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Are teams less inequality averse than individuals?

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Abstract: We compare inequality aversion in individuals and teams by means of both within- and between-subject experimental designs, and we investigate how teams aggregate individual preferences. We find that team decisions reveal less inequality aversion than individual initial proposals in team decision-making. However, teams are no more selfish than individuals who decide in isolation. Individuals express more inequality aversion in their initial proposals in teams probably partly because they anticipate the selfishness of other members. Within teams, the member with median social preferences leads the team decision and the most inequality averse player makes the largest concessions. Finally, social image has little influence except that the lack of anonymity slows down the aggregation of preferences.

Keywords: Team, inequity aversion, preference aggregation, social image, experiment
JEL classification: C91, C92, D03, D63, D72

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1. INTRODUCTION

Social comparisons are widespread in human societies. Most individuals compare their performance, their wealth, and their opportunities to those of relevant others, and differences affect their utility. While some individuals enjoy outperforming others, many people are inequality averse. In economic models such as Fehr and Schmidt's (1999) and Bolton and Ockenfels' (2000), inequality aversion captures the fact that people care about both their own material payoff and the distribution of payoffs between them and others. To date, the literature on inequality aversion has almost exclusively considered individual preferences. Yet, groups might also suffer from guilt and envy when comparing themselves to other groups. This possibility is particularly relevant when a group feels discriminated against by another group or when its perspectives are lower compared to others'. This issue is important because inequality aversion between groups may lead to social conflicts.

If teams may be inequality averse, it is unclear whether this preference is stronger or weaker than in individuals. We explore this issue by addressing four questions. First, we study whether guilt and envy in various allocation tasks differ between individuals and teams. Second, we investigate whether individual initial choices, which will be aggregated in team decisions, differ from individual choices made in isolation, revealing the role of the decision-making context. Third, we explore who in the team has the strongest influence on the team decision. Finally, we study how social image concerns affect team decision-making when interactions within teams are no longer anonymous.

The first research question relates to measuring the difference in preferences between individuals and teams. Many previous studies using a variety of games have found that teams behave more rationally and selfishly than individuals (Charness and Sutter, 2012), while others find that the difference depends crucially on the nature of the task and on the decision-making procedure (*e.g.*, Kocher and Sutter, 2007). These studies did not explore inequality aversion. A recent exception is Balafoutas *et al*. (2014), who show that teams express the same guilt as individuals; they are more benevolent than individuals in the domain of disadvantageous inequality and more efficiency-oriented. Our hypothesis is that team decisions in our games reveal less inequality aversion than individual decisions because a more inequality averse individual in a team will have more difficulty to impose a decision that leads to a sacrifice on all team members. However, this process may depend on the decision-making procedure and, in particular, on whether the anonymity of team members is preserved or not during the aggregation process.

Our second and third questions examine the aggregation of individual preferences to form team decisions. We start by comparing the individual allocation choices made in isolation and those made in a team environment in which unanimity is required to form the team decision. Indeed, individuals may submit more inequality averse proposals within a team than in an isolated context to influence the bargaining process. Then, we explore whether some individuals have a stronger bargaining power in the team decision-making process, testing the hypothesis that median players make less concessions than other team members. We thus contribute to the literature on how individual preferences are aggregated in groups (Zhang and Casari, 2012; Ambrus *et al*., 2014).

The last question investigates how the degree of anonymity affects individual initial proposals in teams and their adjustment during the aggregation process. In real settings, collective choices by juries, boards, and families usually result from non-anonymous interactions. When it is common information that a proposal emanates from a physically identified team member, allocation choices are expected to express more inequality aversion than when choices are made anonymously, due to social image concerns (see, *e.g.*, Benabou and Tirole, 2006) because team members can assign personal responsibility to a specific member. In this context, anonymity may facilitate convergence to the group norm because of deindividuation (Reicher *et al*., 1995).

We have designed a laboratory experiment that allows us to compare inequality aversion between individuals and teams and to investigate the aggregation process. We elicit inequality aversion at the individual level by means of allocation tasks introduced by Blanco *et al*. (2011), specifically an Ultimatum Bargaining Game and a Modified Dictator Game. Blanco *et al*. (2011) used these tasks to test the model of Fehr and Schmidt (1999) using a within-subject design. Our contribution is to adapt this design to elicit advantageous and disadvantageous inequality aversion at the team level when all team members receive the same payoff. Pairs of three-player teams perform the same allocation tasks. The team decisions result from votes made under a unanimity rule without communication. Using a within-subject design allows us to compare individuals' decisions made in isolation and their initial proposals within a team. To identify the role of social image, we use a between-subject design and compare a treatment in which individual proposals in teams are anonymous with a treatment in which subjects can identify their team members and their proposals. Finally, to test the predictive value of our estimated guilt and envy parameters in a different environment, we use the Production Game designed by Yang *et al*. (2013) both in its original individual version and in our team environment.

We have four main findings. First, we find no within- or between-subject differences between individual and team advantageous and disadvantageous inequality aversion. Second, the initial proposals made in a team context show more inequality aversion than the individual decisions made in isolation by the same subjects. This effect is not primarily driven by social image concerns, as we find no systematic difference between initial proposals made anonymously or non-anonymously. It cannot be explained either by efficiency concerns, as the difference is observed even when efficiency is kept constant across the decision problems. This result likely stems from the fact that in the absence of information about team members' preferences, individuals adjust their initial proposals in the direction of higher inequality aversion, possibly anticipating more selfishness from team members. Third, team members with median level of inequality aversion preferences drive the aggregation process, while the above median players make the largest concessions towards the position of the median members. This drives the team decision towards less inequality aversion compared to the mean initial proposals. Finally, if the guilt parameter predicts the advantaged team's behavior in the Production Game when choices are not anonymous, the envy parameter shows no predictive power in any configuration of this game. It suggests that this parameter captures a mixture of inequality aversion and other motives that do not influence behavior in the Production Game. Alternatively, preferences might not be stable across games.

The remainder of this paper is organized as follows. Section 2 briefly reviews the related literature. Section 3 presents the experimental design and procedures. Section 4 analyzes the results, and Section 5 discusses these results and concludes the paper.

2. RELATED LITERATURE

Our paper connects the literatures on inequality aversion and on team decision-making. Tests of individual inequality aversion models have first been developed at the aggregate level (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Then, several experimental studies attempted to elicit these preferences at the individual level (Engelmann and Strobel, 2004; Bolton and Ockenfels, 2006; Dannenberg *et al*., 2007; Güth *et al*., 2009; Bartling *et al*., 2009; Blanco *et al*., 2011; Yang *et al*., 2013). For example, Blanco *et al*. (2011) elicit the advantageous inequality aversion (or guilt) and the disadvantageous inequality aversion (or envy) parameters in Fehr and Schmidt's model by means of two multiple price lists based on a Modified Dictator Game and an Ultimatum Game.

Within-subject tests of the predictive power of the inequality aversion preference estimates have produced mixed evidence. In particular, Engelmann and Strobel (2004) find no support for either

Fehr and Schmidt's model or Bolton and Ockenfels' model in a simple distribution game. Comparing the performance of the Fehr and Schmidt's model at both the aggregate and the individual levels, Blanco *et al*. (2011) conclude that its predictive power is limited at the individual level. In contrast, Dannenberg *et al*. (2007) show that the guilt parameter has some explanatory power in social dilemmas. These tests have used sequential-move prisoner's dilemma games (Blanco *et al.,* 2011) or public good games (Blanco *et al*., 2011; Dannenberg *et al*., 2007). The novel production game introduced by Yang *et al*. (2013) has the advantage of providing precise normative standards in a rich environment offering more than binary choices and leaving no room for risk attitudes. It shows the robustness of the inequality aversion model to efficiency concerns and variations in payoff scales. In our paper, we adjust the games used in Blanco *et al*. (2011) and in Yang *et al*. (2013) to elicit inequity aversion in teams.

We also contribute to the literature on group decision-making. Many studies have found that teams behave more selfishly than individuals in various games (Kugler *et al*., 2012)[1] but not all.[2] This behavior may be due either to the fact that people behave differently in groups, to the higher persuasiveness of selfish people, or to the skewness of the distribution of individual members' preferences. Ambrus et al. (2014) argue in favor of the third explanation. In groups, median members have a stronger influence because extremes on both sides neutralize each other. If the median member's preference is below the mean in terms of pro-social preferences, it drives the group choice toward greater selfishness. Teams also behave more rationally in non-strategic

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[1] This result holds for dictator games (Luhan *et al*., 2009), sequential games such as ultimatum (Robert and Carnevale, 1997; Bornstein and Yaniv, 1998), trust (Cox, 2002; Kugler *et al*., 2007; Song, 2009), centipede (Bornstein *et al*., 2004), and power-to-take games (Bosman *et al.*, 2006), as well as simultaneous games such as public goods (Van Vugt *et al*., 2007), beauty contests (Kocher and Sutter, 2005; Kocher *et al.*, 2006; Sutter, 2005), and auctions (Cox and Hayne, 2006; Sutter *et al*., 2009; Sheremeta and Zhang, 2010; Casari *et al*., 2011; Cheung and Palan, 2011).

[2] Cason and Mui (1997) find that teams act less selfishly than individuals in a dictator game. This group polarization is due more to social comparisons (which give more weight to pro-social individuals) than to persuasion. Müller and Tan (2013) find less selfish team choices in sequential market games. Kocher and Sutter (2007) find mixed evidence in a gift-exchange game. Franzen and Pointner (2013) find no difference in a dictator game with communication.

interactions.[3] Studies have examined how inequality aversion in teams affects the design of contracts (Rey-Biel, 2008; Bartling and von Siemens, 2010), sharing rules (Gill and Stone, 2012), peer pressure (Mohnen *et al*., 2008), sanction and cooperation (Masclet and Villeval, 2008; Kölle *et al*., 2011). However, the comparison between inequality aversion in individuals and in teams has remained almost unexplored. One exception is Balafoutas *et al*. (2014), who use a double price-list technique under both individual and team regimes with free communication. They find that teams eliminate choices consistent with inequality aversion and spitefulness and they favor choices that increase efficiency. In contrast to them, we attempt at identifying the role of image concerns in team preferences without communication and we measure the predictive power of Fehr and Schmidt's model for teams in a production game.[4]

The individual-team differences may depend crucially on the decision-making procedure. Most studies use face-to-face with unrestricted communication (Kocher and Sutter, 2005; Kocher *et al*., 2006; Kugler *et al*., 2007; Sutter *et al*., 2009; Ambrus *et al*., 2014; Balafoutas *et al*., 2014). Bosman *et al.* (2006) find that the combination of the decision rule and the distribution of players' types determines the differences. Kocher and Sutter (2007) show that groups behave more selfishly than individuals in an anonymous computerized procedure but not in a face-to-face protocol. In our paper, we do not allow free communication but we manipulate anonymity because it may affect the process of deindividuation within teams, in an unpredictable direction though.[5]

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[3] Teams make fewer mistakes (Fahr and Irlenbusch, 2011), suffer less from hindsight bias (Stahlberg *et al*., 1995), myopic loss aversion (Sutter, 2007), and overconfidence (Sniezek, 1992), are more risk averse (Baker *et al*., 2008; Shupp and Williams, 2008) or closer to risk neutrality (He *et al.*, 2012) or take better risks (Rockenbach *et al*., 2007).
[4] There are other differences with our design. Contrary to Balafoutas *et al*., our games are played in a single session and we alternate the order between team and individual decisions. In their design, unanimity must be reached in five rounds maximum, while in our case, we apply a time constraint.
[5] Anonymity as a key factor of deindividuation has been extensively studied in social psychology. The deindividuation theory of Festinger *et al*. (1952) predicts that the anonymity of individuals in a group may lower their sense of personal identity and reduce compliance with the group norm. In contrast, the social identity model of deindividuation (Reicher *et al*., 1995) suggests that anonymity facilitates the alignment of the individual with the group's preferences.

