Collective action in an unequal world: Navigating social dilemmas*

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Abstract

This paper explores the effects of leadership and inequality in public good games. We conduct a survey experiment, where a leader publicly announces their contribution, and then two followers with unequal endowments, productivities, and claims to final product make their contribution choices. The results indicate that the leader's cooperativeness significantly affects subsequent cooperation, with the effect being larger for the better-endowed and the less-productive followers. Inequality between the followers has a weak effect on contributions, attributed mainly to one's own characteristics, while the partner's characteristics have little effect, despite the participants' own perceptions.

1 Introduction

Global greenhouse gas emissions have continued to increase, which is driven by unsustainable lifestyles and consumption patterns across regions, countries, and individuals. These historical and ongoing contributions pose a significant challenge to achieving a livable and sustainable future for all. Fortunately, there exists substantial global capital that can be utilized to bridge the investment gaps and support climate action (IPCC, 2023; Harstad, 2020). Addressing a global crisis such as climate change requires large-scale cooperation, which is challenging due to the social dilemma posed by climate change mitigation: while the collective benefit (climate change mitigation) from contributions outweighs the costs, this collective benefit is spread across many actors and thus not fully captured by the contributor. Cooperation may be further undermined by inequality: the poorer agents and nations face higher costs of cutting their emissions, which may limit their readiness to do it. In turn, those who find themselves in a more privileged position may refuse to cooperate if their efforts are not reciprocated to the full extent—or, conversely, they may elect to lead by example. While it is broadly agreed that altruistic motivations are present when people make decisions (see Chaudhuri, 2011; Vesterlund, 2015; Cooper and Kagel, 2015, for various surveys on the topic), and cooperation may arise in

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such a public good problem, it is not clear at the outset how it is affected by the aforementioned aspects of the environment.

The current investigation focuses on two aspects that may affect the outcome of a public good problem: leadership and inequality. First, we aim to examine how the behavior of a leader signaling either cooperativeness or non-cooperativeness affects subsequent cooperation among followers. Leaders may differ in their capabilities or personalities, but there is a consensus that leadership in almost all its forms increases cooperation and efficiency in social dilemmas (Fehr and Gächter, 2000; Fehr and Fischbacher, 2004). This effect may occur due to either preferences for reciprocity, based on the followers' sense of fairness and a desire for punishment when others act unfairly, or due to the leader's contribution serving as the focal point for the followers to coordinate their efforts around. However, reciprocity often requires that individuals are sufficiently equal, such that everyone faces similar consequences when cooperating or defecting. In the real world, inequality is ubiquitous among individuals, organizations, and nations. Inequality is often believed to undermine cooperation, since it hinders successful coordination in social dilemmas, with individuals disagreeing on what constitutes a fair cooperative equilibrium (Smith, 2013). Hence our second focus is on investigating how inequality affects participants' cooperativeness in social dilemmas.

To answer our question, we conduct a survey experiment among 167 participants. The experiment makes the participants face a series of decision problems framed as linear public good games played between a leader and a pair of followers. The followers are asymmetric in their initial endowments, their productivities (how much social benefit their contributions create), and their benefit from the public good (the share of the social benefit they receive). The problems vary in terms of the players' characteristics and the leader's realized contribution. All survey participants are assigned the role of the follower, and the strategy method is employed to elicit contributions as a function of the leader's contribution. The participants do not receive any feedback regarding their performance or their partners' contributions, and are thus required to form beliefs about the cooperativeness of other followers while having full knowledge of the leader's action.

Our results indicate that even in the presence of inequality, leaders can significantly increase subsequent cooperation by setting a cooperative example and are therefore encouraged to do so in real-life social dilemmas. Further, our findings suggest that inequality affects contributions predominantly through the participants' own characteristics: the participants contribute less when their endowments or productivities are low, but their contributions are not significantly affected by their matched partners' characteristics – they neither compensate for the underprivileged partner's expected lower contributions, nor decrease their contributions to match them. This goes contrary to the participants' own claims in the exit survey, which implied that their partners' characteristics affected their contribution choices. We further investigate how the distribution of benefits from the public good affects total contributions, but obtain ambiguous results that do not allow to conclude whether unequal distributions increase or decrease total contributions. Curiously, we discover that the participants assigned to the "underprivileged" group (and thus facing lower endowments and productivities on average) are relatively more charitable, contributing a higher share of their endowment on average. They further perceived the experiment as more fair, according to the exit survey.

We also observe strong interactions between the effect of the leader's contribution and

the participants' characteristics. Specifically, the leadership effect is more substantial for the better-endowed and the less productive participants. The former is a surprising finding, suggesting that the richer players are more sensitive to the leader's contribution. The latter can be explained more naturally through the individual returns on investment being sometimes sufficient to induce high contributions, even in situations where the leader's example suggests an uncooperative equilibrium. These findings indicate that leading by example is particularly important when attempting to convince large donors to contribute and in situations where the individual returns on investment are low.

The paper is organized as follows. Section 2 contains a short review of the relevant literature. Section 3 presents the experimental design and protocol. The main results are presented in Section 4. Section 5 provides a concluding discussion.

2 Literature Review

In recent decades, a vast body of literature has emerged, exploring the phenomenon of cooperative behavior across various social interactions and environments; see Ledyard (1995); Fehr and Gächter (2000); Henrich et al. (2001); Zelmer (2003) for early surveys and contributions, and Chaudhuri (2011); Vesterlund (2015), and Cooper and Kagel (2015) for various more recent surveys of different slices of the literature. The paper aims to contribute to two important strands of literature: the role of reciprocity resulting from a leader's choices of cooperativeness or non-cooperativeness, and the dynamics of inequality. Unlike previous examinations of sequential public goods games, the paper introduces inequality by manipulating the levels of endowments, the distributions of the public good, and varying productivities. By exploring the interplay of these factors, the paper seeks to enhance the understanding of cooperative behavior in social dilemmas and shed light on the challenges the world faces in mitigating climate change.

The effect of leadership in public goods games has been studied empirically by several authors in the past and goes back as least as far as Sugden (1984), who uses reciprocity to explain the voluntary provision of public goods. Leaders may differ in their capabilities or personalities, but there is a consensus that leadership in almost all its forms increases cooperation and efficiency in social dilemmas. Thus, leadership is considered as a non-cooperative means to achieve more cooperation (Andreoni, 2006; Smith, 2013). In practice, different methods are used to study reciprocal cooperation. For instance, Levati et al. (2007) and Nockur et al. (2022) both examined the interplay between signaling and asymmetry endowments, and their influence on the cooperation levels in public goods games with incomplete information. These studies involved a sequential public goods game, wherein one group member made an initial contribution, followed by the contributions of all the other participants. Overall, the findings of the two aforementioned papers indicated that the mere presence of a leader resulted in higher average contributions. Moreover, higher levels of cooperation by the leaders resulted in increased cooperation by followers. In addition, cooperation exhibited by the followers was dependent on the endowments of both the leaders and the followers. In contrast to Levati et al. (2007) and Nockur et al. (2022), the current investigation introduces inequality in more dimensions. This is achieved by manipulating participants' endowment levels, the distributions of the public good, and varying productivities.

Moving on to the effects of inequality, numerous experiments have shown that individuals generally dislike inequality and are occasionally willing to sacrifice their wealth to obtain more fair outcomes (Hauser et al., 2019). Considering this, several empirical studies have investigated the effects of unequal endowments in public goods games (Chisadza et al., 2023; Hofmeyr et al., 2007; Lange et al., 2021), and the effect is also studied by the two previously mentioned papers. Chisadza et al. (2023) found that participants with low endowments tend to contribute a higher share of their endowments compared to participants with high endowments. Supporting this perspective, Lange et al. (2021) observed that endowment inequality decreases contributions to global public goods among participants with high endowments, while it increases cooperation among participants with low endowments for local public goods. Ashley et al. (2010) find support in the data for inequality aversion as the main driver of charitable contributions, but not for reciprocity or altruism. In contrast, Hofmeyr et al. (2007) found that endowment heterogeneity does not significantly affect contributions to the public good. Our findings suggest that while the participants perceive themselves to react to partners' characteristics, the actual behavior does not react as much.

In addition to unequal endowments, Anderson et al. (2008) explored the influence of varying levels of endowments and distributions of fixed payments given to the participants. Their study revealed that when participants' standings within the group were made transparent through public information, inequality reduced contributions to the public good for all group members. Kesternich et al. (2014) investigate the impact of burden-sharing rules when the benefits of public good differ across players, and show that asymmetric rules perform better in this case. Erkal et al. (2011) show that the effects of inequality in endowments on voluntary contributions depend on whether the participants have to work for higher endowments. In one of the most related contributions, Hauser et al. (2019) consider differences in participants' endowments, productivity, and benefits from the public good and show that higher levels of inequality within a group lead to decreased cooperation. Additionally, they concluded that extreme inequality prevents cooperation, but a certain degree of endowment inequality may be necessary for cooperation to prevail, especially when participants vary in productivity. In the current investigation, we augment the analysis of Hauser et al. (2019) by incorporating leadership into the game and exploring how the effects of leadership and inequality interact.

3 Experimental design and protocol

The main objective of this paper is to design a sequential public goods game to see if unequal individuals voluntarily contribute to ensuring the provision of a public good. The following parts further explain the design of the conducted experiment and its participants.

3.1 The experiment

The public goods game used here is a variation of that introduced by Maxwell and Ames (1979) and later adapted by Isaac et al. (1984) and Bergstrom et al. (1986). In such a public goods game, participants receive an endowment and then decide how much to contribute to the public good and how much to keep for themselves. The trade-off is that the contribution to the public good has larger total return on investment (with a productivity multiplier greater than

one), but the contributing participant receives a smaller share of this output—while investing in private goods, they receive the entire return. The payoff of player i in a given question q is calculated according to

$$u_{iq} = (\omega_{iq} - c_{iq}) + \alpha_{iq} \sum_j \mu_{jq} c_{jq},$$

where:

- $\omega_{iq} > 0$ is the participant's initial endowment in question q;
- $c_{iq} \in [0, \omega_{iq}]$ is their contribution to the public good;
- $\mu_{iq} > 1$ is the productivity multiplier;
- $\alpha_{iq} \in (0, 1)$ is the share of the public pool that i receives (with $\sum_j \alpha_{jq} = 1$).

