The Nature of Fairness in Dictator and Ultimatum Games

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Social norms such as fairness and reciprocity have vital functions for the integration of societies. Important insights into the nature of fairness as seen in humans stem from experiments with the dictator game, in which subjects often share considerable portions of their endowment with co-players. These findings violate the assumption that humans are narrow payoff maximizers and suggest that adaptations to the traditional economic theory are required. Recently, however, these results have been challenged by findings that show a tremendous variability of prosocial behavior. In particular, the devastating effect of anonymity on fairness poses critical questions concerning whether or not the underlying motivations of subjects are truly other-regarding. In this contribution, we will first look at results from dictator games under different conditions of anonymity. Our results suggest that when anonymity is convincingly implemented in the dictator game, individuals closely follow self-serving motives. We conclude that whether or not a player gives parts of an endowment to an anonymous co-player depends on the opportunity for signaling fairness. These results lead to a further study where the robustness of altruistic punishment is tested in the ultimatum game. The results demonstrate that altruistic punishment is stable in the ultimatum game under varying conditions of anonymity. We suggest that subjects punish for emotional reasons and not because of rational or signaling motives.

1 Introduction

The well-being and functioning of a society depends crucially on its institutions and the norms shared by its members. In particular, the idea that fairness and reciprocity are important elements of human behavior and have vital functions in solving cooperation problems can already be found in the seminal writings of Georg Simmel (1908), Alvin Gouldner (1960) and Marcel Mauss (1968). The norm of reciprocity can be defined as the expectation that

an individual treats other individuals as they treated him or her. Hence, an actor will return a favor but will also punish others for misbehavior towards him- or herself even if punishment is costly. Since returning favors and losses restores equality between two actors, the fairness norm is possibly even more fundamental and general than the norm of reciprocity. Fairness can be defined as the idea that, of all the rights and resources divided in a society, individuals are basically entitled to the same amount.[1] It is easy to see why both norms should be important for societies. Suppose a society consists of many individuals that adhere to these norms, then, knowing that others return favors should ease the initiating of social and economic exchange. Vice versa, societies in which individuals fear exploitation and unfair treatment will less easily engage in exchange and trade, or will restrict exchange to a very small group of kin contacts. However, restricting exchange and trade to small groups of kin contacts limits a society's ability to fully realize the advantages of specialization and thereby economic development.

Fairness and reciprocity promote the well-being of societies but are not necessarily in the self-interest of individuals. Sharing resources voluntarily with others is sometimes costly, as is reciprocal behavior. Hence, according to the basic assumption of economics and game theory that most individuals behave in a self-interested way most of the time, fairness and reciprocity should be hard to find in human behavior.[2] However, this hypothesis is seemingly at odds with experimental evidence. Many experiments with the dictator game have shown that individuals do share substantial proportions of an endowment with anonymous co-players (for reviews see Engel 2011 and Camerer 2003) or do reject unfair offers in the ultimatum game (Güth and Kocher 2013).

These results are puzzling, and the question of how the empirical results can be reconciled with economic theory has received much attention. Basically, there are two options: Either actors are less selfish than previously supposed and have social preferences instead, caring about the utility of others (this option would call for a refinement if not for a complete revision of economic theory); or, individuals follow certain subtle incentives that are contained in the game or in the experiments. In this case, specifying the conditions in which individuals cooperate more or less is vital. In this contribution we show that fair behavior in the dictator game can be explained by the subtle incentives present in the experimental procedure. One crucial condition for fair behavior is visibility. Individuals behave fairly if they believe that their

1 This definition refers to distributive fairness, which is distinguished from procedural fairness (see Konow 2003; Pointner and Franzen 2015).

2 This applies only to anonymous one-shot interactions, not to ongoing or iterative relations.

behavior is observed. But fair behavior almost disappears under conditions of anonymity. However, there is no disappearing of fairness under anonymity in other games such as the ultimatum game. In what follows, we demonstrate both the disappearance of fairness in the dictator game and the stability of altruistic punishment in the ultimatum game.

The remainder of the paper is structured into four sections. In section two, we provide a short review of some major findings concerning the behavior of subjects in dictator and ultimatum games. The review demonstrates the large proportion of fair and altruistic behavior displayed in these experiments. In section three we then describe a series of our own dictator game experiments in which anonymity increases successively. The results show that under strict conditions of anonymity using the randomized response technique (RRT) fair behavior almost disappears completely. In section four we then apply similar techniques to experiments with ultimatum games. However, in this case subjects' behavior does not change with increasing anonymity. Hence, not all behavior is sensitive to visibility or anonymity in the same way. The last section summarizes results and draws some conclusions.

