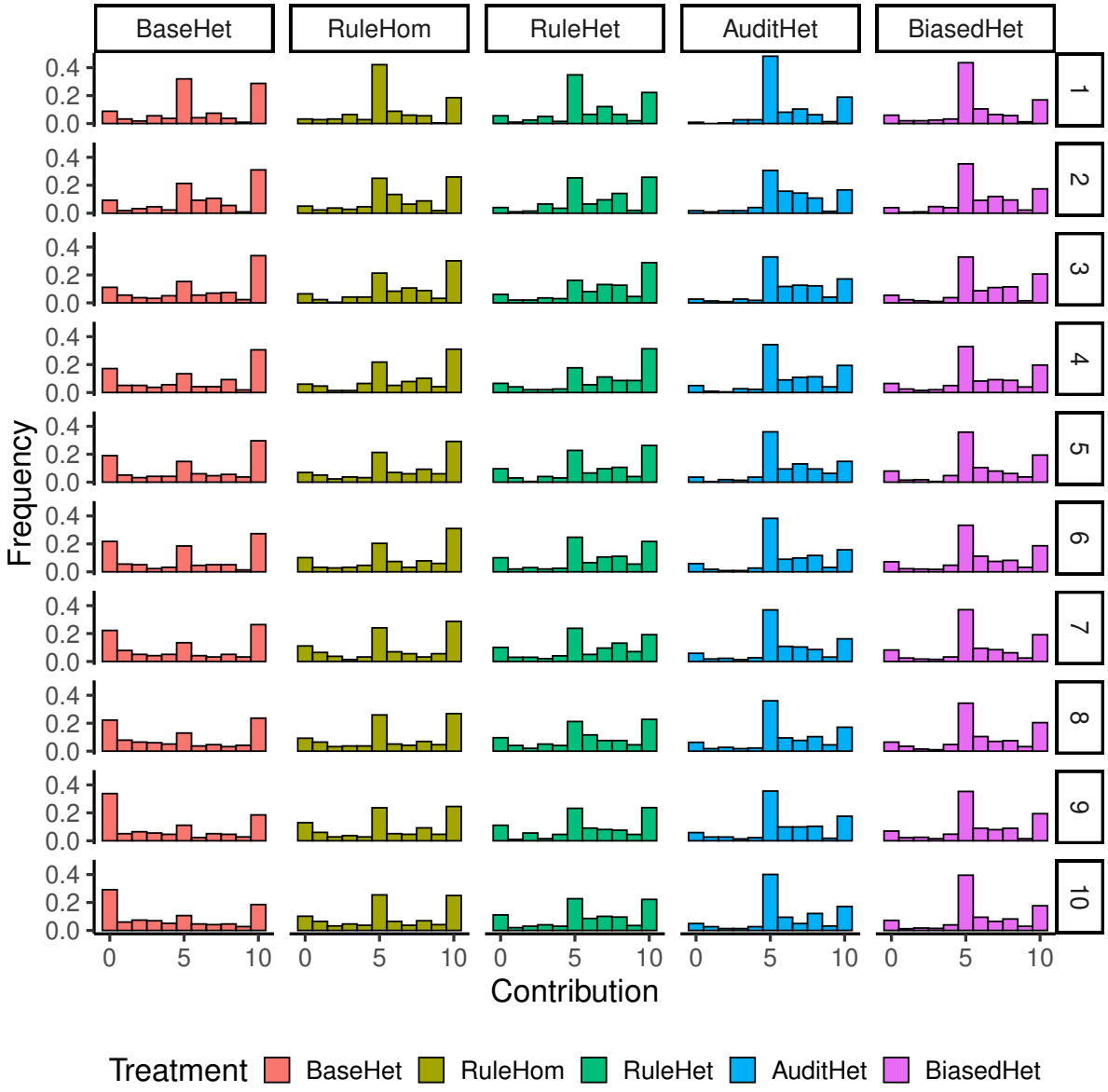


Figure D.1: Distribution of contribution decisions by treatment and round.

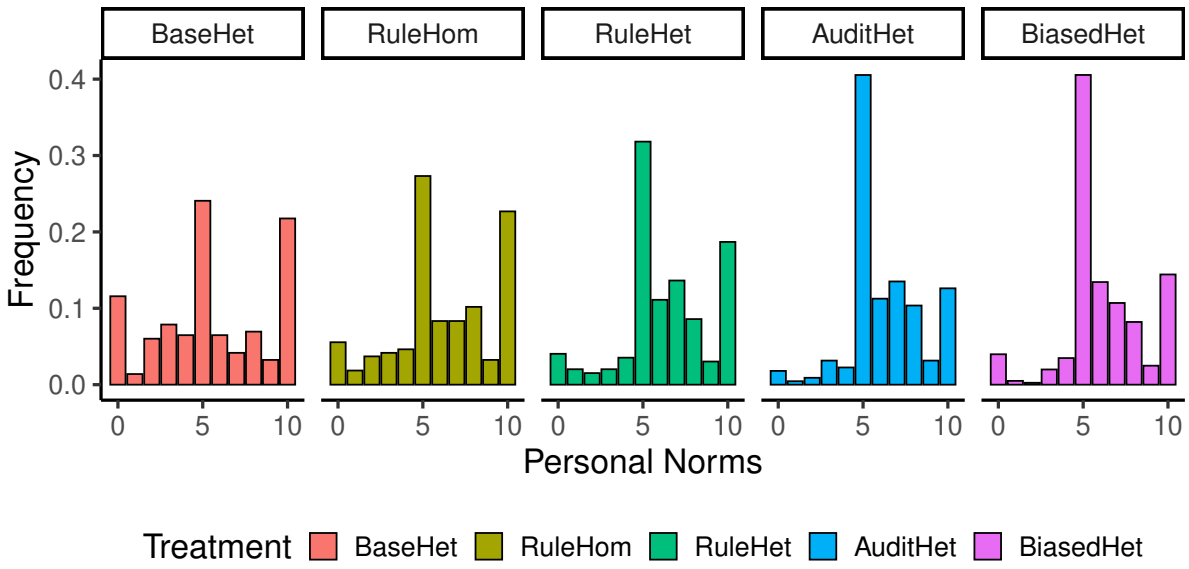


Figure D.2: Distribution of personal norms by treatment.

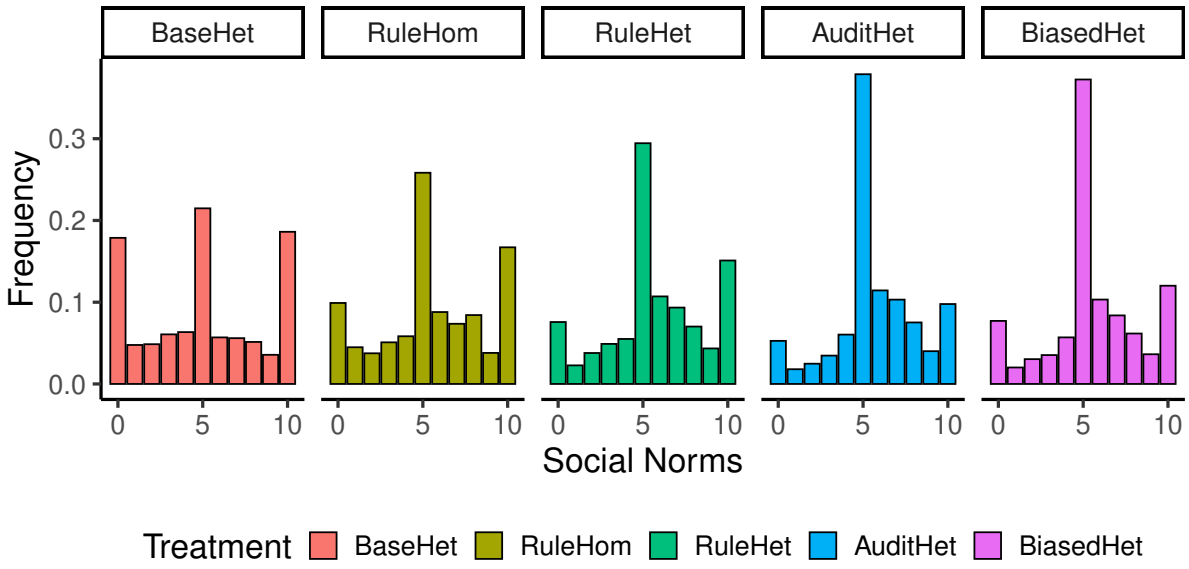


Figure D.3: Distribution of social norms by treatment.

Appendix E: Additional Statistical Details

Model results for contributions

Table E.1: Full model results for estimated marginal means of contributions. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	5.30	0.36	14.65	$< .001$
RuleHom	6.16	0.27	22.74	$< .001$
RuleHet	6.30	0.24	26.11	$< .001$
AuditHet	6.22	0.21	29.12	$< .001$
BiasedHet	6.02	0.16	37.90	$< .001$

Table E.2: Treatment comparisons for contributions. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are for group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	1.00	0.43	1249	2.30	0.021	3.65	1	0.056
RuleHet - RuleHom	0.14	0.36	1249	0.38	0.701	0.06	1	0.805
RuleHet - AuditHet	0.07	0.32	1249	0.22	0.825	0.07	1	0.791
RuleHet - BiasedHet	0.28	0.29	1249	0.97	0.331	0.93	1	0.335
AuditHet - BiasedHet	0.21	0.27	1249	0.79	0.432	0.49	1	0.482

Models results for exact rule compliance

Table E.3: Full model results for estimated marginal means of exact rule compliance (i.e., contributions of exactly five points. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.16	0.02	8.46	$< .001$
RuleHet	0.23	0.02	10.45	$< .001$
RuleHom	0.25	0.02	12.82	$< .001$
AuditHet	0.37	0.03	13.67	$< .001$
BiasedHet	0.36	0.02	17.32	$< .001$