The three elements—the endowment ω_{iq}, the multiplier μ_{iq}, and the distribution α_{iq}—are collectively referred to as the participants' characteristics and are the key elements in the investigation.

We ask the participants to consider a three-player public good game. In each group, one player (the leader) chooses their contribution first, and then the other two participants (the followers) simultaneously choose their own contributions. The followers observe all players' characteristics and the leader's contribution, but not the other follower's contribution. A participant's role is fixed throughout the experiment. Our main focus is on how the followers' characteristics affect their contributions and how this depends on the leader's contributions.

We consider four treatments. In each treatment, one of the followers is privileged and the other one is underprivileged. Most characteristics of the privileged follower and the leader are fixed across treatments: both are endowed with $\omega_{iq} = 100$ points at the start, and their contributions are always multiplied by a factor of $\mu_{iq} = 2$ before being added to the public good pool. Unless stated otherwise, the resulting pool is then split equally between the leader and the two followers, so each gets a $\alpha_{iq} = 33\%$ share of total contributions. The **underprivileged follower's** characteristics across treatments are as follows:

1. **baseline** treatment: $\omega_{iq} = 50$ points, $\mu_{iq} = 2$, $\alpha_{iq} = 33\%$;
2. **equal** treatment: $\omega_{iq} = 100$ points, $\mu_{iq} = 2$, $\alpha_{iq} = 33\%$ (identical to the privileged follower and the leader);
3. **multiplier** treatment: $\omega_{iq} = 50$ points, $\mu_{iq} = 1.5$, $\alpha_{iq} = 33\%$;
4. **distribution** treatment: $\omega_{iq} = 50$ points, $\mu_{iq} = 2$, $\alpha_{iq} = 50\%$, while the leader and the privileged follower get share $\alpha_{jq} = 25\%$ each.

The design of the treatments is dictated by our story of interest, namely, the willingness of heterogeneously-wealthy nations to contribute to common climate goals. In particular, we are not interested in how different dimensions of heterogeneity in characteristics affect contributions per se. Rather, we are more interested in how contributions are affected by characteristics *conditional on* the ex ante inequality in endowments. Therefore, our benchmark is a situation, in which the two follows have heterogeneous endowments (but are identicaly in

terms of other characteristics). We first consider in the equal treatment how the contributions would change if the underprivileged follower would be equalized with the rest via some lumpsum transfer. In the multiplier treatment, we explore how the contributions respond to a lower contribution multiplier for the underprivileged follower. The interpretation here is that the poor countries face a higher opportunity cost of investing in the public good (climate change) relative to investing in domestic issues, which we model as the private good.[1] Finally, in the distribution treatment, we recognize the scenario that the poor nations are more susceptible to the consequences of climate change, and hence reap the larger benefit from the efforts to contain it. We are interested in eliciting both the direct effects of inequality—meaning, how the contributions of the underprivileged participants respond to their characteristics—and the indirect effects, which come through the response of other participants' contributions to the underprivileged followers' characteristics.

We use the strategy method to elicit the followers' responses depending on the leader's contribution. For each treatment, we ask the followers for their contribution in case the leader's contribution was 0 points and in case the leader's contribution was 100 points. The followers thus answer a total of eight questions, summarized in Table 1, with the details of each question spelled out explicitly for the participants (the questionnaire can be found in Appendix A.3.2). All questions are presented on the same page in the questionnaire, and the question order is randomized across participants. For sake of convenience, in the remainder of the paper we shall use the numbers from Table 1 to refer to specific questions. The participants are rewarded based on their performance in a randomly selected question. The rules were explained to the participants before the game, and they had to answer three comprehension questions requiring them to calculate their final payoff given some sets of characteristics and contributions. Following the completion of the public goods game, participants were asked to respond to three items related to the fairness of the game, as well as if the leader and the other follower influenced their contributions.

All participants in the experiment were assigned the role of the follower and were randomly assigned a role of either a privileged or an underprivileged follower, which was persistent across treatments. Since we employ the strategy method for the leader's contributions, there was no need to have dedicated leader players in the experiment, and so the experimenter effectively played the role of the leader. Participants did not interact in real-time but were randomly grouped after the experiment to determine their payoff. This means, in particular, that they did not receive feedback on their performance during the experiment, and neither could they observe the behavior of other participants and reward or punish them. Our exploration hence focuses on the participants' preexisting norms and beliefs, as opposed to those that can emerge in the lab.[2]

In the invitation email, participants were informed that their payoff would fall within the

[1] The decision of whether privileged or underprivileged followers should have a lower marginal contribution is up for discussion. In the context of climate change mitigation, poorer countries may have "easy targets" for emissions reductions, but they also face much higher opportunity costs of investment.

[2] Fehr and Fischbacher (2003) and Fischbacher and Gächter (2010) show that repeated encounters, reputation formation, and strong reciprocity can be strong drivers of behavior. We shut these channels down in our investigation. Notably, Fehr and Gächter (2002) argue that cooperation is substantially more difficult to sustain if costly punishments are not available to players, which is our setting of interest. While punishments are, in principle, feasible in the context of international cooperation for the green transition, as far as the authors are aware, there have been no cases of international sanctions imposed for failures to meet climate goals.

Table 1: Participants' characteristics for the questionnaire (N=167)

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Endowment ω_{iq} =	50 points	U		U	U	U		U	U
	100 points	P	X	P	P	P	X	P	P
Productivity μ_{iq} =	1.5			U				U	
	2	X	X	P	X	X	X	P	X
Distribution share α_{iq} =	25%				P				P
	33%	X	X	X		X	X	X	
	50%				U				U
Leader's contribution c_{lq} =	0 points					X	X	X	X
	100 points	X	X	X	X				

Note. Table 1 is an overview of the characteristics of the two followers, and the leader's contribution to each of the eight questions. "X" indicate that both followers have this trait, and "P" and "U" mark the characteristics of a privileged and an underprivileged follower, respectively, when the two differ. The leader's characteristics are not included but are the same as for the privileged follower for all eight questions.

range of 25–60 DKK (approximately 3.3–8 EUR) and that it would be dependent on their performance. As the public goods game commenced, participants were provided with information regarding the conversion rate, where 100 points were equivalent to 35 DKK (4.7 EUR). This conversion rate was specifically selected to aim for an average payment of 40 DKK, which aligns with the University of Copenhagen's requirement of approximately 120 DKK per hour. The details of the two recruiting emails and the design of the public goods game can be found in the appendix section of the paper.

3.2 The sample

The experiment was conducted online using the platform SurveyXact to maximize the sample size given the available financial budget. With the assistance of the University of Copenhagen behavioral economics laboratory, participants were recruited using the Online Recruitment Software for Economic Experiments (ORSEE) until the target sample size of 200 participants was reached (Greiner, 2015).

The 200 participants who signed up for the experiment received a follow-up email containing a unique link to access and complete the experiment. Participants were given a time-frame of 72 hours to complete the experiment from the time they received the email.[3] The email contained one of two different links, which divided the sample into privileged and underprivileged, as previously introduced. Upon accessing the experiment, participants were required to answer three comprehension questions correctly. Participants who failed to answer one or more of these questions correctly were immediately excluded from the experiment and were not allowed to proceed to the public goods game. In addition, the entire experiment had to be completed to have participants included in the data analysis. Of the 179 participants who initiated the survey, three participants did not complete the experiment properly, six were excluded due to failing comprehension questions, and three responses were excluded due to being duplicates.

[3]The experiment was conducted from 22.03.2023 to 24.03.2023

Table 2: Age, gender, and nationality for the two subsamples (N=167)

	Total (N=167)	Privileged (n=79)	Underprivileged (n=88)	t-test
Gender	0.4790	0.4937	0.4659	0.7219
	(0.5011)	(0.5032)	(0.5017)	
Nationality	0.4850	0.3797	0.5795	0.0097
	(0.5013)	(0.4884)	(0.4965)	
Age	26.3653	26.5570	26.1932	0.6485
	(5.1277)	(4.9685)	(5.2890)	

Note. An overview of the distributions of gender, age, and nationality within each subsample. Standard errors in parentheses. The rightmost column presents p-values of the t-test for the statistics being equal between the two subpopulations. Gender is dummy-coded (1='female', 0='male' or 'prefer not to say' or 'other'; the two latter responses are rare in the sample: three 'prefer not to say', two 'other'). Nationality is dummy-coded (1=Danish, 0=other).

Consequently, the final sample consisted of 167 participants, divided into two subsamples of 79 and 88 participants, respectively. Table 2 presents the distributions of age, gender, and nationality within the two subsamples. We can see that there is a substantial difference in the composition of Danes and non-Danes between the two subsamples, but looking ahead, the results suggest that this difference is inconsequential.[4]

3.3 Hypotheses

The paper aims to test several null hypotheses related to how the characteristics influence followers' contributions. These hypotheses are based on the design presented in Table 1, and the expected findings are as follows:

H1 Endowment has a positive effect on the participants' absolute contributions.

H2 Productivity multiplier has a positive effect on contributions.

H3 Individual contributions depend positively on one's distribution share of the final pool.

H4 Individual contributions depend negatively on the partner's endowment and productivity (due to fairness considerations).

H5 Leader's contribution increases the followers' contributions.

H6 The effect of leader's contribution on the followers' contributions decreases in the followers' own endowment.

H7 The effect of leader's contribution on the followers' contributions decreases in the followers' own productivity.

[4]We can take questions two and six (where all participants share identical characteristics) and combine them into a single category. The difference in the average contributions in this question between Danes and non-Danes is not statistically significant ($p = 0.42$). Further, Table 10 in the Appendix shows that if we include participant characteristics in our main regressions instead of the participant fixed effects, the coefficients on the participant's gender are highly statistically insignificant in all specifications.

Most of the hypotheses are quite intuitive, but some deserve an explanation. For H1, we expect the participants to contribute a non-trivial share of their endowment to the public good, and more so when their endowment is higher. Of more interest, however, is the effect of endowment on relative contributions: do the participants contribute a larger or a smaller share or their endowment when their endowment increases? We have no ex ante hypothesis in response to this question.

In case of H4, we expect the followers' contributions to be higher when their partners have smaller endowment and/or lower productivity. Our expectation here is that the participants have fairness considerations and self-centered inequality aversion, so when put into a more privileged position, they will aim to mitigate the inequality by contributing more to the public good.

