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## Unstructured Bargaining over an Endogenously Produced Surplus and Fairness Ideals – An Experiment

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## Abstract

*Fairness considerations are important determinants of behavior in unstructured bargaining situations with equal bargaining power. If the surplus over which the bargaining takes place was created by separate, individual efforts, several entitlement-related fairness ideals might be relevant. In our experiment we first elicit subjects' fairness ideals using a questionnaire. In the following production phase each player generates output by luck, individual effort and talent. We analyze whether the elicited fairness ideals guide subjects' behavior in the subsequent bargaining in which the joint output is distributed among two individuals. We find that bargaining claims deviate significantly from the elicited fairness ideals and are strongly related to performance if one individual had produced more than the partner. These findings contrast the previous literature on fairness ideals and enrich the findings on self-serving fairness.*

*JEL Classification: C91, D39, D63*

*Keywords: Fairness; unstructured bargaining; self-serving fairness; opportunism*

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# 1 Introduction

It is by now a widely accepted result in experimental economics that people are driven by fairness concerns and are willing to pay for fairness (e.g., Camerer 2003). However, economists are still puzzled by fairness beyond the mere fact that it is relevant, which can be summarized in two questions. First, what exactly is fairness? Second, how does fairness matter for economic decisions?

Regarding the first question, the literature for a long time equated fairness with equality of outcomes (Fehr and Schmidt 1999, Bolton and Ockenfels 2000). This is only natural as the standard theory describes identical agents and the standard lab experiment therefore creates homogeneous roles for all participants with any initial endowments being exogenously (and randomly) distributed by the experimenter. An alternative view is taken in the growing literature on bargaining with joint production (see Karagözoğlu, 2012). Here a joint pie to be distributed is produced individually by the agents. In Cappelen et al. (2007, 2011) and Cappelen et al. (2010), fairness is based on ideals derived from theories of justice. Fairness ideals such as egalitarianism, choice egalitarianism, meritocratism, and libertarianism, which differ by what an individual can be held responsible for, are better suited than other-regarding preferences to study bargaining situations in which the payoff to be distributed was produced instead of exogenously given to the players like "manna from heaven". Indeed, Cappelen et al. (2007, 2011) and Cappelen et al. (2010) show that the 50:50 split often observed in ultimatum games (UG) and dictator games (DG) without production is less frequent in experiments in which the surplus was endogenously produced.

Our paper is closely related to Cappelen et al. (2007, 2010, 2011), but focuses on the second question of how fairness affects economic behaviour. We argue that it is quite problematic to generalise finding from highly stylized games such as the dictator game or the ultimatum game to real-world applications. While the examination of these highly stylized bargaining games is very useful for isolating behavioural factors, they are quite unrealistic. Especially the dictator game has been criticised for being unnatural and its results being difficult to generalise (Oechssler 2010, Smith 2010). In fact, Cappelen et al. consider the dictator game as a method to elicit the fairness ideals and less as a per se interesting decision situation.

In this paper, we report the results of an economic laboratory experiment in which subjects produce a joint surplus in a real-effort task and divide it according to an unstructured bargaining protocol. We elicited subjects' fairness ideals using a questionnaire with hypothetical choices and analyse whether and how these fairness ideals affect the bargaining behaviour. The initial fairness ideals were elicited before the subjects had any information about the subsequent experiment so that it is impossible that the original fairness ideals are biased by the anticipation of the bargaining. The elicited fairness ideals can hence be interpreted as the views of an impartial spectator. We also check whether after

the experiment subjects adjust the fairness ideals that were reported prior to the experiment by using a second questionnaire, similar to the one used before the experiment.

Our experimental design captures important bargaining situations such as business partnerships where partners contribute to a joint output, which must then be distributed among the partners. The crucial features are that the joint surplus must be produced first and is then distributed among the partners that have equal roles and bargaining power in the bargaining process. Fairness concerns become more salient in this setup, when the partners contribute unequally to the common surplus. The individual contribution of each partner to the common surplus may create an entitlement to a share of the common surplus that can influence the subsequent bargaining and can relate to each subject's stated fairness ideal. An unstructured bargaining protocol, in which each partner can make and respond to offers at any time and offers only become binding if the other partner accepts, seems to be the best design to study the effects of entitlements of bargaining behaviour. To make the perceived entitlements strong, we let subjects perform an IQ test-like quiz and a tedious number counting task. Additionally, half of the subjects received earnings from a coin toss. We believe this setting captures the realistic roles of effort, talent and luck in isolation.

Our main research question is whether subjects' behaviour in the bargaining stage is determined by the elicited fairness ideals or whether it deviates from the ideals in a self-serving manner. By self-serving fairness we understand that the shares they claim for themselves in the bargaining phase of the experiment are significantly larger than those predicted by the elicited fairness ideals[4]. If subjects behave opportunistically when bargaining they might also adjust their answers in the post-experimental questionnaire compared to the first questionnaire in order to reduce cognitive dissonance.

Although our paper is closely related to Cappelen et al. (2010), there are notable differences. We do not estimate the proportions of each fairness ideal in the population based on choices made in a dictator game, but use the answers given in the questionnaire to classify subjects according to the four different fairness ideals. After letting participants produce income in a real-effort task involving talent, effort and luck in a way that each factor is perfectly transparent we analyse whether the behaviour in the subsequent unstructured bargaining can be explained by the attributed fairness ideals.

Our design extends the design in Gächter and Riedl (2005, 2006) and Karagözoğlu and Riedl (2010) in which an endowment is distributed through an unstructured bargaining process. There are several

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[4] Babcock, and Loewenstein (1997), Konow (2000), and Rodriguez-Lara, and Moreno-Garrido (2012) also find evidence of self-serving fairness in different settings.

differences between these papers and ours. First, in Gächter and Riedl (2005, 2006) there is no production of a joint output, but entitlements are determined by performance in a general knowledge quiz. In Karagözoğlu and Riedl (2010) there is also a luck component, but subjects do not know whether output was determined by performance or luck. In our setting the luck component is disentangled from the two other production factors effort and talent. As we shall see below, subjects with different fairness ideals disagree on how the earnings from luck are to be distributed. Hence it is important to isolate the luck component from the two other output components, talent and effort. Second, these authors study the effect of claims on the endowment by subjects that cannot all be paid out to the subjects, i.e. infeasible claims, on bargaining and look at different distributional norms than the ones we consider. As stated earlier we study the links between bargaining and elicited fairness ideals, not the attractiveness of different solutions concepts to subjects. The distributional norms studied in those papers (which are normative solution concepts to bargaining problems with claims) differ substantially from the fairness norms we consider. Finally, Gächter and Riedl (2005, 2006) and Karagözoğlu and Riedl (2010) elicit subjects' fairness ideals after subjects have been informed of their and their opponents' relative performances. It is therefore possible that the elicited beliefs are self-serving and do not reflect subjects' true fairness ideals. In contrast, in our experiment subjects have to answer the fairness questionnaire before they take part in the production tasks and the bargaining phase. We believe that this allows us to elicit subjects' fairness ideals without those ideals being contaminated by the information they have of their relative performance in the production task. As we shall see below this is important since subjects who perform better in the quiz bargain very differently than subjects who have performed less well.