Table E.4: Treatment comparisons for exact rule compliance. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.07	0.03	1249	2.34	0.020	5.12	1	0.024
RuleHet - RuleHom	-0.02	0.03	1249	-0.63	0.530	0.50	1	0.482
RuleHet - AuditHet	-0.14	0.03	1249	-3.91	$< .001$	12.36	1	$< .001$
RuleHet - BiasedHet	-0.13	0.03	1249	-4.19	$< .001$	12.43	1	$< .001$
AuditHet - BiasedHet	0.01	0.03	1249	0.26	0.792	0.19	1	0.661

Model results for free-riding

Table E.5: Full model results for estimated marginal means of free-riding (i.e., contributions of exactly zero points). Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.19	0.03	6.14	$< .001$
RuleHet	0.08	0.02	4.46	$< .001$
RuleHom	0.08	0.02	4.64	$< .001$
AuditHet	0.04	0.01	4.46	$< .001$
BiasedHet	0.07	0.01	6.09	$< .001$

Table E.6: Treatment comparisons for free-riding. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	-0.11	0.04	1249	-3.00	0.003	7.20	1	0.007
RuleHet - RuleHom	0.00	0.03	1249	0.09	0.927	0.00	1	0.956
RuleHet - AuditHet	0.04	0.02	1249	1.95	0.052	2.25	1	0.134
RuleHet - BiasedHet	0.02	0.02	1249	0.83	0.409	0.86	1	0.354
AuditHet - BiasedHet	-0.02	0.01	1249	-1.60	0.110	0.52	1	0.472

Table E.7: Full model results for estimated marginal means of free-riding (i.e., contributions of exactly zero points) in round 1. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.09	0.02	5.25	$< .001$
RuleHet	0.06	0.01	3.59	$< .001$
RuleHom	0.03	0.01	2.94	0.004
AuditHet	0.01	0.01	1.01	0.314
BiasedHet	0.06	0.01	5.17	$< .001$

Table E.8: Treatment comparisons for free-riding in round 1. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	H	df	p
RuleHet - BaseHet	-0.03	0.02	1249	-1.42	0.156	2.05	1	0.152
RuleHet - RuleHom	0.02	0.02	1249	1.22	0.224	1.19	1	0.275
RuleHet - AuditHet	0.05	0.02	1249	2.60	0.009	9.33	1	0.002
RuleHet - BiasedHet	0.00	0.02	1249	-0.21	0.830	0.02	1	0.884
AuditHet - BiasedHet	-0.05	0.01	1249	-3.47	0.001	10.94	1	0.001

Model results for full cooperation

Table E.9: Full model results for estimated marginal means of full cooperation (i.e., contributions of exactly ten points). Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.27	0.04	6.94	$< .001$
RuleHet	0.24	0.03	7.12	$< .001$
RuleHom	0.27	0.04	7.39	$< .001$
AuditHet	0.17	0.03	5.37	$< .001$
BiasedHet	0.19	0.02	8.06	$< .001$

Table E.10: Treatment comparisons for full cooperation. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	-0.02	0.05	1249	-0.47	0.640	0.00	1	0.957
RuleHet - RuleHom	-0.03	0.05	1249	-0.54	0.592	0.13	1	0.723
RuleHet - AuditHet	0.07	0.05	1249	1.57	0.118	4.99	1	0.025
RuleHet - BiasedHet	0.05	0.04	1249	1.31	0.189	3.29	1	0.070
AuditHet - BiasedHet	-0.02	0.04	1249	-0.47	0.638	1.00	1	0.317

Model results for compliance

Table E.11: Full model results for estimated marginal means of compliance. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.61	0.04	14.71	$< .001$
RuleHom	0.77	0.03	26.38	$< .001$
RuleHet	0.80	0.03	29.66	$< .001$
AuditHet	0.88	0.02	47.35	$< .001$
BiasedHet	0.84	0.01	56.96	$< .001$

Table E.12: Treatment comparisons for compliance. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.19	0.05	1249	3.73	$< .001$	9.25	1	0.002
RuleHet - RuleHom	0.03	0.04	1249	0.72	0.471	0.30	1	0.584
RuleHet - AuditHet	-0.08	0.03	1249	-2.51	0.012	4.61	1	0.032
RuleHet - BiasedHet	-0.04	0.03	1249	-1.18	0.237	0.82	1	0.365
AuditHet - BiasedHet	0.05	0.02	1249	1.94	0.052	4.29	1	0.038

Table E.13: Full model results for estimated marginal means of compliance in round 1. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.77	0.03	24.77	$< .001$
RuleHet	0.84	0.02	35.56	$< .001$
RuleHom	0.81	0.03	31.21	$< .001$
AuditHet	0.93	0.02	41.30	$< .001$
BiasedHet	0.84	0.02	46.05	$< .001$

Table E.14: Treatment comparisons for compliance in round 10. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	H	df	p
RuleHet - BaseHet	0.07	0.04	1249	1.92	0.055	2.40	1	0.121
RuleHet - RuleHom	0.03	0.04	1249	0.81	0.417	0.35	1	0.555
RuleHet - AuditHet	-0.09	0.03	1249	-2.72	0.007	9.66	1	0.002
RuleHet - BiasedHet	0.00	0.03	1249	0.01	0.996	0.04	1	0.840
AuditHet - BiasedHet	0.09	0.03	1249	3.07	0.002	12.14	1	$< .001$

Model results for compliance, round 10

Table E.15: Full model results for estimated marginal means of compliance in round 10. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	0.45	0.06	8.04	$< .001$
RuleHet	0.77	0.04	18.65	$< .001$
RuleHom	0.72	0.04	17.09	$< .001$
AuditHet	0.87	0.03	31.92	$< .001$
BiasedHet	0.84	0.02	42.96	$< .001$

Table E.16: Treatment comparisons for compliance in round 10. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are computed on group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.31	0.07	1249	4.50	$< .001$	14.25	1	$< .001$
RuleHet - RuleHom	0.05	0.06	1249	0.85	0.395	0.74	1	0.390
RuleHet - AuditHet	-0.10	0.05	1249	-2.06	0.040	3.72	1	0.054
RuleHet - BiasedHet	-0.08	0.05	1249	-1.66	0.098	1.86	1	0.173
AuditHet - BiasedHet	0.03	0.03	1249	0.78	0.437	0.91	1	0.339

Model results for personal normative beliefs

Table E.17: Full model results for estimated marginal means of personal norms. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	5.54	0.30	18.24	$< .001$
RuleHom	6.23	0.31	20.25	$< .001$
RuleHet	6.29	0.23	27.36	$< .001$
AuditHet	6.23	0.21	30.13	$< .001$
BiasedHet	6.11	0.15	40.47	$< .001$

Table E.18: Treatment comparisons for personal norms. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are for group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.76	0.38	1249	1.98	0.047	5.14	1	0.023
RuleHet - RuleHom	0.07	0.38	1249	0.17	0.863	0.05	1	0.815
RuleHet - AuditHet	0.06	0.31	1249	0.20	0.838	0.42	1	0.517
RuleHet - BiasedHet	0.18	0.28	1249	0.65	0.517	0.84	1	0.361
AuditHet - BiasedHet	0.12	0.26	1249	0.45	0.653	0.09	1	0.762

Model results for normative expectations

Table E.19: Full model results for estimated marginal means of normative expectations. Standard errors are clustered at the group level.

Treatment	Est.	SE	t	p
BaseHet	4.98	0.30	16.85	$< .001$
RuleHom	5.53	0.26	21.72	$< .001$
RuleHet	5.70	0.20	29.29	$< .001$
AuditHet	5.66	0.18	31.25	$< .001$
BiasedHet	5.50	0.14	38.60	$< .001$

Table E.20: Treatment comparisons for normative expectations. Wald tests are based on regressions with cluster-robust standard errors; Kruskal-Wallis tests are for group means.

	Wald test					Kruskal-Wallis test		
Contrast	Est.	SE	df	t	p	χ^2	df	p
RuleHet - BaseHet	0.72	0.35	1249	2.02	0.043	4.07	1	0.044
RuleHet - RuleHom	0.17	0.32	1249	0.53	0.598	0.60	1	0.438
RuleHet - AuditHet	0.04	0.27	1249	0.15	0.877	0.04	1	0.841
RuleHet - BiasedHet	0.19	0.24	1249	0.80	0.426	0.78	1	0.377
AuditHet - BiasedHet	0.15	0.23	1249	0.66	0.512	0.40	1	0.526

Model results for audit probability

Table E.21: Differences between high (HetH) and low (HetL) audit probability subgroups in heterogeneous treatments, on contributions, compliance, personal norms, and normative expectations. Standard errors are clustered at the group level.

	Contrast	Est.	SE	df	t	p
Contributions	HetH - HetL	0.205	0.199	400	1.028	0.305
Compliance	HetH - HetL	0.038	0.024	400	1.553	0.121
Personal Norms	HetH - HetL	0.338	0.224	400	1.512	0.131
Normative Expectations	HetH - HetL	0.118	0.155	400	0.761	0.447

Post-audit effects

Table E.22: Effects of audits on post-audit compliance. Models with cluster-robust standard errors and treatment, round, and player fixed effects.

	Model 1		Model 2		Model 3	
Predictor	Est.	p	Est.	p	Est.	p
audited	-0.09(0.01)	$< .001$	-0.09(0.01)	$< .001$	-0.23(0.05)	$< .001$
complied			-0.09(0.03)	0.002	-0.12(0.03)	$< .001$
audited:complied					0.16(0.05)	0.001

Table E.23: Effects of audits on post-audit contributions. Models with cluster-robust standard errors and treatment, round, and player fixed effects.

	Model 1		Model 2		Model 3	
Predictor	Est.	p	Est.	p	Est.	p
audited	-0.48(0.08)	$< .001$	-0.49(0.08)	$< .001$	-1.29(0.24)	$< .001$
complied			0.00(0.15)	0.987	-0.18(0.15)	0.230
audited:complied					0.93(0.26)	$< .001$

Appendix F: Replication Package

Experimental details

Design

Our experiment comprises four stages: in the first stage, participants receive instructions for a public goods game, are assigned a colour tag (in the four treatments with heterogeneous groups), and are informed about the contribution rule for the public goods game (in the four treatments with a rule); in the second stage, they play ten rounds of a public goods game, in the third stage, we elicit personal and social norms, and in the fourth stage, we elicit trust and trustworthiness using a trust game.

