Choosing With Whom to Cooperate in an Unequal Society

The Effect of Free Partner Choice on Cooperation During a One-Shot Public Goods Game in Which Players Differ in Their Income and Productivity

Luuk Snijder

s1651293

ll.snijder@gmail.com

First reader: Dr. Mirre Stallen

Second reader: Prof. Dr. Carsten K. W. De Dreu

Unit Social, Economic & Organisational Psychology, Leiden University

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Abstract

Most human societies are marked by inequality. However, classic behavioral economic models, which are developed to explain cooperation within society, are based on the assumption that individuals are equal, and hence do not differ in their income or productivity. Furthermore, whereas humans often can choose with whom to interact, standard economic theory is largely confined to situations in which partner choice is either limited or fully absent. Here we address both shortcomings in contemporary theory and research of these classic models by studying, in two behavioral experiments, how free partner choice impacts cooperation under inequality. In Experiment 1, participants (n = 322) differed in their income (their endowment) and productivity (their multiplication factor) and played a two-player single shot public goods game four times, either with an assigned partner, or with a partner they were free to choose. Results show that participants cooperated most when they had a low income and a high productivity, when they were paired with someone with a high income and a high productivity, and when they could freely choose their partner. Furthermore, participants preferred to interact with partners who had a high income and a high productivity. In Experiment 2, participants (n = 82) faced the public goods game in the role of a third party, made pairs themselves by assigning players who differed in their income and productivity to each other, and assigned an income or a productivity to a player who was missing an income or a productivity. Here, participants expected people with a low income and people with a high productivity to cooperate most. Underlying motivations for combining incomes and productivities consisted of fairness beliefs (a redistribution of income), maximizing (joint) outcomes (maximizing the total surplus), and preferences to cooperate with similar others. Together, these results show that free partner choice and inequality impact cooperation and should be taken into account in models of cooperation.

Keywords: Inequality, Partner choice, Cooperation, Public goods game, Social norms

Inequality in wealth and income is considered to be an important social problem (Piketty, 2014; Buttrick & Oishi, 2017; Sitaraman, 2017). That is, inequality is associated with reduced economic growth, political instability, underinvestment in education, poor health outcomes, and increases individuals' propensity to commit crimes (Thorbecke & Charumilind, 2002). Nonetheless, income inequality is on the rise in many countries. Measured in terms of the Gini coefficient, a standard measure of income inequality, inequality has risen from the mid-1980s to the late 2000s (Stand & Rising, 2011; Piketty & Saez, 2014). Even more striking is that the wealth owned by the eight richest people in the world is equivalent to the wealth owned by the poorest 50% of the world (Oxfam, 2017) and that the bottom 70% owns only 3% of the world's wealth (Suisse, 2015).

Surprisingly, classic behavioral economic models of cooperation are based on the assumption that individuals do not differ in their income and productivity (Van Lange, Joireman, Parks, & Van Dijk, 2013), while inequality is omnipresent in real life. These classic models are also based on the assumption that partners are assigned to each other (Van Lange et al., 2013), while people are often free to choose with whom to cooperate in real life, such as friends, allies, and mates (Barclay, 2016). Remarkably, the effects of free partner choice on cooperation under inequality have, to our knowledge, never been investigated before. As a result, classic and contemporary theory is ill-suited to answer pressing questions about cooperation and to help the design of calibrated interventions aimed at reducing inequality and enhancing cooperation.

The current study aims to resolve this shortcoming and examines how free partner choice and inequality impact cooperation. We specifically consider how free partner choice impacts partner selection, how free partner choice impacts cooperation under inequality, and why free partner choice impacts cooperation under inequality.

Hypotheses: Free Partner Choice and Cooperation Under Inequality

According to biological market theory (Barclay, 2016), individuals who are free to choose with whom to interact should prefer partners who are, intentionally or accidentally, most able and available to confer benefits. When it comes to partner selection in behavioral experiments under inequality, people indeed select the most able partners. That is, people prefer partners with a high (versus low) income if partners do not differ on other relevant aspects (Schaefer, 2012; Raihani & Barclay, 2016) and partners who signal high wealth (Nelissen & Meijers, 2011). Similarity is expected to impact partner selection as well. That is, people prefer to cooperate, and cooperate more, with people similar to themselves (De Dreu, Farina, Gross, & Ma, 2020). Thus, under inequality, we expect people to prefer partners with a high income and partners who are similar to them.

Additionally, we are interested in how free partner choice impacts cooperation under inequality. Income inequality decreases contributions to public goods (Rapoport & Suleiman, 1993; Anderson, Mellor, & Milyo, 2008), reduces the prospects of reaching targets of public goods (Tavoni, Dannenberg, Kallis, & Löschel, 2011), and has adverse welfare consequences (Nishi, Shirado, Rand, & Christakis, 2015), often because people with a high income contribute less under inequality compared to equality (Cherry, Kroll, & Shogren, 2005; Heap, Ramalingam, & Stoddard, 2016). This is in line with the finding that inequality has a negative effect on generosity in richer participants: the rich are more generous when economic inequality is low, than when inequality is high (Côté, House, & Willer, 2015; Nishi & Christakis, 2015). As a consequence, the poor contribute relatively more than the rich under inequality (Buckley & Croson, 2006). In real life, inequality is negatively associated with the efficacy of collective action as well (Alesina & La Ferrara, 2000; Cardenas, 2003). Based on these findings, we expect that income inequality undermines cooperation.

Besides income inequality, there are other forms of inequality as well, such as productivity inequality. However, previous research did not find any effects of productivity inequality on cooperation in public goods games (Fisher, Isaac, Schatzberg, & Walker, 1995). In a recent paper by Hauser, Hilbe, Chatterjee, and Nowak (2019), the impact of income and productivity inequality on cooperation were investigated. As expected based on previous research, income inequality led to lower relative contributions because high-income players contributed less compared to situations of equality. In addition, productivity inequality in itself did not impact cooperation. Interestingly, aligned inequality, a situation in which the player with the highest income also had the highest productivity and was paired with a player with the lowest income and lowest productivity, led to the highest cooperation rates and the highest payoffs. Since aligned inequality can increase both the stability of cooperation and maximize social welfare, Hauser and colleagues (2019) conclude that (aligned) inequality does not necessarily have to undermine cooperation. If people with high incomes are also most productive this can increase cooperation and the overall surplus.

What remains an open question is whether and how aligned inequality impacts cooperation under free partner choice. From a psychological perspective it feels different, to invest in someone you selected yourself versus investing in someone who was assigned to you. Indeed, previous research has shown that free partner choice leads to more cooperation (Barclay & Willer, 2007). Thus, we expect people to cooperate more when they can freely choose their partner.

Next to examining how free partner choice impacts cooperation under inequality, we studied *why* free partner choice may impact cooperation under inequality. People might differ in their expectations about the willingness of others to cooperate under (in)equality when they can or cannot freely choose their partner. These expectations impact players' cooperativeness (Fischbacher & Gachter, 2010): players cooperate more when they believe

their partner will as well (Murphy & Ackermann, 2019). Under inequality, players with low incomes are expected to be more likely to contribute than players with high incomes (Rapoport, 1988). Under free partner choice, players select partners who they expect to be most cooperative (Barclay & Willer, 2007). What remains an open question is whether and how aligned inequality impacts expectations under free partner choice.

Exploration of Underlying Motivations

Cooperation under (in)equality and assigned or free partner choice could be driven by different motivations, such as fairness beliefs, maximizing (joint) outcomes, or similarity. Fairness beliefs play an important role in social dilemmas (Biel, Eek, & Gärling, 1999). Van Dijk and Grodzka (1992) investigated fairness beliefs during public goods games. When no information was available about others' wealth, people considered equal contributions to public goods to be fair. However, when people knew that players differed in their incomes, they considered it to be fair that high-income players contribute more than low-income players. Indeed, norms of cooperation are often driven by fairness beliefs, such as that the rich should contribute more than the poor (Van Dijk & Grodzka, 1992), that the rich should help the poor (e.g. foreign aid; Van Heerde & Hudson, 2010), or that public goods should redistribute income (e.g. the use of (progressive) tax systems; Van Dijk & Wilke, 1994). People are generally averse to inequality as well (Fehr & Schmidt, 1999; Camerer & Fehr, 2004), which is in accordance with these fairness beliefs.

However, social preferences and motivations can conflict with these fairness beliefs as well, such as preferences to maximize the total efficiency and total surplus (Almås, Cappelen, Sørensen, & Tungodden, 2010), preferences to maximize one's own outcomes (self-interest; Van Heerde & Hudson, 2010), or preferences to cooperate with similar others (Traulsen & Claussen, 2004). Previous research suggests that people are primarily motivated

by their own preferences (Krueger, Massey, & DiDonato, 2008) and that social preferences can explain behavior better than social norms (Gächter, Nosenzo, & Sefton, 2013). Based on these previous findings we explore if beliefs about how much people should cooperate under inequality are driven by fairness beliefs (in line with the social norm), maximizing (joint) outcomes, similarity, or other social preferences.