Understanding how fairness concerns interact with self-interest motivations when subjects bargain over the division of a joint produced output is not straightforward, and the purpose of this paper is to shed empirical light on this issue. A first hypothesis is that subjects make decisions that are consistent with their fairness ideals as impartial spectators. However, it is also possible that subjects' bargaining behavior is more generous or more selfish compared to the elicited fairness ideal. Cappelen et al. (2011) also elicit fairness ideals with a questionnaire before a dictator game with previous production and find little evidence for a self-serving fairness, which is in contrast to the finding in Karagözoğlu and Riedl (2010). The role of fairness and opportunism might depend on the focality of a particular fairness notion. If there is no obvious difference between the negotiators, an equal 50:50 split may be very focal and thus be chosen as a coordination device. If subjects contribute unequally to the joint surplus, take different roles in the bargaining, or have unequal bargaining power, these differences either exacerbate fairness concerns or obfuscate them in favour of self-interest. Rustichini and Villeval (2012) argue that moral hypocrisy, which they define as the motivation to appear moral without acting according to the moral prescriptions, depends on power

and strategic considerations. They show that the strong side in a bargaining bends the norm in its favor and the weak sides agrees. Moral hypocrisy is larger in games where real choices have no strategic consequence than in those where they do. Both findings would suggest that we should observe more self-serving behaviour in a dictator game than in unstructured bargaining, since in unstructured bargaining both partners have equal power and their behavior may have strategic consequences. However, the converse might be true. One can also hypothesize that subjects will be less fair and display more moral hypocrisy in unstructured bargaining than in dictator games, because they have more "moral wriggle room". As Dana et al. (2007) show, many subjects behave fairly in dictator games without actually valuing the fair outcome, because they feel compelled to do so. In an unstructured bargaining situation in which both partners have equal bargaining power, this perceived moral obligation may be much weaker, since each player is equally responsible for the final allocation. So, subjects can make more selfish offers than they would in dictator games with the justification that their bargaining partner is not forced to accept them. If the bargaining partner accepts any unfair offers, the proposer can shift the responsibility to the partner

## 2 Theory and research questions

We focus on fairness judgments, which can be justified by a theory of distributive justice (Konow 2003) rather than those derived from pro-social preferences. In theories of pro-social preferences fairness is typically related to the distribution of resources among two or more individuals including the person who makes the fairness judgment. Whether a distribution is fair or not involves a comparison of the resources of the person who makes the judgement and those of other persons. While the social-preference approach has proven its usefulness in predicting behaviour in many distributional games, it may be less applicable to other situations. One example is distributional justice at the societal level, which involves assessments of distributions as fair or unfair when the assessor has no stake in the distribution. Another example is interactive negotiations in which the negotiators need reasons to justify a demand as fair. If a bargaining partner must be convinced to accept a proposed distribution, it may not be sufficient to call it fair, because the partner might have a different opinion. Providing reasons why a proposal is fair for both partners seems to be the more successful bargaining strategy.

Cappelen et al. (2010) propose four fairness ideals, which are derived from a theory of justice based on responsibility. The four fairness ideals differ by the responsibility cut, which defines the factors, which individuals should or should not be held responsible for. One extreme view is that responsibility does not matter and the equal distribution of resources is fairest. This ideal is called *egalitarianism*. The other extreme case is *libertarianism* according to which every individual is fully

responsible for his own fate or income, even for factors beyond individual control. The distributional prescription of libertarianism is that every individual deserves what he or she can earn and that no redistribution of income should take place. There are two intermediate cases in which subjects are responsible for some factors of their income, but not for others. *Choice egalitarianism* says that one is responsible for factors under direct control, such as effort, whereas *meritocratism* also includes personal traits or merits. Cappelen et al. (2010) use a proportional rule to derive the fair distributions according to the different ideals. Proportionality refers to a situation where each agent's share of the final outcome corresponds to his share of production.

We believe, however, that a proportional rule is less intuitive and easy to apply than a linear rule that we adopt in this paper. A simple yet plausible rule would be that each participant is entitled to a certain fraction of the pie and the remaining amount is split equally. This rule is analogous to the so-called Talmud rule (see Aumann and Maschler 1985, Gächter and Riedl 2005) that applies to bankruptcy problems in which not all claims of all debtors can be satisfied. We can translate the fairness ideals into a linear rule in the following way. A distribution is fair if each partner receives the total amount of income for which he is responsible and the remainder is shared equally. Let us assume that the income was produced with the factors effort, talent, and luck. Combine the incomes of two individuals, and let $FC_i$ represents the fair claim of individual i as a function of i's income components and the ones of the other individual k. Then we have

$$FC_i = \eta Y_i^{effort} + \tau Y_i^{talent} + \lambda Y_i^{luck} + (1 - \eta)Y_k^{effort} + (1 - \tau)Y_k^{talent} + (1 - \lambda)Y_k^{luck}$$

The four different fairness ideal can be easily captured by different weights in this function, which can have the values 0, 0.5, or 1 (see Table 1). According to the egalitarian ideal, one has, $\eta=\tau=\lambda=0.5$, implying that individual i can claim half of all income components. A choice egalitarian would claim all of his income from effort, $\eta=1$, and none of the other individuals' effort income, $1-\eta=0$, income resulting from talent and luck is shared, $\tau=\lambda=0.5$. Meritocrats also claim their full income from talent and libertarians have $\eta=\tau=\lambda=1$.

**Table 1: Weights on income sources according to different fairness ideals**

|                    | $Y_i^{effort}$ | $Y_i^{talent}$ | $Y_i^{luck}$ | $Y_k^{effort}$ | $Y_k^{talent}$ | $Y_k^{luck}$ |
|--------------------|------|------|------|------|------|------|
| Egalitarian        | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  | 0.5  |
| Choice Egalitarian | 1    | 0.5  | 0.5  | 0    | 0.5  | 0.5  |
| Meritocratic       | 1    | 1    | 0.5  | 0    | 0    | 0.5  |
| Libertarian        | 1    | 1    | 1    | 0    | 0    | 0    |

We have three main research questions. First, we want to know which of the four responsibility-based fairness ideals our subjects endorse when they are asked to find fair distributions of income that do not affect themselves. We are hence interested in their normative convictions on how fairness relates to performance and responsibility. On the background of the studies summarized in Karagözoğlu (2012) we expect that performance-related notions of fairness will be more important in our experiment with real-effort production than the egalitarian equal split of income often found in distributional experiments with exogenously given endowments.

Second, building on our classification of subjects according to their normative convictions, we wish to investigate if the fairness judgements concerning other persons guide their behaviour in bargaining about their own income. More specifically, we ask whether subjects' bargaining claims correspond to what they consider fair. If subjects value being fair, their fairness ideals should at least in part determine their behaviour so that we should be able to predict their bargaining claims by their normative judgments.

In contrast to the view that individuals have a preference for being fair, fairness might have a purely instrumental role for them. People might want to appear fair because this is appreciated by society and they value the recognition of others for conforming to a social norm instead of the norm itself. In a bargaining situation fairness might also be used instrumentally to reach an agreement. If subjects are purely self-interested, they might nevertheless resort to fairness arguments to defend their claims. In this case we would expect that subjects opportunistically make claims that maximize their own income, but can still be justified as fair by some fairness ideal. Such offers could be called "best fair offers". Our final research question is whether opportunistic behaviour (or self serving fairness)[5], in the sense that subjects make "best fair offers" instead of claims that are consistent with their expressed normative views, is frequent.

# 3 Design and Procedures

Our experiment has four parts: a pre-experimental questionnaire with which we elicit subjects' normative judgements, a real-effort production phase in which subjects individually generate a monetary surplus, a bargaining phase in which pairs of subjects distribute their endowments in an unstructured bargaining protocol, and a post-experimental questionnaire similar to the pre-experimental questionnaire. We also elicited personal details such as age, gender, and field of study after the experiment.

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[5] In this paper opportunism is synonymous with self-serving fairness, and both terms are used to mean the same thing.