In the public goods game we implement a between-subjects design with five experimental treatments. Specifically, we introduce variation in the group composition (*homogeneous* versus *heterogeneous groups*), the absence or presence of a contribution rule (*rule* vs. *no rule*), the absence or presence of audits (*no audits* versus *audits*), and the fairness of audits (*random audits* versus *biased audits*). This results in five treatments:

1. BaseHet: Heterogeneous groups without rule ($H = 1$, $B = E = R = 0$);
2. RuleHom: Homogeneous groups without audits ($R = 1$, $B = E = H = 0$);
3. RuleHet: Heterogeneous groups without audits ($H = R = 1$, $B = E = 0$);
4. AuditHet: Heterogeneous groups with random audits ($E = H = R = 1$, $B = 0$);
5. BiasedHet: Heterogeneous groups with biased audits ($B = E = H = R = 1$).

Our experimental design is based on a standard public goods game with ten rounds. Participants are assigned randomly to groups of $n = 6$ members, which remain fixed for the duration of the experiment. In every round each player receives an endowment of $\Psi = 10$ points. Each player decides independently how to allocate these points between a private account and a group account. Points allocated to the private account yield one point each for the player. Points allocated to the group account are tripled and redistributed equally across all players, so that every point contributed to the group account, $g_i \in \{0, 1, \ldots, 10\}$, yields $\mu = 0.5$ points for every group member. Thus, individual payoffs, π_i, are determined by

$$\pi_i = \Psi - g_i + \mu \sum_{j=1}^{n} g_j. \tag{F.1}$$

First, we introduce variation in the group composition across treatments. In the treatment with *homogeneous* groups (RuleHom), there exists no way of distinguishing between players. In contrast, in the treatments with *heterogeneous* groups (BaseHet, RuleHet, AuditHet, BiasedHet), each group of six players is partitioned into 'red' and 'blue' subgroups, with exactly three players assigned to each subgroup. In all treatments the group composition, including the player's subgroup, remains constant between rounds, and each player knows the colour of their subgroup. As the presence of subgroups is the only difference between the RuleHom and RuleHet treatments, a pure heterogeneous group membership effect can be inferred from this contrast.

Second, we introduce a contribution rule. In the BaseHet treatment, players are given no indication how much to contribute to the public good. In all other treatments,

participants are told that they must make a minimum contribution, $\underline{g}$, of five points, or half of their endowment, to the group account. However, participants are informed that a contribution of any amount $\{0, 1, \ldots, 10\}$ is possible, and that each group member has the same choice to make.

Third, we introduce variation in the *audit* mechanism, i.e., the institutional mechanism which checks contributions to the group account. In the BaseHet, RuleHom and RuleHet treatment, there are no audits; i.e., the rule is non-binding. In the audit treatments (AuditHet and BiasedHet) players face a probability $p \in (0, 1)$ of being audited, an event indicated by $a \in \{0, 1\}$. If a player is audited and the audit reveals that the contribution in this round is below the required minimum contribution of five points, the player pays a fine f that is $s = 2$ times the difference between the player's contribution and the required minimum contribution, or $f_i = s(\underline{g} - g_i)$.

Thus, in the audit treatments, payoffs are determined by

$$\pi_i = \begin{cases} \Psi - g_i + \mu \sum_{j=1}^{n} g_j & \text{if } g_i \geq R; \\ \Psi - g_i + \mu \sum_{j=1}^{n} g_j - \mathbf{1}_{a=1} \times f_i & \text{if } g_i < R. \end{cases}$$

In expectation, this simplifies to

$$\mathbf{E}(\pi_i) = \Psi - g_i + \mu \sum_{j=1}^{n} g_j - ps \max\{\underline{g} - g_i, 0\}. \tag{F.2}$$

In the treatment with *random audits* (AuditHet), all players are audited with probability $p = .2$. In contrast, in the treatment with *biased audits* (BiasedHet), players in one subgroup are audited with a low probability of $p = .1$ (BiasedHetL), whereas players in the other subgroup are audited with a high probability of $p = .3$ (BiasedHetH). The audit probabilities (of both subgroups) are common knowledge in all audit treatments and are fixed for the length of the experiment. We design the audit mechanism so that sanctions are imperfect, i.e., breaking the rule pays in expected monetary terms (Engel, 2013; Tyran and Feld, 2006).

After participants have completed the public goods game, we elicit social norms by adapting methods from Bicchieri and Xiao (2009) and Dimant (2023). Specifically, we first assess personal normative beliefs $N_{personal}$ by asking participants, "*Personally, how many points do you think would be the appropriate contribution to the group account?*" Participants use a slider with range 0–10 to indicate their personal normative beliefs.

Subsequently, we elicit normative expectations in the form of expectations about the distribution of responses to the above question. To this end, we ask participants to indicate how many out of ten participants in the same treatment $n \in \{0, 1, \ldots, 10\}$ they believe stated each possible level of personal normative belief $N_{personal} \in \{0, 1, \ldots, 10\}$. Participants must allocate exactly ten points (one for each other player) across the eleven possible responses for the appropriate contribution to the group account.[6]

Finally, we elicit trust towards other group members (in treatments with *homogeneous* groups), respectively towards members of both subgroups (in treatments with *heterogeneous* groups) through sender decisions in a trust game (Berg et al., 1995). In the first part of the game, all players receive an endowment of $E = 10$ points and act as a sender towards a randomly selected member of their group. They may send any amount $M \in \{0, 1, \ldots, 10\}$ to the receiver and the amount sent is tripled. The amount not sent

[6]We do not incentivise the elicitation of normative expectations as we are not aware of a scoring rule that allows incentive-compatible elicitation of beliefs about distributions of ordinal variables.

remains in the sender's possession. In the treatments with *heterogeneous* groups we use the strategy method to elicit trust towards a randomly selected receiver from the 'red' and the 'blue' subgroups. In the second part, all players again receive a ten-point endowment and act as the receiver to decide how much, up to a maximum of $3M$, to return to the sender. The amount not returned remains in the possession of the receiver. We use the strategy method to elicit receivers' decisions for each $M \in \{0, 1, \ldots, 10\}$.

Participants play two trust games. First, all participants take the role of the sender and decide how many points M (1 point = £0.05) of their 10 point endowment to send to a randomly selected recipient from their group. In the treatments with *heterogeneous* groups we use the strategy method to elicit trust towards a randomly selected player from the 'red' and the 'blue' subgroups. Subsequently, all players, now taking the role of receivers and again endowed with ten points, can return any integer amount up to $3M$ to the sender they have been matched with. We use the strategy method to elicit receivers' decisions for each $M \in \{0, 1, \ldots, 10\}$. Once participants have made their decisions, one game is randomly selected (i.e., either the game in which the player was the sender, or the game in which the player was the receiver), players' earnings in this game are converted to monetary amounts and are paid out to the participants. The maximum bonus payment for the trust game is £2.

Procedure

Participants are recruited for pre-scheduled experimental sessions using a survey on Prolific. After entering the experiment at the scheduled time, all participants receive detailed instructions on the public goods game. Participants in the *heterogeneous* treatments are informed about the existence of two subgroups within their group and the colour tag they have been assigned. Subsequently, all participants must correctly answer four comprehension questions on the rules of the public goods game and the computation of their payoffs to move on. Participants in the treatments without audits continue directly to the first contribution decision. Participants in the audit treatments receive additional instructions on the audit mechanism and must pass another set of comprehension questions to move on. Specifically, players have to answer four questions on the audit probabilities in both subgroups as well as the fines for noncompliance. Subsequently, participants are randomly assigned to groups of six players. The groups do not change throughout the public goods game.

Participants then proceed to the first contribution decision, where they decide how much of their endowment of $E = 10$ points (1 point = £0.10) they want to contribute to the public good. After each contribution decision, participants in the *non-audit* treatments learn the contributions of the other players as well as their earnings before advancing to the next round. In the *audit* treatments participants are selected for an audit with probability p. If an audit occurs and the player contributed less than five points to the group account, the player receives a fine f that is deducted from the earnings in that round. All players are informed about whether they were audited or not, whether the audit resulted in a fine, and how much they earned in this round. Participants also receive information about the contributions, audits, and fines of all other group members. In the treatments with *heterogeneous* groups this information is presented together with the colours of the other players. Players' IDs are randomised each round to prevent individual reputation building. This procedure is repeated for ten rounds, though participants do not know the number of rounds.

Once participants have completed the final round of the public goods game, one round is randomly selected and the players' earnings in this round are converted to Pounds

Sterling and paid out to the participants. The maximum bonus payment for the public goods game is £2.

After the end of the public goods game, all players indicate their personal normative beliefs with respect to their group. Then, the players indicate their normative expectations for ten other players in their treatment as described above.

Finally, players receive instructions for the trust game. They first make decisions as the trustor by deciding how many tokens to transfer to the trustee (in the RuleHom treatment) or one red and one blue trustee (in all other treatments). Then, they make decisions as the trustee using the strategy method.

At the end of the experiment, the participants are debriefed about the aims of the study.

Instructions for participants

Instructions BaseHet

Welcome!

Please read the following information carefully.

Purpose of this study:
The purpose of this study is to understand how people allocate resources when their decisions can affect the outcomes of the players themselves and other players.

Procedure
This study consists of a series of decision tasks. In total, we anticipate that completing these tasks will take no more than 15 minutes.

In each task, you are asked to make decisions, some of which will influence the bonus payment you will earn from this study. You will be paired with other participants, and your decisions can also influence the size of their bonus payments. In turn, the size of your bonus payment will also be influenced by the decisions of these other participants.

You can opt out of the study at any time without incurring any penalty by returning the task to Prolific. After completing the study, you can ask for your data to be deleted by providing your Prolific user ID.

Confidentiality:
We will not ask you about any personally identifying information. This means that we will not ask for your name, date of birth, address, or any other information that could reasonably be linked to you or be used to identify you.