Current Study

We examined cooperation as a function of free partner choice and inequality in two experiments. In Experiment 1, we investigated the effects of free partner choice and inequality on partner selection, cooperation, and expectations. Here, players who differed in their income and productivity, played a one-shot public goods game in which they were assigned or could freely choose their partner. In Experiment 2, we investigated how inequality impacts beliefs about how much people should cooperate. Here, players, in the role of a third party, were asked how much they expected participants from Experiment 1 to cooperate. Players were also asked to make four pairs according to their own preferences by assigning players with certain incomes and productivities to each other. Furthermore, players were asked to assign an income or a certain productivity to another player who was missing an income or a certain productivity.

Methods & Materials Experiment 1

Participants and Ethics

The data of 322 participants were collected via the online platform Prolific. Four participants were excluded because they finished the experiment in an unreasonably fast time, i.e. under seven minutes. This exclusion criterion was pre-registered via AsPredicted (#43194). Thus, in total, 318 participants were included in the data-analysis. These data consisted of 135 male and 180 female participants (three participants did not want to indicate their gender). Participants were between 18 and 73 years of age (M = 29.78, SD = 9.96). A post-hoc power calculation (G*Power, version 3.1.9.2; Faul, Erdfelder, Buchner, & Lang, 2009) indicated that this sample size would be sufficient to get a power of .89 with an alpha of .05 and a medium effect size (.25).

We paid participants 1.70 pounds for their time in addition to a bonus payment that was based on their decisions. This bonus was based on participants' decisions in the public goods game (M = £.65, SD = .32, range: 0.16 – 1.40£) and participants' expectations (M = £.01, SD = .03, range: 0.0 to 0.1£).

Materials were pilot-tested and adapted before final implementation. This study did not involve any deception and was approved by the ethics committee (2020-05-15-M. Stallen-V1-2441). Furthermore, this study was pre-registered via AsPredicted (#43194).

Design

Experiment 1 used a 2 [Partner condition: Assigned vs Free] x 4 [Type: High Income – High Productivity (HH), High Income – Low Productivity (HL), Low Income – High Productivity (LH), Low Income – Low Productivity (LL)], between-subjects design. The online survey software (Qualtrics) randomly assigned participants to conditions. The Assigned and Free partner choice condition both consisted of 159 participants. In the

Assigned partner condition, there were 41 participants with a HH Type, 40 participants with a HL Type, 39 participants with a LH Type, and 39 participants with a LL Type. In the Free partner choice condition, there were 40 participants with a HH Type, 41 participants with a HL Type, 40 participants with a LH Type, and 38 participants with a LL Type. Participation lasted approximately 15 minutes.

Procedure

Participants had to enter their Prolific-ID and agree to the informed consent before starting the experiment. Thereafter participants read the instructions. The instructions explained to participants that their decisions, and those of other participants, would influence both their own payment and that of others. Participants were instructed that each unit earned during the public goods game was worth 0.01GBP and that they received a bonus of 0.10GBP for each correct expectation. After the rules of the public goods game were explained, participants answered 12 practice questions to probe their understanding of the task. Only after all practice questions were answered correctly, participants could continue to the public goods game. After the public goods game, participants were asked to answer questions related to their strategies during the public goods game and gave their demographics (age, gender, education, country, socioeconomic status, income, and the number of persons in their household; see Appendix A). Finally, participants were debriefed.

The Public Goods Game

Participants played a one-round two-player public goods game. At the beginning of the game, each participant was assigned an income and a multiplier. The income was the number of units each participant received at the start of the public goods game, i.e. 75 or 25 units. The multiplier was the factor by which each participant's contribution to the public good was multiplied (reflecting differences in productivity), i.e. 1.7 or 1.3. The specific

combination of the income and multiplier determined a participant's Type. In total, there were 4 Types: the HH Type (income = 75, multiplier = 1.7), the HL Type (income = 75, multiplier = 1.3), the LH Type (income = 25, multiplier = 1.7), and the LL Type (income = 25, multiplier = 1.3). Note that we used neutral labels to refer to these Types during the experiment: Type 1 (HH), Type 2 (HL), Type 3 (LH), and Type 4 (LL). Each participant was assigned a Type after the instructions of the public goods game and participants remained this Type throughout the entire experiment.

Assigned Partner Condition

In the Assigned partner condition, participants were assigned a partner to play the public goods game with. Participants played the public goods game four times. Participants first saw a screen indicating that they would be paired with another participant. Then, the Type of the other participant was revealed. Finally, to investigate the impact of inequality on cooperation, participants had to indicate how many units they wanted to contribute to the public good as well as the number of units they expected each Type to contribute. Participants had to make these decisions for each Type, because participants were paired after the experiment. That is, participants were randomly assigned to another participant after the experiment to calculate their earnings based on their decisions in the public goods game. The order in which they had to indicate their investment in the public good for the different Types was randomly determined.

Free Partner Choice Condition

Participants in the Free partner choice condition were asked to order partner Types from most preferred Type to play the public goods game with, to least preferred Type to play the public goods game with. We explained that we would pair them with their preferred partner if possible; when this was not possible because the person of this Type did not prefer

their Type, they would be paired with their second choice. If this was not possible, they would be paired with their third choice, etcetera. After indicating their preferred partner Type, participants had to indicate how many units they wanted to contribute to the public good as well as the number of units they expected each Type to contribute. Participants had to make these decisions for each Type, because participants were paired after the experiment. The order in which they had to indicate their investment in the public good for the different Types was randomly determined.

Attention Checks

There were three attention checks in the experiment, in order to determine serious participation. If participants failed two out of three attention checks, they were excluded from data-analysis (pre-registered via AsPredicted, #43194). First, after the practice questions, there was a multiple-choice question for which participants had to select the option "Correct". Second, after all decisions in the public goods game were made, there was an attention check during which participants had to indicate that they wanted to contribute 20 units to the public good and had to indicate that they expected their partner to contribute 10 units. The partner Type for this attention check was randomly determined. Finally, after completing the demographics questionnaire, there was an attention check during which participants had to type the word "green" in a response box.

Payment

Assigned Partner Condition

After the experiment, pairs were made by randomly pairing participants. Based on the decisions made within their pair, participants received a bonus payment (M = £0.64, SD = 0.30, range 0.20 to 1.39£). Each unit earned during the public goods game was worth 0.01GBP. Excluded participants were paired with each other (n = 2). There were 159 (non-

excluded) participants, of whom we could pair 158 participants to each other. One participant was therefore paired to a randomly selected participant from the Assigned partner condition of the pilot study. To calculate how much participants additionally earned for their correct expectations, we checked whether participants' expectations per Type were similar to the average contribution of each partner Type (*M* = £0.01, *SD* = 0.03, range 0.0 to 0.1£). That is, if a participant with a high income and a high multiplier expected a partner with a low income and a low multiplier to contribute 20 units, we compared this expectation (of 20 units) with the average contribution of participants with a low income and a low multiplier when being paired with a partner with a high income and a high multiplier. If similar, participants received a bonus payment for this correct expectation. For each correct expectation, participants received 0.10GBP.

Free Partner Choice Condition

In the Free partner choice condition, we paired participants based on their partner preferences. If participants could not be paired based on their first preferences, they were paired based on their second preferences. Participants who could not be paired based on their first and second preference, were paired based on their third preferences, and finally fourth preferences. Participants who still did not have a partner after comparing their fourth preferences were paired randomly. Participants were paid out based on the decisions made within their pair (*M* = £.65, *SD* = .34, range 0.16 to 1.4£). Each unit earned during the public goods game was worth 0.01GBP. Again, excluded participants were paired with each other (*n* = 2). There were 159 (non-excluded) participants, of whom we could pair 158 participants to each other. One participant who could not be paired based on their first, second, third and fourth preference was therefore paired to one randomly selected participant from the Free partner choice condition of the pilot study. To calculate how much participants additionally earned for their correct expectations, we checked whether participants' expectations per Type

were similar to the average contribution of each partner Type (*M* = £0.0, *SD* = .02, range 0.0 to 0.1£). For each correct expectation, participants received 0.10GBP.

Results Experiment 1

Attention Checks

The first and third attention checks were done correctly by all participants. The second attention check was missed by two participants. Accordingly, no participants were excluded from the final analyses.

How Does Free Partner Choice Impact Partner Selection?

Participants in the Free partner choice condition could choose what partner they preferred to be paired with. As can be seen in Figure 1, participants preferred to play the public goods game with a partner with a high income and a high multiplier (HH). Next, they preferred to be paired with a partner with a high income and a low multiplier (HL) over partners with a low income and a high multiplier (LH). The partner with a low income and a low multiplier (LL) was preferred the least. These partner preferences were independent of participants' own Type (HH partner: X^2 (9, N = 40) = 11.04, p = 0.27; HL partner: X^2 (9, N = 41) = 9.19, p = 0.42; LH partner: X^2 (9, N = 40) = 6.49, p = 0.69; LL partner: X^2 (9, N = 38) = 14.99, p = 0.09).