2 Behavior in dictator and ultimatum games

The dictator game is a very simple one-shot decision situation in which an endowment is assigned to two players. One of them – the dictator – can distribute the amount in any way he/she wants and the recipient must accept the allocation. Assuming that individuals are payoff-maximizing and given that recipients remain anonymous, dictators should keep the whole endowment and assign nothing to the recipient.

The decision situation in the ultimatum game is similar, but now the co-player – the responder – has veto power. He/she can reject the offer of the proposer. In this case, both players earn nothing. Again, under standard economic assumptions, subjects in the role of the responder are expected to accept any allocation larger than zero. If the proposer anticipates rational behavior from his/her co-player, he/she will also choose only the lowest possible allocation.[3]

Many studies show that observed behavior is at odds with the standard economic expectations. In the very first experiment using the dictator game, Kahneman et al. (1986) asked students to choose between an equal split of

3 Notice that the dictator game is a special case of the ultimatum game in which the responder has no veto power. Suleiman (1996) has pointed out that the veto power of the responder does not have to be either 0 (as in the dictator game) or 1 (as in the ultimatum game) but could be in the interval [0,1].

$20 ($10 each) or assigning $2 to the recipient and keeping $18 for themselves. Three quarters of the subjects chose the equal split and thus deviated substantially from maximizing monetary payoffs. In a meta-analysis of 129 dictator game studies, Engel (2011) reports that subjects allocate on average 28.35 % of their endowment to anonymous co-players. But giving behavior is not robust. Several studies show that the amount allocated depends on various conditions. For instance, less money is transferred when subjects have to "earn" resources as compared to when they simply receive "windfall gains" (Arkes et al. 1994; Hoffman et al. 1994; Cherry et al. 2002; Cappelen et al. 2007; List and Cherry 2008) or when the social distance between proposers and recipients is large (Hoffman et al. 1996; Bohnet and Frey 1999; Rankin 2006; Charness and Gneezy 2008). Dictators also give more money when recipients are poor (Branas-Garza 2006; Aguiar et al. 2008; Cappelen et al. 2008) or when recipients have high status (Ball and Eckel 1998; Harbaugh 1998).

Ultimatum game results reveal further evidence for deviations from self-interested behavior. For instance, Camerer (2003) sums up evidence from different studies and concludes that neither proposers nor responders seem to act predominantly as payoff maximizers. Proposers often share a great amount of their endowment and frequently choose the equal split. And responders almost always reject allocations below 20 percent of the endowment of the proposer. The rejection behavior of low offers can be interpreted as altruistic punishment. Responders punish proposers that disregard the fairness norm (fair shares for both players). As the behavior is costly for the responder (he/she earns nothing) and since future interactions are ruled out, the behavior seems to be altruistically motivated. Responders presumably want to signal what "correct" behavior would look like by rejecting offers that deviate too far from the fair offer.

In sum, most experimental results suggest that individual behavior is driven not only by selfishness but also by a concern for the well-being of others. However, there are also studies that cast doubt on the idea that individuals really display other-regarding preferences or that norms are internalized. Bardsley (2008) and List (2007) report that dictators even withdraw resources from recipients when there is an option to take money away (taking game). Other studies find that dictators prefer to exit the game before receivers are informed that they are actually part of an experiment (Dana et al. 2006; Broberg et al. 2007; Lazear et al. 2012). If dictators cared about others, they should use the opportunity of sharing their endowment rather than to exit the game. Giving is also severely reduced when the responsibility of the dictator is ambiguous, e.g. if receivers' payoff is not only determined by the dictator but

also by chance (Dana et al. 2007). These results suggest that dictators might share only because they want to be seen as fair actors in the eyes of recipients.

Additionally, subjects might try not only to impress participants but also to impress the experimenter. This phenomenon is well-known in reactive settings such as experiments. Subjects know that they are observed and therefore assumed expectations of others play a role. Usually, experimenters try to counterbalance the "Hawthorne-Effekt" by introducing double-blind procedures. In this case, decisions are not disclosed to the experimenter or the recipient. But even in strict double-blind conditions such as the experiment by Hoffman et al. (1996, DB1 condition), 36 percent of the dictators allocated at least some endowment to the recipient and some even gave half of the endowment.

We suspect that conditions of anonymity are often imperfectly conveyed to subjects or simply not believed by them. Similar concerns were already stated by Forsythe et al. (1994, 363): "[...] players may believe there is a risk that anonymity will not be preserved or that failure to act fairly will have adverse consequences for them". In our following experiments we use the randomized response technique (RRT) to ensure anonymity via a random mechanism. In a first study, conducted in 2009, we demonstrate that anonymity via the RRT-design reduces giving to almost zero in the dictator game (see also Franzen and Pointner 2012). These results, briefly outlined in the next section, give rise to a second question: If fairness behavior collapses under conditions of anonymity in the dictator game how does anonymity affect reciprocity and altruistic punishment in the ultimatum game?