3. EXPERIMENTAL DESIGN AND PROCEDURES

3.1. The games

Individuals' inequality aversion

To estimate the individuals' disadvantageous and advantageous inequality aversion parameters as defined in Fehr and Schmidt's model, we replicate two of the games used in Blanco *et al*. (2011).[6] Each game consists of 21 decision problems, as shown in Table 1. The games are played under the veil of ignorance using the strategy method.[7]

Table 1. The Ultimatum Game and the Modified Dictator Game

Decision problem	Ultimatum Game			Modified Dictator Game	
	Proposer's decision	Responder's decision		Dictator's decision	
		Option A	Option B	Option A	Option B
1	(400，0)	Reject	Accept	(400，0)	(0，0)
2	(380，20)	Reject	Accept	(400，0)	(20，20)
3	(360，40)	Reject	Accept	(400，0)	(40，40)
4	(340，60)	Reject	Accept	(400，0)	(60，60)
5	(320，80)	Reject	Accept	(400，0)	(80，80)
6	(300，100)	Reject	Accept	(400，0)	(100，100)
7	(280，120)	Reject	Accept	(400，0)	(120，120)
8	(260，140)	Reject	Accept	(400，0)	(140，140)
9	(240，160)	Reject	Accept	(400，0)	(160，160)
10	(220，180)	Reject	Accept	(400，0)	(180，180)
11	(200，200)	Reject	Accept	(400，0)	(200，200)
12	(180，220)	Reject	Accept	(400，0)	(220，220)
13	(160，240)	Reject	Accept	(400，0)	(240，240)
14	(140，260)	Reject	Accept	(400，0)	(260，260)
15	(120，280)	Reject	Accept	(400，0)	(280，280)
16	(100，300)	Reject	Accept	(400，0)	(300，300)
17	(80，320)	Reject	Accept	(400，0)	(320，320)
18	(60，340)	Reject	Accept	(400，0)	(340，340)
19	(40，360)	Reject	Accept	(400，0)	(360，360)
20	(20，380)	Reject	Accept	(400，0)	(380，380)
21	(0，400)	Reject	Accept	(400，0)	(400，400)

Note: The first numbers in parentheses display the proposer's payoffs, the second numbers the receivers' payoffs.

[6] Fehr and Schmidt define utility as follows: $U_i = x_i - \frac{\alpha_i}{n-1}\sum_{k\neq i}\max(x_k - x_i, 0) - \frac{\beta_i}{n-1}\sum_{k\neq i}\max(x_i - x_k, 0)$, assuming that $0 \le \beta_i \le \alpha_i$ and $\beta_i < 1$, with α representing the disadvantageous inequality aversion parameter and β the advantageous inequality aversion parameter, and with x_i and x_k representing the payoffs of players *i* and *k*, respectively. In a two-player game, utility is thus defined as $U_i(x_i, x_j)=x_i - \alpha_i(x_j - x_i)$ if $x_i \le x_j$ and $U_i(x_i, x_j)=x_i - \beta_i(x_i - x_j)$ if .$x_i > x_j$.

[7] Brandts and Charness (2011) survey the literature to compare the strategy method and the direct-response method. A total of 16 out of the 29 comparisons show no difference, four find differences and nine find mixed evidence.

The Ultimatum Game (UG) involves a proposer and a responder. The proposer must share a pie of 400 points between himself and the responder. He makes an offer *S* to the responder, keeping (400 - *S*) to himself. If the responder rejects the offer (he chooses option A), both players earn zero. If the responder accepts the offer (he chooses option B), the share is implemented. The proposers' offers are restricted to multiples of 20, leading to 21 distributions from (400, 0), (380, 20), … to (0, 400). Subjects make their 21 decisions in each of the two roles sequentially on two separate screens to minimize interactions between the two decisions.

In the Modified Dictator Game (MDG), the dictator also receives a pie of 400 points and she must decide how many points she is willing to pay to equalize payoffs between herself and the receiver. There are 21 decision problems with two options. The left option always pays 400 points to the dictator and nothing to the receiver. The right option gives equal payoffs to both players and varies from (0, 0), (20, 20), … to (400, 400). Each subject makes a choice in the role of a dictator.

In both games, we impose the restriction of single switching between the two options in the 21 problems.[8] Specifically, in the UG, responders choose the number of the decision problem from which they accept all of the proposer's offers; in the MDG, dictators select the number of the decision problem from which they always choose equal sharing. It was made clear to the subjects that they could switch from the first problem and that they were also allowed not to switch at all. This ability gives each responder in the UG a single minimum acceptable offer that determines the envy parameter, α. In the MDG, this ability reveals the maximum amount that the dictator is willing

[8] Imposing single switching is in contrast with Blanco *et al*. Of course, rational players with monotone preferences should switch only once from Option A to Option B because their payoff becomes larger in the UG for all decision problems beyond the switching point; similarly in the MDG, the egalitarian outcome is always cheaper beyond this point. However, approximately 15% of subjects switched several times in Blanco *et al*. Imposing single switching facilitates team decision-making and rules out inconsistent choices. The same procedure has been applied by Tanaka *et al*. (2010) to elicit risk preferences and time consistency.

to sacrifice to implement equal sharing, which allows us to estimate the guilt parameter, β. These parameters are calculated as in Blanco *et al.*, using non-linear monotonic conversion.[9]

The actual role in each of these games was randomly assigned at the end of the session, and only one of the 21 decision problems in each game was randomly selected for payment.

In addition, we used the Production Game (PG, hereafter) of Yang *et al*. (2012) to test the predictive power of the inequality aversion estimates from the UG and the MDG for individuals and teams. The PG involves two workers, A and B, who are in charge of departments 1 and 2, respectively. Each worker chooses an effort level (an integer between 0 and 100, multiple of 10) that determines the production of his department, p_i:

$$p_i(e_i) = 4e_i - e_i^2/100,\ i = A, B$$

The effort of each worker in his department conditions both his payoff and his co-worker's payoff. Indeed, the total income in this game is determined by four elements. (1) A's fixed salary, s_i, is 200 points for A and 0 points for B. (2) Bonus 1 depends on A's production in department 1: this production is equally divided between A and B. (3) Bonus 2 depends on B's production in department 2: this production is also equally shared between A and B. (4) Effort is costly: each unit

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[9] As explained by Blanco *et al.*, to determine a near point estimate of α_i for each individual, we can suppose that s_i' is the minimum offer responder *i* is willing to accept and s_i' *- 20* is the highest offer that *i* rejects. A responder is indifferent between accepting an offer $s_i \in [s_i' - 20, s_i']$ and rejecting it. Thus, $U_i(s_i, 400 - s_i) = s_i - a_i(400 - s_i - s_i) = 0$, which gives

$$a_i = \frac{s_i}{[2(200 - s_i)]}.$$

Determining a near point estimate of β_i for each individual requires identifying the decision (x_i, x_i) for which the dictator in the MDG is indifferent between sharing equally and keeping her 400 points. If she switches to equal sharing at (x_i', x_i'), she prefers (400, 0) over $(x_i' - 20, x_i' - 20)$ but (x_i', x_i') over (400, 0). Thus, she is indifferent between (400, 0) and $(\tilde{x}_i, \tilde{x}_i)$, where $\tilde{x}_i \in [x_i' - 20, x_i']$ and x_i' Î $\{0, ..., 400\}$. So, β_i is estimated from the equation $U_i(400, 0) = U_i(\tilde{x}_i, \tilde{x}_i)$ iff $400 - 400\beta_i = \tilde{x}_i$, which gives $\beta_i = 1 - \frac{\tilde{x}_i}{400}$.

We assume $s_i = s_i' - 10$ and $\tilde{x}_i = x_i' - 10$. For the responders who accept only $s_i > 200$ in the UG, we only know that $\alpha_i \geqslant 4.5$, and therefore we consider arbitrarily that $\alpha_i = 4.5$, and if $s_i' = 0$, we set $\alpha_i = 0$. Similarly, we set $\beta_i = 0$ for subjects who prefer (400,0) to (400,400) but who perhaps would have $b_i < 0$, and we set $\beta_i = 1$ for subjects who prefer (0,0) over (400,0) but who perhaps would have $\beta_i > 1$ because we cannot observe a switching point.

of effort in one's department costs 2 points to A and 1 point to B. The total income is therefore equal to the sum of the basic salary and half of Bonuses 1 and 2 minus the cost of effort, that is,

$$\pi_i(e_A, e_B) = s_i + \frac{1}{2}\sum_{j=A,B} p_j(e_j) - e_i c_i,\ i = A, B.$$

Because worker A always earns more than B regardless of the combination of efforts, the prediction is that worker A's effort should depend positively on his degree of guilt, while the effort of worker B should depend negatively on his degree of envy. Subjects must make two simultaneous effort decisions in the role of A and B, as indicated in Figure A1 in Appendix 2. For each decision, the subjects can use a calculator on their screen to explore the consequences of any possible combination of effort exerted by A and B before validating their two effort choices.[10] The actual roles in the pairs are randomly assigned at the end of the session.

Inequality aversion in teams

To elicit team inequality aversion, we paired teams of three individuals who play a collective version of the previously described Ultimatum and Modified Dictator Games. We also implemented a team version of the Production Game to study whether team inequality aversion elicited with the UG and the MDG has predictive value. We use the same tables as for individual decisions. To hold the player's monetary incentives comparable across individual and team conditions, the payoffs achieved in the team games are paid to each team member. For example, if the selected decision in the DG pays 400 points to the dictator team and leaves nothing for the receiver team, each of the three dictator team members earns 400 points and each of the three receiver team members receives 0. The actual role of a team in each game was randomly assigned at the end of the session, and one decision problem in each of the UG and the MDG was randomly selected for payment.

[10] A subject's screen displays his effort level, the bonus from his department, his effort cost and his total income. The bonus from the other department cannot be displayed because it depends on the other worker's effort. The consequences of this other effort could be explored in the right panel of the screen.

Unanimity is required to form a team decision.[11] All team members must agree on *i*) the offer proposed to the responder team in the UG; *ii*) the number of the decision problem from which the team accepts all of the proposer team's offers in the UG; *iii*) the number of the decision problem from which the dictator team always chooses equal sharing in the MDG; and *iv*) the efforts of working teams A and B in the PG. Precisely, in each game, the team members must simultaneously submit their individual proposal for the team decision. Then the three proposals are displayed on the members' screens. If they are not identical, a new round starts and each member must submit a new proposal. It is made clear that it is allowed to submit the same proposal as in the previous round. This procedure is repeated until all teammates submit identical proposals. The number of rounds is unrestricted within the limit of 10 minutes for each team's decision. In case unanimity has not been reached after the 10 minutes have elapsed, it is common information that the computer selects one decision at random. By imposing simultaneous moves without free communication, our environment is highly artificial but it allows us to observe simply the evolution of proposals when all members make the same number of proposals and can only persuade others through their proposals.

One advantage of our design is that for each subject, we are able to observe his individual decision made in isolation, which should reveal his inner preference, his initial proposal in the team bargaining, and his final decision as aggregated in the team decision.