The first questionnaire[6] consisted of seven questions, each presenting a hypothetical distribution of a joint surplus between two hypothetical persons, A and B. Subjects were informed that this surplus had been produced by a combination of talent, effort and luck. The individual contributions of each subject were shown in a table, and each subject knew the extent to which A's and B's surplus was generated by talent, effort and luck. Four of these questions were open choice questions. Here subjects had to specify a fair division of the surplus between person A and person B. In the remaining three questions subjects had to choose one fair distribution of the surplus between A and B from a list of possible distributions. The distributions were given in a table, and subjects could again see how much A and B each contributed to the joint surplus in the talent, effort and luck stages. Each proposed distribution in the table corresponded to one of the fairness ideals we are interested in, i.e. meritocratism, choice egalitarianism, egalitarianism and libertarianism, calculated by the formula given in the previous section[7]. The numbers of the contributions of the hypothetical persons A and B were chosen such that the four fairness ideals demanded different distributions. The second questionnaire was shorter and consisted only of one open choice question and one question similar to that given in the pre-experiment questionnaire. The questionnaires were not incentivized. Importantly, subjects received the pre-experimental questionnaire before they were informed about the nature of the subsequent experiment.
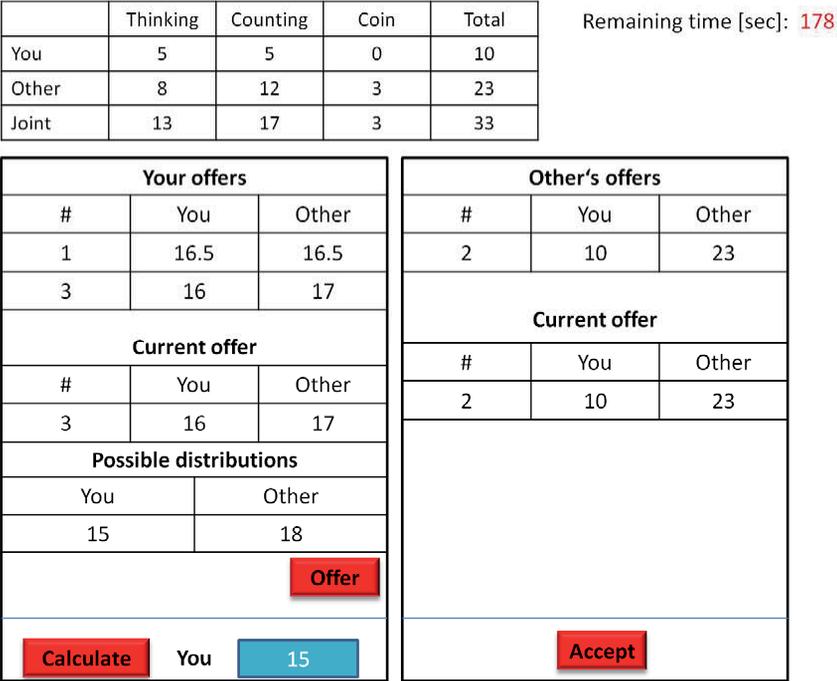
In the first part of the experiment (production phase), participants had to produce a surplus in three different ways during three distinct stages. In the first stage of the production phase participants had to answer a twenty question IQ test-like quiz (taken from Hesse and Schrader 2009). The first stage lasted fifteen minutes. The contribution of each participant in this phase was then labeled "earnings from talent". In the next stage of the production phase, participants had to take part in a real-effort task consisting of counting ones in rows of zeros and ones on a screen. There was a maximum of 60 screens during fifteen minutes. With each counting screen came the possibility to exit the production phase by pressing a button. Contributions of each participant in this stage were labeled "earnings from effort". For each of the first two stages of the production phase, high performers in the top tercile of the session received twelve euros, middle performers received eight euros, and low performers in the bottom tercile received five euros credited on an account. The third and final stage of the production phase was a coin toss, and was labeled "luck". In this stage a participant was chosen randomly to toss a coin in front of the other participants. At the beginning of the experiment all participants had been randomly assigned to a H-group and T-group. If the coin fell on head, then

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[6] The questionnaire the instructions can be found in the Appendix.
[7] We also presented the choice egalitarian and the meritocratic offers calculated with a proportional rule as an alternative to the way we capture the fair distributions. These distributions based on the proportional rules were almost never chosen so that we did not take them into account in the analysis.

all participants in group H received three euros, if it fell on tail, then the other group earned three euros.

**Figure 1: Bargaining screen**

|  | Thinking | Counting | Coin | Total |
|---|---|---|---|---|
| You | 5 | 5 | 0 | 10 |
| Other | 8 | 12 | 3 | 23 |
| Joint | 13 | 17 | 3 | 33 |

Remaining time [sec]: 178

| Your offers | | |
|---|---|---|
| # | You | Other |
| 1 | 16.5 | 16.5 |
| 3 | 16 | 17 |

| Current offer | | |
|---|---|---|
| # | You | Other |
| 3 | 16 | 17 |

| Possible distributions | |
|---|---|
| You | Other |
| 15 | 18 |

Offer

Calculate  You  15

| Other's offers | | |
|---|---|---|
| # | You | Other |
| 2 | 10 | 23 |

| Current offer | | |
|---|---|---|
| # | You | Other |
| 2 | 10 | 23 |

Accept

Upon completion of the first part of the experiment participants received instructions for the second part that were again read aloud. Any questions were answered privately. This second part of the experiment was the bargaining phase. The subjects were matched randomly with a partner. When a match was formed each of the surpluses generated by one of the two partners (produced during the production phase) were put on a joint surplus account. Subjects were informed about their own earnings from talent, effort, and luck and about the earnings of the partner (see Figure 1). Matched participants then bargained for five minutes about how to divide the joint surplus. The bargaining was unstructured: each subject could propose a distribution, and could respond to a proposal made by the other subject, at any time[8]. To make an offer a subject enters a claim for himself and the computer calculated the remainder to the partner (participants just had to press a "calculate" button to see this remainder), such that proposed divisions were efficient by design, and no resources were wasted. After the proposing subject confirmed an offer, the offer became visible in an offer table

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[8] This design is related to the design of other unstructured bargaining experiments such as Roth and Murnighan (1982), and Isoni, Poulsen, Sugden, and Tsutsui (2012).

both for the proposer and the partner and was labeled current offer. The partner could respond by either accepting the current offer, making a counter offer, or doing nothing. At any time each subject could make a new offer, which replaced the old current offer. New offers were added to the table of offers so that the complete history of offers was visible all the time. If an offer was accepted, the round ended and the distribution was recorded as potentially payoff relevant. If the bargaining time was over without any of the subjects accepting the partner's current offer, both subjects received a payoff of zero for this round.

Participants were re-matched randomly with five participants in total. Only one of the five bargaining rounds was randomly chosen for the final monetary payoff in order to avoid carry-over effects between the rounds. During the bargaining, subjects could send unrestricted messages to each other using a chat function.

The computer-based experiment was conducted at the RUBEX lab at the Ruhr-University of Bochum in 2012, using the experimental software z-Tree (Fischbacher, 2007). 72 students from all disciplines participated in 5 sessions. Approximately 40% of participants were female, 71% of the participants were native German speakers, and about 50% of the participants were economics/management students. Sessions lasted roughly 2 hours and the average payoff was €21.43, including a show-up fee of € 4.

Upon arrival, experimental participants were seated in separate cubicles and allocated randomly into two groups, H and T. Each session started with instructions for the main part of the experiment (provided in the Appendix). At this stage it was made clear that there would be additional parts of the experiments, but that the instructions for these parts would only be handed out after the completion of the current part. Participants received written instructions (see the Appendix), which were read aloud to ensure common knowledge. Everybody had the opportunity to ask questions in private.

## 4 Results

We first classify subjects into different fairness types based on their answers in the questionnaire and based on their claims in the bargaining. Then we analyse the relation between the fairness ideal and the claims by testing whether the claims are in line with the theoretically predicted claims in Table 1. In the last subsection we analyse whether claims are systematically more selfish than predicted by the respective fairness ideal. In this paper, we do not analyse the bargaining process itself. It is of course very interesting to ask questions about the duration and success of the bargaining or the

bargaining strategies of the subjects. But those questions cannot be analysed in detail in this paper due to space constraints.