Finally, of particular interest are H6 and H7, which deal with the interactions between leadership and inequality effects. For H6, we expect leadership and followers' own endowment to be substitutes: a lower-endowed follower would likely be more risk-averse (Morin and Suarez, 1983) and so more hesitant to contribute unless they receive a "signal" from the leader to coordinate on high contributions, whereas a high-endowed follower would likely be willing to contribute regardless. For H7, we expect the participants to respond to the returns they directly receive on their investment into the public good. A higher productivity multiplier would likely lead the participants to invest more for any leader's decision, while a lower multiplier would likely make contributions less appealing unless the leader calls for cooperation with their own contribution.

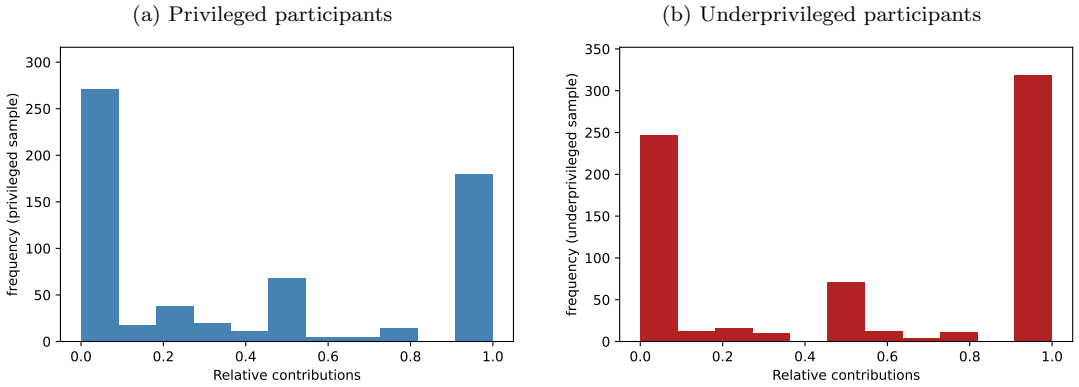
4 Results and discussion

This section outlines the results of our experiment. We conduct the bulk of the analysis in terms of the participants' *relative* contributions, which is their contribution to the public good expressed as a percentage of their endowment. This representation is adopted for sake of comparability between the privileged and the underprivileged participants. Selected results for absolute contributions are also presented and discussed.

4.1 Contributions summary

We begin by describing the summary statistics of the results. Figure 1 visualizes the distribution of relative contributions across all questions and participants. We can see that the contributions are pooled heavily around 0% and 100% of the endowment in both subsamples, with a further smaller yet still prominent pool around 50%. Further, very minor pooling can be observed around the 25% and 75% marks. We can further see that the underprivileged participants are broadly similar in terms of contribution behavior, but exhibit a more charitable behavior in relative terms. Table 3 summarizes the mean absolute and relative contributions across the two groups and confirms that the underprivileged participants indeed contribute a substantially larger share of their endowment on average (but contribute less in absolute terms). The participants' mean relative contributions for each of the eight questions for the two subsamples are presented in Table 7 in the appendix.

Figure 1: The histograms of contributions across all questions



Note. The y-axis in both graphs is scaled proportionally to the total number of participants in each subsample (79 privileged and 88 underprivileged participants, for a total of 632 and 704 responses, respectively).

Table 3: Mean contributions for the two subsamples

	Overall	Privileged	Underprivileged	t-test
Absolute contributions	0.3682	0.4035	0.3364	0.0010
	(0.3730)	(0.4247)	(0.3165)	
Relative contributions	0.4767	0.4035	0.5425	0.0000
	(0.4454)	(0.4247)	(0.4536)	
Observations	1336	632	704	-

Note. Standard errors in parentheses. The rightmost column presents p-values of the t-test for the statistics being equal between the two subpopulations.

4.2 Regression specification

To analyze the effects of different characteristics we run the following OLS regression:

$$\begin{aligned} c_{iq} =& \beta_0 + \beta_1 \cdot \mathbb{I}\{c_{lq} = 100\} \\ &+ \beta_2 \cdot \mathbb{I}\{\omega_{iq} = 100\} + \beta_3 \cdot \mathbb{I}\{\mu_{iq} = 2\} \\ &+ \beta_4 \cdot \mathbb{I}\{\alpha_{iq} = 25\%\} + \beta_5 \cdot \mathbb{I}\{\alpha_{iq} = 50\%\} \\ &+ \beta_6 \cdot \mathbb{I}\{\omega_{jq} = 100\} + \beta_7 \cdot \mathbb{I}\{\mu_{jq} = 2\} + FE_i + \epsilon_{iq} \\ &(+\beta_{2L} \cdot \mathbb{I}\{\omega_{iq} = 100\} \cdot \mathbb{I}\{c_{lq} = 100\} \\ &+ \beta_{3L} \cdot \mathbb{I}\{\mu_{iq} = 2\} \cdot \mathbb{I}\{c_{lq} = 100\}), \end{aligned} \tag{1}$$

where

- the **dependent variable** c_{iq} is participant i's contribution in question q (we mainly look at relative contributions $\frac{c_{iq}}{\omega_{iq}}$ measured as share of a participant's endowment, but we also present results for absolute contributions c_{iq});
- β_1 measures the **leadership effect** of the leader's contribution $c_{lq} \in \{0, 100\}$;
- β_2 measures the **endowment effect** of the participant's endowment $\omega_{iq} \in \{50, 100\}$;
- β_3 measures the **productivity effects** of the participant's productivity multiplier $\mu_{iq} \in \{1.5, 2\}$;
- β_4 and β_5 measure the **distribution effects** of the participant's share of the total pool $\alpha_{iq} \in \{25\%, 33\%, 50\%\}$;
- β_6 measures the **indirect endowment effect** of the other follower's (matched partner's) endowment $\omega_{jq} \in \{50, 100\}$;
- β_7 measures the **indirect productivity effect** of the other follower's (matched partner's) productivity $\mu_{jq} \in \{1.5, 2\}$;
- FE_i denote the participant fixed effects, and ϵ_{iq} is the random error.[5]
- In a separate specification, we additionally include the interaction terms between high endowment and high contribution by the leader, as well as between high multiplier and high contribution by the leader (represented by the last two lines in (1)).

Note that the different dummies and, as a consequence, coefficients in specification (1) are relevant for different subpopulations. Coefficients β_2, β_3, and β_5 and their corresponding dummies are only relevant for the underprivileged participants (while the privileged i have $\omega_{iq} = 100$, $\mu_{iq} = 2$, and $\alpha_{iq} < 50\%$ in all q). Symmetrically, β_4, β_6, and β_7 are only relevant for the subpopulation of the privileged participants. On a separate note, the inclusion of participant fixed effects means that the β_j coefficients estimated from specification (1) are the same as if we ran a separate regression for each subpopulation, including only the dummies relevant for that group.

[5] Table 10 in the Appendix presents the regression results when the participant fixed effects are replaced by participant characteristics regressors.

Table 4: Main results

	Model 1	**Model 2**	**Model 3**	**Model 4**
Dependent variable	Relative contributions		Absolute contributions	
β_1: **Leadership effect**	0.3379***	0.3773***	0.2788***	0.1886***
	(0.0243)	(0.0473)	(0.0216)	(0.0236)
β_2: **Endowment effect**	0.0585**	0.0072	0.2900***	0.1735***
	(0.0236)	(0.0316)	(0.0247)	(0.0300)
β_{2L}: **Endowment*leadership**		0.1027**		0.2329***
		(0.0404)		(0.0318)
β_3: **Productivity effect**	0.0830***	0.1414***	0.0415***	0.0707***
	(0.0241)	(0.0364)	(0.0121)	(0.0182)
β_{3L}: **Productivity*leadership**		-0.1168**		-0.0584**
		(0.0471)		(0.0235)
β_4: **Distribution effect (low)**	-0.1323***	-0.1323***	-0.1323***	-0.1323***
	(0.0283)	(0.0283)	(0.0283)	(0.0283)
β_5: **Distribution effect (high)**	0.3427***	0.3427***	0.1714***	0.1714***
	(0.0428)	(0.0429)	(0.0214)	(0.0214)
β_6: **Indirect endowment effect**	0.0489**	0.0489**	0.0489**	0.0489**
	(0.0232)	(0.0233)	(0.0232)	(0.0233)
β_7: **Indirect productivity effect**	0.0370	0.0370	0.0370	0.0370
	(0.0242)	(0.0242)	(0.0242)	(0.0242)
No. Observations	1336	1336	1336	1336
R^2	0.3601	0.3645	0.3512	0.3830

Note. Standard errors in parentheses (clustered by participant); significance levels: *** $p < .01$, ** $p < .05$, and * $p < .10$. Dependent variables: relative contributions (share of endowment committed to public good, Models 1–2); absolute contributions (points committed to public good, divided by 100, Models 3–4). All regressions include participant fixed effects.

Table 4 presents the results from our main regression. Models 1 and 2 present the effect estimates for relative contributions with and without the interaction terms, respectively, while Models 3 and 4 do the same for absolute contributions. The following subsections explore and discuss the estimates from Table 4 in detail.

Figure 4 in the Appendix complements the analysis in Table 4 by demonstrating many of the same effects in a series of scatterplots. Each scatterplot plots the participants' contributions in matched question pairs. For example, the endowment effect in panel (b) is illustrated by comparing the underprivileged participants' contributions in questions 2 and 6 (high endowment) against those in questions 1 and 5, respectively (low endowment), since all other parameters are the same for the paired questions. The matchings for other effects are done analogously. We note that these scatterplots do not utilize all available information (e.g., the underprivileged participants also face low endowment in questions 3, 4, 7, and 8, but this information is not used in any way in panel (b) of Figure 4), yet they allow for the clearest visual representation of the effects.

We now proceed to discuss the effects identified in Table 4.

4.3 Effects of inequality

Starting with the direct effects of inequality, we see that **the endowment effect** (β_2) is positive for relative contributions: doubling a participant's endowment slightly increases (by 5.8 percentage points in Model 1) the share of endowment they are willing to commit to the pool. The absolute contributions, therefore, respond strongly to endowment, which can also be seen from Models 3 and 4 in Table 4, confirming our hypothesis H1. While the coefficient for relative contributions in Models 1 and 2 is small and not statistically significant at the 1% confidence level, what is remarkable is that it is not negative: with high endowment, the participants do not contribute a lower share of their endowment but scale it up proportionally. Further, Models 3 and 4 show that for absolute contributions, the endowment effect is highly positive and significant. These results suggest that the participants may be thinking in relative categories ("what share of my wealth do I contribute?"), contributing a relatively stable part of their endowment, rather than deciding in absolute magnitudes ("how much do I contribute?").