3.2. Treatments and matching protocol

The experiment consists of three main treatments using a between-subjects design. Each treatment includes five parts that allow us to make within-subject comparisons across parts. In the three

[11] Many papers on group decisions impose unanimity (e.g., Sutter, 2005; Kocher and Sutter, 2005, 2007; Shupp and Williams, 2008; Luhan et al., 2009; Sutter et al., 2009). Some use the majority (Baker *et al*., 2008; Harrison *et al*., 2012) or the median (Bischoff and Krauskopf, 2013). Others allow for unrestricted deliberation (Cason and Mui, 1997; Bornstein *et al*., 2004; Bosman *et al*., 2006; Schupp and Williams, 2008; Ambrus *et al*., 2014). Choosing the unanimity instead of the majority rule has enabled us to study in details the convergence process to the team decision.

treatments, Parts 1 and 2 correspond to the one-shot UG and MDG played individually, whereas Parts 3, 4 and 5 differ across treatments. The I-I (I for *Individual*) treatment involves only individual decision-making: Parts 3 and 4 replicate Parts 1 and 2 (UG and MDG) and Part 5 consists of the individual PG. The I-AT (AT for *Anonymous Team)* treatment introduces collective decision-making in Parts 3 and 4 (UG and MDG) and in Part 5 (PG). Players do not know whom they are interacting with, and there is no possible identification of team members. The I-NAT (NAT for *Non-Anonymous Team*) treatment is identical to the I-AT treatment with two exceptions. First, we lift anonymity within the team: at the beginning of Part 3, players are told that the three participants seated in the same row belong to the same team, with identification numbers I, II, and III assigned to the players seated at the left, middle and right of the row, respectively. Second, the number of the player appears next to his proposals so that teammates can trace the evolution of a player's proposals across rounds. In contrast, players receive no information on the composition of the team they are paired with and on the proposals made within the other team.

To control for possible order effects, we also conducted the NAT-I treatment. Its content is identical to the I-NAT treatment, except that the appearance order of Parts 3 and 4 and Parts 1 and 2 is reversed, i.e., participants played the one-shot UG and MDG individually after they had played the same two games in a team context. This treatment allows us to identify social influence or persuasion by studying whether decisions made in isolation after a team decision differ from those made before the team bargaining.

The appearance order of the UG and the MDG was randomized across sessions, but the order of the two games was held constant in Parts 1 and 2 and in Parts 3 and 4 in the same session. A perfect stranger matching protocol rules out reciprocity and reputation building across parts. Each team (individual) was paired with a different team (individual) across parts, whereas the composition of each team was kept constant across parts.

Table 2 summarizes the key features of our experimental design.

Table 2. Summary of the experimental design

Treatment	Part 1	Part 2	Part 3	Part 4	Part 5
I-I	Individual UG/MDG	Individual MDG/UG	Individual UG/MDG	Individual MDG/UG	Individual PG
I-AT	Individual UG/MDG	Individual MDG/UG	Team UG/MDG Anonymity	Team MDG/UG Anonymity	Team PG Anonymity
I-NAT	Individual UG/MDG	Individual MDG/UG	Team UG/MDG No anonymity	Team MDG/UG No anonymity	Team PG No anonymity
NAT-I	Team UG/MDG No anonymity	Team MDG/UG No anonymity	Individual UG/MDG	Individual MDG/UG	Team PG No anonymity

Note: UG for Ultimatum Game, MDG for Modified Dictator Game, and PG for Production Game.

3.3. Procedures

The experiment was conducted at the laboratory of Beijing Normal University. A total of 336 volunteers were recruited via announcements on the bulletin board system and in teaching and accommodation buildings of local universities. 24 subjects participated in each of 14 sessions (2 sessions with I-I and 4 with each of the I-AT, I-NAT and NAT-I treatments). In total, we obtained 48 individual observations for the I-I treatment and 32 team observations for each of the I-AT, I-NAT and NAT-I treatments. Due to inability to reach unanimity, we lost a few team observations either in the role of the dictator in the MDG (1 in both I-AT and NAT-I) or in the role of the proposer in the UG (4 in I-AT and 2 in NAT-I).

The experiment was computerized using z-Tree (Fischbacher, 2007). Upon arrival, the subjects were assigned randomly to a computer terminal. Each part was introduced sequentially after completion of the previous one. Instructions were distributed and questions were answered in private (see Appendix 1). Subjects were given no information about the number of parts and they received no feedback on the outcome of any part until the end of the entire experiment.

Sessions lasted approximately 90 minutes. Participants received in cash the sum of their earnings for all parts from an assistant who was not aware of the content of the experiment. This was made common information in the instructions. Participants earned on average 82.70 Yuan (about $13.65), including a 10-Yuan show-up fee.

4. RESULTS

First, we report descriptive statistics on the envy (aversion to disadvantageous inequality, α) and guilt (aversion to advantageous inequality, β) parameters in individuals and teams. Second, we compare inequality aversion for individuals and teams across treatments. Third, we explore the process that leads to unanimous team decisions. Last, we test whether the guilt and envy parameters predict behavior in the Production Game.

4.1. Guilt and envy in individuals and teams

Table 3 displays for each treatment the distribution of the two parameters using the same intervals as Fehr and Schmidt (1999) and Blanco *et al*. (2011) based on the individual decisions, the individual initial proposals in team decision-making, and the team decisions.

At the extreme ends of the distribution, we find 14% of subjects with α=0, 10% of subjects with $\alpha \geq 4.5$, 8% of subjects with β=0 and 5% of subjects with β=1.

Table 3. Distribution of the α and β parameters for individual and team decisions

		Envy parameter (α)				*Guilt parameter (β)*		
		α<0.4	0.4≤α<0.92	0.92≤α<4.5	4.5≤α	β<0.235	0.235≤β<0.5	0.5≤β
Fehr and Schmidt (1999)		30%	30%	30%	10%	30%	30%	40%
Blanco et al. (2011)		31%	33%	23%	13%	29%	15%	56%
Our data								
Individual decisions	All treatments	35%	24%	31%	10%	23%	23%	54%
Individual initial proposals	I-AT	26%	18%	37%	19%	16%	18%	66%
	I-NAT	25%	19%	45%	11%	15%	20%	66%
	NAT-I	30%	18%	37%	16%	27%	32%	41%
Team decisions	I-AT	21%	29%	39%	11%	13%	19%	68%
	I-NAT	22%	25%	47%	6%	16%	25%	59%
	NAT-I	33%	23%	40%	3%	29%	32%	39%

Using point estimates, Mann-Whitney rank-sum tests (M-W, hereafter)[12] indicate no significant difference between the values of α and β calculated from individual decisions in our experiment and those reported in Blanco *et al*. (2011) (p=0.594 for α and p=0.878 for β).[13,14] Kolmogorov-Smirnov tests indicate that the distributions of each parameter in the two samples are similar (p=0.234 for α and p=0.562 for β). Finding no difference in inequality aversion between a communist country (China) and a traditionally market-oriented economy (the U.K.) is interesting, given the huge differences in cultural and political backgrounds. Table 4 reports the mean values of the guilt and envy point estimates based on the same three types of decisions, by treatment.

Table 4 reveals an inverted U-shaped trend of variation in both α and β from individual decisions to individual initial proposals, and from initial proposals to team decisions in all treatments with team decision-making, regardless of the order of decisions. Indeed, the mean values of α and β are almost always higher in the individual initial proposals compared to both the individual and the team decisions. Individuals make on average more inequality-averse initial proposals in teams than when they decide in isolation. Teams' final decisions reveal a similar degree of inequality aversion than individual decisions, except in the I-NAT treatment where the lift of anonymity leads to a marginally higher degree of guilt in team decisions.

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[12] All our non-parametric tests are two-tailed. Each individual gives one independent observation in the individual decisions and initial proposals, while each team gives one independent observation for the team decisions. Considering $s_i = s_i' - 10$ and $\tilde{x}_i = x_i' - 10$ in the calculation of the envy and guilt parameters is an approximation that does not impact the results of the non-parametric statistics because they are based on ordinal rankings (see Blanco *et al.*, 2011).

[13] In the UG, the mean individual offer is 40% of the pie (the same in teams) and 32.74% of the subjects (33.03% of teams) chose the equal split. In Blanco *et al*., these percentages are respectively 40% and 48%. The median and mean of both the individual and team acceptance threshold correspond to problem #6 (300, 100). In the MDG, the average individual switching point is at problem #12 (220-220) (the same in teams) and 32.74% of the subjects (27.27% of teams) switch to the egalitarian option before problem #10. In Blanco *et al*., where subjects must share a pie of £20, the mean was also problem #12 (£11-£11 *vs*. £20-£0), but 43% of the subjects switched in the range (£0-£0) to (£9-£9). This comparison indicates some but no dramatic differences between individual decisions in our data and those reported in Blanco *et al*.

[14] In the absence of individual data to compare with Fehr and Schmidt (1999), we conducted Chi-squared tests like Blanco *et al*. with the aggregate data for the distribution percentages in the various categories. There is no significant difference between our distributions and those reported in Fehr and Schmidt (p=0.785 for α and p=0.140 for β).

Table 4. Mean values of the α and β parameters for individual and team decisions, by treatment

Treatments	Individual decisions			Individual initial proposals			Team decisions		
	Mean	S.D.	Obs.	Mean	S.D.	Obs.	Mean	S.D.	Obs.
Envy parameter (α)									
I-I	1.07	1.43	48	-	-	-	-	-	-
I-AT	1.29	1.53	84	1.68 [a]	1.67	84	1.34	1.43	28
I-NAT	1.04	1.29	96	1.49 [a]	1.46	96	1.29	1.26	32
NAT-I	1.10	1.40	90	1.47 [b]	1.59	90	1.12	1.27	30
Guilt parameter (β)									
I-I	0.45	0.28	48	-	-	-	-	-	-
I-AT	0.51	0.29	93	0.54 [b]	0.28	93	0.51	0.20	31
I-NAT	0.45	0.27	96	0.53 [a]	0.26	96	0.50 [c]	0.21	32
NAT-I	0.36	0.29	93	0.39	0.24	93	0.35	0.22	31

Note: S.D. stands for standard deviations. The number of team observations is different for α and β because the number of teams reaching unanimity differs in the UG and the MDG. Superscripts indicate the level of significance of two-tailed Wilcoxon signed rank tests in which the reference is the parameters determined by the individual decisions, with [a] for 0.01 level of significance, [b] for 0.05 and [c] for 0.10.

The joint distributions of the α and β parameters in each treatment and for each type of decision are displayed in Figure A2 in Appendix 2. Spearman correlation coefficients indicate that α and β are not correlated in either individual decisions, initial proposals or team decisions in any treatment (p>0.100 in all cases). This result is consistent with Blanco *et al*. but in contrast with Fehr and Schmidt's assumption. Finally, when pooling treatments together, we find that 40% of the subjects violate Fehr and Schmidt's assumption that $\alpha \geq \beta$ when making individual decisions. This violation occurs for 33% of the team decisions in I-AT, 34% in I-NAT and 28% in NAT-I. Wilcoxon signed rank tests (W, hereafter) on the difference in means for each treatment indicate that teams are not significantly more or less likely than individuals to have $\alpha \geq \beta$ (p>0.100).

4.2. Within- and between-subject comparisons

Within-subject comparisons in each treatment

The I-I treatment shows no significant difference in the values of α (W tests, p=0.453) and β (p=0.929) between the two sequences of individual decisions. In the other treatments, the only significant difference between individual and team parameters is found in I-NAT for the guilt parameter β that is higher in teams (p=0.059). These results differ from the common finding in the literature stating that teams behave more selfishly than individuals. This result does not mean, however, that team decisions are simply the mean of individuals' preferences. Indeed, individual initial proposals differ from both decisions made in isolation and from the final team decision.