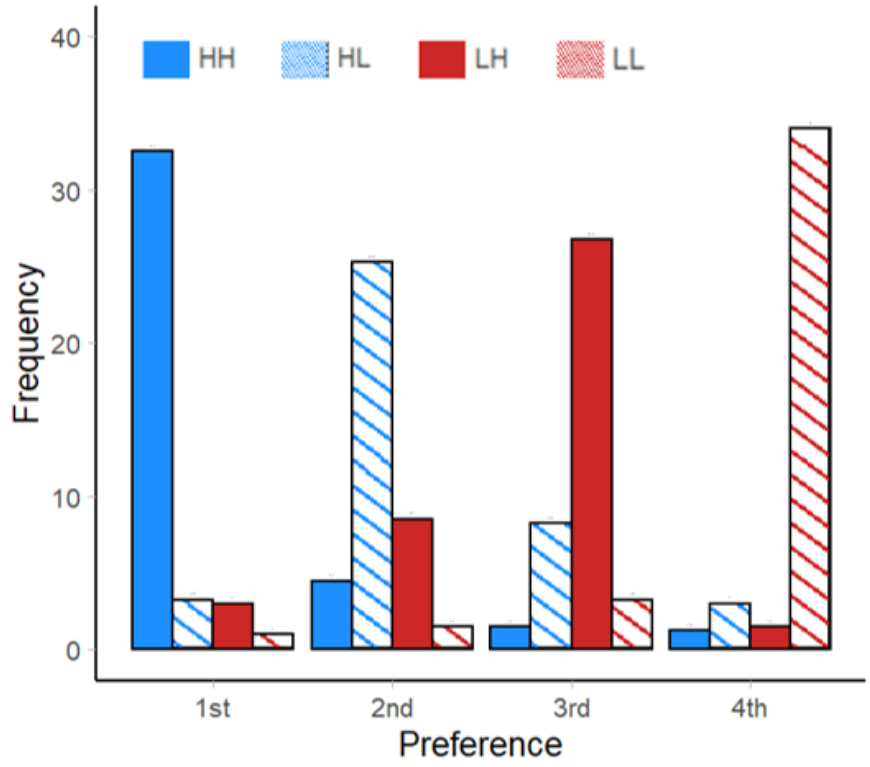

Figure 1. Frequency of partner Type preferences, with first (1st) indicating the most preferred Type and fourth (4th) indicating the least preferred Type.

How Does Free Partner Choice Impact Cooperation Under Inequality?

To investigate the impact of free partner choice on contributions to the public good under inequality, a three-way ANOVA was carried out with relative contributions as the dependent variable and participant Type, partner Type, and condition as independent variables. Relative contributions were calculated by dividing participants' contributions by their total income. Here, we were interested in three types of results: 1) what is the impact of inequality on cooperation (the effect of participant Type, partner Type, and their interaction), 2) what is the impact of free partner choice on cooperation (the effect of condition), and 3) what is the effect of free partner choice on cooperation under inequality (the interaction between condition, participant Type, and partner Type).

The Impact of Inequality on Cooperation

Participant Type had a significant impact on relative contributions, with $F(3, 1240) = 42.23$, $p < .001$, $\eta_p^2 = .09$ (see Figure 2A). Participants with a low income and a high multiplier (LH) contributed relatively most to the public good ($M = 59.4$, $SE = 1.43$). Participants with a high income and a high multiplier (HH; $M = 45.0$, $SE = 1.66$) and with a low income and a low multiplier (LL; $M = 43.5$, $SE = 1.66$) contributed relatively less. Least was relatively contributed by participants with a high income and a low multiplier (HL; $M = 35.6$, $SE = 1.43$).

Partner Type had a significant impact on relative contributions as well, with $F(3, 1240) = 10.10$, $p < .001$, $\eta_p^2 = .02$ (see Figure 2B). Participants contributed relatively most when paired to a HH partner ($M = 52.3$, $SE = 1.70$). When the partner was a HL Type ($M = 45.4$, $SE = 1.55$) or a LH Type ($M = 44.8$, $SE = 1.59$), participants contributed relatively less. The least was relatively contributed when paired to LL partners ($M = 40.7$, $SE = 1.57$).

The interaction between participant Type and partner Type was also significant, with $F(9, 1240) = 2.86$, $p < 0.01$, $\eta_p^2 = .02$ (see Figure 2C). Participants contributed most when being paired with a HH partner. Thereafter, participants contributed the second most when they were paired to a partner of a similar Type.

Finally, to test if inequality impacts cooperation, we created a dummy variable coding for (in)equality. This variable coded if similar Types were paired (e.g. HH with HH) or if non-similar Types were paired (e.g. HH with LL). Conducting a one-way ANOVA with relative contributions as the dependent variable and this dummy variable as the independent variable, showed that participants contributed significantly more under equality ($M = 51.9$, $SE = 1.72$) compared to inequality ($M = 43.8$, $SE = 0.91$), with $F(1, 1270) = 18.81$, $p < .001$, $\eta_p^2 = .01$.

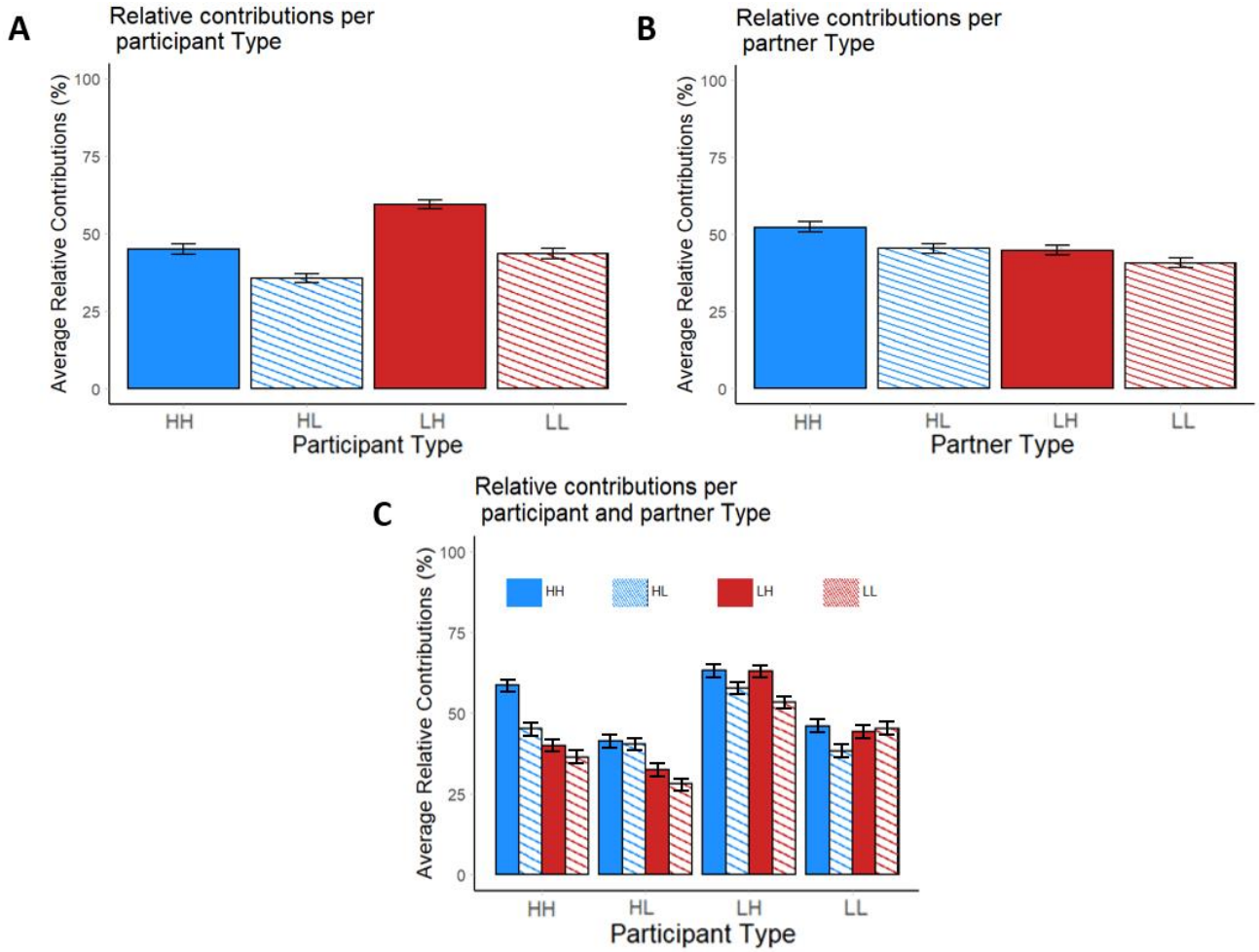

Figure 2. The impact of inequality on relative contributions with standard errors as error-bars. A) Relative contributions for each participant Type. B) Relative contributions for each partner Type. C) Relative contributions for each combination of participant and partner Types.