Moreover, Models 2 and 4 suggest that endowment affects the participants' response to the leader's contribution.[6] Specifically, high endowment appears to amplify the reciprocal response: the followers contribute more when the leader contributes more (as discussed further), and this difference is larger for high-endowed followers. This is true not only for absolute contributions, as in the discussion above, but also, surprisingly, for relative contributions. We discuss the implications of this in the following subsection where we talk about the effects of leadership.

The productivity effect (β_3) is positive and significant at the 1% level in all specifications, which implies that the participants are sensitive to the return on their action. High productivity multiplier increases the participants' relative contributions by 8 percentage points (Model 1), supporting our hypothesis H2. It is worth noting, though, that our experiment had no repeated interactions, so there was no explicit reputation building. On the one hand, our design is

[6] Precisely establishing the direction of causality is, however, difficult. It may instead be the case that the leader's contribution affects the participants' response to different endowments. We adopt the interpretation that is more likely to occur in the real world (where one's endowment is likely to be more persistent than partners' actions in an interaction), but we emphasize that further investigation is needed.

thus better at eliciting the more innate motivations (like self-image) that do not depend on reputation effects. On the other hand, in many real-world interactions the reputation effects can be a significant factor that we do not account for in this investigation.

Models 2 and 4 suggest that the productivity effect is larger when the leader's contribution is low, increasing relative contributions by over 14 percentage points on average in that case. When the leader's contribution is high, however, the productivity effect, which is equal to $\beta_3 + \beta_{3L}$ in this case, decreases drastically to about 2.5 percentage points. While the causal interpretation of this observation is ambiguous (see Footnote 6), one possible interpretation would be to see this as the high leader's contribution decreasing the productivity effect. We discuss this story in detail in the following subsection.

The distribution effects (β_4 and β_5) are economically substantial and statistically significant in all specifications, suggesting again that the participants respond strongly to the share of the pool that *they* receive, and they care less about contributing to the pool if they receive a smaller share of it (but their share is transferred to other players instead). This supports our hypothesis H3. This also suggests a high degree of selfishness in the participants, which seems to contradict the fact that a high share of participants contribute strictly positive amounts (and thus appear to be altruistic). This seeming contradiction can possibly be resolved by attributing positive contributions to self-image concerns (with the participants wanting to maintain their self-perception as "altruistic", and hence contributing some positive amounts on principle, while balancing them with selfish motives), as opposed to altruism (and the participants actually caring about others' well-being). Alternatively, the data can be explained by assuming that the participants are altruistic but put a strictly lower weight on others' well-being as opposed to their own.

We can also attempt to estimate the effect of the distribution scheme on *total contributions* to see whether allowing the underprivileged participants to reap a larger share of the benefits increases their contribution to the extent sufficient to offset lower contributions from other players. This analysis would, however, be incomplete, since we do not study the leader's response to changing the share of the pool they receive. Further, even abstracting from this concern and only looking at the followers' sum of contributions, the results of this investigation appear to be ambiguous and dependent on the estimation approach. On the one hand, one could simply look at the sum $\beta_4+\beta_5$ in Models 3 or 4, since this sum estimates the average joint response of privileged and underprivileged participants to the unequal allocation rule (25% to the privileged, 50% to the underprivileged).[7] We can see that $\beta_4 + \beta_5 \approx 3.9$ endowment points (out of total endowment of 150 or 200 points across the two followers), suggesting that allowing the underprivileged participants to appropriate a larger share of the benefits very slightly increases the total pool. However, we note that the baselines for comparison differ for the two subpopulations: while the privileged participants have stable characteristics in all questions where they receive an equal share, the characteristics of the underprivileged participants vary across these questions.

Therefore, a cleaner identification strategy could be used instead, which would be to look at the difference of total contributions in questions Q4 and Q8 (with unequal distribution shares) and in Q1 and Q5 (equal distribution shares), since only the distribution shares vary across these two pairs of questions while all other question parameters remain stable. The results

[7] We note that the estimates of β_4 and β_5 coincide in the two specifications.

Table 5: Sum of absolute contributions

		Privileged	Underprivileged	Sum of contributions	
Equal shares	Q1	.6571	.3290	.9861	.6651
	Q5	.2100	.1340	.3440	
Unequal shares	Q4	.4217	.4356	.8573	.6011
	Q8	.1809	.1640	.3449	

Note. Columns 1 and 2 show average absolute contributions in the respective questions over the two subsamples (statistics for all questions, as well as standard errors, are presented in Table 8 in the Appendix). Column 3 sums the mean absolute contributions over the two subsamples, showing mean sum per question. Column 4 show mean total absolute contributions over the respective pairs of questions (Q1 & Q5, and Q4 & Q8, respectively).

are presented in Table 5 and suggest that the departure from equal distribution of the pool *decreases* the sum of total contributions by 6.4 endowment points. This goes in the opposite direction compared to the estimate above and suggests that a separate investigation is needed into the effects of distributional inequality on total contributions, especially in settings where other sources of inequality are present.

Moving on to **the indirect effects**, we can see that the effects of both the other follower's endowment (β_6) and their productivity (β_7) are positive, albeit small in magnitudes and are weak in terms of statistical significance (with the former significant at the 5% level, the latter not significant at the 10% level in all specifications). We can, therefore, make a tentative judgement that the participants are slightly more inclined to cooperate with better-endowed and higher-productivity partners, likely due to expecting higher contributions from them. On the other hand, the fairness considerations that would lead the participants to be more charitable and contribute more when matched with poorer or less productive partners do not seem to be a large driver behind the contributions. Our hypothesis H4 has thus not found much support in the data.

The current paper provides evidence that altering participants' characteristics has a strong and significant influence on their cooperative behavior. However, as discussed above, this influence is largely driven by the productivity of the participants' contributions and how their characteristics affect this productivity. Indeed, the participants respond strongly to changing the productivity multiplier, as well as to changing the shares of the public pool that the participants receive.

While the current findings do support the hypothesis that inequality undermines cooperation because it hinders successful coordination in social dilemmas (Smith, 2013), this support is weak at best. The results in Table 4 above suggest that the cooperativeness of the privileged participants is not affected too strongly by how underprivileged their paired counterparts are. The participants' decisions are not sensitive to the endowments or productivities of their fellow participants. Yet, as shown in the later subsections (see Figure 2), according to the post-experiment survey, the participants perceive the constructed public goods game as unfair. In other words, the survey suggests that the participants recognize the inequality, but their decisions show that they do not react to it. It therefore appears that the privileged partici-

pants either do not demonstrate self-centered inequality aversion (which would lead them to contribute more when their partner starts off worse), or it is offset by them being conditional cooperators and believing that the less privileged participants contribute less (which would lead the privileged to preemptively punish their partners' expected non-cooperative behavior).

4.4 Effects of leadership

The leadership effect (β_1) appears to be quite substantial in our setting, supporting hypothesis H5. The followers' contributions respond strongly to the leader's contribution: a high contribution by the leader increases the followers' relative contributions by 34 percentage points (Model 1) and the absolute contributions by almost 28 points (Model 2), as compared to the case when the leader contributes nothing, with all point estimates being significant at the 1% level. This positive effect can also be seen on the scatterplot of contributions presented in panel (a) of Figure 4 in the Appendix. This conclusion aligns with previous research (Nockur et al., 2022) and may be driven by different effects. On the one hand, the participants may be directly reciprocating the leader's contribution. On the other hand, this observation could be explained by the followers using the leader's contribution as a coordination device to implicitly agree on their own contributions. (Of course, no explicit communication was allowed during the experiment.)

It proves interesting to try to classify the participants according to their contribution strategies (in terms of relative contributions) and their response to the leader's move.[8]

- Most participants (121 of 167 participants) can be categorized as **reciprocal cooperators** or conditional cooperators (Fehr and Fischbacher, 2004), with higher contributions when the leader contributes all of their endowment, as opposed to nothing. This supports the hypothesis that participants contribute more when the leader is cooperative, in line with the theory of reciprocity that justifies, to some extent, the prosocial behavior we observe in the experiment. Interestingly, the rate of cooperation is still substantial (average contribution of 30.8 percent of endowment) after the leader defected.
  - Of these 121, 6 participants contribute the same as the leader. These can be categorized as **fully reciprocal cooperators**.
- Conversely, 7 out of 167 participants contributed more when the leader contributed nothing (as compared to the case when the leader contributed everything). This is likely an attempt to substitute for the missing contributions and get to some "benchmark" level of the public good provision.
- The remaining 39 of 167 participants contributed the same share of their endowment across all eight questions.
  - Of these 39 participants, 12 chose to never cooperate, that is, to contribute nothing in all eight questions, indicating **low altruism**/lack of social preferences.
  - The positive contribution choices of the other 27 participants indicates that some have very strong social preferences that make them **unconditional cooperators**.

[8] For an early classification and overview of evidence on reciprocity and cooperation types, see Fehr and Gächter (2000).

In particular, 9 of those **cooperated fully** regardless of the first mover's contribution, meaning they committed all of their endowment to the public good in all questions. Indeed, seeing that the leader does not contribute can even increase motivation to display prosocial behavior in prosocial participants. Naturally, this can also be explained by factors such as trust and conditional cooperation because the participant believes the other participant will contribute as well.

Of interest are also the interaction coefficients β_{2L} and β_{3L} in Models 2 and 4, which estimate the effect of the participants' characteristics on their reciprocal response. The leadership-endowment interaction coefficient β_{2L} is positive and significant at the 5% level in both models, suggesting that high endowment makes the participants more sensitive to the leader's contribution and providing strong evidence against our hypothesis H6. Indeed, in Model 2, high endowment increases the leadership effect for relative contributions from $\beta_1 \approx 37$ percentage points to $\beta_1 + \beta_{2L} = 48$ percentage points. The result is even more pronounced in Model 4 that deals with absolute contributions. The richer (better endowed) participants are thus more hesitant to contribute after seeing the bad example set by the leader and are more eager to contribute after a good example than the underprivileged. This may suggest that the richer participants are more risk averse, but such a conclusion would contradict other empirical findings (c.f. Morin and Suarez, 1983). It is then possible that the effect we identify arises from the participants' beliefs about others' contributions. We conclude that leadership by example is hence important in all cases, but even more so in dealing with richer followers who have more to lose (in absolute terms) in case others do not cooperate.