Comparing the individual initial proposals in teams and the individual decisions made in isolation reveals significant positive differences for both parameters. Regarding α, Wilcoxon signed tests indicate p-values of 0.005 in I-AT, 0.001 in I-NAT and 0.019 in NAT-I. The respective p-values for β are 0.033, 0.001 and 0.588. Thus, in most cases, the initial proposals in teams reveal more envy and guilt than the individual decisions.[15] This can be attributed to three reasons. First, individuals may anticipate that other team members are less inequality averse than themselves (recall that subjects receive no information about the preferences of their team members). Thus, they may strategically submit more inequality averse proposals in order to balance others' expectedly more selfish proposals. Second, the fact that a team decision impacts six people instead of two could amplify the inequality aversion of individuals who are motivated by efficiency concerns since in DG the size of the pie increases with equality along with decision problems. Third, behavior may be driven by social image concerns because proposals are shown to team members. If the second interpretation is correct, then we should observe a difference only for the β parameter since in the UG efficiency (as measured by the sum of payoffs) is kept constant across all the decisions. However, as indicated above and in Table A1 in the Appendix 2 we also find a significant difference in the value of α depending on whether it is based on individual decisions or on initial proposals. If

[15] This result is largely confirmed by the random-effects interval regressions and Tobit regressions reported in Table A1 in Appendix 2 in which we study the sensitivity of α and β to the type of decision by treatment. Detailed results from the post-regression tests are shown in Table A2.

the third interpretation is correct, then we should observe significantly larger differences between individual decisions and initial proposals in I-NAT than in I-AT. However, Chi-squared tests reject the difference between the two coefficients for both α (p=0.729) and β (p=0.148). These results provide stronger support to the first interpretation. This does not mean, however, that the inflation of the parameters in the initial proposals is driven by the most inequality averse players. Indeed, Spearman correlation coefficients indicate a negative correlation between the parameters from individual decisions and the degree of inflation (p=0.005 for α and p<0.001 for β). Relatively selfish people also increase the degree of inequality aversion of their initial proposal to the team.

Finally, comparing the individual initial proposals and the final team decisions reveals significant positive differences for α in I-AT (p=0.010) and NAT-I (p=0.023), but not in I-NAT (p=0.158). In most treatments, the aggregation process moves teams towards less envious decisions. In contrast, aggregation does not significantly modify the guilt parameter β (p=0.196 in I-AT, 0.282 in I-NAT and 0.394 in NAT-I), which could indicate a higher efficiency concern in teams.

Between-subject comparisons across treatments

We can first rule out the possibility that the differences between treatments are due to sample specificities. Pairwise comparisons show no significant difference in the guilt and envy parameters derived from individual decisions.[16] There is no significant difference either when comparing the second set of individual decisions in I-I and the team decisions in I-AT (M-W, p=0.142 for α, 0.266 for β) and I-NAT (p=0.110 for α, 0.398 for β). Consistent with the within-subject analysis, M-W tests indicate significant differences between the second set of decisions in I-I and the individual initial proposals in I-AT (p=0.036 for α, 0.068 for β) and I-NAT (p=0.032 for α, 0.080 for β).

[16] M-W tests give the following p-values for α: 0.673 for I-I *vs*. I-AT, 0.841 for I-I *vs*. I-NAT, and 0.650 for I-AT *vs*. I-NAT. The respective values for β are 0.277, 0.942, and 0.221. Using instead Fisher's exact tests for categorical outcomes gives the same qualitative conclusions. Kruskal-Wallis tests for I-I *vs*. I-AT *vs*. I-NAT indicate p=0.867 for α and 0.386 for β.

Because we find no difference between I-AT and I-NAT as regards both the initial proposals (M-W tests, p=0.719 for α, 0.834 for β) and the team decisions (p=0.940 for α, 0.754 for β), it is unlikely that social image motivates the higher inequality aversion in initial proposals within teams.

Finally, we compare the I-NAT and the NAT-I treatments to explore order effects. Starting a session with team decision-making reduces people's guilt in initial proposals and in team decisions (M-W tests, p<0.001). Guilt in individual decisions is also lower when individual decisions follow team decisions (p=0.031) than when they precede them. We cannot, however, conclude that this result stems from social information or persuasion when others' preferences are revealed by the aggregation process. Indeed, guilt in initial proposals in NAT-I is also lower than that in individual decisions in the I-NAT treatment in which team decision-making follows decisions made in isolation. In contrast, the degree of envy revealed by individual decisions, initial proposals and team decisions is not affected by the order of the decisions (p=0.990, 0.613, and 0.455, resp.).

Econometric analysis of envy and guilt in individuals and teams

Table 5 reports Tobit regressions (because data are censored) of the determinants of the envy parameter α (models (1) to (4)) and the guilt parameter β (models (5) to (8)) as calculated from the individual decisions from all treatments, the individual initial proposals and the team decisions in the I-AT, I-NAT and NAT-I treatments. Models (4) and (8) pool the data from the individual decisions and initial proposals in teams and include an independent dummy variable for individual decision-making.[17] The independent variables include a dummy variable to control for order effects and a dummy variable to capture the influence of anonymity when appropriate. In the regressions on initial proposals, we include the respective point estimates of α (model (2)) and β (model (5)) from individual decisions. In the regressions on team decisions, we include the respective median value of

[17] We also estimated interval regressions (see Table A3 in Appendix), which provide qualitatively similar results.

α (model (3)) and β (model (6)), as determined by the three teammates' initial proposals. We also include the positive distance between the estimates of α (respectively, β) for the player who is above the median in his team and for the player with the median preference. Similarly, we include the absolute negative distance for the player who is below the median and for the median player. This allows us to get a first indication of the impacts of the various teammates on the team decision. We control for the gender composition of the team and interact this variable with the non-anonymity of the proposals. Finally, except for the team decisions, we control for a number of individual characteristics detailed below in Table 5 but we only report those that reach significance.

Table 5 confirms that individuals express both more guilt and envy in their initial proposals within teams than when they decide in isolation (see models (4) and (8)). This rejects that the difference is driven by higher efficiency concerns in teams. Table 5 also reveals that anonymity has no impact on the initial proposals (models (2) and (6)) and on the guilt revealed by team decisions (model (7)). It has a marginal influence on envy in team decisions (model (3)); this effect is largely driven by females, as the interaction between the number of males in the team and the non-anonymous framing is significant and negative. This shows that anonymity has little impact on the parameters of initial proposals while it plays some role during the aggregation process. Taken together, these findings give stronger support to the interpretation of the higher initial proposals in terms of strategic behavior in view of the further bargaining.

Models (3) and (7) further show that the median parameters in the initial proposals influence the inequality aversion of the final decisions. None of the positive and absolute negative distances between the team members' and the median player's social preferences have any effect on envy in the final decision, whereas the positive distance has a surprisingly negative impact on the degree of guilt, suggesting that more extreme positions may have a counter effect during the aggregation process.

Table 5. Tobit regressions of the envy and guilt parameters

	Envy parameter (α)				*Guilt parameter (β)*			
	Indiv. decision (1)	Initial proposal (2)	Team decision (3)	Indiv. decision and initial proposal (4)	Indiv. decision (5)	Initial proposal (6)	Team decision (7)	Indiv. decision and initial proposal (8)
Team decision first (NAT-I treatment)	0.024	-0.103	-0.199	-0.145	-0.120***	-0.069***	-0.014	-0.152***
	(0.158)	(0.165)	(0.192)	(0.186)	(0.034)	(0.027)	(0.031)	(0.033)
Non-anonymity	-	0.032	0.589*	-	-	0.004	-0.016	-
		(0.171)	(0.343)			(0.027)	(0.049)	
Individual decision-making	-	-	-	-0.435*	-	-	-	-0.080*
				(0.232)				(0.042)
Number of males in the team	-	-	0.258	-	-	-	-0.009	-
			(0.195)				(0.026)	
Number of males in the team * Non-anonymity	-	-	-0.409*	-	-	-	-0.007	-
			(0.229)				(0.032)	
α in individual decision	-	0.644***	-	-	-	-	-	-
		(0.036)						
β in individual decision	-	-	-	-	-	0.635***	-	-
						(0.032)		
Team median α in initial proposals	-	-	0.749***	-	-	-	-	-
			(0.098)					
Dist between above median and median α in initial proposals	-	-	-0.184	-	-	-	-	-
			(0.122)					
∣Dist∣ between below median and median α in initial proposals	-	-	0.059	-	-	-	-	-
			(0.061)					
Team median β in initial proposals	-	-	-	-	-	-	1.048***	-
							(0.074)	
Dist between above median and median β in initial proposals	-	-	-	-	-	-	-0.176***	-
							(0.062)	
∣Dist∣ between below median and median β in initial proposals	-	-	-	-	-	-	-0.050	-
							(0.069)	
Male	-0.004	0.202	-	0.119	-0.059*	-0.032	-	-0.063**
	(0.152)	(0.144)		(0.171)	(0.033)	(0.023)		(0.031)
Rural register	-0.160	0.073	-	-0.052	0.038	0.072***	-	0.078**
	(0.159)	(0.154)		(0.180)	(0.034)	(0.024)		(0.032)
Number of close friends	0.029	0.050	-	0.063*	0.015**	0.008	-	0.016**
	(0.031)	(0.030)		(0.035)	(0.007)	(0.005)		(0.006)
Acquaintances in the session	-0.090	-0.174	-	-0.279	-0.035	0.044*	-	0.012
	(0.155)	(0.148)		(0.175)	(0.034)	(0.023)		(0.032)
Boarding school	0.184	0.175	-	0.360*	0.021	0.018	-	0.042
	(0.167)	(0.158)		(0.188)	(0.037)	(0.025)		(0.034)
Other controls	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*
Observations	318	270	90	318	330	282	94	330
Chi-squared test	0.976	0.000	0.000	0.249	0.095	0.000	0.000	0.000
Log-likelihood	-564.107	-427.932	-117.320	-582.510	-125.663	34.909	35.454	-87.571

Notes: Marginal effects are reported and standard errors are in parentheses. *** indicates significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level. The other control variables include age, Han ethnicity, number of siblings, importance of social image, having already participated in an experiment, occupational activity while studying, being a member of the Communist party, studying economics, years of education, family size, number of siblings, income.

Another observation is that β is lower when team decisions are made at the beginning of the experiment rather than later and when decisions made in isolation follow team decision-making. Finally, few individual characteristics are significant. In particular, males express less guilt in individual decisions than females, whereas being a rural resident, attending a boarding school (meaning living in a dormitory) prior to entering university, having acquaintances in the session and more close friends all increase advantageous inequality aversion.

This analysis is summarized in the following results.

Result 1: The envy (α) and guilt (β) parameters are almost always similar in individual and team decisions, except for guilt when the team decision is made non-anonymously.

Result 2: Individual initial proposals in teams reveal more guilt and envy than individual decisions made in isolation. This results more from strategic reasoning in the absence of information about others' preferences than from efficiency concerns or social image.

4.3. Aggregation of individual choices in teams

We now explore the aggregation of preferences in teams by means of two measures. The first one is the number of proposal rounds needed to reach unanimity, which captures the tension in the team. The second measure is a concession index between an individual's initial proposal to the team decision, given by the mean absolute distance (described by the number of decision problem) between an individual's initial proposal and the team decision divided by the number of rounds. A higher index means larger concessions per round. We exclude four teams for which the initial proposals were already unanimous and eight teams that did not reach unanimity.