The Impact of Free Partner Choice on Cooperation

We were additionally interested in the impact of free partner choice on cooperation. Condition had a significant impact on relative contributions, with $F(1, 1240) = 7.63$, $p < .01$, $\eta_p^2 = .01$ (see Figure 3A). Relative contributions were higher in the Free partner choice

condition (M = 47.9, SE = 1.16) compared to the Assigned partner condition (M = 43.7, SE = 1.13).

When looking at the total contributions by each pair, most was relatively contributed when participants with a LH Type were paired together (see Figure 3B). Least was relatively contributed when HL participants were paired with LL participants. In contrast to what was expected based on previous research, we did not find that cooperation was highest under aligned inequality (HH_LL) in neither the Assigned nor the Free partner choice condition.

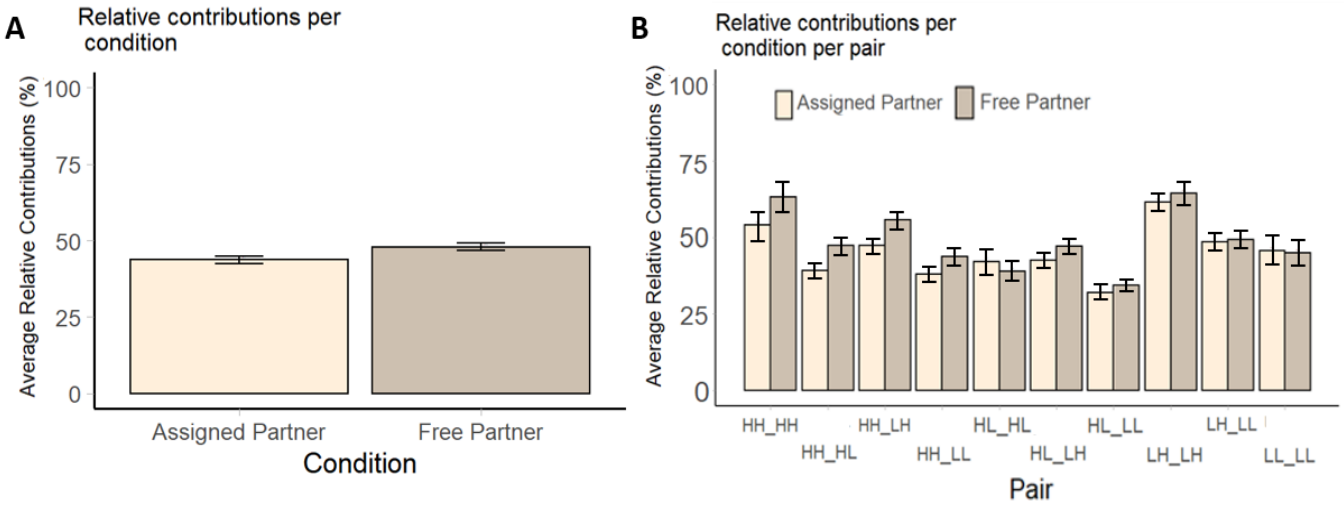

Figure 3. The impact of partner choice on relative contributions with standard errors as error-bars. A) Relative contributions made by participants in each condition. B) Relative contributions by each pair in each condition.

The Impact of Free Partner Choice on Cooperation Under Inequality

When investigating the effects of free partner choice on cooperation under inequality, we did not find any significant effects. That is, the interaction between participant Type and condition (F(3, 1240) = 0.96, p = 0.41, η_p^2 = .002), the interaction between partner Type and

condition ($F(3, 1240) = 1.14$, $p = 0.33$, $\eta_p^2 = .003$), and the three-way interaction between participant Type, partner Type, and condition ($F(9, 1240) = 0.23$, $p = 0.99$, $\eta_p^2 = .002$), were not significant.

Why Does Free Partner Choice Impact Cooperation Under Inequality?

To investigate whether cooperation depended on participants' expectations about the behavior of their partner, we asked participants how many units they expected each Type to contribute. Relative expectations were calculated by dividing the expected contribution of each Type by the total income of each Type. When using a linear regression with relative contributions as the dependent variable and relative expectations as the independent variable, relative expectations were a significant predictor, with $\beta = 0.60$, $t(1270) = 23.51$, $p < 0.001$, $R^2 = .30$, $R^2_{\text{Adjusted}} = .30$, 95% CI [0.55, 0.65]. If participants expected others to contribute relatively more, they contributed relatively more themselves as well.

Because relative expectations correlated with relative contributions, we investigated how relative expectations are impacted by partner choice under inequality as well, using a three-way ANOVA. In this ANOVA, relative expectations were the dependent variable and partner Type, participant Type, and condition were the independent variables. Again, we were interested in three types of results: 1) what is the impact of inequality on expectations (the effect of participant Type, partner Type, and their interaction), 2) what is the impact of free partner choice on expectations (the effect of condition), and 3) what is the effect of free partner choice on expectations under inequality (the interaction between condition, participant Type, and partner Type).

The Impact of Inequality on Expectations

Participant Type had a significant impact on relative expectations, with $F(3, 1240) = 5.85$, $p < 0.001$, $\eta_p^2 = .01$ (see Figure 4A). Participants with a high income and a high

multiplier (HH) expected their partners to relatively contribute most (M = 49.3, SE = 1.65). Participants with a low income and a high multiplier (LH; M = 44.6, SE = 1.38) and with a high income and a low multiplier (HL; M = 43.2, SE = 1.36) expected relatively lower contributions. Participants with a low income and a low multiplier (LL) expected the lowest relative contributions from their partners (M = 41.2, SE = 1.48).

Partner Type had a significant impact on relative expectations as well, with $F(3, 1240) = 21.36$, $p < .001$, $\eta_p^2 = .05$ (see Figure 4B). Partners with a LH Type (M = 52.8, SE = 1.43) were expected to relatively contribute most. From LL partners (M = 45.1, SE = 1.50) and HH partners (M = 43.8, SE = 1.48), participants expected relatively lower contributions. HL partners were expected to relatively contribute least (M = 36.8, SE = 1.37).

The interaction between participant and partner Type was not significant, with $F(9, 1240) = 1.60$, $p = 0.11$, $\eta_p^2 = .01$.

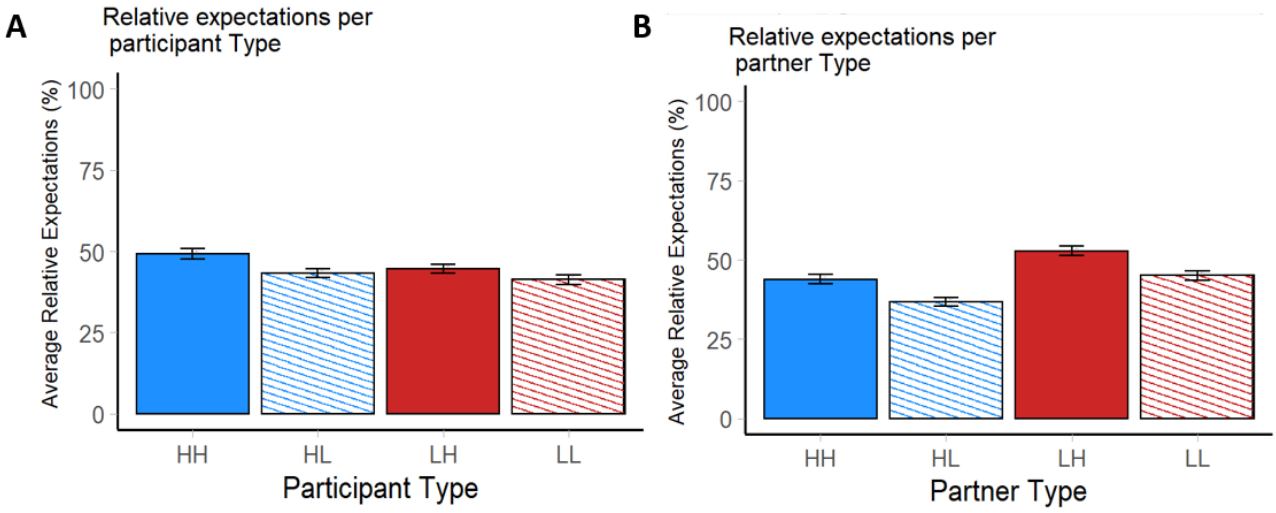

Figure 4. The impact of inequality on relative expectations with standard errors as error-bars. A) Relative expectations for each participant Type. B) Relative expectations for each partner Type.

The Impact of Free Partner Choice on Expectations

Condition had a significant impact on relative expectations, with $F(1, 1240) = 11.43$, $p < .001$, $\eta_p^2 = .01$ (see Figure 5A). Relative expectations were higher in the Free partner choice condition ($M = 47.0$, $SE = 1.06$) compared to the Assigned partner condition ($M = 42.2$, $SE = 1.03$).