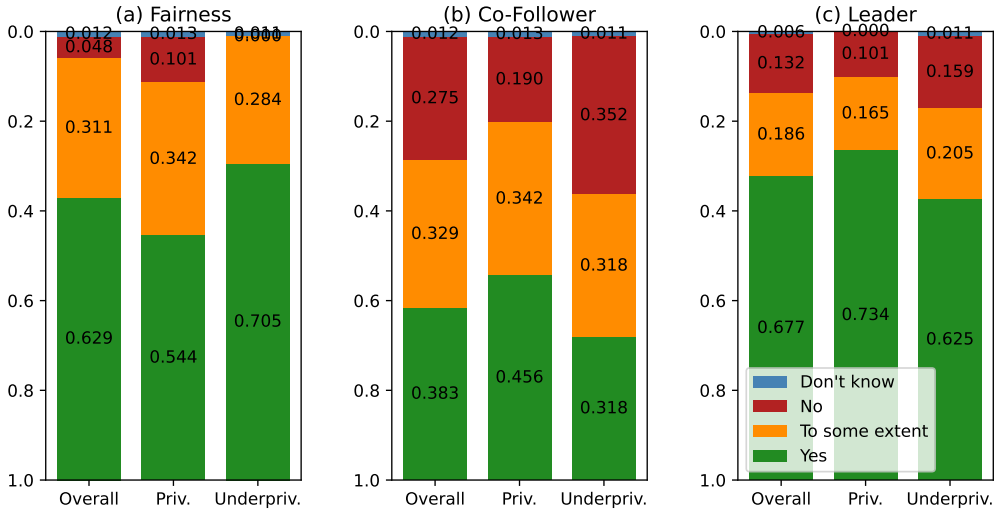
While the conclusion above is obtained by comparing the underprivileged participants' contributions in situations with high and low endowment, similar results can be obtained by estimating leadership effects separately for the two subpopulations. The results of such estimation (presented in Table 9 in the Appendix) yield leadership effects at 36.8 percentage points for the privileged and 31.1 percentage points for the underprivileged, implying again that the leadership effect is larger for the richer participants.

The story is the opposite for the leadership-productivity interaction coefficient β_{3L}, which is negative in Models 2 and 4 and statistically significant at the 5% level, lending some support to our final hypothesis, H7. While the coefficients are not large enough to negate the leadership effect β_1, this does suggest that the more productive participants (those with the higher productivity multiplier) are less sensitive to the leader's decision. In other words, individual productivity and leadership can be seen as partial substitutes in inducing contributions to the public good: the participants make high contributions either when their individual productivity is high enough, or when the leader sets a good example, but having both of these conditions satisfied does not imply double the effect. The takeaway is that leadership is particularly important when the positive externalities created by public goods are strong, and the participants cannot claim a large share of the surplus they create.

4.5 Supplementary questionnaire

To further explore the effects of inequality on contributions, the current experiment assessed how the participants perceived the fairness of the game, and if the leader and the other follower had an influence on contributions. This was conducted to explore whether participants' social

Figure 2: The distribution of survey responses



Note. Figure 2 illustrates the participants' perception of fairness and whether the other follower and the leader had an influence on their contributions. For each of the three questions in panels (a), (b), and (c), respectively, the distribution of responses in the overall sample is plotted ("overall") alongside the distributions in each of the two subsamples ("priv." and "underpriv.", respectively).

preferences differed depending on their characteristics in the public goods game. The questions asked were as follows:

1. "Do you consider the rules of the game as fair?"
2. "Did the characteristics of the other follower affect your contribution?"
3. "Did the leader's contribution influence your decision to contribute?"

In all three questions, the participants could answer "Yes", "No", "To some extent" or "I do not know".

The distribution of responses is plotted in Figure 2. We can see from panel (a) that the majority of participants in both subsamples agreed that the rules of the game were fair. Curiously, the underprivileged participants saw the experiment as more fair than the privileged did. Further, panel (c) indicates that most participants claimed that the leader's contributions influenced their contributions, at least to some extent. This aligns well with the leadership effect coefficient β_1 being statistically significant in all specifications in Table 4.

Finally, panel (b) indicates that over a third of participants responded "Yes" to whether the other participant's characteristics affected their contributions, and another third answered "To some extent".[9] Theories of inequality aversion (Fehr and Schmidt, 1999; Charness and Rabin, 2002) suggest that individuals would behave prosocially towards those who are worse off. However, these ideas are not supported by our regression analysis, which suggests the

[9]These shares are even higher for the subsample of privileged participants, for whom this question is most relevant (since the experiment primarily varies the underprivileged participants' characteristics while keeping those of the privileged participats quite stable).

Table 6: Shares of positive survey responses (n=167)

	Total (N=167)	Privileged (n=79)	Underprivileged (n=88)	t-test
Q1: Fairness	0.9401	0.8861	0.9886	0.0051
	(0.2380)	(0.3197)	(0.1066)	
Q2: Co-follower	0.7126	0.7975	0.6364	0.0216
	(0.4539)	(0.4045)	(0.4838)	
Q3: Leader	0.8623	0.8987	0.8295	0.1974
	(0.3456)	(0.3036)	(0.3782)	

Note. The first three columns summarize the shares of positive ("Yes" or "To some extent") responses to each of the three questions in the whole sample and the two subsamples, respectively. Standard errors in parentheses. The rightmost column presents p-values of the t-test for the statistics being equal between the two subpopulations.

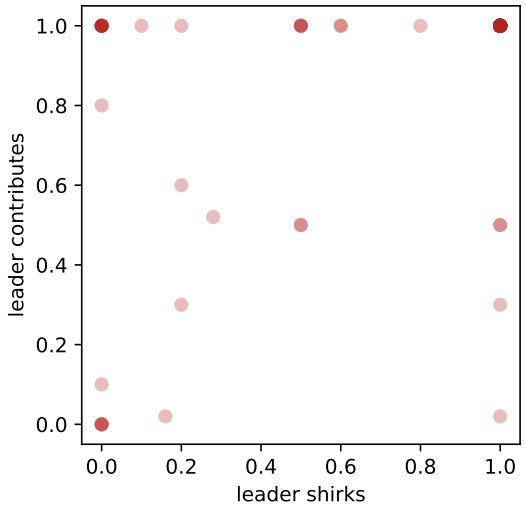
indirect effect coefficients (β_6 and β_7) are, if anything, positive, so contributions are slightly lower when one's partner is worse off. In other words, the participants' positive responses to the survey question should not be seen as the expression of their inequality aversion.

We then split the responses into "positive" ("Yes" and "To some extent") and "negative" ("No" and "Don't know") and explore the differences in the shares of positive responses across the two subsamples. The results are presented in Table 6. We see that the two subsamples are substantially different in how agreeable the participants are with the first two questions, with the t-tests yielding $p = .0051$ for question 1 ("Do you consider the rules of the game as fair?") and $p = .0216$ for question 2 ("Did the characteristics of the other follower affect your contribution?"). The difference in responses to question 2 is easy to explain by observing that the privileged participants' characteristics are stable in our experiment, which likely led to negative responses from some underprivileged participants who would otherwise be sensitive to their privileged partner's characteristics. The difference in responses to question 1, on the other hand, is still surprising, with a larger share of underprivileged than privileged participants perceiving the experiment as fair. Conversely, responses to question 3 ("Did the leader's contribution influence your decision to contribute?") do not demonstrate a significant difference between the subsamples in the followers' perception of how the leader's contribution affects their contributions. However, the privileged participants do give slightly more positive responses to this question, which is supported by the data: Table 9 in the Appendix shows that the leadership effect for relative contributions is 5.7 percentage points stronger for the privileged participants than for the underprivileged.

4.6 Alternative explanations

How can the higher-than-expected level of cooperation in public goods games be explained? Our main focus in this paper is on such explanations as inequality aversion, reciprocity, and conditional cooperation. However, Burton-Chellew and West (2013) argued that cooperation can also be due to uncertainty or incorrect beliefs, or caused by noise which can result from a variety of factors, including errors, boredom, learning, exploration, fluctuating preferences, confusion, or evolutionary constraints. Some of these alternative explanations (such as various

Figure 3: Dominated contributions



Note. Figure 3 illustrates the underprivileged participants' relative contributions in questions Q4 (y axis) and Q8 (x axis), where contributing the whole endowment was a weakly dominant strategy. The color intensity indicates the number of participants with a given pair of contributions (darker color means more observations in a given point).

forms of learning during the course of the experiment) can be ruled out in our case, since the order of the eight questions was randomized in the experiment and the participants did not receive any ongoing feedback on their performance. However, our results may be influenced by the participants' confusion. Andreoni (1995) conducted an experiment, where the outcome revealed a significant presence of confusion. About 75 percent of the participants were found to be cooperative, of whom half were found to be confused. Furthermore, Houser and Kurzban (2002) showed that 50 percent of the contributions were out of confusion and that confusion was particularly responsible for higher contributions in the earlier rounds.

We can evaluate the amount of confusion in our experiment by looking more carefully at the underprivileged participants' contributions in Q4 and Q8. As one can see from Table 1, in these two questions, their contribution is doubled and they receive 50 percent of the total contributions – i.e., contributing to the public good does not affect (increase or decrease) their own payoff while increasing the payoffs of other players. As a consequence, contributing the whole endowment is a weakly dominant strategy in these questions (unless we assume the participants are either actively misanthropic, or negatively reciprocal towards uncooperative leaders in case of Q8). Out of 88 underprivileged participants, only 55 contributed their full endowment in both questions. The full scatterplot of contributions for these two questions is presented in Figure 3. One can see that many participants contribute their full endowment in at least one of the two questions (a total of 131 of the 176 responses do this). Further, if we restrict the sample to the 33 participants that make dominated contributions, we see that they contribute more when the leader contributes: their mean contributions are 0.656 in Q4 and 0.307 in Q8, with t-test $p = .0004$ for the two being equal. This is in line with the leader effect being significant in our analysis (see Table 4). More specific to these questions,

low contributions in Q8 can be interpreted as punishments for the uncooperative leader, as opposed to the participants simply being confused or naïve (in which case we would expect similar contributions across the two questions).