When we pool the three team treatments, it takes on average 4.44 rounds (S.D.=3.77) to converge to a team decision on the acceptance threshold in the UG and 4.14 rounds (S.D.=2.11) to converge to the dictator's decision in the MDG.[18] These values do not differ significantly (W test, p=0.327). The mean concession index is 0.89 switching point per round in the UG

[18] For the team acceptance decision in UG, the number of rounds is 4.74 in I-AT, 4.19 in I-NAT and 4.44 in NAT-I, and the convergence speed is respectively 1.03, 0.81 and 0.85. For the team dictator decisions, the number of rounds is 3.68 in I-AT, 4.13 in I-NAT and 4.61 in NAT-I, and the convergence speed is respectively 1.51, 1.41 and 1.18.

(S.D.=1.49) and 1.37 (S.D.=2.07) in the MDG. The difference is significant ($p<0.001$): dictators adjust more quickly than responders in the UG, suggesting that guilt is a weaker preference than envy. Comparing the I-AT and I-NAT reveals no significant difference based on either the number of rounds or the concession index on the acceptance threshold in the UG (W tests, $p=0.849$ and 0.909, respectively) or the dictators' decision ($p=0.288$ and 0.503, respectively).

Next, we study who in the team is converging more rapidly to the team decision. In each team, we classify the players based on the median initial proposal and we calculate for each player's rank in the team the number of rounds until this player proposes the team decision. On average, the median members need 1.48 and 0.87 fewer rounds to reach the team decision than the below-median players whose initial proposals are more selfish for the α and β parameters, respectively (M-W tests, $p<0.001$ in both cases). They need, respectively, 1.02 and 0.62 fewer rounds than the above-median players whose initial proposals are more inequality averse ($p<0.001$ in both cases). These observations indicate that the aggregation process is driven by the median players.

Considering next the mean absolute distance between the initial proposal and the team decision for each rank in the team, we find that this distance is significantly smaller for the median player (0.40 for α and 0.05 for β) than for the below-median player (0.94 for α and 0.23 for β) and for the above-median player (1.83 for α and 0.27 for β) (M-W tests, $p<0.001$ in all comparison tests). The concessions are larger for the above-median individuals than for the below-median team members; this difference is significant for α ($p<0.001$), not for β ($p=0.200$). The same findings are observed when we compare the distance between the first and the second rounds in the team decision-making instead of the final decision ($p<0.001$ for α and $p=0.651$ for β).. Finally, the move toward more selfish team decisions compared to the initial proposals can be partly explained by the fact that median team members make on average less inequality averse initial proposals than the mean, at least for the α parameter (mean difference=0.110,

p=0.064) if not for β (mean difference=-0.007, p=0.401), and by the fact that the players who have inflated their initial proposals make more concessions. These findings on the higher influence of the median player and on the importance of relative position in the team in terms of social preferences are consistent with those of Ambrus *et al*. (2014). This analysis, however, does not control for the value of the median parameter.

Therefore, we turn to a more formal test of the aggregation process. Table 6 reports four regressions in which the dependent variable is either the number of rounds until convergence (Tobit models (1) and (3))[19] or the concession index at the team level (OLS models (2) and (4)). The first two columns are for the team's acceptance threshold and the last two columns for the dictator team's decisions. The independent variables include the median value of α (respectively, β), as determined by the three teammates' initial proposals, the positive distance between the estimates of α (β) for the player who is above the median in the team and for the player who is the median, and the corresponding absolute negative distance for the player who is below the median. They also control for the reversed order of the team decision-making (equal to 1 for NAT-I and 0 for the other treatments), the non-anonymity of proposals, the number of males in the team and an interaction term between the last two variables.

Table 6 shows that a higher median value of envy and guilt in the team reduces the number of rounds needed to reach unanimity. It decreases the concession index in the UG but increases it marginally in the MDG. Controlling for the median value, a greater distance between the above-median player's and the median player's inequality aversion increases both the number of rounds for convergence and the size of concessions per round, for both guilt and envy. A greater absolute negative distance between the below-median player and the median player has no significant impact on the number of rounds but it increases the size of concessions per round. For

[19] Using negative binomial count data models instead of the Tobit models delivers the same qualitative results.

envy, the coefficient of the concession per round for the below-median players (0.107) is almost six times lower than the coefficient associated with the above-median players (0.604) (p<0.001).

Table 6. Determinants of the number of proposal rounds and convergence speed in teams

Variables	*Team's acceptance threshold*		*Team's dictator decisions*	
	Number of proposal rounds (1)	Concession index (2)	Number of proposal rounds (3)	Concession index (4)
Team median α in initial proposals	-0.163** (0.539)	-0.389***(0.101)	-	-
Dist between above median and median α in initial proposals	1.633***(0.615)	0.604***(0.115)	-	-
⎜Dist⎜ between below median and median α in initial proposals	0.395 (0.248)	0.107**(0.052)	-	-
Team median β in initial proposals	-	-	-2.200*(1.243)	1.062*(0.613)
Dist between above median and median β in initial proposals	-	-	3.895***(0.933)	2.051***(0.470)
⎜Dist⎜ between below median and median β in initial proposals	-	-	0.764 (1.068)	2.998*** (0.525)
Team decision first (NAT-I treatment)	0.651 (0.815)	-0.029 (0.167)	0.299 (0.472)	-0.119 (0.234)
Non-anonymity	-1.886 (1.421)	0.106 (0.290)	1.893**(0.777)	-0.240 (0.376)
Number of males in team	-0.364 (0.810)	0.015 (0.165)	1.297***(0.403)	-0.329*(0.198)
Number of males in the team* Non-anonymity	1.122 (0.965)	-0.279 (0.197)	-1.151**(0.496)	0.216 (0.242)
Constant	-	0.842***(0.257)	-	0.166 (0.479)
Observations	86	86	94	94
Left-censored obs.	29	-	16	-
Chi-squared test	0.072	-	0.000	-
F-test	-	0.000	-	0.000
Pseudo-R^2 /R^2	0.033	0.323	0.069	0.393
Log-Likelihood	-189.83	-	-182.43	-

Notes: The regressions include only teams that reached unanimity with at least two rounds of proposals. Models (1) and (3) are Tobit regressions and Models (2) and (4) are OLS regressions. Marginal effects are reported and standard errors are in parentheses. *** indicates significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level.

Table 6 also shows that abandoning anonymity increases the number of rounds needed to converge to the dictator choice. Because initial proposals were not higher without anonymity, this result suggests that people are less prepared to make concessions when their choices are made visible to others. Model (3) further confirms that this effect is mainly driven by females, as it is largely reduced when there are more males in the team. In contrast, when decisions are anonymous, having more males in a team increases the number of rounds and reduces concessions per round. To some extent, females' behavior tends to support Reicher *et al.*

(1995)'s deindividuation theory of anonymity, while males behave more in accordance with the deindividuation theory of Festinger *et al*. (1952).

This analysis supports the following results.

Result 3: A higher heterogeneity of team members' preferences in both games slows down the convergence to unanimity, while anonymity accelerates convergence for the dictator team choice.

Result 4: By order of importance, the aggregation process within teams is driven first by the team member with median preferences, then by the more-selfish-than-median player, and finally by the more-inequality-averse-than-median player. The most inequality averse individual in the team makes more concessions than the most selfish player.

4.4. Predictive power of the inequality aversion parameters in the Production Games

In the Production Games, Yang *et al*. (2012) predict that because worker (or team) A always earns more than worker (or team) B, effort should depend exclusively and positively on the degree of guilt (with $e_A = 200\beta_A$). We find that worker A's mean effort levels (57.71, S.D.=31.09), initial proposals (59.27, S.D.=30.53) and team effort levels (58.95, S.D.=29.75) are all significantly higher than 0 (W tests, p<0.001), showing evidence of guilt. The model predicts that the effort of worker (or team) B should depend negatively on the degree of envy (with $e_B = 100 - 100\alpha_B$). We observe that worker B's mean effort levels (88.33, S.D.=19.93), initial proposals (86.81, S.D.=20.87) and team effort levels (93.54, S.D.=12.65) are all significantly lower than 100 (W tests, p<0.001), showing evidence of envy. In contrast to worker A, worker B agrees on higher effort in the team compared to the initial proposals (W tests, p<0.001).

Table 7 reports various Tobit regressions. The dependent variable is the effort levels of worker A, e_A (model (1)), and worker B, e_B (model (2)), in the individual PG. The independent variables include the individual α and β parameters. Models (3) and (4) for the team PG include the team α and β parameters and dummy variables for each treatment (I-NAT being the reference category). Models (5) and (6) augment models (3) and (4), respectively, with interaction terms between α and β and each treatment because their impact might differ across treatments.

Table 7 reveals that α and β fail to predict behavior in the individual PG. Team B's effort is also not affected by α (see models (4) and (6)). In contrast, model (3) shows that the guilt parameter β has significant explanatory power for team A's effort provision, although its magnitude is merely close to one quarter of the theoretical prediction. Model (5) reveals that this effect is driven by the NAT-I treatment. Team effort in this treatment is significantly lower than in I-NAT, but the dominant effect of β in NAT-I makes effort in the two treatments comparable, which supports our last result.

Table 7. Determinants of effort levels in the individual and team Production Games

	Individual Production Game		*Team Production Game*			
	e_A (1)	e_B (2)	e_A (3)	e_B (4)	e_A (5)	e_B (6)
Envy parameter (α)	-	-1.139 (1.852)	-	-1.279 (1.031)	-	-1.090 (1.733)
Guilt parameter (β)	23.575 (15.305)	-	43.308*** (12.974)	-	18.839 (21.388)	-
I-AT treatment	-	-	-8.705 (6.876)	1.800 (3.193)	1.075 (17.217)	2.306 (4.809)
NAT-I treatment	-	-	-7.923 (7.194)	1.229 (3.101)	-39.215*** (13.973)	1.536 (4.547)
α*I-AT treatment	-	-	-	-	-	-0.346 (2.436)
α*NAT-I treatment	-	-	-	-	-	-0.223 (2.511)
β*I-AT treatment	-	-	-	-	-18.466 (31.870)	-
β*NAT-I treatment	-	-	-	-	81.006*** (29.438)	-
Observations	48	48	94	90	94	90
Right-censored obs.	9	28	18	64	18	26
Pseudo R^2	0.006	0.002	0.017	0.006	0.031	0.006
Log-likelihood	-201.773	-118.300	-392.174	-158.208	-386.707	-158.197
Chi-squared test	0.137	0.540	0.003	0.593	0.000	0.860

Note: These regressions are Tobit models. Marginal effects are reported and standard errors are in parentheses. *** indicates significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level. Teams that did not reach unanimity are excluded.

Result 5: The guilt parameter β predicts the advantaged teams' behavior in the Production Game when choices are not anonymous. The envy parameter α fails to predict behavior in any configuration of the Production Game.

5. DISCUSSION AND CONCLUSION

Charness and Sutter (2012) write that teams are "less behavioral than individuals" because they are more likely than individuals to make decisions following standard game-theoretic predictions. This claim does not reflect our findings. First, comparing behavior in an Ultimatum

Game and in a Modified Dictator Game when people make individual decisions and when they are part of a team does not reveal significant within- or between-subject differences in the degree of envy or guilt between individuals acting in isolation and acting as teams. A second important finding is that the initial proposals in the team decision process express more inequality aversion than both the decisions made in isolation and the team final decisions. Indeed, individuals tend to inflate the degree of inequality aversion of their initial proposals. This is more likely due to the willingness to influence the team decision in the anticipation of the presence of more selfish team members, than to efficiency or social image concerns. This finding has also methodological implications, as it suggests a possible bias in the studies on individual and team decisions that assume that initial proposals reveal the individuals' inner preferences. A third result is that the team decision is mainly influenced by the degree of inequality aversion of the team member who holds the median preferences. Relative position matters also in the sense that the more-selfish-than-median player makes smaller concessions than the more-inequality-averse-than-median player. Our last result is that anonymity in team decision-making has an impact mainly on the aggregation process and on the guilt parameter.