## 4.1 Classifications of subjects

We use the data from the pre-experiment questionnaire to classify all subjects according to the fairness ideal that best fit their answers. Not all subjects gave answers that are consistent with a unique fairness ideal across the different questions. For that reason we compute the distance between the chosen hypothetical allocations and the ones predicted by the fairness ideals in the following way. For each of questions Q1 – Q4 we compute a fairness index for each ideal, k, $F^k_{ij} = 1 - |m_{Aj} - f_{Aj}|/f_{Aj}$, where $m_{Aj}$ is the amount of money subject $i$ would give to person A in question $j$ and $f_{Aj}$ is the amount that person A should receive according to the respective fairness ideal (egalitarian, choice egalitarian, meritocratic libertarian). In questions Q5 – Q7 subjects had to choose one distribution among a list of distributions, each of which reflected a different fairness ideal. For these questions $F_{ij}^k$ was given the value of 1, if the respective fairness ideal was chosen and 0 otherwise. Each individual was then assigned an overall index for each ideal k. $F^k_i = \frac{F_{i1}^k + F^k_{i2} + \cdots + F^k_{i7}}{7}$. By construction, $F^k_i$=1 if a subject's answers consistently and perfectly reflect one fairness ideal k. In the questionnaire after the experiment, only questions Q1 and Q6 were repeated in order stay within a time frame of two hours, and the index was computed analogously.

**Table 2: Classification of subjects based on questionnaire responses**

|  | Egalitarian | Choice Egalitarian | Meritocratic | Libertarian |
|---|---|---|---|---|
| Pre-experiment | 0 | 0.264 (19) | 0.444 (32) | 0.292 (21) |
| Post-experiment | 0.097*** (7) | 0.111*** (8) | 0.347 (25) | 0.444*** (32) |
| Same classification | 0 | 0.176 (6) | 0.382 (13) | 0.441 (15) |

Notes: Pre-experiments: questionnaire before the experiment; post-experiment questionnaire after the experiment; Same classification: same classification with both questionnaires. If the robustness of the answers before and after the experiment is checked with the same questions, the results are roughly identical. *** indicate statistical differences between the first and the second questionnaire at the1% level (t-test); numbers in parentheses are absolute frequencies

The last row of Table 2 shows that 34 out of 72 subjects (47.2%) are assigned the same type by the pre- and the post-experimental questionnaire. Of those 34 subjects 15 are classified as libertarians (44.1%), 13 as meritocratists (38.2%), and 6 as choice egalitarians (17.6%). When asked before the experiment, no subject gave egalitarian answers. The number of egalitarian subjects went up to 7 after the experiment, which is a statistically significant increase to 9.7% (p=0.003, t-test[9]). The fraction of choice egalitarians dropped significantly from 26.4% before the experiment to 11.1% after

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[9]Due to the lack of observed egalitarians in the pre-experimental questionnaire, a χ²-test was not possible here.

the experiment (p=0.001, χ²-test). The share of libertarians increases from 29.2% to 44.4% (p=0.003 χ²-test), while the shares of meritocrats are not statistically different before and after the experiment at 10%.

In the pre-experimental questionnaire many subjects did not give consistent answers meaning that they chose allocations based on different fairness ideals. Assigning a fairness type based on the overall closeness to one ideal is hence subject to error. We can use the maximum fairness ideal index F, on which the classification is based, as a measure of the consistency of the answers and also of the strength of the implied fairness ideal.

As Table 3 shows, the average maximum fairness ideal index $F^{max}$ is 0.81, which roughly means that the answers in the questionnaire on average deviate by 19% from the fairness ideal that describes them best. If using only the two questions that appeared in the post-experimental questionnaire, the value is significantly higher, which is not surprising as it is easier to consistent in two than in seven questions. After the experiment, subjects' answers are more consistent. With an index of 0.97 the answers in the questionnaire differ only slightly from the perfect answer to the best ideal. The more consistent answers in the post-experimental questionnaire suggest that subjects' answers to the fairness questions are influenced by their experiences in the experiment itself. It is also noteworthy that the pre-experimental fairness index of those subjects who did not change their types during the experiment is significantly larger than of those subjects who did change their types (0.86 vs. 0.77, p<0.001, t-test). Using the median of the fairness index (0.806), we can divide subjects into a group of people with strong fairness ideals above the median and one with weak ideals. Having a strong fairness ideal measured by a fairness index above the median is negatively correlated with changing one's type during the experiment (Spearman rank correlation index -0.33, p=0.004). We conjecture that the group with weak fairness ideals responded more to the specific circumstances in the bargaining than the other group.

**Table 3: Strength of fairness ideals**

|     |                    | Mean $F^{max}$ | Difference | P |
| --- | ------------------ | -------------- | ---------- | ------ |
| (1) | before, 7 questions | 0.81 |            |        |
| (2) | before, 2 questions | 0.94 | (2) > (1)  | <0.001 |
| (3) | After              | 0.97 | (3) > (1)  | <0.001 |
|     |                    |      | (3) > (2)  | <0.001 |
| (4) | before, no change  | 0.86 |            |        |
| (5) | before, change     | 0.77 | (5) < (4)  | <0.001 |

Notes: $F^{max}$ is the mean of the maximum fairness indices across individuals. Difference: t-test on equality of means. p: significance level

We tried to explain the elicited fairness ideal by gender, whether the subjects study economics or not, by age, by being native or not, and by a battery of questions concerning social responsibility in logistic regressions. None of these factors, however, makes any of the fairness ideals more or less likely.

An alternative way to determine the fairness type of a subject is to use the claims[10] for themselves they make in the bargaining. In each bargaining situation, we can predict what the claim should be depending on the four fairness types. Each actual claim can then be assessed using the squared distance from the different fair claims. We classify each claim as (choice) egalitarian, meritocratic or libertarian if it has the minimum squared distance to the predicted claim based on the respective fairness ideal. If the claims were determined only be the upheld fairness ideal, we would get an unambiguous revelation of subjects' types based on their claims. Since we observe that the same subjects make claims of different fairness types we classify the subjects based on the claim types that they make most frequently.

**Table 4: Classification of subjects based on claims**

|  | Egalitarian | Choice egalitarian | Meritocratic | Libertarian |
|---|---|---|---|---|
| Questionnaire | 0 | 0.304 | 0.347 | 0.348 |
| Claims | 0.087* | 0.304 | 0.174* | 0.435 |
| Correlation |  | -0.03 | 0.15 | -0.09 |

Notes: 23 subjects for which a unique classification based on claims was possible. Questionnaire: share of fairness ideals of these 23 subjects based on pre-experimental questionnaire. Claims: share of fairness ideals of these 23 subjects based on all claims made. Correlation: correlation coefficient between classifications based on questionnaire and on claims. * indicates that the shares are statistically different at 10% (t-test).

Table 4 presents the classification of subjects based on all claims they made in the bargaining. Unfortunately, we can only classify 23 subjects with this procedure because 28 subjects did not make any claims and 21 subjects cannot be classified uniquely. Two results are interesting in Table 4. First, according to their claims significantly more subjects are egalitarian and fewer meritocratic than according to their answers in the questionnaire. Second, the shares of choice egalitarians and libertarians are similar irrespective of the classification method. However, the Spearman correlation coefficients between the classifications are very low suggesting that many individuals made claims not in line with the ideal elicited in the questionnaire. While the behaviour in the bargaining seems to be influenced by fairness convictions, other factors also seem to be important.

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[10] In the following we use the terms "claims" and "offers" interchangeably. Each offer in the bargaining consists of a claim for the proposer himself and a proposal for the other player. In the analysis, we use the claim as the dependent variable, since by design all offers are efficient and exhaust the total available surplus.