The Impact of Free Partner Choice on Expectations Under Inequality

The interaction between participant Type and condition was significant as well, with $F(3, 1240) = 9.28$, $p < .001$, $\eta_p^2 = .02$ (see Figure 5B). Relative expectations of each participant Type were compared between the Assigned partner and Free partner choice condition by using independent samples t-tests. We only found a significant difference between HH participants. Participants with a HH Type expected their partner to contribute more in the Free partner choice condition ($M = 57.9$, $SE = 2.34$) compared to the Assigned partner condition ($M = 40.9$, $SE = 2.13$), $t(318.3) = -5.37$, $p < .001$. For HL participants ($t(315.4) = 0.98$, $p = .33$), LH participants ($t(308.1) = -0.27$, $p = .78$), and for LL participants ($t(303.7) = -1.35$, $p = .18$), relative expectations were similar.

The interaction between partner Type and condition ($F(3, 1240) = .10$, $p = 0.96$, $\eta_p^2 = .0002$) as well as the three-way interaction between participant Type, partner Type, and condition ($F(9, 1240) = 0.50$, $p = 0.87$, $\eta_p^2 = .004$), were not significant.

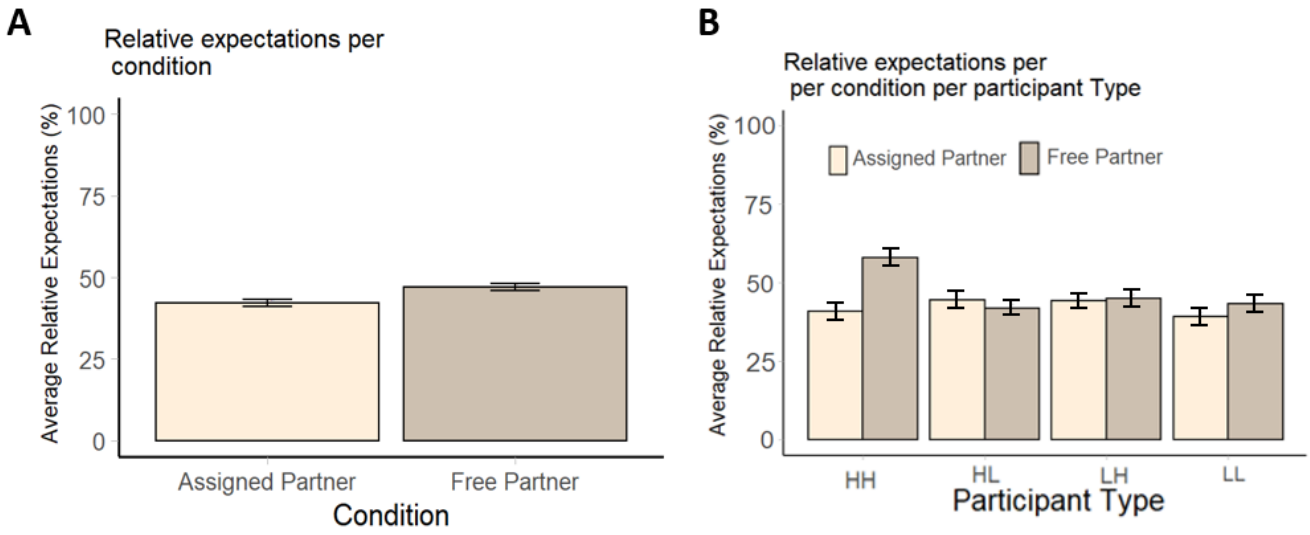

Figure 5. The impact of Free partner choice on relative expectations with standard errors as error-bars. A) Relative expectations in each condition. B) Relative expectations for each participant Type in each condition.

Conclusion Experiment 1

The results of Experiment 1 illustrate that free partner choice impacts partner selection under inequality and cooperation. Participants preferred to be paired with a partner with a high income and a high productivity. Thereafter, participants preferred to be paired with a partner with a high income and a low productivity. Partners with a low income and a low productivity were preferred the least. Furthermore, these preferences were independent of participants' own income and productivity.

Most was cooperated when participants had a low income and a high productivity, while least was cooperated when participants had a high income and a low productivity. Participants cooperated most when being paired with a high-income high-productivity partner. The second most was cooperated when being paired with a partner with a similar income and productivity. In pairs, most was cooperated when participants had a similar

income and a high productivity. Furthermore, participants cooperated most when they could freely choose their partner.

Participants correctly expected that partners with a low income and a high productivity invested most in cooperation, that other participants cooperated most with high-income high-productivity partners, and that other participants cooperated most under free partner choice. However, only participants with a high income and a high productivity expected their partner to invest most in cooperation under free partner choice. In reality, cooperation was higher overall under free partner choice, not only for participants with a high income and a high productivity.

We were also interested in the psychological mechanisms underlying cooperation under inequality. For instance, is cooperation driven by fairness beliefs, participants' preferences to maximize (joint) outcomes, or their preferences to cooperate with similar others. For this purpose, we ran a second experiment.

Methods & Materials Experiment 2

Ethics, Participants, and Design

37 male and 45 female participants (n = 82) were recruited via the online platform Prolific to participate in this experiment. A post-hoc power calculation (G*Power, version 3.1.9.2; Faul et al., 2009) indicated that this sample size would be sufficient to get a power of .61 with an alpha of .05 and a medium effect size (.25). Participants were between 18 and 63 years of age (M = 29.05, SD = 9.90). We paid participants 1.70 pounds for their time in addition to a bonus payment that was based on their decisions (M = £.07, SD = .07, range 0.0 to 0.3£).

This experiment had no experimental manipulation. Participation lasted approximately 15 minutes. Materials were pilot-tested and adapted before final implementation. This study did not involve any deception and was approved by the ethics committee (2020-05-15-M. Stallen-V1-2441). Furthermore, this study was pre-registered via AsPredicted (#43194).

Procedure

Participants had to enter their Prolific-ID and agree to the informed consent before starting the experiment. Thereafter participants read the instructions of the study. The instructions explained to participants that another study (Experiment 1) was already conducted and that they would be asked for their opinion on this decision-making task. Furthermore, it explained that their decisions would influence their own payment. That is, participants were instructed that they received a bonus of 0.10GBP for each correct expectation. After the rules of the public goods game of Experiment 1 were explained, participants answered 12 practice questions to probe their understanding of the task.

After all practice questions were answered correctly, participants were asked how many units they expected participants from Experiment 1 would contribute to the public good for each Type in each possible pairing. The order of these questions was randomized across participants. We compared participants' expectations about others' cooperativeness with the average contributions of participants from Experiment 1. For each correct answer, participants received a bonus of 0.10GBP.

Next, participants were asked to make four pairs, by assigning Types to each other, according to their own preferences. Participants could select each Type once. The order of the Types that participants could select was randomized. Furthermore, we asked participants to explain their choices.

Thereafter, participants had to assign an income or a multiplier to a Type that missed an income or a multiplier. The order in which the questions about the incomes and multipliers were presented was random, as well as the order of the answer options within each question. Again, we asked participants to explain their choices.

Lastly, participants were asked to answer questions related to their strategies during the experiment and their demographics (age, gender, education, country, socioeconomic status, income, and the number of persons in their household; see Appendix A). At the end of the experiment participants were debriefed.

Attention Checks

There were three attention checks in the experiment, in order to determine serious participation. If participants failed two out of three attention checks, they were excluded from data-analysis (pre-registered via AsPredicted, #43194). First, after all investment decisions were made, there was an attention check during which participants had to indicate they expected others to contribute 20 units to the public good. The Types this pair consisted of

was randomized across participants. Second, after the questions in which participants had to combine incomes and multipliers to create Types, there was an attention check for which participants had to assign the left income [multiplier] to *person 1* and the right income [multiplier] to *person 2*. It was randomly determined if this attention check related to the income or the multiplier. Finally, after completing the demographics questionnaire, there was an attention check during which participants had to type the word “green” in a response box.

Results Experiment 2

Attention Checks

The first attention check was missed by five participants. The second and third attention checks were done correctly by all participants. Furthermore, no participants finished the experiment in an unreasonably fast time (under seven minutes). Accordingly, no participants were excluded from the final analyses.

Why Does Free Partner Choice Impact Cooperation Under Inequality?

To investigate what the norm is for cooperation under inequality, we asked participants how many units they expected participants from Experiment 1 to contribute to the public good. A two-way ANOVA was carried out with relative expected contributions as the dependent variable and each Type's income and multiplier as the independent variables. Relative expected contributions were calculated by dividing participants' expected contributions by each Type's total income. Here, we were interested in three types of results: 1) what are the expected contributions for cooperating under income inequality (the effect of income), 2) what are the expected contributions for cooperating under productivity inequality (the effect of the multiplier), and 3) what are the expected contributions for cooperating under aligned inequality (the interaction between income and the multiplier).