We acknowledge that some of these findings may be driven by some features of our design. First, individuals bargain in teams without being able to communicate freely with their teammates, which certainly misses an important dimension of real settings but allowed us to monitor precisely the aggregation process. In our games, the pressure of the group and group thinking are probably less intense than when verbal deliberations are possible due to the importance of deliberation in collective decision-making (Goeree and Yariv, 2011). This lack of verbal deliberation may explain the difference between our results and those of Balafoutas *et al*. (2014). An extension of our experiment could explore whether with various modes of communication, such as via a chat-box or face-to-face, the influence of the player with median preferences would be challenged because of the verbal persuasion abilities of the other players.

Second, our observation that players increase their degree of envy or guilt at the onset of the aggregation process may be amplified by the uncertainty about others' social preferences. An extension would consist of reducing uncertainty by displaying the individual preferences of each teammate at the onset of the game. Third, allowing for sequential proposals in teams would enable to check who makes the initial proposal and to which extent the first mover's influence depends on his social preferences. We could also test the robustness of our findings to a setting where people can self-select to be part of a team.

We have conducted our experiment in China. Interestingly, our participants express levels of inequality aversion similar to those seen in participants in experiments conducted in Europe, despite their exposure to different political and economic institutions. It would be interesting to explore whether individual and group thinking are more similar in collectivist societies than in more individualized societies by replicating this experiment in other countries.

Finally, we found that the envy parameter predicts neither individual nor team behavior. Blanco *et al*. (2011) also found no correlation between the inequality aversion parameters at the individual level and behavior in a public goods game and a sequential prisoners' dilemma game. This suggests that the envy parameters may also capture other social preferences like negative reciprocity that do not play a role in the production game. Alternatively, it could be that preferences are not stable across games. Further investigations are needed to explore this issue.

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Appendix 1. Instructions for the I-NAT treatment (translated from Chinese: instructions for the other treatments available upon request)

Welcome to this experiment. You have already earned 10 Yuan for showing up on time. During today's experiment, you and the other participants will be asked to make decisions. If you read the following instructions carefully, you can earn a considerable amount of money depending on the decisions you and other participants make. It is therefore important that you take your time to understand the instructions. Please do not communicate with the other participants during the experiment. Should you have any questions, please raise your hand. The experimenters will come to you and answer your question in private.

The experiment consists of several parts. In each part you will be asked to make one or more decisions. You will receive specific instructions before each part begins. The instructions for different parts are different; please read them carefully. Your decisions and answers will remain anonymous unless explicitly specified.

Note that your final earnings from the experiment will be the sum of payoffs from all parts. All payments in the experiment are denoted in points. At the end of the experiment, points will be exchanged to Yuan at a rate of *1 points = 0.03 Yuan* .

Your experimental payoff plus the show-up fee will be paid to you in cash in private in another room at the end of the experiment, by an assistant who is not aware of the content of this experiment.

Please do not touch the computer before you are told so, and please do not fold the screen during the entire experiment.

If you have finished reading these instructions and do not have any question, please wait quietly. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Part 1

In this part, there are two roles: Player A and Player B.

Player A is asked to choose between two possible distributions of money between himself/herself and Player B in each of the 21 different decision problems.

Player B knows that A has been asked to make those decisions, and there is nothing s/he can do but accept them.

The role of each participant will be randomly determined as Player A or Player B by the program at the end of the experiment. Which role a participant plays will remain anonymous.

<u>*Decisions*</u>

The 21 decision problems will be presented in a chart. Each decision problem will look similar to the following example:

Option X		Option Y		Player A's decision	
Player A's Payoff	Player B's Payoff	Player A's Payoff	Player B's Payoff	(Choose X or Y)	
400	0	100	100	X	Y

You will have to make a decision in the role of Player A.

Hence, if in this particular decision problem you choose Option X, you decide to keep the 400 points for you, so your paired Player B's payoff will be 0 points. Similarly, if you choose Option Y, you and your paired Player B will receive 100 points each.

The 21 rows will be displayed on the computer screens as illustrated in the below chart. The payoffs in Option X are always 400 points for Player A and 0 point for Player B in all decision problems, while the payoffs in Option Y are the same for both Player A and Player B and the payoffs vary from 0 to 400 points in increments of 20 points, in decision problems #1 to #21.

The 21 decision problems for Player A (Payoffs in point)

Decision problem #	Option X		Option Y		Player A's decision (Choose A or B)	
	Player A's Payoff	Player B's Payoff	Player A's Payoff	Player B's Payoff		
1	400	0	0	0	X	Y
2	400	0	20	20	X	Y
3	400	0	40	40	X	Y
4	400	0	60	60	X	Y
5	400	0	80	80	X	Y
6	400	0	100	100	X	Y
7	400	0	120	120	X	Y
8	400	0	140	140	X	Y
9	400	0	160	160	X	Y
10	400	0	180	180	X	Y
11	400	0	200	200	X	Y
12	400	0	220	220	X	Y
13	400	0	240	240	X	Y
14	400	0	260	260	X	Y
15	400	0	280	280	X	Y
16	400	0	300	300	X	Y
17	400	0	320	320	X	Y
18	400	0	340	340	X	Y
19	400	0	360	360	X	Y
20	400	0	380	380	X	Y
21	400	0	400	400	X	Y

At the end of the experiment, the computer program will randomly assign you as the role of Player A or Player B. If you are assigned the role of Player A, your payoff will be determined as the amount you have chosen for Player A. If you are assigned the role of Player B, your payoff will be determined as the amount your paired participant has chosen for Player B.

You will have to decide the number of the decision problem until which you choose Option X and after which you choose Option Y. You will have to enter an integer between 1 and 21 into one of the two boxes on your computer screen as indicated below, to specify your decision.

I choose Option X from decision problem # 1 to decision problem # [ ].

I choose Option Y from decision problem # [ ] to decision problem # 21 .

Once you enter a number in the range 1-20 in the box in the first line, you must fill in the box in the second line with the number equals to one plus the number in the box in the first line. This means that once you start to choose Option Y in a decision problem, you are not allowed to switch to choose Option X again in any decision problems occurring after this one.

You are also allowed to make the same choice for all 21 decision problems.

If you always choose Option X, you enter the number 21 in the box in the first line. You must keep the box in the second line blank.

If you always choose Option Y, you enter the number 1 in the box in the second line. You must keep the box in the first line blank.

Examples

If you enter 21 in the box in the first line, it indicates that you decide to choose Option X in all 21 decision problems.

If you enter 9 in the box in the first line and 10 in the box in the second line, it indicates that you decide to choose Option X from decision problem #1 to decision problem #9 and Option Y from decision problem #10 to decision problem #21.

If you enter 1 in the box in the second line, it indicates that you decide to choose Option Y in all 21 decision problems.

After you have made your choices, please validate your decision by clicking the “Validate” button on your screen.

Payoff determination

At the end of the experiment, the computer program will randomly pair you with another participant in the room and will randomly assign the two roles. The computer program will randomly choose one of the 21 decision problems, and the decision outcome in the chosen decision problem will then determine your earnings. The matching and role assignment will remain anonymous. You will make the decision as Player A, but the computer program might assign you the role of Player B when determining payoffs. The assignment of roles is random and does not depend on your decisions as Player A.

If you are assigned the role of Player A, you will receive the amount that you have chosen for Player A in the randomly selected decision problem, and the person paired with you will receive the amount that you have chosen for Player B.

If you are assigned the role of Player B, you will receive the amount that the Player A whom you are paired has chosen for Player B in the randomly selected decision problem.

Before this part begins, a few control questions will be asked to make sure that you have fully understood these instructions. If you have finished reading these instructions and do not have any questions, please wait quietly. The control questions will be displayed on your screen soon. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Part 2

In this part, there are two roles: Player A and Player B.

Player A is asked to choose one of 21 possible distributions of 400 points between her and Player B.

Player B knows that A has been asked to make those decisions, and may either accept the distribution chosen by A or reject it.

If Player B accepts A's proposed distribution, this distribution will be implemented. If B rejects the offer, both receive nothing.

The role of each participant will be randomly determined as Player A or Player B by the program at the end of the experiment. Which role a participant plays will remain anonymous.

Decisions

The 21 decision problems for Player A and Player B will be presented in a chart. Each decision problem will look similar to the following example:

Distribution chosen by Player A		Option X	Option Y	Player B's decision (Choose X or Y)	
Player A's Payoff	Player B's Payoff				
300	100	Reject	Accept	X	Y

You will have to make decisions in the roles of both Player A and Player B.

In the latter case, you will have to decide whether you reject or accept each of A's possible 21 proposed distributions. In this example, if you choose Option X, it rejects your paired Player A's proposed distribution and both of your payoffs will be 0 points. If you choose Option Y, A's proposed distribution is accepted; you will receive 100 points and your paired Player A will receive 300 points.

The following chart showing the 21 decision problems will be displayed on your computer screen. The 21 decision problems illustrate the 21 possible distributions of 400 points proposed by Player A, respectively. For decision problems #1 to #21, the payoff distributed to Player A reduces from 400 to 0 in increments of 20 points, while the payoff distributed to Player B increases from 0 to 400 in the same increments of 20 points.

The 21 decision problems for Player B (Payoffs in point)

Decision problem #	Distribution proposed by Player A		Option X	Option Y	Player B's decision (Choose X or Y)	
	Player A's Payoff	Player B's Payoff				
1	400	0	Reject	Accept	X	Y
2	380	20	Reject	Accept	X	Y
3	360	40	Reject	Accept	X	Y
4	340	60	Reject	Accept	X	Y
5	320	80	Reject	Accept	X	Y
6	300	100	Reject	Accept	X	Y
7	280	120	Reject	Accept	X	Y
8	260	140	Reject	Accept	X	Y
9	240	160	Reject	Accept	X	Y
10	220	180	Reject	Accept	X	Y
11	200	200	Reject	Accept	X	Y
12	180	220	Reject	Accept	X	Y
13	160	240	Reject	Accept	X	Y
14	140	260	Reject	Accept	X	Y
15	120	280	Reject	Accept	X	Y
16	100	300	Reject	Accept	X	Y
17	80	320	Reject	Accept	X	Y
18	60	340	Reject	Accept	X	Y
19	40	360	Reject	Accept	X	Y
20	20	380	Reject	Accept	X	Y
21	0	400	Reject	Accept	X	Y

In the role of Player A, you will have to decide how to distribute 400 points payoff between Player A and Player B as stated in one of the 21 decision problems. You will have to enter an integer between 1 and 21 in the box on your computer screen as indicated below, to specify your decision.

> **I decide to distribute the 400 points payoff between me and my paired Player B as the way stated in decision problem # ☐.**

In the role of Player B, you will have to decide whether you reject or accept each of A's possible 21 proposed distributions. You will have to decide the number of the Player A's proposal until which you reject Player A's proposals (i.e., choose Option X) and after which you accept Player A's proposals (choose Option Y). You will have to enter an integer between 1 and 21 into one of the two boxes on your computer screen as indicated below, to specify your decision.