In general, the leader effect is difficult to interpret: it may be attributed either to the participants' reciprocity towards the leader, or to them being conditional cooperators who change beliefs about the other follower's behavior. In particular, Teyssier (2012) shows that trust increases participants' contributions when these contribution decisions are made under strategic uncertainty. In such a setting, the cooperativeness of other participants is uncertain, so participants must form beliefs about it and behave based on their conjectures, as opposed to any factual observations. The leader's contribution can then serve as a coordination device for the two followers: if the leader contributed, this increases the probability that one follower reciprocates the leader and makes a high contribution too, which strenghtens incentives for the other follower to reciprocate them both. Disentangling the direct reciprocation towards the leader from the strategic effects of the leader's contribution is an interesting avenue for future research.

Similarly, the two distribution effects (β_4 and β_5 in Table 4) are not straightforward to interpret, as the effects may come from either a participant's own changing share, or the other participant's changing share. However, the signs of indirect effects (β_6 and β_7 in Table 4), as well as relatively low self-reported sensitivity to the other follower's characteristics (panel (b) in Figure 2), suggest that the effect of changing the share of the pool received by the contributing participant should account for the bulk of the total effect estimate, as opposed to changing the other follower's share.

Furthermore, as financial constraints and other considerations prevent significant alterations to participants' disposable income through payments, it should be considered whether the payment amount used in the experiment was too small (ranging from a minimum of 25 DKK to a maximum of 60 DKK, equivalent to approximately 3.3–8 EUR) to induce more self-centered behavior. This could have led participants to opt for cooperation and therefore may explain a part of the observed prosocial behavior in the results. However, it is important to note that the sample primarily consisted of students who regard these experiments as student jobs, and their motivation is likely centered around maximizing their payoff. Additionally, DellaVigna and Pope (2018) presented a key finding regarding performance in real-effort tasks, suggesting that monetary incentives have a strong and monotonic motivating effect, even when small in magnitude. In their study, they significantly varied the payment amounts and hypothesized that very low payments could potentially undermine participants' motivation. Instead, effort in the very-low-pay treatments aligned with the predictions of a model of effort for such an incentive size. These two arguments suggest that the participants' preferences in the current investigation may not have been significantly influenced by the average payment size.

5 Conclusion

The paper presents a sequential public goods game with incomplete information to contribute to two strands of literature: leadership signaling of (un)cooperativeness, and the effects of inequality on public good provision. The paper introduces inequality by manipulating endowments, productivities, and distribution rules. The effects are assessed by conducting a survey

experiment involving 167 participants.

The results are in line with predictions of prosocial behavior. We show that leading by example (high contribution to the public good as a leader) increases the subsequent followers' relative contributions by almost 34 percentage points, while the absolute contributions increase by almost 28 percentage points. The results indicate that leaders can significantly increase subsequent cooperation by setting a cooperative example even in the presence of substantial inequality among the followers, and are therefore encouraged to do so in real-life social dilemmas.

The effects of inequality, on the other hand, are much less clear cut. While a large share of participants self-report that their decisions were being affected by their characteristics and the other follower's characteristics, the actual effects of these characteristics on contributions are modest. Changing the endowment influences the participants' absolute contributions, but the effect is almost proportional to the change, so relative contributions (as shares of the initial endowment) are barely affected. In addition, the characteristics of the other participant have weakly positive effects on contributions, meaning the privileged participants contribute slightly more when their underprivileged partner starts better off. That is, it appears that the privileged participants either do not demonstrate self-centered inequality aversion, or it is more than offset by the fact that some privileged participants are conditional cooperators (who expect the underprivileged to contribute less).

On the other hand, the participants reacted strongly to changing the productivity of their contributions, as well as their distribution share of the common pool. Both of these directly affect the "rate of return" on contributions – i.e., the amount that returns directly back to the participant per unit contributed. This suggests that while altruism is a factor in participants' decision-making (as implied by a high share of non-zero contributions), individuals are not too sensitive to the parameters of the problem that do not directly affect them, but respond readily to parameters that do. The very significant effect of leadership becomes even more salient in this context, suggesting that it is one of the few indirect channels that can boost individual contributions.

These results provide valuable insights for policymakers seeking to maximize their efforts in leading and accelerating the global transition to address social dilemmas in an unequal world. Specifically, in the context of climate transition, our results suggest that the inequality in resources available to different countries should not substantially affect the share of these resources that countries would be willing to commit to fighting climate change. In contrast, these commitments could be boosted by a leader paving the way—e.g., by developed countries like the US and the EU member states investing heavily in combating climate change in order to serve as examples and to create a focal point for coordination of other countries' efforts.

Some limitations and further directions of this paper must be acknowledged. First, we assessed the decision-making of unequal participants by having leaders serve as role models to better replicate the public goods game of mitigating climate change. However, whether the results of this investigation can be directly translated to a real-world context of mitigating climate change needs further examination. It is important to explore an even broader range of real-world situations to ensure the generalizability and applicability of these findings in an applied setting. For example, in the context of mitigating climate change, individuals' characteristics may at times be hidden, as transparency is not always consistently maintained.

Levati et al. (2007) found that leadership is almost ineffective if participants do not know the distribution of endowments. In addition to this, when participants' endowments are hidden, other participants with smaller endowments get punished for smaller absolute contributions. However, Hauser et al. (2019) found that when endowments are transparent, other participants with larger endowments get punished for smaller relative contributions.

Second, to ensure greater generalizability and applicability of the current findings in an applied setting, additional considerations such as group size, repeated interactions, communication, and punishment must be acknowledged. Regarding group size, Pecorino (1999) maintained that cooperation is more difficult in larger groups, and one candidate to explain this is informational problems relating to the unobservability of preferences. Repeated interactions among group members may further establish trust and cooperative norms. Along with norms of reciprocity, this trust helps to foster collective actions. Communication is an obvious mechanism to promote cooperation. The main insight of Bochet et al. (2006) was that once face-to-face communication is allowed, contributions jump to 96 percent of participants' endowments, which is a significant increase. Finally, experimental research has discovered that conditional cooperators are willing to engage in punishments of free-riders even though the punishments are costly and confer no long-term gain (Chaudhuri, 2011). The results of Herrmann et al. (2008) showed that punishment opportunities are socially beneficial only if complemented by strong social norms of cooperation. Eventually, through peer monitoring and social sanctions, the problem of free-riding can be partially avoided. However, Smith (2015) argued that when there is greater contribution heterogeneity within a particular round, average contributions to the public good will decrease more between the subsequent rounds, other things being equal. As seen by the current investigation, inequality increases contribution heterogeneity. Consequently, the aforementioned factors play a significant role in replicating the public goods game within the context of mitigating climate change. However, conducting further investigation and comprehensive analysis is necessary to assess their impact on participants with unequal resources and capabilities.

Third, and in line with the aforementioned, the current investigation offers valuable insights for policymakers on effective communication strategies and methods to foster cooperation in tackling global social dilemmas. However, the behavior and decision-making of policymakers can be influenced by a range of factors beyond the preferences of common citizens. Political decision-making tends to revolve around short-term goals, such as securing reelection or immediate policy victories. As a result, policymakers may neglect or overlook opportunities to mitigate future harms, even if such actions are in the best interest of the majority of their country's citizens. Moreover, while the current investigation reveals individual preferences, such as altruism, fairness, reciprocity, and inequality aversion, it is important to acknowledge that the dynamics shaping policymakers' decisions may differ significantly. Policymakers may not prioritize the same trade-offs between their country's payoff and those of their immediate peers, as individuals do in experimental public goods games (Di Bartolomeo et al., 2018). While the current paper does not extensively explore these dimensions, it is of significance to acknowledge its relevance in discussions related to governance and policy-making.

Finally, in this investigation, the assumption is consistently made that leaders are privileged. However, this prompts the question of whether underprivileged leaders also can lead by example. In particular, Nockur et al. (2022) found that followers' cooperation levels vary

depending on the resources of the leader, and that only high cooperative signals from underprivileged leaders can make a difference. However, an extension of applying more unequal participants within the framework of the aforementioned paper is yet to be presented.

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A Appendix

A.1 Additional Tables

Table 7: Mean relative contributions per question

	Total (N=1336)	Privileged (n=632)	Underprivileged (n=704)	t-test
Q1	0.6575	0.6571	0.6580	0.9894
	(0.4172)	(0.4084)	(0.4249)	
Q2	0.6907	0.6867	0.6943	0.9037
	(0.4029)	(0.4029)	(0.4028)	
Q3	0.5761	0.5844	0.5686	0.8142
	(0.4303)	(0.4178)	(0.4412)	
Q4	0.6585	0.4216	0.8711	0.0000
	(0.4218)	(0.4153)	(0.2954)	
Q5	0.2405	0.2100	0.2680	0.3034
	(0.3612)	(0.3205)	(0.3921)	
Q6	0.3153	0.2782	0.3486	0.2538
	(0.3958)	(0.3641)	(0.4196)	
Q7	0.1996	0.2087	0.1914	0.7401
	(0.3354)	(0.3376)	(0.3332)	
Q8	0.4756	0.1809	0.7402	0.0000
	(0.4549)	(0.3112)	(0.3971)	