## 4.2 Claims and fairness ideals

In order to learn more about how fairness ideals affect claims, we must examine the individual claims. As explained earlier, we classified each claim according to the least squared deviation from the predicted fair claim in a given situation.

Table 5 summarizes the results of the claim classification. Of all claims, 23.9% are egalitarian, 25% are choice egalitarian, 13.6% are meritocratic, and 37.5% are libertarian[11]. It is remarkable that the distribution of fairness ideal in claims is quite different from the distribution in subjects (compare Table 2 and Table 5). This suggests that subjects do not always make offers based on what they considered fair in the pre-experimental questionnaire.

**Table 5: Classification of claims**

|  | # | Egalitarian | Choice egalitarian | Meritocratic | Libertarian |
|---|---|---|---|---|---|
| All claims | 184 | 0.239 | 0.25 | 0.136 | 0.375 |
| Lower contribution | 82 | 0.390 | 0.28 | 0.073 | 0.256 |
| Higher contribution | 93 | 0.129 | 0.161 | 0.193 | 0.516 |
| Difference high vs. low (p-value) |  | <0.001 | 0.028 | 0.010 | <0.001 |
| All initial claims | 53 | 0.132 | 0.208 | 0.113 | 0.547 |
| Lower contribution | 26 | 0.269 | 0.231 | 0.077 | 0.423 |
| Higher contribution | 24 | 0 | 0.083 | 0.167 | 0.75 |
| Difference high vs. low (p-value) |  | 0.003 | 0.081 | 0.170 | 0.01 |

Notes: Only offers that can be classified uniquely according to least squared deviation.

An obvious factor that might affect claims is the own contribution to the joint surplus measured by total earnings in the production phase compared to the contribution of the bargaining partner. If we group subjects according to whether they contributed less or more than the partner we see that there are significant differences. Subjects with lower contributions make significantly more egalitarian (or choice egalitarian) claims than the partners and significantly fewer meritocratic and libertarian claims. The most frequent claim of subjects with lower earnings is the egalitarian offer (39%) and the most frequent claim of the high-contributors is the libertarian offer (51.6%). These findings are very plausible because these claims are the most beneficial in the respective situations.

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[11] Note that these shares refer only to claims that can be classified uniquely. In many cases an offer in a particular case is consistent with several fairness ideals. In all cases, in which the contributions of the two partners are identical, no matter how they were produced, the egalitarian and the libertarian distribution are identical.

**Figure 2: Shares of offers by relative contribution**
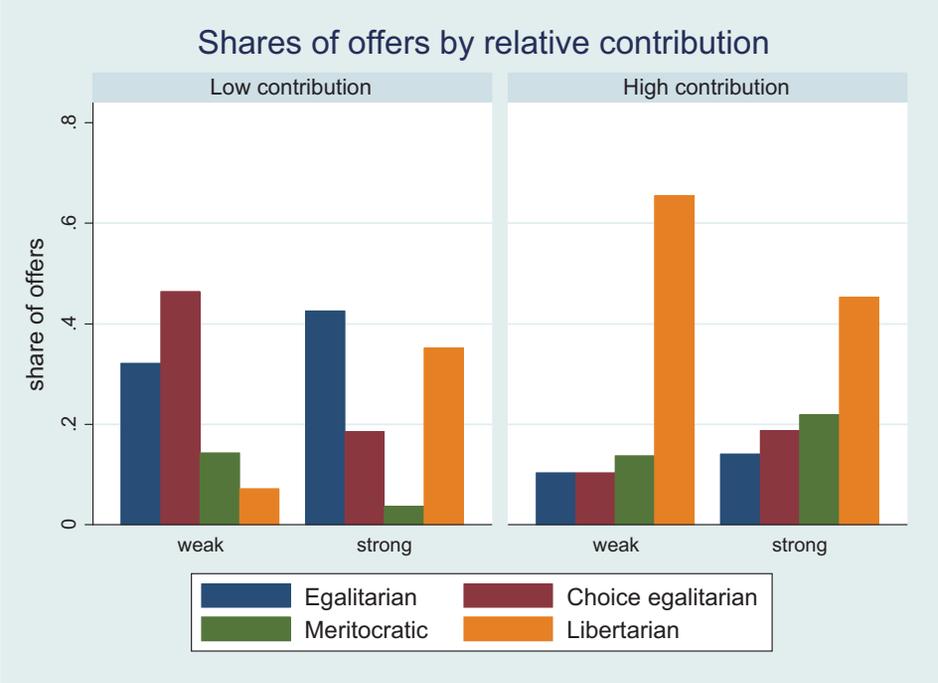


Notes: Left panel: subjects who contributed less than the partner; right panel: subjects who contributed more than the partner; bars indicate share of offers classified according to the four fairness norms; weak: consistency of answers in questionnaire below median, strong: consistency of answers in questionnaire above median

Figure 2 suggests that whether subjects make claims that benefit them in the respective situation might be a function of the strength of the fairness ideal. Apparently if subjects make low contributions (left panel), the share of meritocratic claims is lower for subjects with strong ideals (p=0.052, $\chi^2$-test). The shares of egalitarian and libertarian claims seem to be higher in the group with strong ideals and the share of choice egalitarian claims seems to be lower, these differences are not statistically significant, however. Similarly, among the subjects with relatively high contributions, the share of choice egalitarian claims is lower with weak than with strong ideals (p = 0.0034, $\chi^2$-test). Subjects who gave more consistent answers in the initial questionnaire hence seem to be more willing to refrain from opportunistic offers.

**Table 6: Estimation of weights on contributions**

|  |  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|---|
|  |  | Choice Egalitarian | Meritocratic | Libertarian | All types |
| Own | $Y_i^{effort}$ | 1.17*** | 0.98*** | 0.90*** | 0.99*** |
|  |  | (0.11) | (0.06) | (0.05) | (0.03) |
|  | $Y_i^{talent}$ | 0.89*** | 0.97*** | 0.90*** | 0.93*** |
|  |  | (0.09) | (0.06) | (0.04) | (0.03) |
|  | $Y_i^{luck}$ | 0.88*** | 0.73*** | 0.87*** | 0.89*** |
|  |  | (0.29) | (0.19) | (0.14) | (0.10) |
| Partner | $Y_k^{effort}$ | -0.17 | 0.02 | 0.10** | 0.01 |
|  |  | (0.11) | (0.06) | (0.04) | (0.03) |
|  | $Y_k^{talent}$ | 0.11 | 0.03 | 0.10** | 0.07** |
|  |  | (0.09) | (0.06) | (0.04) | (0.03) |
|  | $Y_k^{luck}$ | 0.12 | 0.27 | 0.12 | 0.11 |
|  |  | (0.29) | (0.19) | (0.13) | (0.10) |
|  | const | 0.61 | 0.37 | 0.50** | 0.68*** |
|  |  | (0.47) | (0.25) | (0.19) | (0.13) |
|  | Adj. $R^2$ | 0.758 | 0.773 | 0.918 | 0.800 |
| Test | P | <0.001 | 0.566 | 0.012 |  |
|  | # | 48 | 81 | 53 | 249 |

Notes: OLS, only initial offers, adj. $R^2$ refers to the estimation with unconstrained coefficients, Test refers to F-test on difference from theoretically predicted weights, ***,** indicate significant difference from zero at 1%, 5% level.

One central question of our paper is whether the claims in the bargaining are consistent with the type elicited in the questionnaire[12]. To answer this question we estimate the weights put on the different categories of earnings in the production phase of by the subject who makes the claim (we call this subject the proposer) and his partner for each fairness type. The theoretical weights are given in Table 1. We estimate OLS regressions for initial offer only since they are likely to reflect the fairness ideals best[13]. Table 6 contains the estimated weights for the three fairness types individually

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[12] We performed the analysis both with classification based on the pre-experimental questionnaire and on the post-experimental questionnaire. The results are not statistically different from one another. Since we consider the pre-experimental questionnaire the better instrument for eliciting the pure fairness ideals, we only present the results based on this questionnaire.