3 Fairness and anonymity in the dictator game

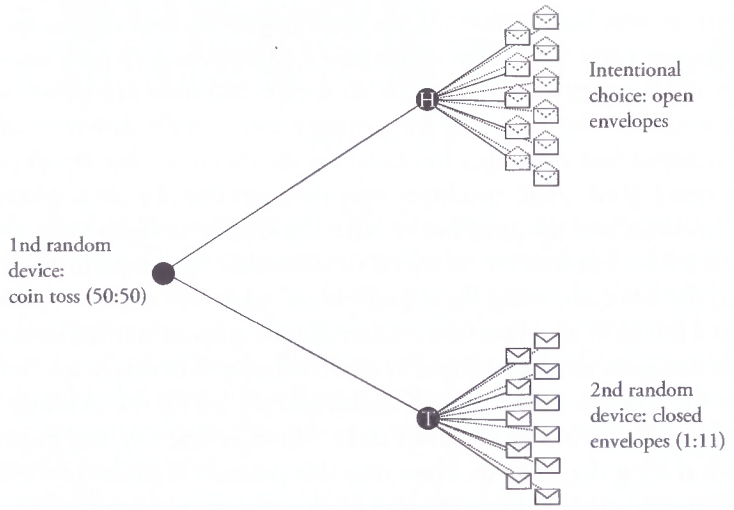
In our first study 177 subjects from the University of Cologne participated in experiments with the dictator game. In each session, students were able to choose a seat upon arrival. We did not control the names of the subjects on a participant list, as is standard in other experiments. Subjects were divided by blinds so that they could not observe each other. In the dictator games, participants could decide how to allocate an amount of 10 Euro between themselves and an anonymous co-player. Instructions always explicitly mentioned that subjects can split the 10 Euro in any way they want, including the possibility of keeping or giving away everything.

One group of subjects (n = 81) was randomly assigned to play the dictator game under standard double-blind conditions (control group) similar to the DB2 experimental design by Hoffman et al. (1996). All other subjects (N = 96)

played the dictator game using the RRT (treatment group). Originally, RRT was designed by Warner (1965) to eliminate the response bias for sensitive questions in surveys. RRT guarantees respondents a high degree of anonymity by using random devices to conceal respondents' answers from the interviewer.

In the RRT-dictator game we used a coin toss as the first random device. Depending on the outcome of the coin toss, subjects either chose from a pack of eleven closed or eleven open envelopes (see Figure 1 for a graphical presentation of the design). In each of the eleven envelopes were one white and one green Euro-voucher. The white voucher denoted the amount of money dictators could keep and the green voucher displayed the amount dictators could assign to the recipient. The value of the two coupons varied from zero to ten in one-Euro increments summing up to the total endowment of 10 Euro. Thus, every envelope contained one element of the binary value set {(0, 10) (1, 9) (2, 8) (3, 7) (4, 6) (5, 5) (6, 4) (7, 3) (8, 2) (9, 1) (10, 0)}.

Figure 1: RRT and the choice options in the dictator game



If the coin showed heads, subjects had to choose from the open envelopes. In this case, subjects could look up the combination of vouchers in the envelopes and choose the distribution they liked, i.e. make an intentional choice.[4] If the coin was tails participants had to choose from the pack of closed envelopes.

4 Open envelopes were sorted, upmost the combination with the highest value for the white voucher (and the lowest value for the green voucher) and at the bottom the lowest value for the white voucher (and the highest value for the green voucher).

Since this pack contained eleven envelopes with every possible payoff combination and since these envelopes were randomly mixed, the probability of picking any combination of one white and one green voucher is $p(x) = 1/11$. After the decision, participants sealed all open envelopes, kept their selected one, and threw the remaining 21 envelopes into a box in the lab. No envelopes remained in the booths of the laboratory. Since the experimenter did not know the outcome of the coin toss, this procedure made it impossible for him/her to know whether the envelope kept by the subjects was picked by chance (closed envelopes) or was intentionally chosen (open envelopes). Afterwards, subjects left the laboratory to exchange the white voucher for real money. Subjects had no visual contact with members of the research team and payout was strictly anonymous and not face-to-face (for details see Franzen and Pointner 2012). The instructions explicitly pointed out these details.

