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Who cares about the balderdash I spouted yesterday?*
– An experiment on the volatility of bargaining norms –

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Who cares about the balderdash I spouted yesterday?* – An experiment on the volatility of bargaining norms –

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Abstract

When talking about possible bargaining results participants in the Nash bargaining game mainly use fairness norms to support their favored outcome. According to theory a variety of different, fair solutions exists from which the participants can choose. In this paper, we experimentally investigate Nash bargaining with a previous opportunity to chat about the bargaining outcome. We find that playing a dictator game prior to the Nash bargaining game establishes – without any additional communication – a fairness norm, the participants resort to. However, if nothing is played prior to the Nash bargaining game, participants discuss longer about what to play. In addition, we find that deviations in favor of one participant occur the longer preplay communication lasts.

Keywords:
bargaining game, dictator game, norms, experimental economics

JEL classification:
C7, C9

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* Quotation attributed to Konrad Adenauer (German chancellor) and/or Robert Bosch (German entrepreneur)

1 Introduction

In the recent years, especially experimental literature observed several different norms (e.g, Fehr et al. 2002; Seinen & Schram, 2006) to predict cooperative behavior. Although existing literature suggests that the establishment of norms can induce cooperation (Lauer et al., 2008), e.g. via reciprocity (Fehr et al. 1998) or conditional cooperation (Fehr & Fischbacher, 2004), norms are mainly added to economic research as post hoc interpretation (Krupka & Weber, 2013). Moreover, literature is scarce investigating how norms are formed and how one can use them to influence future behavior. In this paper, we investigate behavior in the Nash bargaining game (Nash, 1950), and show that by simply playing a dictator game prior to the bargaining game the norms the participants realize can be manipulated. We argue that, to understand individual outcomes in bargaining experiments (see, e.g., Güth 1995; Anbarci & Feltovich, 2013), it is essential to now the history of a decision maker.

Formally, one can model bargaining using the Nash bargaining game (Nash, 1950). Two participants who are Nash bargaining, distribute a divisible good among each other. Each outcome, in which the participants distribute the whole divisible good, is Pareto efficient. Namely, without taking part of the share of the other participant no participant can increase his own payoff. In consequence, every Pareto efficient allocation can be perceived as "fair": By deviating from an allocation in favor of one bargainer, the other bargainer will perceive the deviation as less fair.

Experimental results of the Nash bargaining game find support for different fair allocations (see, e.g., Burrows & Loomes, 1994; Anbarci & Feltovich, 2013; Kroll et al. 2014). Namely, participants choose outcomes equally improving their payoffs relative to the payoffs when not coming to an agreement. Other participants compare their bargaining results to a situation in which both participants receive nothing. Aside these allocations a variety of other outcomes occurs.

From a theoretic perspective equal splits, both relative to disagreement and to receiving nothing, are inline with theories on other regarding preferences (e.g., Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999). Aside other regarding preferences, efficiency[2] (Engelmann & Strobel 2004), in terms of overall payoffs, is a norm influencing allocations. Efficiency reflects the desire of the participants to maximize the sum of the payoffs of all bargainers. Aside equal splits and efficiency other fairness norms can occur.

In this paper, we investigate what norms the participants establish in the Nash bargaining game. To do so, we implement a bargaining game which disentangles the efficient from the equal split outcome to ensure that we can clearly differentiate the central experimental fairness norms established in existing literature on allocation decisions. To manipulate the established norms, we let the participants, in one treatment, play a dictator game prior to bargaining. The outcome of the dictator game is the realization of one fairness norm. That is, by implementing a dictator game prior to bargaining, participants experience one certain fairness norm. This approach helps us to understand how previously experienced fairness norms influence subsequent behavior.

We find that the number of message has a significant effect on the norm implemented: While groups exchanging only few messages often reach outcomes close to the equal split of payoffs, the bargaining results are closer to efficiency the longer the chats last. When looking at both treatments in isolation, this effect persists for the groups playing no dictator game. For the participants who first played the dictator game the effect of the number of chat messages vanishes. The outcomes they choose in the bargaining game correlate with the outcomes of the previous dictator game.