Income had a significant impact on relative expected contributions, with $F(1, 1636) = 47.07$, $p < .001$, $\eta_p^2 = .03$ (see Figure 6A). Relative expected contributions were higher for Types with a low income ($M = 52.2$, $SE = 0.89$) compared to Types with a high income ($M = 43.6$, $SE = 0.92$). The multiplier had a significant impact on relative contributions as well, with $F(1, 1636) = 50.33$, $p < .001$, $\eta_p^2 = .03$ (see Figure 6B). Relative expected contributions were higher for Types with a high multiplier ($M = 52.3$, $SE = 0.92$) compared to

Types with a low multiplier (M = 43.4, SE = 0.87). However, the interaction between income and the multiplier of Types was not significant, with $F(1, 1636) = .09$, $p = .76$, $\eta_p^2 = 0$.

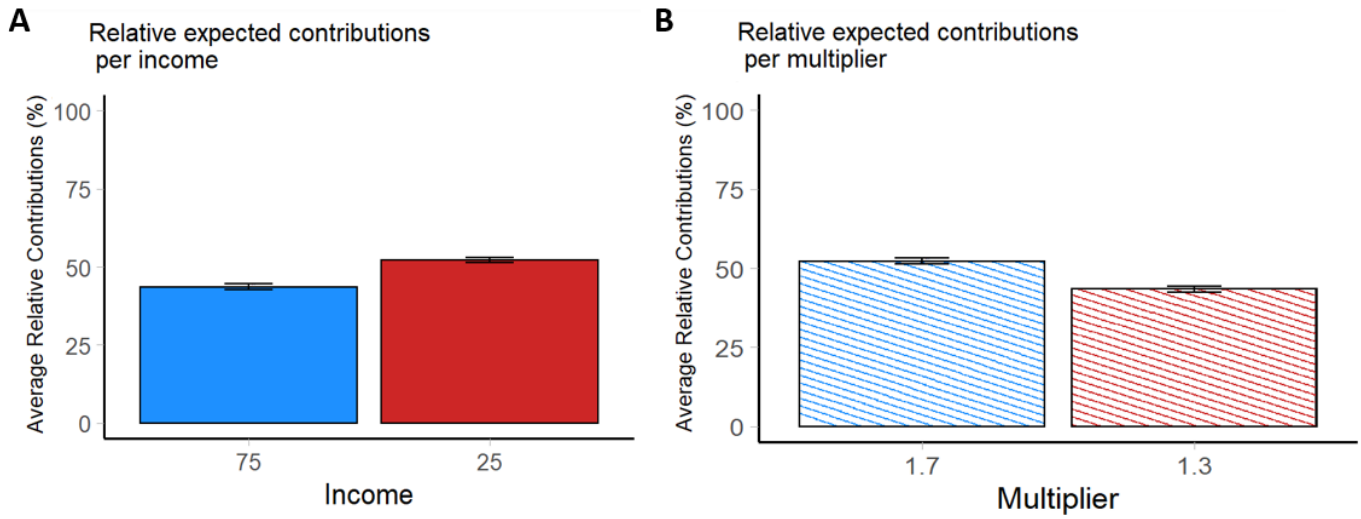

Figure 6. The impact of income and the multiplier on expected contributions with standard errors as error-bars. A) Relative expected contributions for participants with different incomes. B) Relative expected contributions for participants with different multipliers.

Furthermore, to investigate how participants preferred to combine Types into pairs, they were asked to make four pairs according to their own preferences (see Figure 7). We created a dummy variable which coded if participants paired similar Types or not (Similar, N = 186 / Non-similar, N = 142). These frequencies differed significantly from each other when using a chi-square test, with X^2 (1, N = 328) = 5.90, $p < .025$. Thus, participants preferred to pair similar Types. Two independent raters coded participants' explanations regarding why participants made these pairs. 44.04 percent of the participants reported that their decision to pair certain Types was motivated by fairness beliefs (e.g. "I tried to create pairs that would balance each other to give every person a fair share of rewards."), 23.85

percent mentioned maximizing outcomes (e.g. “high earning potential“), 14.98 percent mentioned similarity (e.g. “I created … because they are the same. I feel that if they are the same then maybe they will contribute close to the same amount and leave near the same amount“), and 17.13 percent was coded as *other*.

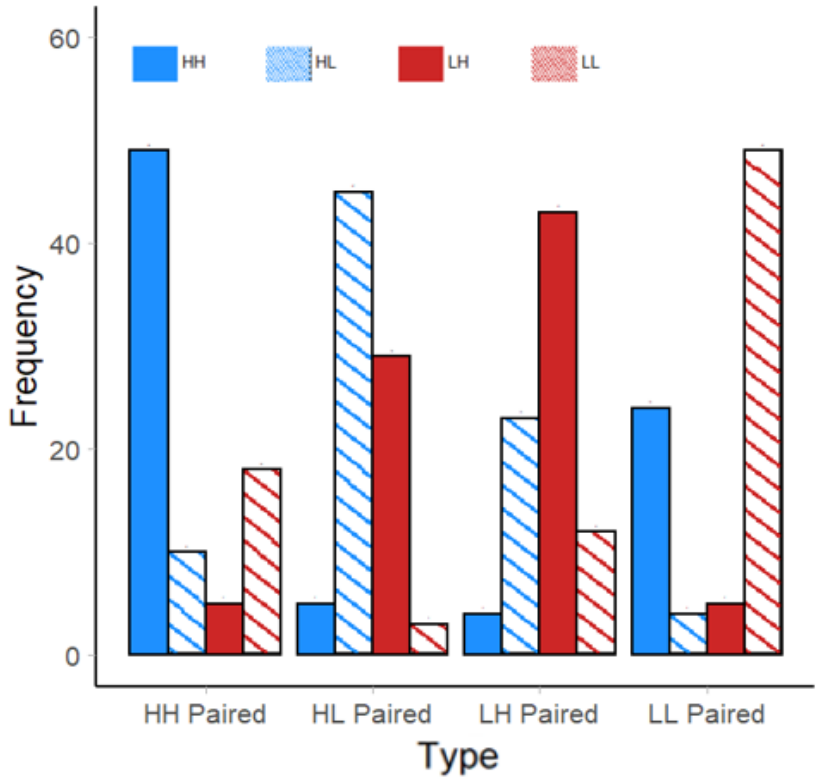

Figure 7. The frequency by which participants preferred to pair Types with each other.

Finally, to investigate how participants preferred to combine incomes and multipliers when they were free to create any combination, participants had to assign an income or a multiplier to a Type that missed an income or a multiplier. Chi-square tests revealed that participants preferred to combine high incomes with low multipliers and vice versa. That is, participants combined high multipliers significantly more often with low incomes compared to high incomes, with X^2 (1, N = 82) = 7.02, p < .01 (see Figure 8A). Furthermore, participants combined high incomes significantly more often with low multipliers compared

to high multipliers, with X^2 (1, N = 82) = 9.56, p < .01 (see Figure 8B). Again, two independent raters coded participants' explanations regarding why participants made these combinations. Here, 39.02 percent of the participants mentioned fairness beliefs (e.g. "It seems fairer to give the person with the higher multiplier the lower income"), 32.32 percent mentioned maximizing outcomes (e.g. "Giving the higher income the higher multiplier gives the highest potential for maximum outcome"), 4.88 percent mentioned similarity (e.g. "If income is higher, multiplier should be higher too"), and 23.78 percent was coded as *other*.

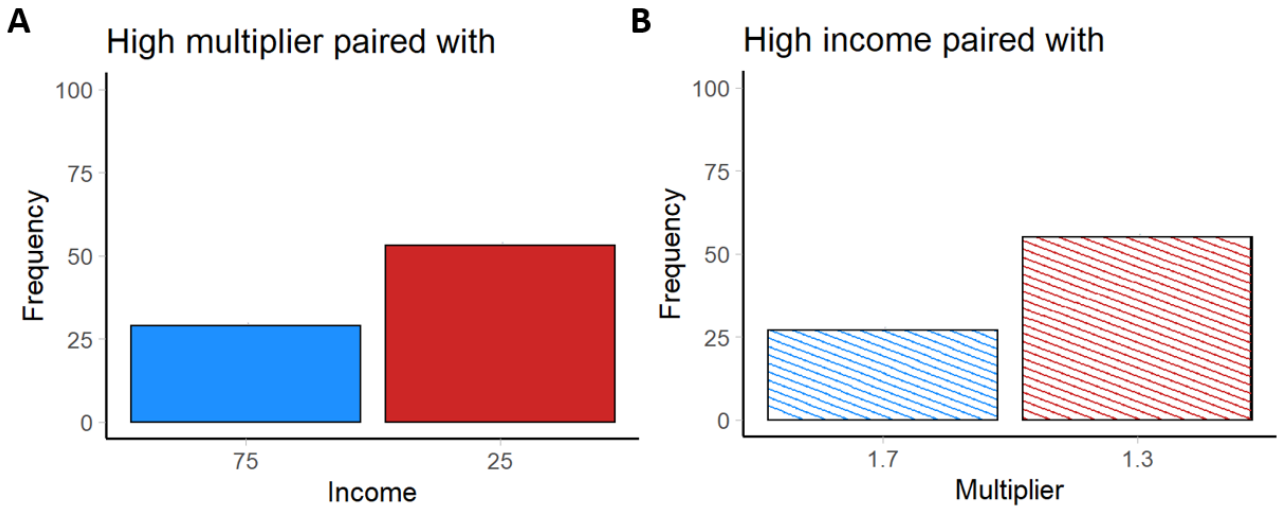

Figure 8. The frequency by which incomes and multipliers are selected to create Types. A) The frequency by which incomes are selected for a high multiplier. B) The frequency by which multipliers are selected for a high income.