The experimental conditions of the control group were designed to be as similar as possible to the conditions of the treatment group (besides using RRT), and as close as possible to Hoffman's et al. (1996) double-blind procedure. Upon arrival in the lab, subjects picked up a big envelope that contained ten one-Euro vouchers, two small envelopes, and the instructions of the dictator game.[5] They were then asked to distribute the ten one-Euro vouchers any way they wanted between themselves and another student (whose identity would not be disclosed) by putting them into the different-colored small envelopes (red envelopes intended for the dictator, blue envelopes for the co-player). Both small envelopes were then put back by the subjects into the big envelope and dropped into a box. The small envelopes were marked with a code which subjects were asked to remember. The experimenter then collected the box containing the big envelopes, took it to another room, and exchanged the Euro vouchers from the envelopes subjects wanted to keep for real Euro. Subjects' small envelopes were then displayed in this room. Subjects then left the lab, went to the payoff room, and picked up the envelopes that were marked by their identification code. No experimenter was present in this room during the pick-up. Note that this procedure guarantees subjects full anonymity, since the experimenter could not know which identification code and hence which payoff envelope belongs to a given subject.

Therefore, dictators did not need to search for long to find their preferred distribution. Closed envelopes were not sorted (which was mentioned in the instructions).

5 Subjects could randomly select an envelope from a box containing all the envelopes for all participants. The instructions were also read aloud by a student assistant and subjects could ask questions in order to ensure that they understood the instructions and the decision situation.

Figure 2 displays the distribution of the amounts allocated by the 81 subjects who participated in the control treatment. On average, subjects donated 3.09 Euro to their recipients. This is very close to the average amount found in the meta-analysis by Engel (2011). About 22 percent (18 subjects) of all subjects decided to allocate half of their endowment, and hence chose an egalitarian allocation, and 18.5 percent (15 subjects) gave nothing (Figure 2).

Figure 2: Simple dictator game (control group), absolute frequency of amount given to recipient

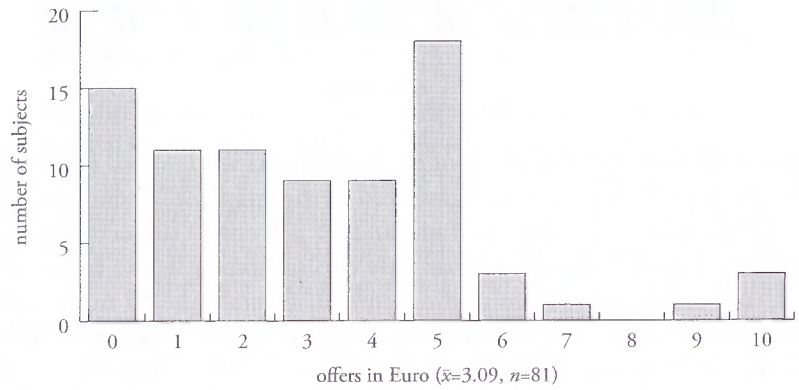


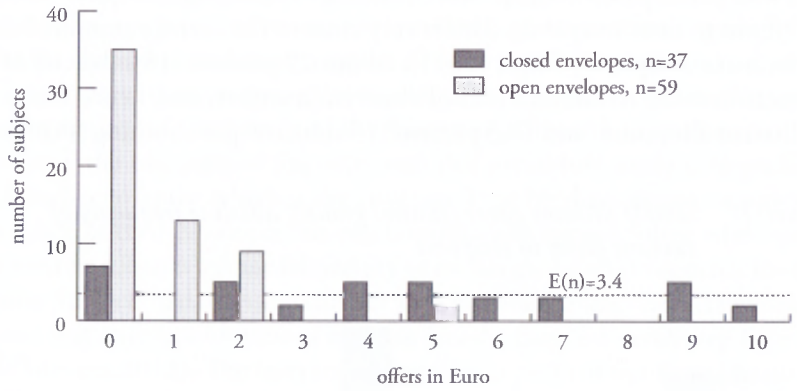
Figure 3 displays the distribution of the allocated amounts in the RRT condition. Since the RRT has never been used before in a dictator game, we tested the functioning of the coin toss by marking the closed envelopes from the inside by magic ink. Thus, after the experiment we were able to identify the number of envelopes that were picked from the pack of closed envelopes, and to distinguish the intentional from the randomly determined choices.[6] The result of the separate distribution for intentional and unintentional choices is displayed in Figure 3.

Overall, 59 subjects (61 percent) chose from the open envelopes, and 37 (39 percent) used the closed envelopes. This distribution is significantly different from an expected value of 48 subjects in each condition (t-value = –2.295, p = 0.024). Thus, either the randomization process of tossing the coin resulted in a skewed distribution, which is unlikely, or some subjects disregarded the result of the coin toss and chose intentionally from the open pack.[7]

6 Note that marking envelopes this way does not allow a given subject's choice to be disclosed, but merely enables visibility of the distribution within the different groups.