[2] To clearly distinguish between Pareto efficiency and efficiency in terms of payoff sums, we will call the later simply "efficiency" and the former "Pareto efficiency" throughout the paper.

In the remainder of this paper, we first describe the experiment in Section 2. We introduce the experimental results in Section 3 and discuss them in Section 4.

2 The experiment

In this sections, we first discuss the treatment design before shedding light on the experimental procedure.

2.1 Treatment design

The experiment consists of playing two games, a dictator game and a Nash bargaining game. In both games two participants i with $i \in \{1,2\}$ interact. In the dictator game, the strong player, the dictator, gets an endowment of 100 points. The strong player decides which amount x_1 of the endowment to keep. The weak player, the recipient, receives the part of the endowment the strong player does not claim, i.e., $x_2 = 100 - x_1$. The game has one sub game perfect equilibrium, namely $x_1 = 100$ and $x_2 = 0$: The weak player cannot make any decision and the strong player maximizes his payoff by keeping everything for himself.

In the Nash bargaining game, the same participants interact. Now, their task is to distribute 100 tokens. Before making their decisions, the strong and the weak player can communicate using a chat window. After the chat, both participants make their decisions, that is, each participant i indicates how many points φ_i to keep for himself. Based on their decisions, the participants reach an agreement or not:

(1) Agreement: If $\varphi_1 + \varphi_2 \leq 100$, only the available tokens are distributed. Each participant receives the number of tokens φ_i, he wanted to keep.

(2) No agreement: If $\varphi_1 + \varphi_2 > 100$, the participants distributed more tokens than available. Hence, both participants receive a disagreement payoff of $\varphi_i = 0$ tokens.

To distinguish between the theoretical solution concepts, the payoff of the participants is $y_1 = f_1 \cdot \varphi_1$ and $y_2 = f_2 \cdot \varphi_2$ points respectively with $f_1 = 6$ and $f_2 = 1.2$. By using these parameters, fairness norms equal split and efficiency (see Table 1).

Another property of the parameter set, namely f_1 and f_2 is, that as for the dictator game, the Nash bargaining game favors the strong player, i.e. the former dictator. For each token the strong player keeps, he gets five times the payoff of the weak player.

Role	Factors (f_i)	Equal Split	Efficiency
Strong player	6.0	83	0
Weak player	1.2	17	100

Table 1: Numerical value of fairness norms

We played two treatments of the games. In the baseline treatment, participants only played the Nash bargaining game, while they played the Nash bargaining game after the dictator game in the dictator treatment.

2.2 Experimental procedure

We recruited 78 participants to the experimental laboratory at the university of Magdeburg (MaXLab) using hroot (Bock et al. 2012). In the beginning, we assigned all participants to random seats in either of the two rooms of the laboratory. We assigned all participants in one room to the role of the strong player and all participants in the other room to the role of the weak player. In the end of each session, we asked the participants to leave the building using opposing directions. In this way, we ensured that interacting participants did not meet during and after the sessions.

All participants played one out of the two treatments, baseline and dictator, computerized with z-Tree (Fischbacher, 2007). In treatment baseline 38 and in treatment dictator 40 participants participated. For both games we handed out written instructions. However, the participants in treatment dictator did not know what type of game they would play after the dictator game and we asked all participants to neither disclose their identity nor reference to the prior game when chatting to exclude any reciprocity effects. Although the participants in treatment dictator played in the same groups throughout the experiment, we did not inform the participants accordingly but only stated that two participants would interact in the second game.

To ensure that all participants, independent of the treatment could receive identical payoffs, the participants in treatment baseline received a show up fee of 5.00 € for participating in the experiment. To not obfuscate the result of the bargaining game, we mentioned the show up fee only seconds before beginning to pay off. Each point the participants earned corresponds to 0,10 €. On average the participants received 13.51 € (min.: 0.00 €; max.: 65.00 €) for the experiment lasting approximately 45 minutes. Notice, both treatments lasted equally long. The time the participants in treatment dictator lost by playing the dictator game, was spent by the participants in treatment baseline for additional chat messages when bargaining (also see Section 3).