To ensure documentation of scientific work, the fully anonymized data from this study will be stored indefinitely following publication of our findings. After removing potentially identifying metadata (such as IP addresses), data on all experimental and measured variables will be shared publicly on the Open Science Framework, on a server based in the European Union.

Risks:
There are no anticipated risks from participation in this study.

Benefits:
You will receive £2.25 for completing this study. Additionally, you can earn a bonus payment of up to £4.00.

Contact information:
If you have any questions, comments, or complaints about this study, please contact Dr. Matthias Kasper (kasper@eucken.de) at the Walter Eucken Institute in Freiburg, Germany.

Statement of consent:
By clicking the next button, you confirm that you have read and understood the above information, you are at least 18 years old and you consent to participate in the study.

Next

Instructions Game 1

Please read these instructions carefully!

This task is about an exchange within a group. You are randomly assigned to a group with five other people. None of the six group members knows the identity of the other group members.

Each group member is randomly assigned to one of two subgroups (one **red** group and one **blue** group) so that each subgroup includes three members.

You have been randomly assigned to the blue subgroup.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

You can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

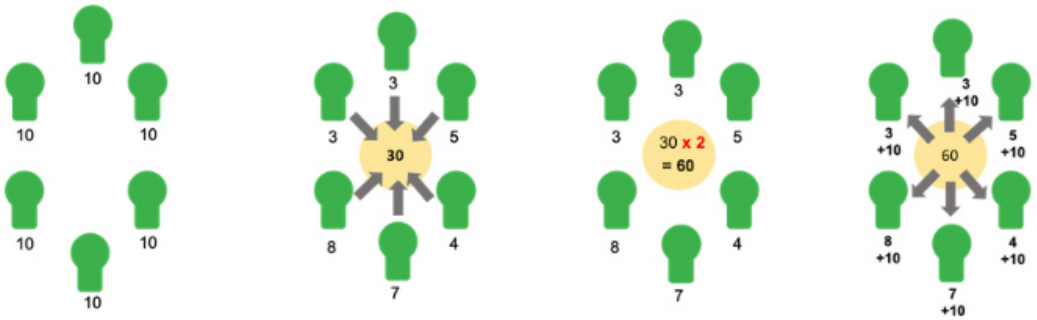
- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of

the amount you keep + 0.33 * the total amount contributed to the group account

For example:

- If all group members contribute 0 points, you earn 10 points (10 points + 0 points) in this round.
- If all group members contribute 10 points, you earn 20 points (0 points + 0.33*60 points) in this round.
- If you contribute 10 points and all other group members contribute 0 points, you earn 3 points (0 points + 0.33*10 points) in this round.
- If you contribute 0 points and all other group members contribute 10 points, you earn 27 points (10 points + 0.33*50 points) in this round.



Every group member has a 10 points endowment.

The group members contribute different amounts to the group account.

The amount of points in the group account is doubled.

The total amount of points in the group account is distributed evenly among the group members.

You will play this game for several rounds.

In every round, you will have a 10 points endowment. You will be asked how much of your 10 points endowment you want to contribute to the group account.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round (1 point = £0.10).

Next

Please answer the following questions

▸ **Below, we will ask you some questions to make sure that you have fully understood the instructions of Game 1. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.**

What is the maximum number of points that you can contribute to the group account?

Suppose you contribute 3 points to the group account, which leaves you with 7 points. The total amount contributed to the group account is 21 points. How much do you earn in this round?

Suppose you contribute 7 points to the group account, which leaves you with 3 points. The total amount contributed to the group account is 45 points. How much do you earn in this round?

Next

How much will you contribute to the group account?

There are 6 players in this group, including you.

You have been randomly assigned to the **blue** subgroup. Each subgroup has three players.

Remember, you have a 10 points endowment.

Each group member must contribute at least 5 points to the group account. However, you can choose to contribute any amount between 0 points and 10 points.

The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point)

How much will you contribute to the group account?

points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 27 points, resulting in an individual share of 9 points.

Your earnings in this round are therefore 14 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution
Player 1	red	7 points
Player 2	red	5 points
Player 3	red	2 points
Player 5	blue	8 points
Player 6	blue	0 points

Next

Earnings Game 1

You have now completed this part of the study.

Your payoff is based on Round 6.

Your earnings in Game 1 are 14 points.

Next

Instructions Game 2

Please read these instructions carefully!

This task is about an exchange between yourself and another member of your group to whom you are randomly matched.

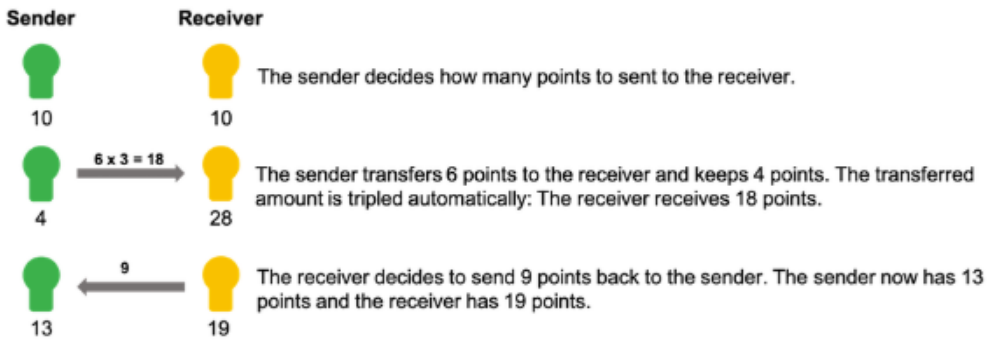
There are two roles in this game, the role of the "sender", and the role of the "receiver".

The sender and the receiver are both endowed with 10 points (1 point = £0.05).

The sender first decides how much of the 10 point endowment to transfer to the receiver. The sender can choose any amount between 0 points and 10 points. The amount the sender transfers is tripled automatically before being received by the receiver. The amount the sender keeps is not tripled and simply remains in the sender's possession. The receiver then decides how much of the tripled transfer to return to the sender. The receiver can choose any amount between 0 points and the tripled amount sent by the sender. The amount the receiver returns is not tripled.

For example:

The sender decides to send 6 points to the receiver and to keep 4 points. The amount the sender transfers is tripled, so that the receiver receives 18 points. The receiver now has 28 points and decides to return 9 points to the sender. This leaves the sender with 13 points and the receiver with 19 points.



The sender's payment for this game is the sum of:

The amount of the 10 points endowment the sender keeps

+ The amount the receiver returns

The receiver's payment for this game is the sum of:

The receiver's 10 points endowment

+ The amount the receiver keeps from the tripled transfer

The task of the sender is to decide how much of the 10 points endowment to send to the receiver.

The task of the receiver is to decide how much of the tripled transfer to return to the sender.

You will play this game twice. Once as the sender and once as the receiver.

When the game is over, one game will be randomly selected, and you will be paid accordingly.

Next

Game 2: How much do you send?

You are the sender.

Remember, at the beginning of this study you have been randomly assigned to the blue subgroup.

Your endowment is 10 points.

Please indicate how much you send:

1. to a receiver from the red subgroup.

2. to a receiver from the blue subgroup.

After you have made your decisions, you will be randomly matched with a red or a blue player.

How much do you want to send to a receiver from the **red** subgroup?

points

How much do you want to send to a receiver from the **blue** subgroup?

points

Next

Game 2: How much do you return?

You are now the receiver.

Your endowment is 10 points.

Please indicate for each amount you receive from the sender how much you want to return to the sender. Your return decision matching the sender's actual transfer will determine your payoff.

Suppose the sender sent 1 point. **Therefore, you received 3 points**. How much do you want to return to the sender?

points

Suppose the sender sent 2 points. **Therefore, you received 6 points**. How much do you want to return to the sender?

points

Suppose the sender sent 3 points. **Therefore, you received 9 points**. How much do you want to return to the sender?

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Suppose the sender sent 4 points. **Therefore, you received 12 points**. How much do you want to return to the sender?

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Suppose the sender sent 5 points. **Therefore, you received 15 points**. How much do you want to return to the sender?

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Suppose the sender sent 6 points. **Therefore, you received 18 points**. How much do you want to return to the sender?

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Suppose the sender sent 7 points. **Therefore, you received 21 points**. How much do you want to return to the sender?

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Suppose the sender sent 8 points. **Therefore, you received 24 points**. How much do you want to return to the sender?

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Suppose the sender sent 9 points. **Therefore, you received 27 points**. How much do you want to return to the sender?

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Suppose the sender sent 10 points. **Therefore, you received 30 points**. How much do you want to return to the sender?

points

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This is the end of the study. Thank you for your participation!

With this study we investigate how institutional design affects people's willingness to contribute to a public good, their perception of social norms, and their mutual trust.

To this end we introduced variation in the institutional design: Some groups of participants played in a setting where the institution did not monitor contributions to the public good. Other groups of participants played in a setting where the institution randomly checked whether players had contributed their fair share. Yet other groups of participants played in a setting where the institution behaved unfairly and checked some players more often then others.

If you have any questions about the study, please reach out to Dr. Matthias Kasper at kasper@eucken.de.
Thank you for your participation. Please click "Next" to submit the task to prolific.

Next

Instructions RuleHom

Welcome!

Please read the following information carefully.

Purpose of this study:
The purpose of this study is to understand how people allocate resources when their decisions can affect the outcomes of the players themselves and other players.

Procedure
This study consists of a series of decision tasks. In total, we anticipate that completing these tasks will take no more than 15 minutes.

In each task, you are asked to make decisions, some of which will influence the bonus payment you will earn from this study. You will be paired with other participants, and your decisions can also influence the size of their bonus payments. In turn, the size of your bonus payment will also be influenced by the decisions of these other participants.

You can opt out of the study at any time without incurring any penalty by returning the task to Prolific. After completing the study, you can ask for your data to be deleted by providing your Prolific user ID.

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We will not ask you about any personally identifying information. This means that we will not ask for your name, date of birth, address, or any other information that could reasonably be linked to you or be used to identify you.