7 Or subjects tossed the coin more than once until they received the desired result.

Figure 3: RRT dictator game with distributions of open and closed envelopes



Almost 60 percent (35 out of 59) of the participants who turned to the open envelopes kept the ten Euro and gave zero to the recipient. Twenty-two percent (13 subjects) gave only one Euro and 15 percent (9 subjects) gave two Euro away. Figure 3 also shows that only two subjects split the endowment in half and assigned five Euro to the recipient. Overall, the 59 subjects who chose from the pack of open envelopes allocated only 41 Euro to recipients from the total amount of 590 Euro, or 7 percent of their endowment. This is considerably less than ever observed under the standard double-blind condition. In comparison with our control group ($\bar{x} = 3.09$), the donated sum decreased to an average of 69 cents. This difference is highly statistically significant (t-value = 7.67, p = 0.000).[8]

The difference between our double-blind procedure (control group) and the dictator game with RRT is tremendous. We believe that anonymity is very convincingly guaranteed to subjects via the RRT method, while the standard double-blind procedure for some reason leaves subjects in doubt as to whether their behavior is truly hidden from recipients and the experimenter. Hence, giving behavior under RRT conditions shows the true prevalence of other-regarding preferences and also shows that the relatively high donations

8 Thirty-seven subjects picked one of the closed envelopes. Thus, the expected number of participants in each category is 3.4. Figure 3 shows that the observed frequencies are fairly close to the expected ones. There are only two allocations (giving one Euro and eight Euro) that were never realized. However, a chi-square test confirms that the observed frequencies differ only randomly from expected ones ($\chi^2 = 15.04$, p = 0.130). The average offer of the closed envelopes is 4.46 and not significantly different from an expected average of 5 Euro (t-value = –1.03, p = 0.31). Thus, the second random device performed very well.

under the standard double-blind condition are contaminated with subjects' motivations to comply with the expectation of the experimenter. But there are also other interpretations. For instance, the coin toss might have elicited the feeling that subjects won a lottery and are therefore entitled to keep the endowment. We tested this possibility by combining the coin toss with the standard double-blind procedure. The results (not presented here) show no difference to the outcome of the standard game without coin toss. Hence, the interpretation that tossing the coin itself affects the decision can be ruled out.[9]

4 Altruistic punishment and anonymity in ultimatum games

Penalizing unfair, uncooperative or overly self-interested behavior is a fundamental mechanism that enables cooperation and solidarity in societies. In contrast, free-riding of self-interested individuals undermines preferable collective outcomes. Oftentimes, certain goods like public transportation, national libraries or clean municipal parks can only be provided if fees are imposed or punishments handed out in case of misuse. But if institutional mechanisms are missing, public goods can only be provided if subjects voluntarily punish free-riders at their own cost. Such behavior is called altruistic punishment and is itself a public good (second-order public good). Fehr and Gächter (2000, 2002) demonstrate in a Public Good Game (PGG) that players sanction uncooperative co-players at their own cost and thus enable cooperation between anonymous players (see also Cinyabuguma et al. 2005; Rockenbach and Milinski 2006; Carpenter 2007; Sefton et al. 2007; Gächter and Herrmann 2009; Bornstein and Weisel 2010). Cooperation rates increase as soon as a punishment option is announced.

However, altruistic punishment does not occur consistently. A recent study by Egas and Riedl (2008) shows that the occurrence of altruistic punishment strongly depends on how costly this behavior is, and takes place only if the cost to the punisher is less than the cost to the punished. Fehr and Gächter (2000, 2002) test the punishment option only with a cost-ratio of 1:3 (punishment costs of one monetary unit for the punisher and three monetary units for the punished). With other cost ratios (1:1, 3:3, or 3:1) the punishment option does not lead to an increasing or even stable cooperation rate (Egas and Riedl 2008). However, if a preference for altruistic punishment were to exist or if altruistic punishment was an internalized norm, this behavior should not be overly sensitive towards monetary factors.

9 Details are contained in Franzen and Pointner (2012).

There are other considerations suggesting that altruistic sanctioning might not only be altruistically motivated. In PGG studies with punishment options, subjects generally play several rounds. Thus, the decisions of subjects are not anonymous because subjects need to identify uncooperative actors in order to target them. Hence, players that impose sanctions on free-riders can build up a positive reputation and can signal that they act according to socially desirable behavior. If subjects like to be perceived as norm-obedient they might punish norm violations for reputational reasons. Studies show that "audience-effects" indeed affect the degree of altruistic punishment (Kurzban et al. 2007; Piazza and Bering 2008). Hence, there is some evidence for rationally-motivated altruistic punishment because a positive reputation ("image scoring") might be advantageous in the course of the experiment.

Moreover, emotions can trigger altruistic punishment. Subjects might feel anger or outrage if they are treated unfairly, if others behave in an overly self-interested manner, or if others deviate from socially expected behavior. Yamagishi et al. (2009) conducted experiments with the impunity game in which a responder can reject a proposed distribution but the proposer receives his/her allocation regardless of the responder's decision. In the "private condition" of the impunity game the proposer is not even informed of the responder's decision. Nonetheless, rejection rates are substantial which is surprising since the responder is not able to even signal his disagreement. These experimental results suggest that subjects react emotionally in the impunity game.