> **I reject the distribution (choose Option X) as shown from decision problem # 1 to decision problem # ☐.**
>
> **I accept the distribution (choose Option Y) as shown from decision problem # ☐ to decision problem # 21.**

Once you enter a number in the range 1-20 in the box in the first line, you must fill in the box in the second line with the number equals to one plus the number in the box in the first line. This means that once you start to accept Player A's proposal in a decision problem, you are not allowed to switch to rejecting the proposals again in any decision problems occurring after this one.

You are also allowed to make the same choice for all 21 decision problems.

If you always reject the proposals of Player A, you enter the number 21 in the box in the first line. You must keep the box in the second line blank.

If you always accept the proposals of Player A, you enter the number 1 in the box in the second line. You must keep the box in the first line blank.

Examples

If you enter 21 in the box in the first line, it indicates that you decide to reject Player A's proposals (choose Option X) in all 21 decision problems.

If you enter 9 in the box in the first line and 10 in the box in the second line, it indicates that you decide to reject Player A's proposals (choose Option X) from decision problem #1 to decision problem #9 and accept the proposals (choose Option Y) from decision problem #10 to decision problem #21.

If you enter 1 in the box in the second line, it indicates that you decide to accept Player A's proposals (choose Option Y) in all 21 decision problems.

After you have made your choices, please validate your decisions by clicking the "Validate" button on your screen.

Payoff determination

At the end of the experiment, the computer program will randomly pair you with another participant in the room and randomly assign the two roles. The assigned roles and decision outcomes of the two matched participants will then determine your earnings. The matching and the role assignment will remain anonymous.

If you are assigned the role of Player A at the end of the experiment, you will receive the payoff you have chosen for yourself only if your paired person B accepts your offer. Otherwise, both will receive nothing.

If you are assigned the role of Player B at the end of the experiment, you will receive the payoff that your paired Player A has chosen for B, only if you accept that particular offer. Otherwise, both will receive nothing.

Before this part begins, a few control questions will be asked to make sure that you have fully understood these instructions. If you have finished reading these instructions and do not have any question, please wait quietly. The control questions will be displayed on your screen soon. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Part 3

This part is identical to *Part 1*, with one exception. The only difference from Part 1 is that you are now a member of a team, and your team must make team decisions jointly as one decision-maker. Your team consists of three participants in this room.

Please note that your team consists of members with the ID numbers I, II, and III. The other two members in your team are seated next to you in the same row. Members I, II and III are seated at the left, middle and right of the row, respectively. For example, if you are seated at the far right of your row, the two persons to your left from left to right are members I and II, respectively. If you are seated in the middle of your row, the persons to your left and right are members I and III, respectively. If you are seated at the far-left of your row, the two persons to your right from left to right are members II and III, respectively. Thus, each member's proposal will be identified by the two other members by his ID number.

In the role of Player A, your team has to make a collective team decision on the number of the decision problem until which you choose Option X and after which you choose Option Y.

Player B makes no decisions.

At the end of the experiment, the computer program will randomly assign your team the role of Player A or the role of Player B.

The three members of the team must propose individual proposals and to enter them on their computer screens independently. **Unanimity is required for the three members to reach a collective team decision**. The following procedure determines the team decision:

- The three individual proposals will be simultaneously displayed on all members' screens.
- If the three proposals are not identical, a new proposal round starts. Each member must enter a new proposal. Each member may choose the same proposal as in previous rounds or make a different proposal.
- This team decision-making procedure must be repeated until all team members propose an identical number. This proposal will be automatically converted into the team's decision.
- Members have unlimited number of rounds to enter new proposals **in a 10 minute window**. Proposals made by each member during previous rounds can be observed in the proposal history box on the right-hand side of the screen.
- If team members have not reached an identical proposal after 10 minutes, the computer program will randomly select one of the possible decisions as the team decision.

Please note that members are not allowed to communicate orally during the entire experiment.

Payoff determination

The rules of payoffs determination are identical to that in *Part 1*.

Please note that each member of the team will receive the determined payoff rather than sharing this amount. That is, for the selected decision, each member in your team will receive this amount.

If you have finished reading these instructions and do not have any questions, please wait quietly. The decision-making screen will be displayed soon. Please enter your proposal as if you were Player A for this part. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Part 4

This part is identical to *Part 2*, with one exception. The only difference from Part 2 is that now you will be teamed up with the same two other members with the same ID numbers as in *Part 3*, and your team must make team decisions jointly as one decision-maker.

In the role of Player A, your team will make a collective team decision for the distribution of 400 points payoff between Player A and Player B as stated in one of the 21 decision problems.

In the role of Player B, your team will make a collective team decision on the number of the Player A's proposal until which you reject Player A's proposals (choose Option X) and after which you accept Player A's proposals (choose Option Y).

At the end of the experiment, the computer program will randomly assign your team the role of Player A or the role of Player B.

The three members of the team must propose individual proposals and to enter them on their computer screens independently. **Unanimity is required for the three members to reach a collective team decision**.

The procedure to determine team decisions is identical to that in *Part 3*. In the role of Player A, members have unlimited number of rounds to enter new proposals in a 10 minute window. If team members have not reached an identical proposal after 10 minutes, the computer program will randomly select one of the possible decisions as the team decision.

In the role of Player B, the same procedure applies. Team members have again 10 minutes maximum to reach an identical proposal, otherwise the computer program will randomly select one decision as the team decision.

Payoff determination

The rules of payoffs determination are identical to that in *Part 2*.

Please note that each member of the team will receive the determined payoff rather than sharing this amount. That is, for the selected decision, each member in your team will receive this amount.

If you have finished reading these instructions and do not have any questions, please wait quietly. The decision-making screen will be displayed soon. Please enter your proposals as if your team was Player A and Player B, respectively, for this part. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Part 5

You are a member of the same team with the two other members with the same ID numbers as in *Parts 3 and 4*. In this part, your team will participate in a production game.

The production game involves two working teams, Team A and Team B, who are in charge of Departments 1 and 2, respectively. Each team chooses an effort level (an integer between 0 and 100 that is a multiple of 10, i.e., 0, 10, 20, … , 100), which will determine the production of the department the team is in charge of. A team's total income from this game consists of four parts: (1) Basic salary; (2) A bonus dependent on the production of Department 1; (3) A bonus dependent on the production of Department 2; (4) Effort cost, which is dependent on team's own effort level. We introduce each part in turn.

1. **Basic salary**. The basic salary is 200 points for Team A and 0 point for Team B.
2. **Bonus 1**. The production of Department 1 will be equally divided between Team A and Team B as Bonus 1. Production is wholly determined by Team A's effort level. The higher the effort level Team A chooses, the more Department 1 produces, and, hence, the larger Bonus 1 received by both Team A and Team B .

3. **Bonus 2**. The production of Department 2 will be equally divided between Team A and Team B as Bonus 2. Production is wholly determined by Team B's effort level. The higher the effort level Team B chooses, the more Department 2 produces, and, hence, the larger Bonus 2 received by both Team A and Team B .
4. **Effort cost**. A team bears the cost of each unit of effort input into the department's production. Each unit of effort in Department 1 costs Team A 2 points. Each unit of effort in Department 2 costs Team B 1 point.

For each team, the total payoff from the production game is represented by the following equation:

Total income = Basic salary + Bonus 1+ Bonus 2 - Effort cost.

Please note that, because Team A's basic salary is 200 points while Team B's is 0, total income for Team A is always higher than Team B regardless of the effort levels chosen by Team A and Team B. Of course, the difference varies with different effort levels chosen by the two teams.

After you enter an effort level, you can immediately view the corresponding potential amount of bonus and effort costs displayed. You may test different effort levels to observe the corresponding variation in total income for Team A and Team B. When make your final decisions, ensure that the numbers in the boxes are correct, and press "Submit" at the bottom of the page.

In this part, you will be randomly paired and assigned the role of Team A or Team B. The results of the random pairing and role assignment will remain anonymous and will not be revealed until the end of the experiment. For this reason, every participant is asked to make a decision as Team A and Team B. At the end of the experiment, your decision for Team A's effort level will only apply if you are assigned the role of the Team A, otherwise, if you are assigned the role of Team B, your decision for Team B's effort level will adopted.

Team decisions

The three members of the team must propose individual proposals and to enter them into their computers independently. **Unanimity is required for the three members to reach a collective team decision**. Team members must propose individual proposals simultaneously in both the roles of Team A and Team B on the same computer screens. The procedure to determine team decisions is identical to that in *Parts 3 and 4*.

In the roles of Team A and Team B, members have unlimited number of rounds to enter new decisions **in a 20 minute window**.

If team members have not reached identical decisions in the roles of the two types of working teams after 20 minutes, the computer program will randomly select one of the possible decisions as the team decisions for Team A and for Team B, respectively.

Payoff determination

Each of the members will receive the determined payoff for a working team rather than sharing this amount. That is, for the selected decision, each of the members in your team will receive this amount.

If you have finished reading these instructions and do not have any questions, please wait quietly. The decision-making screen will be displayed soon. Please enter your proposals as if your team was Team A and Team B, respectively, for this part. Otherwise, please raise your hand and the experimenters will come to you and answer your questions in private.

Appendix 2. Tables and Figures

Table A1. Influence of the type of decision and of the treatment on the disadvantageous and advantageous inequality aversion (envy and guilt) parameters

Variables	*Envy parameter (α)*		*Guilt parameter (β)*	
	(1)	*(2)*	*(3)*	*(4)*
Ref.: First individual decision in I-I	-	-	-	-
Second decision in I-I	-0.036	-0.033	0.008	0.007
	(0.219)	(0.159)	(0.036)	(0.032)
Individual decision in I-AT	0.111	0.111	0.062	0.055
	(0.327)	(0.242)	(0.053)	(0.048)
Initial proposal in I-AT	0.622*	0.485**	0.095*	0.085*
	(0.326)	(0.241)	(0.053)	(0.048)
Team decision in I-AT	0.583	0.487*	0.043	0.039
	(0.380)	(0.279)	(0.061)	(0.055)
Individual decision in I-NAT	-0.121	-0.079	0.001	0.001
	(0.318)	(0.236)	(0.053)	(0.047)
Initial proposal in I-NAT	0.338	0.308	0.088*	0.079*
	(0.318)	(0.236)	(0.053)	(0.047)
Team decision in I-NAT	0.281	0.285	0.087	0.078
	(0.365)	(0.269)	(0.061)	(0.054)
Individual decision in NAT-I	0.016	0.0305	-0.099*	-0.089*
	(0.321)	(0.238)	(0.053)	(0.047)
Initial proposal in NAT-I	0.379	0.301	-0.071	-0.063
	(0.321)	(0.238)	(0.053)	(0.048)
Team decision in NAT-I	0.063	0.120	-0.144**	-0.129**
	(0.370)	(0.272)	(0.062)	(0.055)
Constant	0.905***	-	0.471***	-
	(0.260)		(0.043)	
Observations	726	726	754	754
Left-censored observations	-	77	-	60
Right-censored observations	-	83	-	25
Number of subjects	318	318	330	330
Chi-squared test	-	<0.001	-	<0.001
Log-likelihood	-	-1209.036	-	-128.100

Notes: Regressions (1) and (3) are random-effects interval regression models. Regressions (2) and (4) are random-effects tobit models based on point estimates. Reported values are marginal effects. Standard errors are in parentheses. *** indicate significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level.