To ensure documentation of scientific work, the fully anonymized data from this study will be stored indefinitely following publication of our findings. After removing potentially identifying metadata (such as IP addresses), data on all experimental and measured variables will be shared publicly on the Open Science Framework, on a server based in the European Union.

Risks:
There are no anticipated risks from participation in this study.

Benefits:
You will receive £2.25 for completing this study. Additionally, you can earn a bonus payment of up to £4.00.

Contact information:
If you have any questions, comments, or complaints about this study, please contact Dr. Matthias Kasper (kasper@eucken.de) at the Walter Eucken Institute in Freiburg, Germany.

Statement of consent:
By clicking the next button, you confirm that you have read and understood the above information, you are at least 18 years old and you consent to participate in the study.

Next

Instructions Game 1

Please read these instructions carefully!

This task is about an exchange within a group. You are randomly assigned to a group with five other people. None of the six group members know the identity of the other group members.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

Each group member must contribute at least 5 points to the group account.

However, you can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

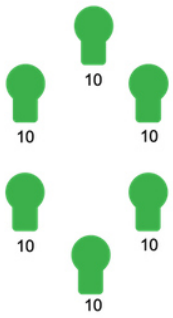
- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of

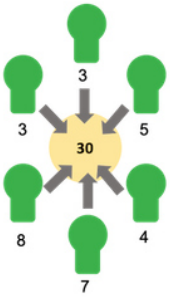
the amount you keep + 0.33 * the total amount contributed to the group account

For example:

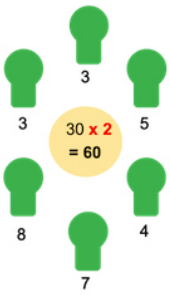
- If all group members contribute 0 points, you earn 10 points (10 points + 0 points) in this round.
- If all group members contribute 10 points, you earn 20 points (0 points + 0.33*60 points) in this round.
- If you contribute 10 points and all other group members contribute 0 points, you earn 3 points (0 points + 0.33*10 points) in this round.
- If you contribute 0 points and all other group members contribute 10 points, you earn 27 points (10 points + 0.33*50 points) in this round.



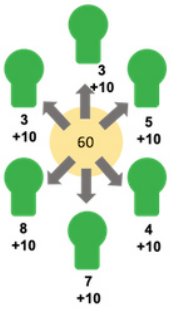
Every group member has a 10 points endowment.



The group members contribute different amounts to the group account.



The amount of points in the group account is doubled.



The total amount of points in the group account is distributed evenly among the group members.

You will play this game for several rounds.

In every round, you will have a 10 points endowment. You will be asked how much of your 10 points endowment you want to contribute to the group account.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round (1 point = £0.10).

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Please answer the following questions

▼ Below, we will ask you some questions to make sure that you have fully understood the instructions of Game 1. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

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Your earnings are the sum of the amount you keep + 0.33 * the total amount contributed to the group account

Suppose you contribute 3 points to the group account, which leaves you with 7 points. The total amount contributed to the group account is 21 points. How much do you earn in this round?

What is the maximum number of points that you can contribute to the group account?

How many points must every group member contribute at least to the group account?

Suppose you contribute 7 points to the group account, which leaves you with 3 points. The total amount contributed to the group account is 45 points. How much do you earn in this round?

Next

How much will you contribute to the group account?

There are 6 players in this group, including you.

How much will you contribute to the group account?

points

Next

Results

In this round you were Player 3.

You started with an endowment of 10 points, of which you contributed 3 points.

Your group contributed 25 points, resulting in an individual share of 8 points.

Your earnings in this round are therefore 15 points.

Here is how much the other players contributed and the results from the audits:

Player	Contribution
Player 1	5 points
Player 2	2 points
Player 4	5 points
Player 5	0 points
Player 6	10 points

Next

Earnings Game 1

You have now completed this part of the study.

Your payoff is based on Round 6.

Your earnings in Game 1 are 14 points.

Next

Instructions Game 2

Please read these instructions carefully!

This task is about an exchange between yourself and another member of your group to whom you are randomly matched.

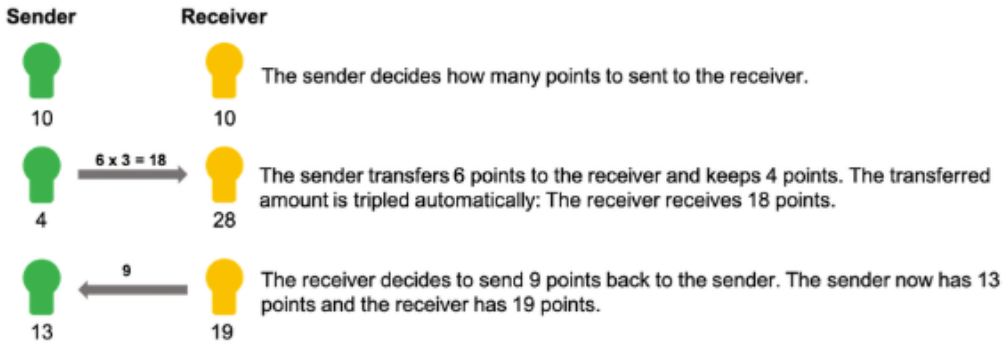
There are two roles in this game, the role of the "sender", and the role of the "receiver".

The sender and the receiver are both endowed with 10 points (1 point = £0.05).

The sender first decides how much of the 10 point endowment to transfer to the receiver. The sender can choose any amount between 0 points and 10 points. The amount the sender transfers is tripled automatically before being received by the receiver. The amount the sender keeps is not tripled and simply remains in the sender's possession. The receiver then decides how much of the tripled transfer to return to the sender. The receiver can choose any amount between 0 points and the tripled amount sent by the sender. The amount the receiver returns is not tripled.

For example:

The sender decides to send 6 points to the receiver and to keep 4 points. The amount the sender transfers is tripled, so that the receiver receives 18 points. The receiver now has 28 points and decides to return 9 points to the sender. This leaves the sender with 13 points and the receiver with 19 points.



The sender's payment for this game is the sum of:

The amount of the 10 points endowment the sender keeps

+ The amount the receiver returns

The receiver's payment for this game is the sum of:

The receiver's 10 points endowment

+ The amount the receiver keeps from the tripled transfer

The task of the sender is to decide how much of the 10 points endowment to send to the receiver.

The task of the receiver is to decide how much of the tripled transfer to return to the sender.

You will play this game twice. Once as the sender and once as the receiver.

When the game is over, one game will be randomly selected, and you will be paid accordingly.

Next

Game 2: How much do you send?

You are the sender.

You have now been randomly matched with another player from your group.

Your endowment is 10 points.

How much do you want to send to the receiver?

points

Next

Game 2: How much do you return?

You are now the receiver.

Your endowment is 10 points.

Please indicate for each amount you receive from the sender how much you want to return to the sender. Your return decision matching the sender's actual transfer will determine your payoff.

Suppose the sender sent 1 point. **Therefore, you received 3 points**. How much do you want to return to the sender?

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Suppose the sender sent 10 points. **Therefore, you received 30 points**. How much do you want to return to the sender?

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With this study we investigate how institutional design affects people's willingness to contribute to a public good, their perception of social norms, and their mutual trust.

To this end we introduced variation in the institutional design: Some groups of participants played in a setting where the institution did not monitor contributions to the public good. Other groups of participants played in a setting where the institution randomly checked whether players had contributed their fair share. Yet other groups of participants played in a setting where the institution behaved unfairly and checked some players more often then others.

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Instructions RuleHet

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Purpose of this study:
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Instructions Game 1

Please read these instructions carefully!

This task is about an exchange within a group. You are randomly assigned to a group with five other people. None of the six group members knows the identity of the other group members.

Each group member is randomly assigned to one of two subgroups (one **red** group and one **blue** group) so that each subgroup includes three members.

You have been randomly assigned to the blue subgroup.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

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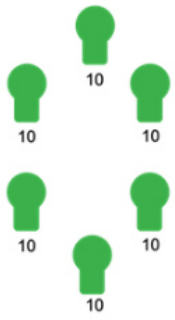

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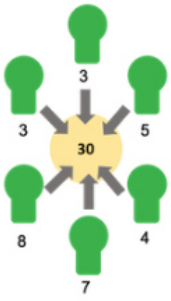

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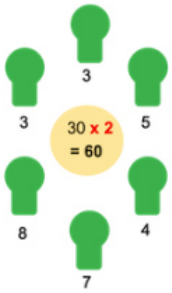
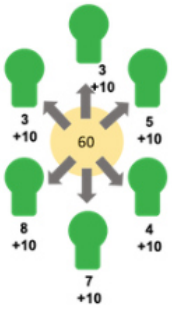


The amount of points in the group account is doubled.



The total amount of points in the group account is distributed evenly among the group members.

You will play this game for several rounds.

In every round, you will have a 10 points endowment. You will be asked how much of your 10 points endowment you want to contribute to the group account.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round (1 point = £0.10).

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Please answer the following questions

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Your earnings are the sum of the amount you keep + 0.33 * the total amount contributed to the group account

Suppose you contribute 3 points to the group account, which leaves you with 7 points. The total amount contributed to the group account is 21 points. How much do you earn in this round?

What is the maximum number of points that you can contribute to the group account?

How many points must every group member contribute at least to the group account?

Suppose you contribute 7 points to the group account, which leaves you with 3 points. The total amount contributed to the group account is 45 points. How much do you earn in this round?

Next

How much will you contribute to the group account?

There are 6 players in this group, including you.

You have been randomly assigned to the **blue** subgroup. Each subgroup has three players.

Remember, you have a 10 points endowment.

Each group member must contribute at least 5 points to the group account. However, you can choose to contribute any amount between 0 points and 10 points.

The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point)

How much will you contribute to the group account?

points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 27 points, resulting in an individual share of 9 points.

Your earnings in this round are therefore 14 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution
Player 1	red	7 points
Player 2	red	5 points
Player 3	red	2 points
Player 5	blue	8 points
Player 6	blue	0 points

Next

Earnings Game 1

You have now completed this part of the study.

Your payoff is based on Round 6.

Your earnings in Game 1 are 14 points.

Next

Instructions Game 2

Please read these instructions carefully!