In the ultimatum game low offers from proposers can be seen as deviations from a fairness norm. Therefore "rejections in the ultimatum game can be viewed as altruistic acts because most people view the equal split as a fair outcome. Thus, rejection of a low offer is costly for the responder and also punishes the proposer for the violation of a social norm" (Fehr and Fischbacher 2003, 786). If individuals want to be perceived as fair the responder should want to signal his/her norm compliance even in non-iterated conditions, e.g. towards the experimenter or other participants. If responders were to accept even small amounts then such behavior could be interpreted as overly greedy since receivers forgo fairness considerations.

The extent of the signaling motivation versus other motivations (fairness consideration, emotions) can be tested by varying anonymity. Some studies show that anonymity leads to lower allocations of proposers in the ultimatum game. In our study, we want to focus on motivations for altruistic punishment and we therefore concentrate on the responder behavior. To our knowledge responder behavior under anonymity has only been investigated in two studies to date. Bolton and Zwick (1995) conceal responders' decisions in ultimatum games through a variant of the closed envelope method also used by Hoffman et al. (1996). Their results show that under anonymity, responders' rejections decrease as the anonymity hypothesis would predict. However, the decrease is small and statistically not significant. Also, Bolton and Zwick (1995) conduct the experiment with only a few subjects, 20 in the anonymity condition which leaves only 10 subjects in the role of the responder. In addition to this, Lamba and Mace (2010) apply different anonymity settings and find no difference in rejection rates with different degrees of anonymity. Since RRT was very successful in securing anonymity in the dictator game, we suggest that it is also worthwhile applying it to the responder behavior in the ultimatum game.

Therefore, following the procedure of study 1, we compare a standard ultimatum game (double-blind) with an ultimatum game with high anonymity conditions (RRT). If the signaling motive is relevant for altruistic punishment, rejection rates should be lower in the RRT-UG. If e.g. emotions drive altruistic punishment, rejection rates will not differ between the two treatments. This leads to the following hypotheses:

Hypothesis 1a: If emotions drive altruistic punishment, then rejection rates should remain unchanged in the ultimatum game with both high and low anonymity.

Hypothesis 1b: If altruistic punishment is due (or partly due) to signaling, rejection rates should be lower in the RRT ultimatum game as compared to the standard double-blind procedure.

Subjects were recruited at the University of Bern in Switzerland. We wrote an invitation email to students and volunteering subjects were able to register via an email link for the experimental sessions. Since we were interested in responder behavior under low offer conditions and since low offers are rare in standard ultimatum games we decided to fake the allocations of the proposers. Using deceit should of course be avoided in any experiment if possible. However, most proposers in ultimatum games offer between 40 % and 50 % (see Camerer 2003; Güth and Kocher 2013). We would have had to multiply the subject pool by ten in order to reach enough cases per condition without deceit.[10] Hence, on their arrival, we distributed participants into two different labs, but told subjects in both rooms via instructions that the subjects in the other room were assigned the role of the proposer. In fact, however, all of our subjects were in the role of the responder and received propositions of

10 We recruited 181 subjects for the experiment. To forgo deceit would have required about 1800 subjects. Recruiting such a large number of subjects is difficult and costly and was impossible for our research budget.

one or two Swiss Franc (10 % or 20 % of a 10 Swiss Franc endowment).[11] Places in the laboratories were separated by blinds and subjects were able to choose any available seat. After the instructions were read aloud by a student assistant, subjects had to wait for the (faked) decision of the proposers. Then, big envelopes containing the decision sheets were brought into the lab by another student assistant.

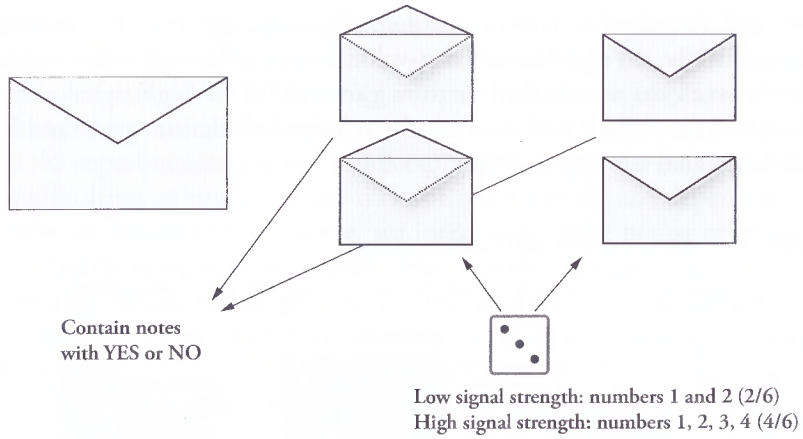
In the standard double-blind procedure two open envelopes were displayed at each booth, one envelope contained a note stating "yes" and the other envelope a note with "no" inscribed. If subjects wanted to accept the allocation then they had to return the envelope with the "yes"-note. If they wanted to reject the proposal, they had to return the envelope with the "no" answer. To complete the decision, subjects had to put the small envelope into the big envelope together with the decision sheet of the proposer. After their decision, a student assistant collected the envelopes and took them back to the "proposers". At the end of the experiment, the participants had to throw the unused envelope into a box. This way neither the student assistant nor the recipient could know which subject rejected or accepted the offer.