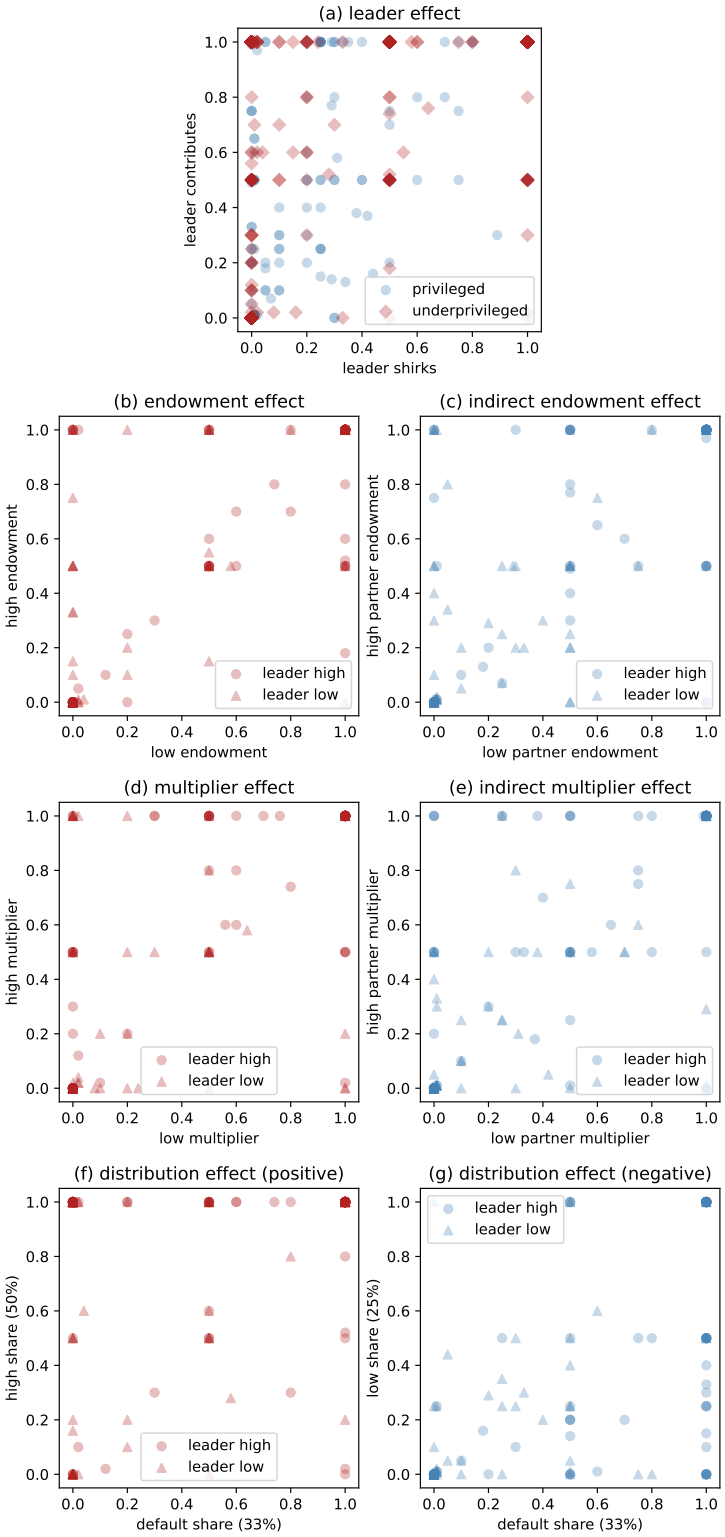
Note. Table 7 shows the participants' mean relative contributions in the respective questions. Standard errors in parentheses. The rightmost column presents p-values of the t-test for the statistics being equal between the two subpopulations.

Table 8: Mean absolute contributions per question

	Total (N=1336)	Privileged (n=632)	Underprivileged (n=704)	t-test
Q1	0.4842	0.6571	0.3290	0.0000
	(0.3599)	(0.4084)	(0.2124)	
Q2	0.6907	0.6867	0.6943	0.9037
	(0.4029)	(0.4029)	(0.4028)	
Q3	0.4263	0.5844	0.2843	0.0000
	(0.3615)	(0.4178)	(0.2206)	
Q4	0.4290	0.4216	0.4356	0.7702
	(0.3052)	(0.4153)	(0.1477)	
Q5	0.1699	0.2100	0.1340	0.0649
	(0.2651)	(0.3205)	(0.1961)	
Q6	0.3153	0.2782	0.3486	0.2538
	(0.3958)	(0.3641)	(0.4196)	
Q7	0.1492	0.2087	0.0957	0.0063
	(0.2678)	(0.3376)	(0.1666)	
Q8	0.2806	0.1809	0.3701	0.0000
	(0.2748)	(0.3112)	(0.1985)	

Note. Table 8 shows the participants' mean absolute contributions in the respective questions.. Standard errors in parentheses. The rightmost column presents p-values of the t-test for the statistics being equal between the two subpopulations.

Figure 4: Scatterplots of contributions across matched question pairs.



Note. Color intensity indicates the number of observations with a given pair of contributions (darker color means more observations in a given point). Each observation corresponds to a participant-question pair and plots the participant's relative contributions in the two questions. Panels (b), (d), (f) only contain the underprivileged participants; panels (c), (e), and (g) only contain the privileged participants; panel (a) contains both subsamples.

Table 9: Leadership effect: main regression by subsample

	Model 1	**Model 2**	**Model 3**	**Model 4**
Dep. Variable	Relative contributions		Absolute contributions	
β_1: **Leadership effect**	0.3680***	0.3110***	0.3680***	0.1987***
	(0.0365)	(0.0321)	(0.0365)	(0.0213)
β_2: **Endowment effect**		0.0585**		0.2900***
		(0.0237)		(0.0247)
β_3: **Productivity effect**		0.0830***		0.0415***
		(0.0241)		(0.0121)
β_4: **Distr-n effect (low)**	-0.1323***		-0.1323***	
	(0.0283)		(0.0283)	
β_5: **Distr-n effect (high)**		0.3427***		0.1714***
		(0.0429)		(0.0214)
β_6: **Indir. endowment eff.**	0.0489**		0.0489**	
	(0.0233)		(0.0233)	
β_7: **Indir. productivity eff.**	0.0370		0.0370	
	(0.0242)		(0.0242)	
Sample	Privileged	Underpriv.	Privileged	Underpriv.
No. Observations	632	704	632	704
R^2 **(Within)**	0.3571	0.3650	0.3571	0.3911

Note. Table 9 presents results analogous to Models 1 and 3 in Table 4, split by the participant subsample.[a] Standard errors in parentheses (clustered by participant); significance levels: *** $p < .01$, ** $p < .05$, and * $p < .10$. All regressions include participant fixed effects.

[a]Note that since the dummies for the two subsamples do not overlap apart from the leadership effect, the only information provided by this set of regressions is that related to the leadership effect β_1 across the two subsamples.

Table 10: Regressions with participant characteristics

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Dep. Variable	Relative contributions			Absolute contributions		
β_1**: Leadership effect**	0.3379***	0.3680***	0.3110***	0.2788***	0.3680***	0.1987***
	(0.0243)	(0.0366)	(0.0322)	(0.0216)	(0.0366)	(0.0213)
β_2**: Endowment effect**	0.0375		0.0585**	0.2691***		0.2900***
	(0.0296)		(0.0237)	(0.0208)		(0.0247)
β_3**: Productivity effect**	0.0830***		0.0830***	0.0415***		0.0415***
	(0.0242)		(0.0242)	(0.0121)		(0.0121)
β_4**: Distr-n effect (low)**	-0.1323***	-0.1323***		-0.1323***	-0.1323***	
	(0.0283)	(0.0284)		(0.0283)	(0.0284)	
β_5**: Distr-n effect (high)**	0.3427***		0.3427***	0.1714***		0.1714***
	(0.0429)		(0.0429)	(0.0214)		(0.0215)
β_6**: Indir. endowment eff.**	0.0723**	0.0489**		0.0722**	0.0489**	
	(0.0309)	(0.0233)		(0.0308)	(0.0233)	
β_7**: Indir. productivity eff.**	0.0370	0.0370		0.0370	0.0370	
	(0.0242)	(0.0243)		(0.0242)	(0.0243)	
Part. gender(F) dummy	0.0037	0.0360	-0.0186	0.0088	0.0360	-0.0112
	(0.0441)	(0.0669)	(0.0573)	(0.0374)	(0.0669)	(0.0371)
Participant age	0.0048	-0.0002	0.0096	0.0030	-0.0002	0.0061
	(0.0053)	(0.0073)	(0.0060)	(0.0045)	(0.0073)	(0.0039)
Part. nationality dummy	-0.0177	-0.0413	0.0136	-0.0188	-0.0413	0.0062
	(0.0482)	(0.0682)	(0.0614)	(0.0420)	(0.0682)	(0.0403)
Sample	Full	Privileged	Underpriv.	Full	Privileged	Underpriv.
No. Observations	1336	632	704	1336	632	704
R^2 **(Within)**	0.3593	0.3571	0.3650	0.3502	0.3571	0.3911

Note. Table 10 presents the results of the pooled OLS regression of the participants' contributions on the same dummies as in the main regressions in Table 4, as well as participant characteristics dummies instead of the participant fixed effects. Models 1 and 4 correspond to Models 1 and 3 in Table 4, respectively. The remaining models run the same regressions on the subsamples of the Privileged and the underprivileged participants. Standard errors in parentheses (clustered by participant); significance levels: *** $p < .01$, ** $p < .05$, and * $p < .10$. Gender(F) dummy takes value 1 if the participant reported their gender as female and value 0 for all other responses (male, other, prefer not to say).

A.2 Recruiting of participants

A.2.1 The invitation emails

Hello #fname# #lname#

We invite you to participate in an online experiment that you can complete at home on your personal computer. It will take approximately 20 minutes to complete and your payoff would range from 25-60 DKK depending on the choices you make. Because the experiment will not require physical presence at our laboratory, be sure to read the mail below carefully as it contains all the relevant information that you will need, including details about sign-up and payment.

PLEASE NOTE

1. Payment: For this experiment, you will be paid via your NemKonto bank account - so no cash will be handed out. You will of course only be paid after completing the full experiment. This means that you can only sign up if you have an active NemKonto bank account and a

CPR number. If you sign up but do not have a valid NemKonto account, you will not be able to receive your payment for participation.

2. You will need a laptop or personal computer. The experiment should not be completed on a mobile phone.

3. You can sign up for ANY of the sessions- kindly ignore the time limit mentioned here and ignore the automated email sent after enrolment that states the physical location of the lab.

4. How the experiment works: If you have a CPR number and a NemKonto account, you can sign up by choosing an available spot in ANY of the sessions after clicking the link below. After registration, you will later receive a second mail that contains the link to the experiment. Because the experiment is online, you can complete it whenever you want within 3 days from the date where you receive the second mail and the experiment opens. At the end of the experiment, you will be asked to provide your name and CPR number. The link is secure and the data is temporarily stored on servers here in Denmark and then deleted as per the General Data Protection Regulation (GDPR) guidelines adopted by the University of Copenhagen.

5. Consent: By participating, you give consent to the University of Copenhagen to temporarily store your personal data and use it to process the payment via the CPR number. For more information about KU's data privacy rules see informationssikkerhed.ku.dk.

6. We plan to send out the second mail containing the experiment links next week around the 22nd of March 2023. Your sign-up is binding, so we expect you to complete the experiment within the time specified in the second mail. If you for some reason do not want to complete the experiment after registration, you have to send us a mail stating that you withdraw your registration. If you do not complete the experiment or choose to withdraw, you will not receive a payment.