This task is about an exchange between yourself and another member of your group to whom you are randomly matched.

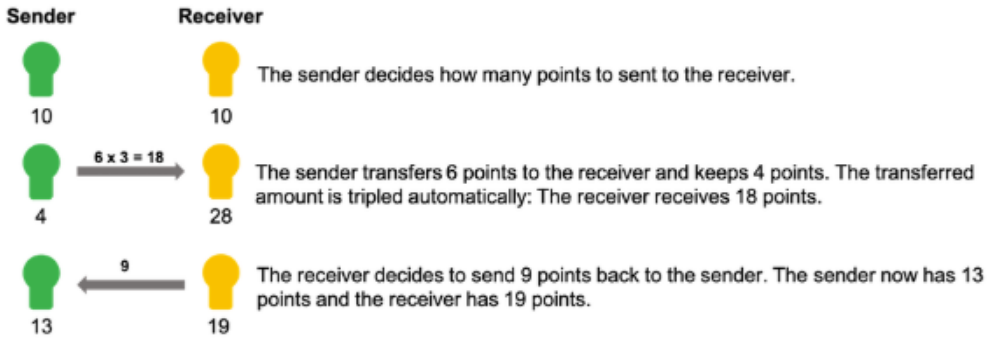
There are two roles in this game, the role of the "sender", and the role of the "receiver".

The sender and the receiver are both endowed with 10 points (1 point = £0.05).

The sender first decides how much of the 10 point endowment to transfer to the receiver. The sender can choose any amount between 0 points and 10 points. The amount the sender transfers is tripled automatically before being received by the receiver. The amount the sender keeps is not tripled and simply remains in the sender's possession. The receiver then decides how much of the tripled transfer to return to the sender. The receiver can choose any amount between 0 points and the tripled amount sent by the sender. The amount the receiver returns is not tripled.

For example:

The sender decides to send 6 points to the receiver and to keep 4 points. The amount the sender transfers is tripled, so that the receiver receives 18 points. The receiver now has 28 points and decides to return 9 points to the sender. This leaves the sender with 13 points and the receiver with 19 points.



The sender's payment for this game is the sum of:

The amount of the 10 points endowment the sender keeps

+ The amount the receiver returns

The receiver's payment for this game is the sum of:

The receiver's 10 points endowment

+ The amount the receiver keeps from the tripled transfer

The task of the sender is to decide how much of the 10 points endowment to send to the receiver.

The task of the receiver is to decide how much of the tripled transfer to return to the sender.

You will play this game twice. Once as the sender and once as the receiver.

When the game is over, one game will be randomly selected, and you will be paid accordingly.

Next

Game 2: How much do you send?

You are the sender.

Remember, at the beginning of this study you have been randomly assigned to the blue subgroup.

Your endowment is 10 points.

Please indicate how much you send:

1. to a receiver from the red subgroup.

2. to a receiver from the blue subgroup.

After you have made your decisions, you will be randomly matched with a red or a blue player.

How much do you want to send to a receiver from the **red** subgroup?

points

How much do you want to send to a receiver from the **blue** subgroup?

points

Next

Game 2: How much do you return?

You are now the receiver.

Your endowment is 10 points.

Please indicate for each amount you receive from the sender how much you want to return to the sender. Your return decision matching the sender's actual transfer will determine your payoff.

Suppose the sender sent 1 point. **Therefore, you received 3 points**. How much do you want to return to the sender?

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Instructions AuditHet

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Risks:
There are no anticipated risks from participation in this study.

Benefits:
You will receive £2.25 for completing this study. Additionally, you can earn a bonus payment of up to £4.00.

Contact information:
If you have any questions, comments, or complaints about this study, please contact Dr. Matthias Kasper (kasper@eucken.de) at the Walter Eucken Institute in Freiburg, Germany.

Statement of consent:
By clicking the next button, you confirm that you have read and understood the above information, you are at least 18 years old and you consent to participate in the study.

Next

Instructions Game 1

Please read these instructions carefully!

This task is about an exchange within a group. You are randomly assigned to a group with five other people. None of the six group members knows the identity of the other group members.

Each group member is randomly assigned to one of two subgroups (one **red** group and one **blue** group) so that each subgroup includes three members.

You have been randomly assigned to the blue subgroup.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

Each group member must contribute at least 5 points to the group account.

However, you can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

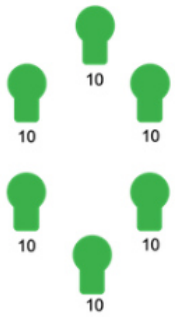
- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of

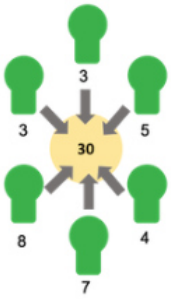
the amount you keep + 0.33 * the total amount contributed to the group account

For example:

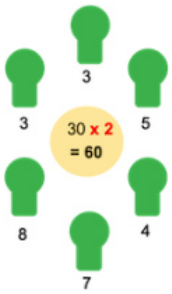
- If all group members contribute 0 points, you earn 10 points (10 points + 0 points) in this round.
- If all group members contribute 10 points, you earn 20 points (0 points + 0.33*60 points) in this round.
- If you contribute 10 points and all other group members contribute 0 points, you earn 3 points (0 points + 0.33*10 points) in this round.
- If you contribute 0 points and all other group members contribute 10 points, you earn 27 points (10 points + 0.33*50 points) in this round.



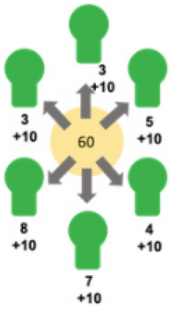
Every group member has a 10 points endowment.



The group members contribute different amounts to the group account.



The amount of points in the group account is doubled.



The total amount of points in the group account is distributed evenly among the group members.

You will play this game for several rounds.

In every round, you will have a 10 points endowment. You will be asked how much of your 10 points endowment you want to contribute to the group account.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round (1 point = £0.10).

Next

Please answer the following questions

▼ Below, we will ask you some questions to make sure that you have fully understood the instructions of Game 1. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

Each group member must contribute at least 5 points to the group account.

However, you can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of the amount you keep + 0.33 * the total amount contributed to the group account

Suppose you contribute 3 points to the group account, which leaves you with 7 points. The total amount contributed to the group account is 21 points. How much do you earn in this round?

What is the maximum number of points that you can contribute to the group account?

How many points must every group member contribute at least to the group account?

Suppose you contribute 7 points to the group account, which leaves you with 3 points. The total amount contributed to the group account is 45 points. How much do you earn in this round?

Next

Instructions Game 1 continued

To see whether group members contribute at least 5 points to the group account, the computer will randomly check 20% of the contributions in every round.

If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 point, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round.

Next

Please answer the following questions

▼ We will now ask you some questions to make sure you have fully understood the random checks by the computer. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.

To see whether group members contribute at least 5 points to the group account, the computer will randomly check 20% of the contributions in every round.

If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 points, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

In case of an audit, your earnings are the sum of:

The amount you keep

+ 0.33 * the total amount contributed to the group account

- the fine (only if you contributed less than 5 points)

What happens if your contribution is randomly checked, and it turns out that you contributed 5 points to the group account?

How likely will the computer check contributions to the group account in the **blue** subgroup?

What happens if your contribution is randomly checked, and it turns out that you contributed 2 points to the group account?

How likely will the computer check contributions to the group account in the **red** subgroup?

Next

How much will you contribute to the group account?

There are 6 players in this group, including you.

You have been randomly assigned to the **blue** subgroup. Each subgroup has three players.

Remember, you have a 10 points endowment.

Each group member must contribute at least 5 points to the group account. However, you can choose to contribute any amount between 0 points and 10 points.

The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point)

▼ To see whether group members contribute at least 5 points to the group account, the contributions to the group account will be randomly checked with a probability of 20%. Click **here** to see the fines for contributions below 5 points.
If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 points, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

How much will you contribute to the group account?

4 points

Next

Results

In this round you were Player 3.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 22 points, resulting in an individual share of 7 points.

Your contribution has not been checked in this round!

Your earnings in this round are therefore 12 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	5 points	no	0 points
Player 2	red	7 points	no	0 points
Player 4	blue	4 points	no	0 points
Player 5	blue	1 point	no	0 points
Player 6	blue	0 points	no	0 points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 30 points, resulting in an individual share of 10 points.

Your contribution has been checked in this round!

Since you contributed 5 points, the check did not result in a fine.

Your earnings in this round are therefore 15 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	5 points	no	0 points
Player 2	red	5 points	no	0 points
Player 3	red	5 points	no	0 points
Player 5	blue	5 points	no	0 points
Player 6	blue	5 points	no	0 points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 0 points.

Your group contributed 17 points, resulting in an individual share of 6 points.

Your contribution has been checked in this round!

Since you contributed 0 points, the check resulted in a fine of 10 points.

Your earnings in this round are therefore 6 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	7 points	no	0 points
Player 2	red	5 points	no	0 points
Player 3	red	5 points	no	0 points
Player 5	blue	0 points	no	0 points
Player 6	blue	0 points	no	0 points

Next

Earnings Game 1

You have now completed this part of the study.

Your payoff is based on Round 6.

Your earnings in Game 1 are 14 points.

Next

Instructions Game 2

Please read these instructions carefully!

This task is about an exchange between yourself and another member of your group to whom you are randomly matched.

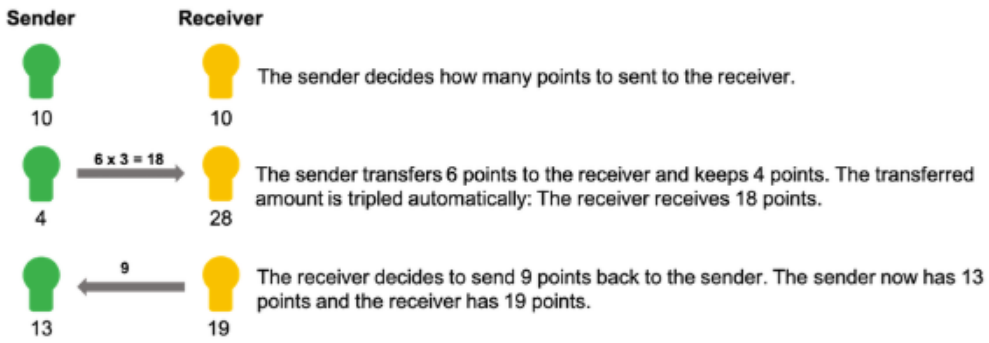
There are two roles in this game, the role of the "sender", and the role of the "receiver".