Comparing Contributions and Expected Contributions

Finally, we compared the relative contributions of participants in Experiment 1 with the relative expected contributions of participants in Experiment 2, using independent samples t-tests. There was only one significant difference between Experiment 1 and

Experiment 2. This difference was observed when participants with a high income and a high multiplier (HH) were paired with participants with a low income and a high multiplier (LH). In this pair, LH participants contributed significantly more in Experiment 1 (M = 63.3, SE = 1.02) than was expected by participants in Experiment 2 (M = 54.0, SE = 2.64), with $t(157) = 2.38$, $p < .025$ (see Figure 9).

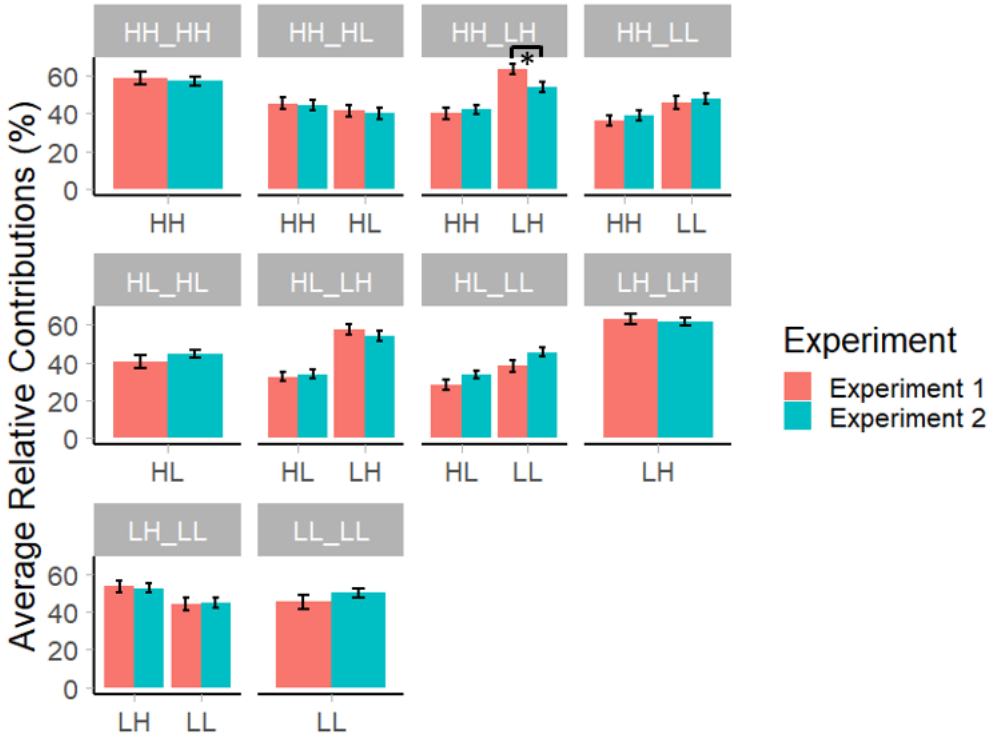

Figure 9. Relative average contribution of each Type in Experiment 1 and Experiment 2 with standard errors as error-bars.

Conclusion Experiment 2

The results of Experiment 2 give us more insight into why free partner choice impacts cooperation under inequality. Participants expected others to invest most in cooperation when others had a low income and when they had a high productivity. Furthermore, actual

cooperation rates (of Experiment 1) were in line with the expectations of third parties, as assessed by Experiment 2.

When asked how participants preferred to combine incomes and productivities to make pairs, participants preferred to combine high incomes and high productivities with each other. However, when participants were free to combine incomes and productivities to create Types, they preferred to combine high incomes with low productivities and vice versa. Fairness beliefs were most often mentioned as underlying motivations when participants combined incomes and multipliers to make pairs and to create Types.

General Discussion

The results reported here demonstrate that free partner choice and inequality impact partner selection and cooperation. When asked what partner people prefer to be paired with in a public goods game under inequality, people preferred to be paired with partners with a high income and a high productivity. This is in line with previous findings that people prefer a high (versus low) income partner (Schaefer, 2012; Raihani & Barclay, 2016).

Furthermore, participants contributed relatively most when being paired with high-income high-productivity partners, and contributed most when they could freely choose their partner (in line with Barclay & Willer, 2007). Interestingly, high-income high-productivity participants knew this, as these participants expected others to contribute most when being paired with them, especially in situations of free partner choice. Thereafter, participants cooperated most when being paired to a partner with a similar income and productivity, which is in line with previous findings that people cooperate most with members from their own group (De Dreu et al., 2020). In addition, most was cooperated by pairs in which people had a similar income and a high productivity. This is in line with previous findings that inequality undermines cooperation (Alesina & La Ferrara, 2000; Anderson et al., 2008; Cardenas, 2003; Cherry et al., 2005; Heap et al., 2016; Nishi et al., 2015; Rapoport & Suleiman, 1993; Tavoni et al., 2011).

When asking participants, in the role of a third party, how many units they expected others to invest in cooperation, people with a low income were expected to contribute relatively most. This finding is in line with the actual behavior of participants as found in Experiment 1 and with previous research (Rapoport, 1988). One explanation for this result is that people with a low income, especially the ones who have a high productivity, have more to gain from cooperation compared to people with a high income. Indeed, participants with a

high productivity and a low income contributed relatively most, while participants with a low productivity and a high income contributed relatively least. What remains puzzling is that participants preferred to be paired with partners with a high income and a low productivity over partners with a low income and a high productivity. This is puzzling because participants expected low-income high-productivity partners to contribute most, while they expected high-income low-productivity partners to contribute least. Our results thus suggest that in situations of free partner choice and inequality, people select partners with a high income (in line with Schaefer, 2012; Raihani & Barclay, 2016) over partners they expect to be most cooperative (as would be expected based on Barclay & Willer, 2007).

Participants made pairs by pairing people with similar incomes and productivities (aligned inequality). Participants' explanations for making these pairs most often consisted of fairness beliefs (in line with Fehr & Schmidt, 1999; Camerer & Fehr, 2004) and maximizing overall surplus (in line with Almås et al., 2010), rather than making pairs based on similarity (opposed to Traulsen & Claussen, 2004). However, when participants were fully free to combine incomes and productivities, they preferred to combine high incomes with low productivities and vice versa. Thus, in this situation participants did not prefer to assign a high productivity to people with a high income (aligned inequality). It remains unclear why people make different decisions in these situations. However, participants' explanations hint towards two differences in their underlying motivations. When people do not yet have a certain income and productivity, participants consider maximizing (joint) outcomes to a greater extent, while they consider similarity to a lesser extent.

Our findings imply that (aligned) inequality does not seem preferable in situations where people can freely choose with whom to cooperate, since high-income high-productivity people prefer to only cooperate with each other. If high-income high-productivity people only cooperate with each other, they are expected to accumulate most

wealth, while least wealth will be accumulated by people with a low income and a low productivity. As a consequence, the inequality gap is expected to further widen.

Limitations and Directions for Future Research

A limitation of both experiments is that our sample only consisted of people who participated via Prolific. Often, these people are merely motivated by earning money, which may increase individualistic behavior. Therefore, we might have underestimated actual cooperation levels with our current studies.

A limitation of Experiment 1 is that the Free partner choice manipulation could have been more salient. Since Experiment 1 was carried out via Prolific, pairs could only be made after the experiment. As a consequence, participants did not experience the actual pairing before making their decisions. The effects of the Free partner choice manipulation could have been stronger if participants did experience the actual pairing. When having a more salient Free partner choice manipulation, we would expect larger differences between both conditions, thus leading to even higher cooperation levels in the Free partner choice condition. Furthermore, after participants indicated their preferences, the order in which they were paired with the other Types was randomly determined. Instead, the Free partner choice manipulation could have been more salient if participants played the public goods game with their preferred partner choice first, and then with their second, third, and fourth preference. For example, if a participant's first preference was to be paired with a high-income low-productivity partner, the Free partner choice manipulation could have been more salient if this participant played the public goods game first with a high-income low-productivity partner (their first preference), while the order was randomly determined in the current experiment. Again, we would expect even larger differences between both conditions when

having a more salient Free partner choice manipulation, with even higher cooperation levels in the Free partner choice condition.

In the current experiment, we could only observe behavior in a one-shot public goods game. To draw more externally valid conclusions about cooperation in real life, we need to better understand how cooperation develops over time and how partner preferences might change over time. Therefore, it would be interesting to investigate the effects of free partner choice on cooperation under inequality in a multiple rounds public goods game. Here, participants experience the actual pairing before deciding how much to invest in cooperation, which makes the Free partner choice manipulation more salient as well.