[13] Remember that each offer can be accepted by the partner and is therefore binding. We believe that the initial offers reflect the subjects' fairness ideal best, because it is not a response to the offers of the partner which reflect his fairness ideal. Later offers are, quite naturally, influenced by both bargainers' fairness ideals.

and for all types together[14]. The F-test shows that the choice egalitarians do not make offers according to their ideals. In fact, their offers are not different from libertarian offers according to an F-test on the joint restrictions on the weights (p=0.44). The offers of meritocrats are in line with the meritocratic ideal that an individual can claim his contributions resulting from effort and talent and should share the random earnings (p=0.56, F-test). The libertarians' offers differ from the ideal ones at the 2% level. While the weights on the own contribution from talent is significantly smaller than one and consequently the weight on the partner's earnings from talent is not zero (at 5%), but slightly positive.

Especially the regression result for the libertarians suggests that the behaviour might depend on the relative contribution of each partner to the joint surplus. One might suspect that the libertarians' weights on their own contributions are too low and those on the partners' income are too high, because libertarians matched with more successful partners are not willing to accept unequal distributions to their own disadvantage. In order to check this conjecture, we repeat the previous regressions for proposers with lower contributions than the partner and for proposers with higher contributions separately.

The regression results in Table 7 confirm that the size of the proposer's contribution to the joint surplus relative to the contribution of the partner has an impact on the initial claims. Both for the choice egalitarians and the libertarians the estimated coefficients are significantly different between the two groups (p=0.029 and p=0.007, chi$^2$-test). According to the Chi$^2$-test the estimated weights that meritocrats put on the contributions do not differ among disadvantaged and privileged subjects, but the F-test rejects that the offers are meritocratic in the groups of high-contributors but not in the other. If the choice egalitarians have earned less than the partner, they also want a part of the partner's effect earnings, which is in contrast to the fairness ideal. Interestingly, they also claim a lot of their income from talent. If their earnings are higher than those of the partner, they make libertarian claims and want to keep their total own contribution. The libertarians behave similarly. In the less favourable position, their weights on talent and effort income are smaller than one and close to 0.5, which would result in the egalitarian claim. If they were more successful in the production stage, their claims are purely libertarian[15].

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We also ran the regressions using all offers and accepted offers only and we obtained very similar results. None of our conclusions change if we use accepted instead of initial offers.

[14] In the regression, we restricted the coefficient of the own income component and that of the partner to sum up to one in line with the theoretical weights in Table 1. Our results do not depend on this restriction.

[15] The F-test rejects that the weights are libertarian, but all individual t-tests do not reject that the coefficients on own income are equal to one at the 10% level or lower.

|  |  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|---|
|  |  | Choice Egalitarian | | Meritocratic | | Libertarian | |
|  |  | Low | high | low | high | low | High |
| Proposer | $Y_i^{effort}$ | 0.79*** | 1.21*** | 1.00*** | 0.98*** | 0.75*** | 0.95*** |
|  |  | (0.12) | (0.21) | (0.06) | (0.03) | (0.10) | (0.03) |
|  | $Y_i^{talent}$ | 0.81*** | 0.84*** | 1.03*** | 0.94*** | 0.58*** | 1.04*** |
|  |  | (0.15) | (0.17) | (0.07) | (0.03) | (0.11) | (0.04) |
|  | $Y_i^{luck}$ | 0.54** | 0.94** | 0.43** | 0.74*** | 0.81*** | 0.92*** |
|  |  | (0.18) | (0.43) | (0.13) | (0.08) | (0.22) | (0.09) |
| Partner | $Y_k^{effort}$ | 0.21 | -0.21 | -0.00 | 0.02 | 0.25** | 0.05 |
|  |  | (0.12) | (0.21) | (0.06) | (0.03) | (0.10) | (0.03) |
|  | $Y_k^{talent}$ | 0.19 | 0.16 | -0.02 | 0.06* | 0.42*** | -0.04 |
|  |  | (0.15) | (0.17) | (0.07) | (0.03) | (0.11) | (0.04) |
|  | $Y_k^{luck}$ | 0.46** | 0.06 | 0.47*** | 0.26*** | 0.19 | 0.08 |
|  |  | (0.18) | (0.43) | (0.13) | (0.08) | (0.22) | (0.09) |
|  | Const | -0.28 | 0.67 | 0.10 | 0.23 | -1.07* | 0.07 |
|  |  | (0.82) | (1.18) | (0.34) | (0.16) | (0.58) | (0.22) |
|  | Adj. $R^2$ | 0.932 | 0.447 | 0.927 | 0.979 | 0.710 | 0.984 |
| Type | P | 0.005 | 0.146 | 0.971 | <0.001 | 0.009 | 0.044 |
| Libertarian | P | 0.094 | 0.624 | 0.001 | 0.013 |  |  |
| equal | P | 0.029 | | 0.088 | | 0.007 | |
|  | # | 14 | 30 | 33 | 39 | 23 | 25 |

Notes: OLS, only initial offers, adj. $R^2$ refers to the estimation with unconstrained coefficients, Type refers to F-test on difference from theoretically predicted weights of the type determined by the questionnaire, Liberarian refers to F-test on difference from theoretically predicted weights of libertarians, equal refers to F-test on equality of coefficients for subjects with low and high contributions, \*\*\*,\*\*,\* indicate significant difference from zero at 1%, 5%, 10% level,

Figure 3 shows how by much the claims of the three types differ on average from the fairness ideals, depending on whether the subject who made the claim had contributed less or more than the partner to the joint surplus. The graphs confirm the results of the previous regressions. Irrespective of their relative contribution meritocrats on average make meritocratic claims. Libertarians behave consistently with their fairness ideal only if they contributed more than the partner. If not, they claim on average €0.78 more than they should. The choice egalitarians claim €1.32 less then what would be fair in the choice egalitarian sense if they are low-contributors and €2.75 more if they are high-contributors. This again is clear evidence that they do not behave in line with their alleged fairness

ideal. These findings strongly indicate that the performance in the previous real-effort task is an important determinant of the bargaining claims. Subjects seem to derive entitlements to the joint surplus from their individual contribution if they contributed more than the partner. If they contributed less, they seem to appeal to fairness ideals that benefit them, even though they do not propose equal sharing of the surplus on average. Entitlements generated by relative personal performance are more important in the bargaining than abstract fairness ideals, which are used to evaluate hypothetical situations that do not affect the evaluator.

**Figure 3: Deviation of claims from fair claims, by relative contribution**
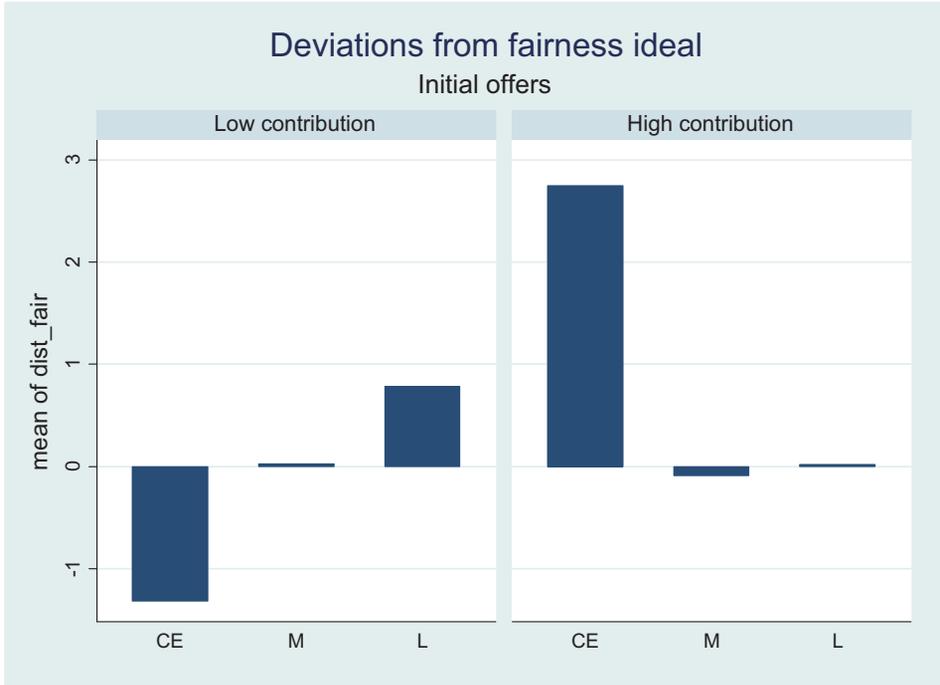


Notes: Left panel: subjects who contributed less than the partner; right panel: subjects who contributed more than the partner;  The acronyms CE, M , and L refer to subjects who are classified as choice egalitarians, meritocrats, and libertarians respectively.