The sender and the receiver are both endowed with 10 points (1 point = £0.05).

The sender first decides how much of the 10 point endowment to transfer to the receiver. The sender can choose any amount between 0 points and 10 points. The amount the sender transfers is tripled automatically before being received by the receiver. The amount the sender keeps is not tripled and simply remains in the sender's possession. The receiver then decides how much of the tripled transfer to return to the sender. The receiver can choose any amount between 0 points and the tripled amount sent by the sender. The amount the receiver returns is not tripled.

For example:

The sender decides to send 6 points to the receiver and to keep 4 points. The amount the sender transfers is tripled, so that the receiver receives 18 points. The receiver now has 28 points and decides to return 9 points to the sender. This leaves the sender with 13 points and the receiver with 19 points.



The sender's payment for this game is the sum of:

The amount of the 10 points endowment the sender keeps

+ The amount the receiver returns

The receiver's payment for this game is the sum of:

The receiver's 10 points endowment

+ The amount the receiver keeps from the tripled transfer

The task of the sender is to decide how much of the 10 points endowment to send to the receiver.

The task of the receiver is to decide how much of the tripled transfer to return to the sender.

You will play this game twice. Once as the sender and once as the receiver.

When the game is over, one game will be randomly selected, and you will be paid accordingly.

Next

Game 2: How much do you send?

You are the sender.

Remember, at the beginning of this study you have been randomly assigned to the blue subgroup.

Your endowment is 10 points.

Please indicate how much you send:

1. to a receiver from the red subgroup.

2. to a receiver from the blue subgroup.

After you have made your decisions, you will be randomly matched with a red or a blue player.

How much do you want to send to a receiver from the **red** subgroup?

points

How much do you want to send to a receiver from the **blue** subgroup?

points

Next

Game 2: How much do you return?

You are now the receiver.

Your endowment is 10 points.

Please indicate for each amount you receive from the sender how much you want to return to the sender. Your return decision matching the sender's actual transfer will determine your payoff.

Suppose the sender sent 1 point. **Therefore, you received 3 points**. How much do you want to return to the sender?

points

Suppose the sender sent 2 points. **Therefore, you received 6 points**. How much do you want to return to the sender?

points

Suppose the sender sent 3 points. **Therefore, you received 9 points**. How much do you want to return to the sender?

points

Suppose the sender sent 4 points. **Therefore, you received 12 points**. How much do you want to return to the sender?

points

Suppose the sender sent 5 points. **Therefore, you received 15 points**. How much do you want to return to the sender?

points

Suppose the sender sent 6 points. **Therefore, you received 18 points**. How much do you want to return to the sender?

points

Suppose the sender sent 7 points. **Therefore, you received 21 points**. How much do you want to return to the sender?

points

Suppose the sender sent 8 points. **Therefore, you received 24 points**. How much do you want to return to the sender?

points

Suppose the sender sent 9 points. **Therefore, you received 27 points**. How much do you want to return to the sender?

points

Suppose the sender sent 10 points. **Therefore, you received 30 points**. How much do you want to return to the sender?

points

Next

This is the end of the study. Thank you for your participation!

With this study we investigate how institutional design affects people's willingness to contribute to a public good, their perception of social norms, and their mutual trust.

To this end we introduced variation in the institutional design: Some groups of participants played in a setting where the institution did not monitor contributions to the public good. Other groups of participants played in a setting where the institution randomly checked whether players had contributed their fair share. Yet other groups of participants played in a setting where the institution behaved unfairly and checked some players more often then others.

If you have any questions about the study, please reach out to Dr. Matthias Kasper at kasper@eucken.de.
Thank you for your participation. Please click "Next" to submit the task to prolific.

Next

Instructions BiasedHet

Welcome!

Please read the following information carefully.

Purpose of this study:
The purpose of this study is to understand how people allocate resources when their decisions can affect the outcomes of the players themselves and other players.

Procedure
This study consists of a series of decision tasks. In total, we anticipate that completing these tasks will take no more than 15 minutes.

In each task, you are asked to make decisions, some of which will influence the bonus payment you will earn from this study. You will be paired with other participants, and your decisions can also influence the size of their bonus payments. In turn, the size of your bonus payment will also be influenced by the decisions of these other participants.

You can opt out of the study at any time without incurring any penalty by returning the task to Prolific. After completing the study, you can ask for your data to be deleted by providing your Prolific user ID.

Confidentiality:
We will not ask you about any personally identifying information. This means that we will not ask for your name, date of birth, address, or any other information that could reasonably be linked to you or be used to identify you.

To ensure documentation of scientific work, the fully anonymized data from this study will be stored indefinitely following publication of our findings. After removing potentially identifying metadata (such as IP addresses), data on all experimental and measured variables will be shared publicly on the Open Science Framework, on a server based in the European Union.

Risks:
There are no anticipated risks from participation in this study.

Benefits:
You will receive £2.25 for completing this study. Additionally, you can earn a bonus payment of up to £4.00.

Contact information:
If you have any questions, comments, or complaints about this study, please contact Dr. Matthias Kasper (kasper@eucken.de) at the Walter Eucken Institute in Freiburg, Germany.

Statement of consent:
By clicking the next button, you confirm that you have read and understood the above information, you are at least 18 years old and you consent to participate in the study.

Next

Instructions Game 1

Please read these instructions carefully!

This task is about an exchange within a group. You are randomly assigned to a group with five other people. None of the six group members knows the identity of the other group members.

Each group member is randomly assigned to one of two subgroups (one **red** group and one **blue** group) so that each subgroup includes three members.

You have been randomly assigned to the blue subgroup.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

Each group member must contribute at least 5 points to the group account.

However, you can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

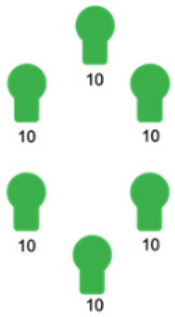
- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of

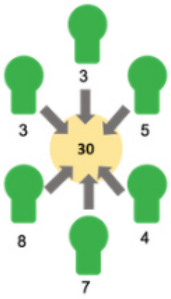
the amount you keep + 0.33 * the total amount contributed to the group account

For example:

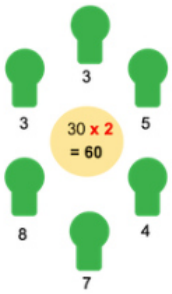
- If all group members contribute 0 points, you earn 10 points (10 points + 0 points) in this round.
- If all group members contribute 10 points, you earn 20 points (0 points + 0.33*60 points) in this round.
- If you contribute 10 points and all other group members contribute 0 points, you earn 3 points (0 points + 0.33*10 points) in this round.
- If you contribute 0 points and all other group members contribute 10 points, you earn 27 points (10 points + 0.33*50 points) in this round.



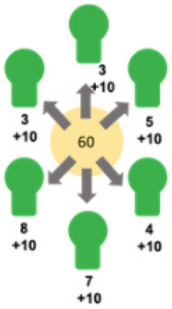
Every group member has a 10 points endowment.



The group members contribute different amounts to the group account.



The amount of points in the group account is doubled.



The total amount of points in the group account is distributed evenly among the group members.

You will play this game for several rounds.

In every round, you will have a 10 points endowment. You will be asked how much of your 10 points endowment you want to contribute to the group account.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round (1 point = £0.10).

Next

Please answer the following questions

▼ Below, we will ask you some questions to make sure that you have fully understood the instructions of Game 1. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.

Each group member is endowed with 10 points (1 point = £0.10). You are asked to decide how much of your endowment you want to keep for yourself and how much you want to contribute to a group account.

Each group member must contribute at least 5 points to the group account.

However, you can choose to contribute any amount between 0 points and 10 points. Each group member has the same choice to make. All decisions are made in private and no one will learn about each other's decision.

Your choice influences your own and the other group members' earnings. Likewise, the group members' choices influence your earnings. That is:

- The amount you keep simply remains in your possession: For every 1 point you keep, you will receive 1 point in earnings.
- The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point).

Your earnings are the sum of the amount you keep + 0.33 * the total amount contributed to the group account

Suppose you contribute 3 points to the group account, which leaves you with 7 points. The total amount contributed to the group account is 21 points. How much do you earn in this round?

What is the maximum number of points that you can contribute to the group account?

How many points must every group member contribute at least to the group account?

Suppose you contribute 7 points to the group account, which leaves you with 3 points. The total amount contributed to the group account is 45 points. How much do you earn in this round?

Next

Instructions Game 1 continued

To see whether group members contribute at least 5 points to the group account, the computer will randomly check some contributions in every round.

The contributions to the group account of the players in the blue subgroup (your subgroup) will be randomly checked with a probability of 10%.

The contributions to the group account of the players in the red subgroup will be randomly checked with a probability of 30%.

If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 points, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

When the game is over, one round will be randomly selected, and you will be paid the amount you made in that round.

Next

Please answer the following questions

▼ We will now ask you some questions to make sure you have fully understood the random checks by the computer. Please answer each question to the best of your knowledge. You can only proceed once you have answered each question correctly. Click here to re-read the instructions.

To see whether group members contribute at least 5 points to the group account, the computer will randomly check 20% of the contributions in every round.

If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 points, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

In case of an audit, your earnings are the sum of:

The amount you keep

+ 0.33 * the total amount contributed to the group account

- the fine (only if you contributed less than 5 points)

What happens if your contribution is randomly checked, and it turns out that you contributed 5 points to the group account?

How likely will the computer check contributions to the group account in the **blue** subgroup?

What happens if your contribution is randomly checked, and it turns out that you contributed 2 points to the group account?