The RRT procedure was similar to the standard double-blind procedure but now subjects had first to throw a dice (see Figure 4 for an illustration of the design). Two open and two closed envelopes were prepared each containing "yes" and "no" notes. Depending on the outcome of the throw, subjects had to return one of the closed envelopes (choice determined by random device) or one of the open envelopes (intentional choice). In the RRT condition, we varied the random device using two conditions, each with a different degree of signaling strength: In a treatment with low signal strength, subjects were able to choose from the open envelopes if they threw the numbers 1 or 2. This means only 33 percent of the decisions of the responders were intentional. In the condition with high signal strength, subjects could turn to the open envelopes if the throw was 1, 2, 3, or 4. Here, the decision is the outcome of an intentional choice in 66 percent of the observations. Subjects were instructed that the probability of an intentional signal was known to the proposers.

Therefore, hypothesis 1b can be refined due to the degree of signaling strength, leading to Hypothesis 1c: If altruistic punishment is due (or partly due) to signaling, rejection rates should be lower in the RRT ultimatum game with low signaling strength as compared to the RRT ultimatum game with high signaling strength.

11 Past experiments demonstrate that most offers at or below 20 % are rejected (Güth and Kocher 2013).

Figure 4: RRT ultimatum game



Overall, 181 subjects participated in the experiment, 36 of them in the standard double-blind ultimatum game (control treatment), 75 subjects in the RRT design with low signal strength and 70 participants in the treatment with high signal strength (see Table 1). Participants were on average 23.7 years old, with the youngest participant being 18 and the oldest 39 years old.

Table 1: Experimental design ultimatum game

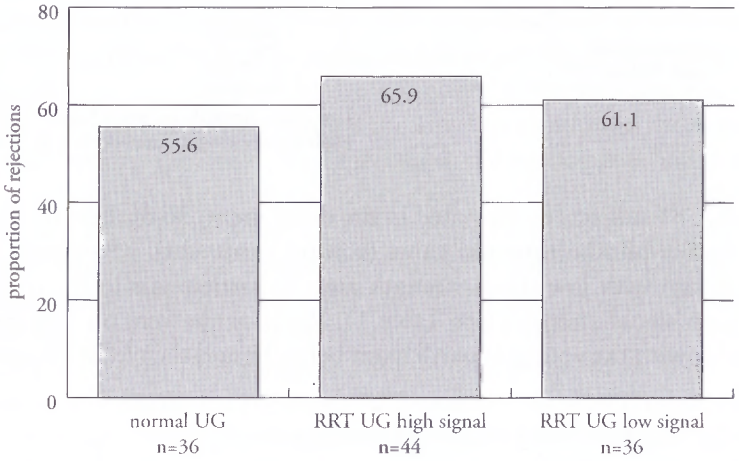
	proposer offers	anonymity conditions of responder	signal strength	number of subjects
1	1 out of 10	Standard double-blind	–	36
2	and	Random mechanism (RRT)	33 %	75
3	2 out of 10 (randomly varied)		67 %	70

The rejection rates of the three conditions are displayed in Figure 5. In the standard ultimatum game, about 55.5 percent of the subjects have rejected the offers of 1 or 2 Swiss Francs (which were randomly varied). In the RRT design, we are only interested in the subjects who made an intentional choice. Similarly to study 1, we marked the envelopes with magic ink (which only becomes visible under black light and thus could not be seen by the subjects). In the design with high signal strength, 44 participants (of 70 subjects) chose intentionally from the open envelopes. In the condition of low signal strength 36 subjects (of 75 participants) made an intentional choice.[12] The rejection

12 In the condition with low signal strength we would have expected only 33 percent of subjects to make an intentional choice but actually 48 percent chose from the open

rates of 65.9 percent in the high signal condition and 61.1 percent in the low signal condition are higher than in the standard double-blind ultimatum game and, therefore, contrary to our hypothesis 1b. However, the differences are statistically not significant. The t-value for the difference in the rejection rates between the standard ultimatum game and RRT high signal strength is t = 0.939 (p = 0.351) and between the standard ultimatum game and RRT with low signal strength t = 0.441 (p = 0.66).