In the fairness literature the egalitarian equal split plays a prominent role and we find that about one quarter of all offers is egalitarian. We can analyse how egalitarian offers depend on the individual earnings in the production phase by regressing the deviation of the egalitarian offer on the differences in earnings between the proposer and the partner $Y_i^{effort} - Y_k^{effort}$, $Y_i^{talent} - Y_k^{talent}$, and $Y_i^{luck} - Y_k^{luck}$. The estimated coefficients for low and high-contributors are presented in Table 8. For low-contributors (column 1), the coefficients on the earnings from effort and talent are significantly different from zero, but smaller than 0.5. A coefficient of 0.5 would mean that the low contributor

would not want to share an additional euro contributed by the partner, but would rather grant his 50 cents from an equal split to the partner. A coefficient which is not significantly different from zero suggests that the low contributor would like to share this income equally. We estimate coefficients on earnings from effort and talent that are both significantly different from zero and 0.5. The effort coefficient of 0.34 means, that on average the players with lower contributions would grant 34 cents of each euro that the partners earned more in the effort task to the partners, but would claim 16 cents of the income difference for themselves. Similarly, players with low contributions claim 26 cents of the partners' additional talent earnings. The coefficient on the luck component of the earnings difference is not significantly different from zero at the 5% level implying that unlucky subjects do not want to deviate from the equal split of the income earned by the coin toss. In other words, they want to be compensated for their bad luck and ask for an equal distribution of earnings from luck. Taken together these results suggest that the bargainers who contributed less to the joint surplus than the partner on average claim some of the partner's earnings, but do not go all the way to ask for an egalitarian distribution.

**Table 8: Deviations from equal split**

| | (1) | p | (2) | p | P |
|---|---|---|---|---|---|
| | Low contribution | <0.5 | High contribution | <0.5 | (2)>(1) |
| Constant | -0.46 | | 0.41 | | |
| | (0.34) | | (0.32) | | |
| $Y_i^{effort} - Y_k^{effort}$ | 0.34*** | 0.01 | 0.53*** | 0.63 | 0.04 |
| | (0.06) | | (0.06) | | |
| $Y_i^{talent} - Y_k^{talent}$ | 0.24*** | <0.001 | 0.46*** | 0.53 | 0.10 |
| | (0.07) | | (0.06) | | |
| $Y_i^{luck} - Y_k^{luck}$ | 0.21* | 0.02 | 0.48*** | 0.86 | 0.09 |
| | (0.12) | | (0.13) | | |
| Adj $R^2$ | 0.22 | | 0.48 | | |
| # | 95 | | 124 | | |

Notes: p indicates the significance level of a t-test on the coefficient being equal to 0.5. P in the last column is the significance level of a test in equality of the coefficients in columns (1) and (2)

The proposers with high contributions behave quite differently, as column (2) shows. The coefficients on all of the three earnings differences are not statistically different from and very close to 0.5. By every euro that they earned more than the partner they deviate by €0.5 from the equal split. In other words they want to keep every euro that they earned more for themselves – which is the libertarian position.

## 4.3 Opportunism

Fairness may play a functional role in the bargaining. Subjects might behave purely out of self-interest, but the bargaining will be successful only if both sides agree and consider the outcome fair. It might hence be less relevant what each bargaining partner would consider fair as an impartial arbitrator than what can be justified as fair in the process of bargaining. If this is the case, subjects' claims will not be strongly related to their own fairness ideals. They rather might use the *best fair offer* in each case, which we define as the one of the four different fair offers, which gives the proposer the highest monetary payoff. Thus the same subject might argue that the equal split is fair, if he is in the disadvantaged position, but make the libertarian claim, if he contributed more than another partner.

**Table 9: Type-consistent offer versus best fair offers**

|  | Claim | Obs | Share | Difference | P |
|---|---|---|---|---|---|
|  | All initial | 182 |  |  |  |
| (1) | Type-consistent |  | 0.33 |  |  |
| (2) | Best |  | 0.566 |  |  |
| (3) | Conflict |  | 0.72 |  |  |
| (4) | Low contribution |  | 0.385 |  |  |
| (5) | High contribution |  | 0.517 |  |  |
|  | With conflict | 131 |  |  |  |
| (6) | Type-consistent |  | 0.183 |  |  |
| (7) | Best |  | 0.511 | (7) > (6) | <0.001 |
|  | With conflict, low contribution | 58 |  |  |  |
| (8) | Type-consistent |  | 0.328 |  |  |
| (9) | Best |  | 0.069 | (9)<(8) | <0.001 |
|  | With conflict, high contribution | 61 |  |  |  |
| (10) | Type-consistent |  | 0.033 |  |  |
| (11) | Best |  | 0.918 | (11)>(10) | <0.001 |

Note: only subjects with pre-experimental questionnaire

One third of all initial offers are consistent with the type of the proposer as measured by the pre-experimental questionnaire, while slightly more than half (56.6%) of the initial offers are best fair offers (see Table 9). Comparing these two shares in not so informative, however, because in 28% of the cases there is no conflict between the best fair offer and the type-consistent offer. If the best fair offer and the type-consistent offer are identical, 70.6% of the offers are type-consistent. The relevant test case for opportunism occurs when there is a conflict between the best fair offer and the type-

consistent offer. In the 131 cases of conflict the share of type-consistent offers is 18.3% and the share of best fair offers is 51.1%, which is significantly larger (p<0.02, χ²-test). We can split up this sample further in the group of proposers with lower contributions than the partner and the group with higher contributions, which delivers an interesting result. Of the proposers with low contributions, 32.8% follow their fairness ideal, 6.9% make best fair offers and the majority does something in between. Those subjects that earned more in the real-effort task than their respective partners choose the best fair offer in 91.8% of the cases in which it is different from their type-consistent offer. Only 3.3% act upon their fairness ideal.

Subjects sometimes behave opportunistically if there is a conflict between their fairness ideal and their self-interest. We can measure the degree of opportunism as follows. Define

$$I_{i,s}^x = best\_fair\_offer_{i,s} - type\_consistent\_offer_{i,s}^x$$

which is the maximum incentive of subject i of type x, in situation s to deviate from the type-consistent offer. We can also define the actual gain from deviating from the type-consistent offer as

$$G_{i,s}^x = offer_{i,s} - type\_consistent\_offer_{i,s}^x$$

Where offer$_{i,s}$ is the offer that subject actually makes in situation s. The ratio

$$O_{i,s}^x = \frac{G_{i,s}^x}{I_{i,s}^x} \quad if \ I_{i,s}^x > 0$$

measures the degree to which a subject exploits the available incentive for opportunistic behaviour in a bargaining situation s. If there is not conflict between self-interest and fairness, I is equal to zero because the best fair offer is the type-consistent offer so that the degree of opportunism is not defined. O can be larger than one, if a subject makes a claim that is even larger than the best fair offer. It is zero if the subject chooses the type-consistent offer and can be negative if the actual offer is lower than type-consistent offer.