3 Results

Of the 39 groups in our experiment, five did not come to an agreement (3 in treatment dictator, 2 in treatment baseline; see Table A.1 for detailed data). In each treatment, one of these groups did not come to an agreement due to one of the participants leaving the chat without making an offer. In the three remaining groups, the participants entered the wrong offer after having come to an agreement in the chat. However, we assume that the participants did not intend the new offer: They always entered the offer of their interaction partner. Hence, if we do not explicitly state otherwise, we neglect the groups having made no offer and report results based on the final offer entered in the chat instead of the offers specified when entering the bargaining result. When reporting our results, we focus on the share of the strong player as in both games, dictator game and Nash bargaining game, the shares add up to 100, the share of the weak player can easily be derived by subtracting the share of the strong player from 100.

3.1 Comparison of payoffs

We first compare the payoffs of the strong player relative to the overall payoff for both treatments (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). In the dictator game, the strong players kept an average of 75% of the pie for themselves. The relative payoffs for the bargaining game are similar. Here, the strong players earn about 70% of the overall payoff. This result clearly indicates that the participants did not show any form of (indirect) reciprocity (Berg et al. 1995). If the strong players wanted to reciprocate, we would have expected shares closer to equal splits or in favor of the weak player in the Nash bargaining game.

Table 2: Bargaining game results in share of tokens kept by the strong player

	Bargaining (result)		Bargaining (chat)	
	Avg.	SD	Avg.	SD
Dictator	41%	32%	37%	30%
Baseline	38%	20%	32%	14%

When we investigate the tokens kept by the strong player in the Nash bargaining game (see Table 2). We again find no significant differences between the treatments, neither when looking at the bargaining result entered after the chat (Mann Whitney U test, two-sided, p = 0.701) nor when comparing the last chat messages (Mann Whitney U test, two-sided, p = 0.665). The strong players on average receive less than 50% of all tokens. This clearly is the result of the different factors f_i we

implemented to derive points from tokens and which favor the strong players over the weak players by 5 (f_1/f_2). However, the standard deviations between both treatments differ. The individual bargaining outcomes vary less around the average in the baseline treatment (standard deviation: 14%) than in the dictator treatment (standard deviation: 30%).

3.2 Frequency of experimental benchmarks

To better understand the variance between both treatments, we compare the frequency of the experimental norms between both treatments (see Figure 1). That is, we classify each observation as equal split, if the strong player keeps the exactly the number of tokens predicted by the equal split or up to 5 more or less, while we classify an observation as efficient, if the strong player keeps everything for himself. All other outcomes are classified as "other outcomes". This classification is motivated by the chat protocols. The participants allocating between 11 and 21 to the strong player discussed to establish an equal split, while only the participants assigning everything to the strong player, discussed efficiency. All other participants discussed other fairness norms. In the baseline treatment the central experimental fairness norms occur. Namely, 11 participants choose the equal split, while 3 participants choose the efficient, i.e. overall payoff maximal, outcome. In the dictator game, we observe less equal splits (8) and no efficient allocations. The distribution of the different experimental fairness norms differs between both treatments (Chi squared test, two-sided, p = 0.035).

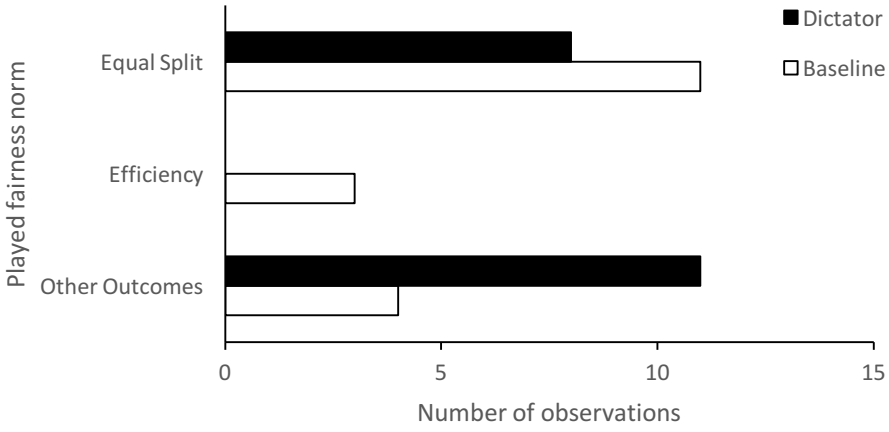

Figure 1: Observed frequency of experimental fairness norms

3.3 Influencing factors

We observe that the participants in our experiment on average show identical behavior in both treatments. However, the results differ, if we relate the results experimental benchmarks. Now, the variance between the outcomes in the dictator treatment are higher than in the baseline treatment and we observe differences in the frequencies of the outcomes. Hence, in the remainder, we investigate what drives the observed differences.