Figure 5: Results of the ultimatum game



With regard to the two treatments of the RRT design, we would have expected a higher rejection rate in the condition with high signal strength in comparison with the condition of low signal strength. The difference between the rejection rates amounts to 4.8 percentage points but is not significant (t-value = –0.439, p = 0.66) and therefore hypothesis 1c is rejected. Thus, our results support hypothesis 1a, which indicates that an emotional explanation of rejection behavior in ultimatum games seems to be appropriate.

envelopes. The difference is statistically significant (t-value = 2.5828 p = 0.006 for a one-sided test). In the condition with high signal strength, we obtained the expected distribution of our subjects. Here, 63 percent of participants chose intentionally (66 percent was the expected proportion).

5 Discussion and conclusion

The results of our first study, in which we varied the degree of anonymity in the dictator game, suggest that most human beings do not have a true preference for fairness in interacting with an anonymous co-player. Rather, most decisions are self-interested as soon as subjects' behavior is concealed from the experimenter and the recipient. If subjects had fairness preferences their allocation of money in the dictator game should not depend on the visibility of the allocation. Hence, we interpret that the giving observed in other dictator game experiments where anonymity is absent or incomplete is due to subjects' desire to appear fair in the eyes of recipients or experimenter. Our result and interpretation is consistent with other studies that vary anonymity (Hoffman et al. 1996; Andreoni and Bernheim 2009), with results in the "taking game" (List 2007; Bardsley 2008), and in dictator game studies with exit options (Dana et al. 2006; Broberg et al. 2007; Lazear et al. 2012). Our result is also compatible with studies that do not decrease but rather increase the visibility of behavior. This can be done e.g. via the provision of a pair of "watching eyes" (for an overview of results see the meta-study by Nettle et al. 2013), or subtle cues to a "supernatural watcher" (e.g. Bering et al. 2005 mentioned the presence of a "ghost" in the laboratory), or increasing subjects' visibility by bright lights in the lab (Chiou and Cheng 2013). These studies suggest that norm compliance is strong under conditions of visibility.

The result suggests that human beings are not either good or bad, or fair or unfair but that they display fair behavior if they can signal fairness and gain social reputation. In other words, fair behavior is displayed if certain incentives are provided. This does not mean that the fairness norm is unimportant or undesirable. Quite to the contrary, the existence of the norm in a society is a necessary condition for individuals to follow it. Otherwise, individuals would not be able to gain social reputation by complying with it. However, the existence of the norm on its own is not a sufficient condition for fair behavior; it takes additional incentives such as the possibility of signaling fairness. Hence, if societies wish to increase compliance with fairness norms they should increase the recognizability of behaviors and avoid anonymity. Anonymity, so to speak, is toxic for fairness.

In contrast to fair behavior in dictator games, altruistic punishment seems to be robust under situations of increased anonymity. Our rejection rates do not vary with different degrees of anonymity. Therefore, the motive of signaling norm compliance does not drive altruistic punishment. We assume that low offers seriously annoy or at least irritate subjects, which leads to rejection. Hence, emotions seem to be the major motivational force

for altruistic punishment. After the experimental session, we asked students in an online questionnaire what their minimal acceptable offer would have been. If we look at the 116 subjects (that made a choice in the standard double-blind ultimatum game or chose the open envelopes), the mean of the minimal acceptable offer is 3.3 Swiss Francs (median is 4 Swiss Francs). This strengthens the assumption that the deviance from the expected offer caused anger or frustration and led to rejection.

Our results are compatible with the findings of others studies such as Bolton and Zwick (1995), Fehr and Gächter (2000, 2002), and Grimm and Mengel (2011). The latter show that rejection rates decrease if subjects are forced to delay decision by a certain time. Obviously, the time delay leads to a cooling of emotions which allows reason to enter the decision process. Evidence that rejection rates are driven by emotions stem also from neuroeconomics: The emotional regions of the brain, which reflect emotional reactions, are more active if unfair offers are made (Sanfey et al. 2003; Rilling et al. 2004). Rejection rates are also low if the proposers cannot decide intentionally but have no other choice than to allocate a small amount (Falk et al. 2003; Sutter 2007; Radke and de Bruijn 2012). Hence, the anger stems not from receiving low amounts as such but from receiving unfair treatment by others.

Taken together, the results suggest an interesting asymmetry. Individuals are willing to treat others unfairly if they see the chance of getting away with it. However, being the subject of unfair treatment will not be accepted and elicits punishment even at a cost. Paradoxically, it is an emotional reaction that stabilizes cooperation and fairness among rational actors.

6 References

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