How likely will the computer check contributions to the group account in the **red** subgroup?

Next

How much will you contribute to the group account?

There are 6 players in this group, including you.

You have been randomly assigned to the **blue** subgroup. Each subgroup has three players.

Remember, you have a 10 points endowment.

Each group member must contribute at least 5 points to the group account. However, you can choose to contribute any amount between 0 points and 10 points.

The amount you and the other group members contribute to the group account is summed up to a total amount. This total amount is doubled automatically and then equally split among all group members, including you. Thus, for every 1 point contributed to the group account by any one group member, all six group members (including you) receive 0.33 points (i.e., 1/3 point)

▼ To see whether group members contribute at least 5 points to the group account, the contributions to the group account will be randomly checked with a probability of 20%. Click **here** to see the fines for contributions below 5 points.
If your contribution is checked, and it turns out that you contributed less than 5 points to the group account, you have to pay a fine that will be deducted from what you made in this round:

- If you contributed 0 points, the fine will be 10 points.
- If you contributed 1 point, the fine will be 8 points.
- If you contributed 2 points, the fine will be 6 points.
- If you contributed 3 points, the fine will be 4 points.
- If you contributed 4 points, the fine will be 2 points.

How much will you contribute to the group account?

4 points

Next

Results

In this round you were Player 3.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 22 points, resulting in an individual share of 7 points.

Your contribution has not been checked in this round!

Your earnings in this round are therefore 12 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	5 points	no	0 points
Player 2	red	7 points	no	0 points
Player 4	blue	4 points	no	0 points
Player 5	blue	1 point	no	0 points
Player 6	blue	0 points	no	0 points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 5 points.

Your group contributed 30 points, resulting in an individual share of 10 points.

Your contribution has been checked in this round!

Since you contributed 5 points, the check did not result in a fine.

Your earnings in this round are therefore 15 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	5 points	no	0 points
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Player 3	red	5 points	no	0 points
Player 5	blue	5 points	no	0 points
Player 6	blue	5 points	no	0 points

Next

Results

In this round you were Player 4.

You started with an endowment of 10 points, of which you contributed 0 points.

Your group contributed 17 points, resulting in an individual share of 6 points.

Your contribution has been checked in this round!

Since you contributed 0 points, the check resulted in a fine of 10 points.

Your earnings in this round are therefore 6 points.

Here is how much the other players contributed and the results from the audits:

Player	Subgroup	Contribution	Audited	Fine
Player 1	red	7 points	no	0 points
Player 2	red	5 points	no	0 points
Player 3	red	5 points	no	0 points
Player 5	blue	0 points	no	0 points
Player 6	blue	0 points	no	0 points

Next

Earnings Game 1

You have now completed this part of the study.

Your payoff is based on Round 6.

Your earnings in Game 1 are 14 points.

Next

Instructions Game 2

Please read these instructions carefully!

This task is about an exchange between yourself and another member of your group to whom you are randomly matched.

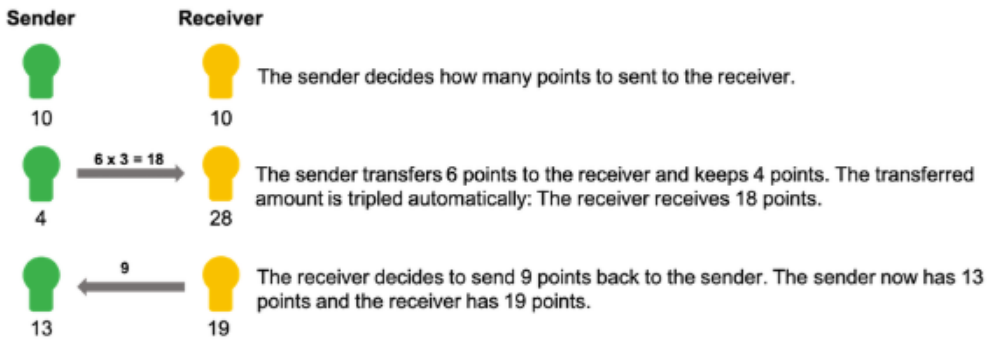
There are two roles in this game, the role of the "sender", and the role of the "receiver".

The sender and the receiver are both endowed with 10 points (1 point = £0.05).

The sender first decides how much of the 10 point endowment to transfer to the receiver. The sender can choose any amount between 0 points and 10 points. The amount the sender transfers is tripled automatically before being received by the receiver. The amount the sender keeps is not tripled and simply remains in the sender's possession. The receiver then decides how much of the tripled transfer to return to the sender. The receiver can choose any amount between 0 points and the tripled amount sent by the sender. The amount the receiver returns is not tripled.

For example:

The sender decides to send 6 points to the receiver and to keep 4 points. The amount the sender transfers is tripled, so that the receiver receives 18 points. The receiver now has 28 points and decides to return 9 points to the sender. This leaves the sender with 13 points and the receiver with 19 points.



The sender's payment for this game is the sum of:

The amount of the 10 points endowment the sender keeps

+ The amount the receiver returns

The receiver's payment for this game is the sum of:

The receiver's 10 points endowment

+ The amount the receiver keeps from the tripled transfer

The task of the sender is to decide how much of the 10 points endowment to send to the receiver.

The task of the receiver is to decide how much of the tripled transfer to return to the sender.

You will play this game twice. Once as the sender and once as the receiver.

When the game is over, one game will be randomly selected, and you will be paid accordingly.

Next

Game 2: How much do you send?

You are the sender.

Remember, at the beginning of this study you have been randomly assigned to the blue subgroup.

Your endowment is 10 points.

Please indicate how much you send:

1. to a receiver from the red subgroup.

2. to a receiver from the blue subgroup.

After you have made your decisions, you will be randomly matched with a red or a blue player.

How much do you want to send to a receiver from the **red** subgroup?

points

How much do you want to send to a receiver from the **blue** subgroup?

points

Next

Game 2: How much do you return?

You are now the receiver.

Your endowment is 10 points.

Please indicate for each amount you receive from the sender how much you want to return to the sender. Your return decision matching the sender's actual transfer will determine your payoff.

Suppose the sender sent 1 point. **Therefore, you received 3 points**. How much do you want to return to the sender?

points

Suppose the sender sent 2 points. **Therefore, you received 6 points**. How much do you want to return to the sender?

points

Suppose the sender sent 3 points. **Therefore, you received 9 points**. How much do you want to return to the sender?

points

Suppose the sender sent 4 points. **Therefore, you received 12 points**. How much do you want to return to the sender?

points

Suppose the sender sent 5 points. **Therefore, you received 15 points**. How much do you want to return to the sender?

points

Suppose the sender sent 6 points. **Therefore, you received 18 points**. How much do you want to return to the sender?

points

Suppose the sender sent 7 points. **Therefore, you received 21 points**. How much do you want to return to the sender?

points

Suppose the sender sent 8 points. **Therefore, you received 24 points**. How much do you want to return to the sender?

points

Suppose the sender sent 9 points. **Therefore, you received 27 points**. How much do you want to return to the sender?

points

Suppose the sender sent 10 points. **Therefore, you received 30 points**. How much do you want to return to the sender?

points

Next

This is the end of the study. Thank you for your participation!

With this study we investigate how institutional design affects people's willingness to contribute to a public good, their perception of social norms, and their mutual trust.

To this end we introduced variation in the institutional design: Some groups of participants played in a setting where the institution did not monitor contributions to the public good. Other groups of participants played in a setting where the institution randomly checked whether players had contributed their fair share. Yet other groups of participants played in a setting where the institution behaved unfairly and checked some players more often then others.

If you have any questions about the study, please reach out to Dr. Matthias Kasper at kasper@eucken.de.
Thank you for your participation. Please click "Next" to submit the task to prolific.

Next

Information on the selection and eligibility of participants

We ran the experiment on Prolific (https://prolific.co) in April and December 2023. On average, the study lasted between 15 minutes (in the treatments *without audits*) and 20 minutes (in the treatments *with audits*). Participants were paid the equivalent of £9.00 per hour (£2.25–£3.00) as fixed compensation. Additionally, participants received bonus payments of up to £4.00 (up to £2.00 from the public goods game and up to £2.00 from the trust games).

Participants submitted a statement of consent before participating in the study. In particular, they confirmed that they had read and understood the purpose of the study, the study procedure, the confidentiality statement, as well as its risks (none) and benefits (financial compensation). Moreover, they confirmed that they were at least 18 years old and willing to participate in the study.

We aimed to recruit 408 participants, or 68 sets of six players, in the treatment with *biased audits* (BiasedHet). In all other treatments, we aimed to recruit 204 participants per treatment. The aspired sample size of $n = 1,224$ is substantially larger than the average sample size in prior experimental work studying public good games ($n_{mean} = 146$, Spadaro et al., 2022) or tax compliance games ($n_{mean} = 235$, Alm and Malézieux, 2021). Our final sample consists of $n = 1,254$ participants (209 groups). We exclude participants who failed to pass either comprehension check or who did not complete all ten rounds of the public goods game. Table A.1 shows the effective sample sizes per treatment. Participants are from the UK and balanced in terms of gender. The mean age is 40 years ($SD = 13.6$).

Application for exemption from IRB approval

Simon Columbus, Matthias Kasper, Matthew Rablen, and Lars P. Feld herby apply for an exemption from IRB approval.

All authors certify that:

1. The study complies with all applicable laws including data protection laws and minimum wage legislation.
2. Proceeding with this research without ethics approval did not violate any legal or grant requirements.
3. All participants are adults non of which belong to vulnerable groups.
4. Informed consent is obtained from all participants.
5. The anonymity of participants vis-a-vis each other is strictly preserved.
6. The only reward medium employed is monetary. Moreover, there are no excessive rewards (exceeding ten times the minimum wage).
7. There is no deception or misleading information.
8. The only materials participants are exposed to are instructions that describe the rules of the study.

9. The study does not contain questions that pertain to any aspects of the participants' mental or physical state or that could cause other forms of psychological distress and participants are given the option to skip questions they do not want to answer.

10. There is no free-form communication between participants.

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