By using a multiple rounds public goods game, we would be able to investigate how the experience of (not) being paired with one's preferred partner Type impacts cooperation. We expect that participants invest more in cooperation when they are paired with their first preference compared to a situation in which they are not. Furthermore, we expect higher cooperation levels when people are paired to their first preference (under free partner choice) than when a partner with the same income and productivity is assigned to them. This hypothesis is based on the observation that, in Experiment 1, participants cooperated more when they could freely choose their partner compared to when their partner was assigned to them.

It would also be interesting to investigate if participants in the Assigned partner condition cooperate more under aligned inequality, a hypothesis based on findings reported by Hauser and colleagues (2019), although not supported by the results of our first experiment. An important difference between our study and the study of Hauser and colleagues (2019), is that in our study participants played a one-shot public goods game, while they played a multiple rounds public goods game in the study of Hauser and colleagues

(2019). With this proposed follow-up study, this difference would most likely disappear. However, in the study of Hauser and colleagues (2019), participants interacted only with one other participant, while in our follow-up study participants would interact with seven others. Furthermore, in our study there will be two participants with a similar income and productivity in each group, due to which it is impossible to personally identify others. Therefore, in our study participants could freeride without it harming one's individual reputation, while cooperating would not directly benefit one's reputation. In the study of Hauser and colleagues (2019), freeriding does harm one's reputation and cooperation does benefit one's reputation. Therefore, we still expect less cooperation in our follow-up study compared to the study of Hauser and colleagues (2019).

This follow-up study would also allow us to investigate how free partner choice and (not) being paired with your preferred partner impacts partner selection over time. We expect that participants will change their partner preference when they cannot be paired with their preferred partner. That is, based on the findings of our study and based on previous research (Schaefer, 2012), we expect (almost) all participants to prefer to be paired with high-value partners, i.e. partners with a high income and a high productivity. Someone without a high income and without a high productivity can therefore never be paired with a high-income high-productivity other. As a consequence, people without a high income and without a high productivity are expected to change their preference over time, because they can never be paired with their preferred partner. Experiment 1 showed that people with a high income and a low productivity are the second most preferred partners, so we hypothesize that participants would switch to selecting high-income low-productivity partners after experiencing one or multiple non-matches with a high-income high-productivity other. Furthermore, we expect that resource inequality (accumulated wealth) will grow over time if people can freely select their partner. If people only cooperate with similar others, people with a high income and a

high productivity are expected to accumulate most wealth, while least will be accumulated by low-income low-productivity people. Consequently, the inequality gap will further widen.

Finally, we could investigate *why* free partner choice impacts partner selection and cooperation over time. For this purpose, we could again measure expectations about others' cooperativeness at the beginning of the experiment. We expect partner preference to correlate with expectations about the investments of each partner Type and we expect expectations about others' cooperativeness to be relatively accurate.

Conclusion

This thesis describes the results of two experiments that investigated the effects of free partner choice on cooperation under inequality. In Experiment 1 we found that free partner choice and inequality in income and productivity impact partner selection and cooperation. In addition, we showed that expectations about others' cooperativeness can partly explain these effects. In Experiment 2 we found that motivations related to fairness, maximizing (joint) outcomes, and similarity underlie expectations about others' cooperativeness under inequality. These motivations underlie preferences for combining incomes and productivities as well. Furthermore, we showed that participants' actual cooperation levels (in Experiment 1) are in line with expected cooperation levels of third parties (in Experiment 2). These results suggest that cooperation in current societies, in which inequality is omnipresent and people can often choose with whom to cooperate, might differ from the predictions made by classic models of cooperation that do not take inequality and free partner choice into account.

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Appendix A

Demographics

We measured participants' age, gender, education, country, socioeconomic status (SES), income, and the number of persons in their household.

Age

Participants had to indicate how old they were in an open question.

Gender

Participants had to indicate their gender. The options were: 1) Female, 2) Male, 3) Other, and 4) Prefer not to say.

Education

Participants had to indicate the highest level of school they have completed or the highest degree they have received. The options were: 1) Less than high school degree, 2) High school graduate (high school diploma or equivalent including GED), 3) Some college but no degree, 4) Associate degree in college (2-year), 5) Bachelor's degree in college (4-year), 6) Master's degree, 7) Doctoral degree, and 8) Professional degree (JD, MD).

Country

Participants had to select the country in which they currently reside from a drop-down list.

Socioeconomic Status

SES was measured using the MacArthur scale of subjective social status (Adler & Stewart, 2007). The MacArthur Scale of Subjective Social Status was presented in a ladder format with 8 steps (see Figure A1). We asked participants to think of this ladder as

representing where people stand in society. At the top of the ladder are the people who are best off – those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off – who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the very top; the lower you are, the closer you are to the people at the very bottom. We asked participants where they would place themselves on this ladder (on a scale from 1 – 8).

Figure A1. Illustration of the ladder used in the "MacArthur" Scale of Subjective Social Status.

Income

We asked participants for their yearly net household income (so after tax). The options were: 1) Less than £10.000, 2) £10.000 - £19.999, 3) £20.000 - £29.999, 4) £30.000 - £39.999, 5) £40.000 - £49.999, 6) £50.000 - £59.999, 7) £60.000 - £69.999, 8) £70.000 - £79.999, 9) £80.000 - £89.999, 10) £90.000 - £99.999, 11) £100.000 - £109.999, 12)

£110.000 - £119.999, 13) £120.000 - £129.999, 14) £130.000 - £139.999, 15) £140.000 - £149.999, and 16) More than £150.000.

The Number of Persons in Their Household

Participants had to indicate of how many persons their household consisted (including themselves) in an open question.

Appendix B

Earnings

We investigated whether there was an effect of inequality on participant's earnings. To calculate earnings, participants' relative contributions were multiplied by their Type's multiplier. These values were summed in each pair. This value was then equally divided over the two participant Types within each pair. The relative number of units kept by each Type was added to this share from the public good.

When looking at the earnings, we observe that participants with a high income and a high multiplier (HH) earned relatively most (M = 133.3), while participants with a low income and a low multiplier (LL) earned relatively least (M = 115.8, see Figure B1A). Furthermore, as can be seen in Figure B1B, most was earned when similar Types with a high multiplier were paired together (i.e. HH_HH & LH_LH).

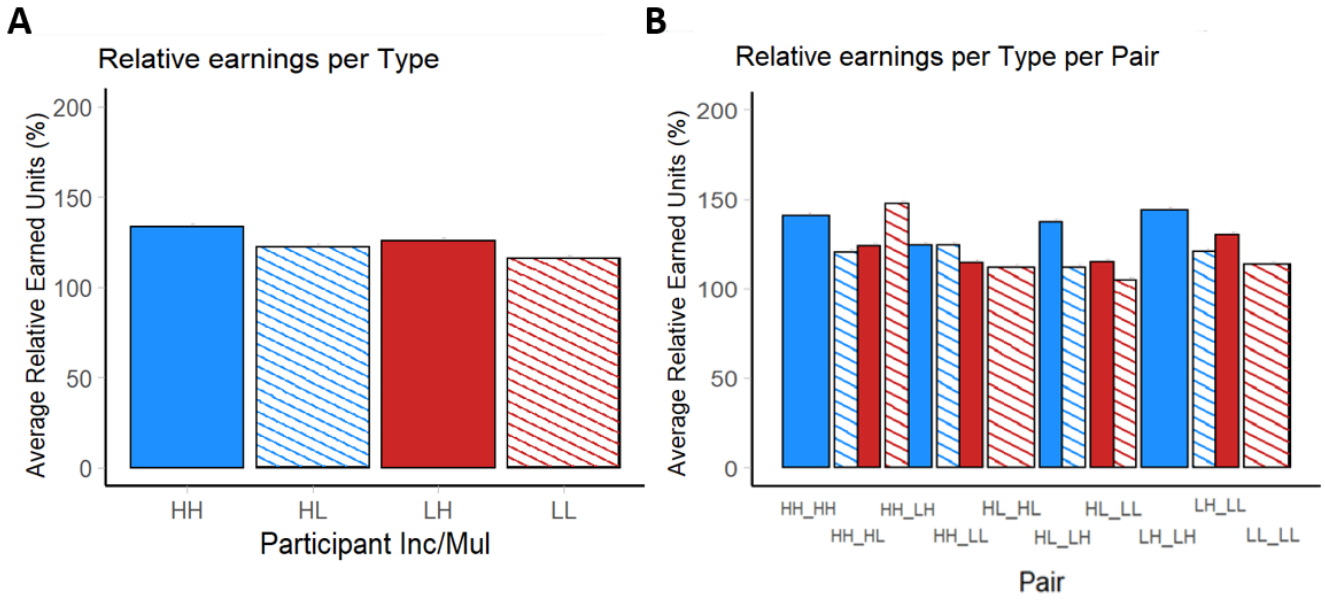

Figure B1. Relative earnings under inequality. A) Relative earnings for each participant Type. B) Relative earnings for each participant Type in each pair.