Table A2. Comparisons among individual and team decisions based on the estimates of Table A1 (*p*-value from Chi-squared tests)

	Envy parameter (α)		*Guilt parameter (β)*	
	(1)	(2)	(3)	(4)
TD *vs*. ID in I-AT	0.067*	0.043**	0.635	0.634
TD *vs*. ID in I-NAT	0.092*	0.034**	0.028**	0.028**
TD *vs*. ID in NAT-I	0.846	0.609	0.267	0.266
IIP *vs*. ID in I-AT	0.003***	0.002***	0.207	0.206
IIP *vs*. ID in I-NAT	0.003***	0.001***	0.001***	0.001***
IIP *vs*. ID in NAT-I	0.023**	0.019**	0.283	0.282
TD *vs*. IIP in I-AT	0.878	0.990	0.193	0.192
TD *vs*. IIP in I-NAT	0.810	0.893	0.974	0.977
TD *vs*. IIP in NAT-I	0.196	0.306	0.071*	0.070*
(TD-ID) in I-AT *vs*. (TD-ID) in I-NAT	0.841	0.962	0.060*	0.059*
(TD-ID) in I-NAT *vs*. (TD-ID) in NAT-I	0.298	0.264	0.020**	0.020**
(IIP-ID) in I-AT *vs*. (IIP-ID) in I-NAT	0.819	0.936	0.136	0.136
(IIP-ID) in I-NAT *vs*. (IIP-ID) in NAT-I	0.667	0.467	0.106	0.106
(TD-IIP) in I-AT *vs*. (TD-IIP) in I-NAT	0.960	0.920	0.366	0.364
(TD-IIP) in I-NAT *vs*. (TD-IIP) in NAT-I	0.448	0.522	0.202	0.201
ID first time *vs*. ID second time in I-I	0.869	0.836	0.832	0.832
ID in I-I *vs*. ID in I-AT	0.735	0.646	0.244	0.243
ID in I-I *vs*. ID in I-NAT	0.705	0.737	0.988	0.987
ID in I-I *vs*. ID in NAT-I	0.960	0.898	0.063*	0.062*
ID in I-AT *vs*. ID in I-NAT	0.393	0.341	0.161	0.161
ID in I-AT *vs*. ID in NAT-I	0.729	0.690	<0.001***	<0.001***
ID in I-NAT *vs*. ID in NAT-I	0.604	0.574	0.022**	0.021**

Notes: Models (1) and (3) are based on the Interval regressions of Table A1 and models (2) and (4) on the tobit models based on point estimates of Table A1. *** indicate significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level. ID for individual decisions, IIP for individual initial proposals, and TD for team decisions.

Table A3. Interval regressions of the envy and guilt parameters

	Envy parameter (α)				*Guilt parameter (β)*			
	Indiv. decision (1)	Initial proposal (2)	Team decision (3)	Indiv. decision and initial proposal (4)	Indiv. decision (5)	Initial proposal (6)	Team decision (7)	Indiv. decision and initial proposal (8)
Team decision first (NAT-I treatment)	-0.022 (0.214)	-0.093 (0.238)	-0.220 (0.243)	-0.167 (0.257)	-0.139*** (0.040)	-0.075*** (0.029)	-0.016 (0.032)	-0.168*** (0.037)
Non-anonymity	-	0.012 (0.246)	0.555 (0.432)	-	-	0.004 (0.029)	-0.016 (0.052)	-
Individual decision-making	-	-	-	-0.540* (0.321)	-	-	-	-0.089* (0.047)
Number of males in the team	-	-	0.310 (0.244)	-	-	-	-0.010 (0.027)	-
Number of males in the team * Non-anonymity	-	-	-0.428 (0.289)	-	-	-	-0.008 (0.034)	-
α in individual decision	-	0.871*** (0.072)	-	-	-	-	-	-
β in individual decision	-	-	-	-	-	0.697*** (0.042)	-	-
Team median α in initial proposals	-	-	0.788*** (0.139)	-	-	-	-	-
Dist between above median and median α in initial proposals	-	-	-0.127 (0.158)	-	-	-	-	-
∣Dist∣ between below median and median α in initial proposals	-	-	0.073 (0.076)	-	-	-	-	-
Team median β in initial proposals	-	-	-	-	-	-	1.096*** (0.085)	-
Dist between above median and median β in initial proposals	-	-	-	-	-	-	-0.185*** (0.085)	-
∣Dist∣ between below median and median β in initial proposals	-	-	-	-	-	-	-0.053 (0.073)	-
Male	-0.017 (0.205)	0.260 (0.208)	-	0.157 (0.237)	-0.068* (0.038)	-0.035 (0.025)	-	-0.069** (0.034)
Rural register	-0.217 (0.216)	0.075 (0.222)	-	-0.088 (0.249)	-0.044 (0.040)	0.079*** (0.026)	-	-0.087** (0.035)
Number of close friends	0.045 (0.042)	0.066 (0.045)	-	0.090* (0.049)	0.018** (0.008)	0.008 (0.005)	-	0.017** (0.007)
Acquaintances in the session	-0.105 (0.210)	-0.258 (0.215)	-	-0.395 (0.243)	-0.040 (0.040)	0.048* (0.026)	-	0.013 (0.035)

Other controls	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*	*Yes*
Constant	0.438	0.024	-0.397	0.564	0.185	0.063	0.020	0.137
	(1.324)	(1.328)	(0.389)	(1.550)	(0.238)	(0.154)	(0.066)	(0.215)
Observations	318	270	90	318	330	282	94	330
Chi-squared	0.975	0.000	0.000	0.242	0.095	0.000	0.000	0.00
Log-likelihood	-951.452	-681.244	-223.510	-900.767	-985.559	-714.195	-206.300	-965.465

Notes: Marginal effects are reported and standard errors are in parentheses. *** indicates significance at the 0.01 level, ** at the 0.05 level, * at the 0.10 level. The other control variables include age, Han ethnicity, number of siblings, importance of social image, having already participated in an experiment, occupational activity while studying, being a member of the Communist party, studying economics, years of education, family size, number of siblings, income.

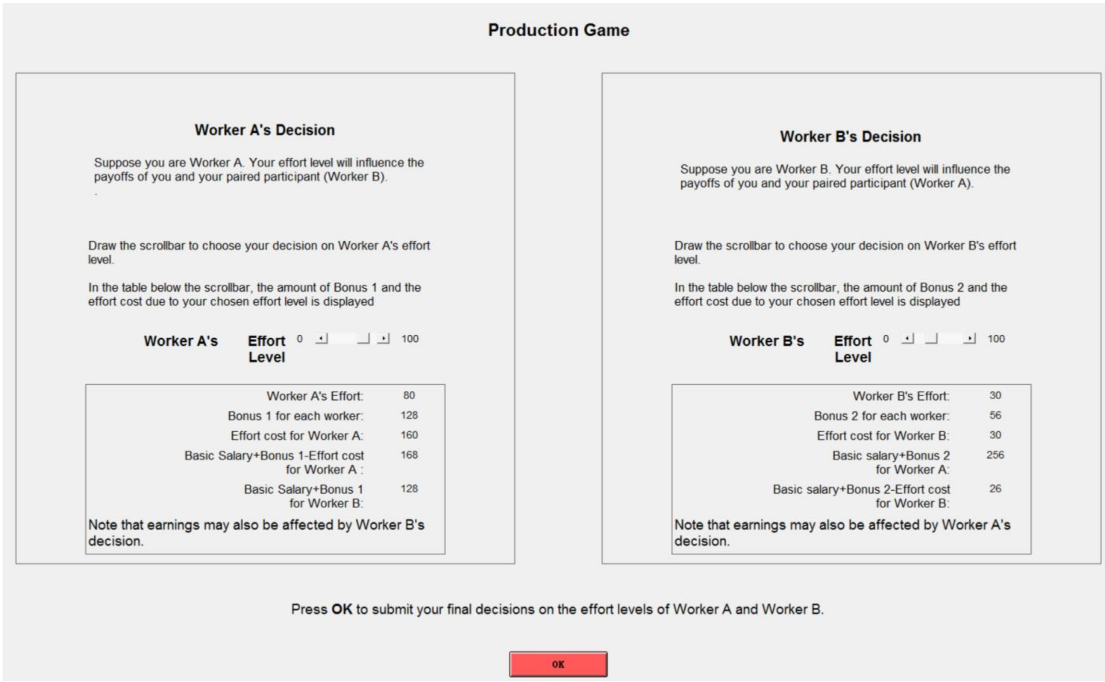
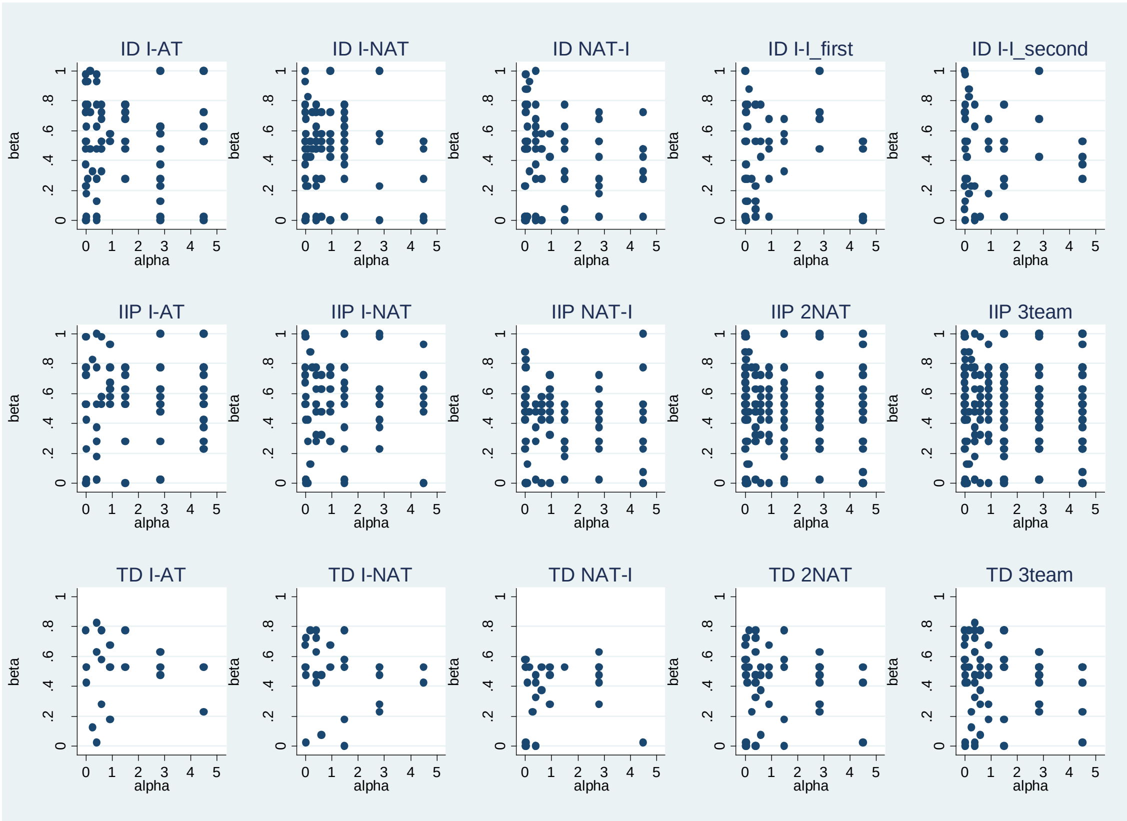


Figure A1. Screenshot of the individual Production Game



Notes: "2NAT" refers to the two treatments with non-anonymous team decisions; "3team" refers to the three treatments with team decisions

Figure A2. α-β joint distribution for individual decisions (ID), individual initial proposals (IIP) and team decisions (TD)