Table 3: Number of messages in chat protocol per treatment

	# messages	
	Avg.	SD
Dictator	9.11	6.34
Baseline	21.94	15.07

To do so, we first calculate the number of messages exchanged before coming to an agreement (see Table 3). While the participants in the dictator treatment only exchange about 9 messages, participants in the baseline treatment on average exchange about twice as much (about 20 messages). The number of messages exchanged in the baseline treatment is significantly higher than in the dictator treatment (Mann Whitney U test, two-sided, p = 0.004).

	All data	Dictator treatment	
	# messages	# messages	Dictator game
# messages	0.571 (0.288)*	-0.737 (0.507)	-0.486 (0.467)
Dictator game			0.226 (0.099)**
Intercept	25.696 (5.756)***	38.340 (5.579)***	19.048 (9.796)*
R^2	0.076	0.058	0.246
N	37	19	19

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Table 4: Factors influencing decisions in bargaining game

Given the differences in the messages exchanged, we conduct a regression analysis to investigate what drives the outcomes in the bargaining game. In a first regression, we investigate the impact of the number of messages exchanged on the number of tokens received by the strong player (see first column of Table 4). If we look at all data, i.e., the data of treatment baseline and dictator, the number of messages has a significant positive effect on the outcome. That is, the longer the participants chat the more receives the strong player. This effect vanishes, if we look at the dictator treatment in isolation (see second column of Table 4). In the dictator treatment, it is the outcome of the dictator game which drives the outcomes in the bargaining game (see last column of Table 4). However, this relationship is not (indirect) reciprocal. The more the strong player keeps in the dictator game, the more he gets in the subsequent Nash bargaining game. That is, the participants in the dictator game play the fairness norm in the bargaining game, which the strong player established in the previous dictator game.

4 Discussion

Existing literature on the establishment of norms is rather scarce. Although we know that we learn norms throughout our lives and adapt to the norms of others (see, e.g., Ostrom, 2000). It is still open how and at which speed we learn norms. This experimental study is one step towards understanding norm adaption. In the remainder, we first discuss whether existing norms can justify the observed behavior, before we argue that the importance and volatility of norms.

Other regarding preferences: One might get the impression that the strong players have stable other regarding preferences. In the dictator treatment, their share of payoffs is similar in both the bargaining as well as the dictator game. If any of the weak players, however, was motivated by other regarding preferences (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999), he should have tried to get more or at least half of the payoff – which they did not. Hence, we conclude that other regarding preferences cannot justify the behavior we observe.

Reciprocity: It is not reciprocity which justifies the observed behavior either. If either of the participants would behave reciprocal, payoffs of the weak players in the bargaining game should be higher than the payoffs of the strong players, after unequal distributions in the dictator game. However, this is not the case. Opposite to the expectation of reciprocity, the payoff of the strong players when bargaining increases, the less equal their distributions in the dictator game.

Efficiency: The desire to reach efficient outcomes, in terms of pay off sums, could explain the observed behavior. In the baseline treatment, 3 weak players assigned all 100 tokens to the strong player. They clearly chose to play the efficient allocation. On average however, the efficiency norm is not played to often: On average the strong player gets less than half the tokens distributable in both treatments. However, if the groups wanted to achieve efficiency, they could have. Hence, the desire to reach efficiency alone cannot justify behavior.