7. Please make sure that you report your earnings to SKAT if necessary.

8. Sign up: You can sign up by clicking on the following link:

#link#

Thanks and cheers!

Laboratory for Experimental Economics
Department of Economics
University of Copenhagen
Øster Farimagsgade 5
Copenhagen K

A.2.2 The email with a link to the experiment

Hi Participant!

The online experiment is now open and the deadline to complete is by **Friday, 24th March**.

Remember that having an active NemKonto linked Bank account and CPR number is a requirement for participation in this experiment. You will not be paid if you participate without providing a valid CPR number that is connected to a NemKonto bank account.

You will need to enter the participant id mentioned below twice: both at the start of the experiment, and when completing the survey used for payment purposes at the end of the

experiment.

Please open the link from a computer and not from your mobile phone and complete the experiment in one go.

Your participant id is XXXXX

Link to the experiment: XXXXX

Thanks and cheers!

Laboratory for Experimental Economics
Department of Economics
University of Copenhagen
Øster Farimagsgade 5
Copenhagen K

A.3 Instructions

A.3.1 Instructions for both privileged and underprivileged participants

Welcome to this experiment!
This is an economic experiment conducted by a master's student at the University of Copenhagen.

By participating you will have the chance to earn money and the experiment will take approximately 20 minutes.

On the next screens, you will be told what the experiment is about, and you will be asked some questions that should ensure that the explanations are understood. After answering these questions correctly, you will be moved to the real decisions screens.

By proceeding further, you explicitly consent to us processing your personal data that we collect, mainly age, gender, and nationality. From the collection of these data, no individual can be personally identified and the data will only be used for academic research. For the purpose of payment, we will also request you to provide your CPR number in a secure link with the data temporarily stored on the servers here in Denmark and then deleted as per the General Data Protection Regulation (GDPR) guidelines adopted by the University of Copenhagen. Your consent to the processing of personal data is voluntary and may be withdrawn at any time. You may at any time change or withdraw your consent by contacting experiment@econ.ku.dk. If you withdraw your consent, it will take effect from that point in time, and will not affect the legality of our work with your data in connection with the project up to that point. Your data will therefore continue to be included in the work done by the project up until the point at which you withdraw your consent.

To proceed, enter the unique participant code mentioned in the invite email and press "Next"

Explanation.
This experiment consists of 8 questions. In each question, you will be asked to make choices in different scenarios, as we will explain in more detail shortly.

It is possible to go back and forth between pages throughout the whole experiment. This means you have the possibility to read the instructions again. You can also go back and change your answers to each question.

We will send you a mail within 4 weeks with your payoff, where you will be paid according to your and the other participants' choice in a **random question**.

Instructions.

For all questions, you are placed in a group with 1 other participant and 1 anonymous person. We will call you and the other participant "followers" and the anonymous person "leader". All participants are informed about this.

Think of the structure of each question in the following way.

Endowments. Each participant receives a certain amount of points. This is called "endowment".

Contribution. Each participant must decide how much of his endowment to contribute to a common pool or to keep for himself. The contribution to the common pool is multiplied by a number larger than 1.

Distribution. The common pool of all contributions is distributed among all 3 participants. This is independent of participants' contributions.

First, the leader decides how much to contribute. The information on the leader's contribution will be available to you and the other follower before you choose your contribution. Also, you know the characteristics (such as his/her endowment, how much his/her contribution increases, and how much of the distribution he/she gets) of the leader and the other follower before you must choose your contribution, but you do not know what the follower contributes. This information is available to all participants.

An example. The two followers and the leader all start with 100 points. First, the leader decides to contribute 50 points and after hearing this, the two followers both contribute 50 points each. This is now placed in a common pool, where the total amount of points is doubled and shared equally among all 3 participants independently of their contributions. This implies that the 150 points are now worth 300 points, and everyone receives 100 points. The total points of each participant are now the starting 100 points with the addition of 100 points gained from the common pool and the deduction of 50 points from the contribution. In total, each participant receives 150 points!

We are interested in your choices under different possible circumstances. After the end date of the experiment, we will reveal to you via email the random question that was chosen. Your payoff will then be calculated according to the choice you, the other follower, and the leader made in that exact question.

Instructions.

Comprehension test.

On this screen, we will ask you some comprehension questions to test your understanding. Upon answering these correctly, the experiment will start. If you receive the message "You have made an entry error which must be corrected before you can continue", then at least one of the questions is answered incorrectly.

Question 1. Yours, the other follower's, and the leader's contribution is doubled and is shared equally among all 3 participants. What are your total points if you are endowed with 100 points, and everyone, including you, contributes 50 points?

Question 2. Yours, the other follower's, and the leader's contribution is doubled and is no longer shared equally among all 3 participants. Instead, you and the other follower both receive 50% of the total contributions. What are your total points if you are endowed with 100

points, and everyone, including you, contributes 50 points?

Question 3. Yours, the other follower's, and the leader's contribution is again shared equally among all 3 participants. Now, the leader's and the other follower's contribution is doubled, while your contribution is tripled. What are your total points if you are endowed with 100 points, and you contribute all 100 points, while the other follower and the leader each contribute 0 points?

Now, the experiment starts!

Remember, you are randomly paired with another person after the experiment ends, where the choices in a randomly chosen question determine your final payment.

Your final payment will be your obtained points in this randomly chosen question. Points will be converted to Danish Kroner at the following rate:

100 points = 35 DKK.

This implies that your choice in this randomly chosen question also affects the other participants' final payment, and vice versa. This is why it is important that you carefully think about your choices in each question because you do not know which one is chosen.

Please press "Next" to continue.

A.3.2 The eight questions for the privileged participants

Remember, you are placed in a group with 1 other follower and 1 leader. The only thing you are not aware of is the other follower's contribution, and the other follower is not aware of your contribution.

Each participant can minimum contribute 0 points and maximum contribute all their endowment.

Be aware! If you receive "You have made an entry error which must be corrected before you can continue", then at least one question is not answered. Furthermore, if you click "previous", the order of questions changes, but your answer(s) will remain. This also happens if you receive the entry error message.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 25% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is doubled and he/she receives 50% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 25% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled, but now you and the leader both receive 25%, whereas the other follower receives 50%.

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 25% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is doubled and he/she receives 50% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 25% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled, but now you and the leader both receive 25%, whereas the other follower receives 50%.

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is multiplied by 1.5 and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 50 points, his/her contribution to the common pool is multiplied by 1.5 and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

A.3.3 The eight questions for the underprivileged participants

Remember, you are placed in a group with 1 other follower and 1 leader. The only thing you are not aware of is the other follower's contribution, and the other follower is not aware of your contribution.

Each participant can minimum contribute 0 points and maximum contribute all their endowment.

Be aware! If you receive "You have made an entry error which must be corrected before you can continue", then at least one question is not answered. Furthermore, if you click "previous", the order of questions changes, but your answer(s) will remain. This also happens if you receive the entry error message.

Question!

You are endowed with 50 points, your contribution to the common pool is multiplied by 1.5 and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution. The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then multiplied by 1.5 and equally shared with all 3 participants?

Please make your choice between 0 and 50 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 100 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 100 points.

Question!

You are endowed with 50 points, your contribution to the common pool is doubled and you receive 50% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 25% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 25% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled, but now you receive 50%, whereas the other follower and the leader both receives 25%.

Please make your choice between 0 and 50 points.

Question!

You are endowed with 50 points, your contribution to the common pool is doubled and you receive 50% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 25% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 25

How much do you wish to contribute to the common pool, which is then doubled, but now you receive 50%, whereas the other follower and the leader both receive 25%.

Please make your choice between 0 and 50 points.

Question!

You are endowed with 50 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 0 points to the common pool. The leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 50 points.

Question!

You are endowed with 50 points, your contribution to the common pool is multiplied by 1.5 and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contribution.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then multiplied by 1.5 and equally shared with all 3 participants?

Please make your choice between 0 and 50 points.

Question!

You are endowed with 50 points, your contribution to the common pool is doubled and you receive 33% of the total contributions.

The other follower is endowed with 100 points, his/her contribution to the common pool is doubled and he/she receives 33% of the total contributions.

The leader's endowment was 100 points and the contribution was 100 points to the common pool. This contribution will be doubled and the leader receives 33% of the total contributions.

How much do you wish to contribute to the common pool, which is then doubled and equally shared with all 3 participants?

Please make your choice between 0 and 50 points.

A.3.4 The questionnaire for both the privileged and underprivileged participants

Questionnaire.

Before the end of the experiment, we would like to ask you some questions. By clicking next you will be moved to a questionnaire.

After completing the questionnaire, please click next to the survey and provide us with your CPR number. The CPR number is necessary to process your payment. If you do not provide your CPR number, then you cannot be paid.

We will within 4 weeks send you a mail with summary information from the experiment, as well as your payment.

Questionnaire.

Question 1. I consider the rules of the questions as fair.

Yes, To some extent, No, I do not know

Question 2. During the questions, the characteristics of the other follower influenced my contribution.

Yes, To some extent, No, I do not know

Question 3. During the questions, the contribution of the leader influenced my contribution.

Yes, To some extent, No, I do not know

The end.

Thank you for your participation in the experiment. To process your payment, we need you to provide your CPR-number. As mentioned earlier, the data will be temporarily stored in servers here in Denmark and then deleted as per the General Data Protection Regulation (GDPR) guidelines adopted by the University of Copenhagen.

Additionally, we would also like to collect some demographic information about you. From the collection of these data, no individual can be personally identified and the data will only be used for academic research. Your consent to the processing of personal data is voluntary and may be withdrawn at any time. You may at any time change or withdraw your consent by contacting experiment@econ.ku.dk. If you withdraw your consent, it will take effect from that point in time, and will not affect the legality of our work with your data in connection with the project up to that point. Your data will therefore continue to be included in the work done by the project up until the point at which you withdraw your consent.

After the end date of the experiment, we will send you a mail with summary information from this experiment as well as your payment.

In case you have not received anything within 4 weeks after the end date of the experiment, please contact us again by writing to experiment@econ.ku.dk.

Please enter your participant code provided in the invite mail:

Please enter your email:

Please provide your CPR-number for payment purposes:

Please re-enter your CPR-number for confirmation:

What is the gender you identify with?

Male, Female, Other, Prefer not to say

What is your age in years?

What is your nationality?