In sum, we find a variety of different bargaining outcomes. Neither of them in isolation can justify behavior. What we see however, is how preferences for fairness norms emerge. After both strong and weak player experienced unfair behavior in favor of the strong player, they both accept this fairness norm and establish similar distributions in the subsequent bargaining game. In treatment baseline, the situation is different. Now no fairness norm is ex ante imposed for both of the participants. Hence, the participants discuss how to allocate the money. That is, they establish their preferences over different fairness norms. In consequence, the bargaining partners bargain significantly longer than in the dictator treatment. The length of bargaining also drives the later result. The more the participants chat, the more they deviate from the equal split of payoffs to an efficient outcome.

We argue that this is also the consequence of norms: In our every day live, the equal split and efficiency norms are omnipresent. If we find no intuitive benchmark, we typically try to establish the simplest norm to think of – just cut the cake in two equal halves or maximize the overall benefit of a decision. Only if we take more time to think about possible distributions, we find other plausible allocations. Convincing the bargaining partner to accept a distribution differing from these obvious fairness norms, e.g., equal split or efficiency, is difficult and takes time. Notice, that it is not always the finally benefiting participant who proposes to choose a certain fairness norm. In one of our groups having a strong player receiving all tokens, it was the weak player who had to convince the strong player of taking everything – in a chat consisting of more messages than most others.

Based on these results, we argue that norms – in contrast to our expectation – are volatile. Just one experience, a simple, short dictator game, can let you choose a certain norm differing from the norm you would have chosen otherwise. This result casts serious doubts on the way we understand other regarding preferences today: What is the benefit of deriving αs and βs for calculating the utility function of a decision maker with other regarding preferences à la Fehr & Schmidt (1999), if an experience lasting for 5 minutes can turn these preferences obsolete?

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Appendix – Experimental Data

	Dictator game		Bargaining Offer				Agree-ment	Control Treatment Offer				Agree-ment
	P. 1	P. 2	P. 1		P. 2			P. 1		P. 2		
1	65	35	40	(40)	60	(60)	Exact	20	(20)	80	(80)	Exact
2	90	10	30	(30)	70	(70)	Exact	22	(22)	78	(78)	Exact
3	50	50	16	(16)	84	(84)	Exact	20	(20)	80	(80)	Exact
4	90	10	50	(50)	50	(50)	Exact	50	(50)	50	(50)	Exact
5	100	0	50	(50)	50	(50)	Exact	17	(17)	83	(83)	Exact
6	90	10	60	(60)	60	(40)	No	100	(-)	100	(-)	No
7	70	30	30	(30)	70	(70)	Exact	40	(40)	60	(60)	Exact
8	90	10	80	(20)	80	(80)	No	100	(100)	0	(0)	Exact
9	80	20	80	(-)	60	(-)	No	20	(20)	80	(80)	Exact
10	100	0	50	(50)	50	(50)	Exact	20	(20)	80	(80)	Exact
11	100	0	20	(20)	80	(80)	Exact	45	(45)	55	(55)	Exact
12	50	50	20	(20)	20	(80)	Underbid.	17	(17)	83	(83)	Exact
13	6	94	18	(18)	82	(82)	Exact	16	(16)	20	(80)	Underbid.
14	100	0	50	(50)	50	(50)	Exact	100	(100)	0	(0)	Exact
15	100	0	30	(30)	70	(70)	Exact	30	(30)	70	(70)	Exact
16	80	20	30	(30)	70	(70)	Exact	20	(20)	80	(80)	Exact
17	8	92	17	(17)	83	(30)	Exact	20	(20)	80	(80)	Exact
18	50	50	20	(20)	80	(80)	Exact	83	(17)	83	(83)	No
19	100	0	80	(20)	80	(80)	Exact	100	(100)	0	(0)	Exact
20	90	10	30	(30)	70	(70)	Exact					

Table A.1: Chat proposals (in brackets) and decisions per group

Notes:

Table A1 shows the results of the dictator game and the distributions in the Nash bargaining game agreed on during the chat (values in brackets) and the actual decisions (values without brackets). The strong player is represented by "P. 1", while the weak player is "P. 2". In the agreement column, we state whether the found distribution distributed all 100 points exactly ("Exact") or more points were distributed ("No"). No group distributed less than the available 100 points.

Remarks on groups coming to no agreement: In Group 9 no group member entered a message in the chat window.

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