For all subjects the average degree of opportunism is 0.302. The average maximum incentive to deviate from the type-consistent offer is €2.62 and the actual average deviation is €1.00. Looking at different groups of subjects, we see some striking patterns (see Figure 4). In line with the results in Table 8, low-contributors do not exhibit opportunism (left panel). High-contributors, in contrast, exploit the scope for opportunism fully. Subjects with weak fairness ideals (as measured by the consistency of the answers in the questionnaire (see Table 3)) are clearly opportunistic, whereas those with above-median values of consistency indicating strong convictions are not opportunistic on average. However, the effect of the relative contribution seems to be stronger than the effect of the

strength of the fairness ideal. Comparing the mean degrees of opportunism between weak and strong convictions if the proposer is a high-contributors reveals that both are positive and not statistically different from each other (1.10 for weak vs. 0.6 for strong, p=0.11, t-test).

**Figure 4**



Average percentage of exploited opportunism

95% confidence intervals
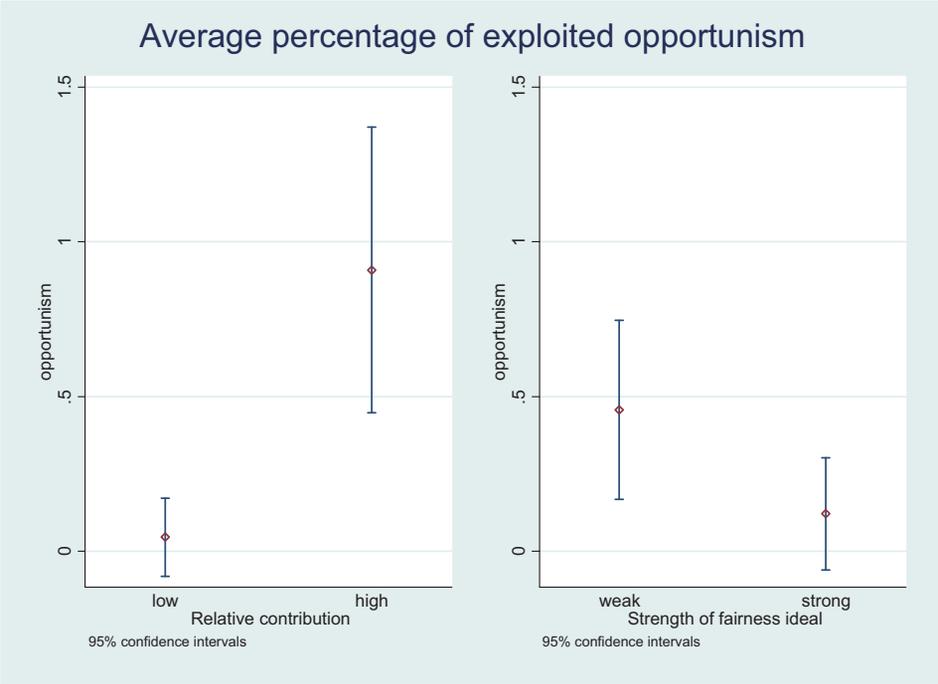
A final question is whether we can explain why subjects change their type from the pre-experimental to the post-experimental questionnaire. Estimating a logit model with as dependent variable a dummy variable that equals one if a subject changed the type and zero otherwise shows that the maximum fairness index $F^{max}$ and the share of type-consistent offers a subject made have strong negative effects (p<0.001 and p=0.03) on the probability of a change. The frequency of being a high-contributor, being male or economics student and total earnings in the production phase do not have significant effects. This suggests that subjects who gave more consistent answers in the first questionnaire did in effect follow an underlying fairness ideal that is not much affected by the experiment. Subjects with a high fraction of type-inconsistent offers are more likely to change their type which indicates that change their fairness ideal in order to re-establish consistency between ideals and previous actions.

The analysis shows that opportunism is widespread in our unstructured bargaining experiment. Subjects who contributed the larger share of the joint surplus generally are totally opportunistic in

the sense that they claim the maximum amount for themselves that can be justified as fair. This is typically their own contribution which is fair according to a libertarian understanding of fairness. On average, subjects are not opportunistic when they are the partners with the lower contribution. However, the average conceals that libertarians in this situation claim more than their ideal would grant them, while choice egalitarians claim less. Only the meritocrats seem to accept the distribution suggested by their ideal.

## 5 Discussion

Our first result is that as impartial, neutral observers none of our 72 subjects consider egalitarian allocations of a jointly produced surplus fair. 26.4% of subjects favour choice egalitarian distributions, but the majority states that the libertarian distribution (29.2%) or the meritocratic distributions (44.4%) are fairest. While we find shares of meritocrats and libertarians that are very similar to those reported in Cappelen et al. (2010) – meritocrats 47% and libertarians 30.1% -, those authors report a significant share of strict egalitarians of 18% and only a small share of choice egalitarians of 4.6%. This difference might be due to the different methods to determine subjects' fairness ideal. The dictator game that is used in Cappelen et al. (2010) could either make the egalitarian division of the surplus very salient or make some subjects believe that they are compelled to make egalitarian offers as argued in Dana et al. (2007). A questionnaire before the bargaining might bring to subjects' attention that distributions other than the equal split can be regarded as fair, especially if subjects have to choose from several available options. Cappelen et al. (2011) find that the share of self-reported strict egalitarians in a pre-ultimatum game questionnaire is 9.8%. In a treatment without questionnaire, they estimate a share of 43.5% of strict egalitarians compared to a point estimate of 20.2% in the treatment with the questionnaire from which they conclude than moral reflection seems to have an impact on behaviour.

A possibly relevant difference between our design and the one in Cappelen et al. (2011) is that we asked our subjects about fair distributions *before* they received the experimental instructions and could know that their answers were relevant for their own behaviour. In contrast, Cappelen et al. (2011) first explained the experiment to their subjects and then gave them the questionnaire. This might have influence their answers since subjects might have wished to avoid an inconsistency between their words and deeds. Such a desire for consistency between reported ideals and actions might explain that our type classification based on the post-experimental questionnaire is strikingly close to the one in Cappelen et al. (2011). Asking our subjects after the experiment, when they are no longer neutral observers, we find that 9.7% are strict egalitarians, 11.1% are choice egalitarians, 34.7% are meritocrats, and that 44.4% are libertarians. This is very close to the 9.8% strict

egalitarians, 46.7% liberal egalitarians[16] and 43.5% libertarians observed in Cappelen et al. (2011). Note that we get approximately the same shares in the control group that was not asked before the experiment, but only afterwards. If we classify the subjects according to the offers they make in the bargaining, again the shares are the same as in the post-experimental questionnaire. However, we also observe that although the shares of types based on questionnaires and based on offers are similar, the correlation among individuals classified by the two methods is practically zero. This is a clear indication that subjects' bargaining offers are in general not closely related to their elicited fairness ideals.

Cappelen et al. (2011) argue that some individuals might not put much thought in how to answer the questionnaire questions when there are not monetary incentives[17]. We find supportive evidence for this hypothesis by measuring the consistency of the answers in the first questionnaire. Supposedly subjects giving highly consistent answers did think about the questions seriously, while others either did not think hard or do not have strong beliefs about fairness. In line with that view subjects with highly consistent answers are much less likely to change their type in the post-experiment questionnaire. There is also some evidence that subjects with more consistent answers make more type-consistent offers and are less opportunistic than those scoring low on the consistency measure.

We find that a large fraction of offers is strongly related to the performance in the production phase. Especially when a subject had performed better than the bargaining partner, he is very likely to make a libertarian or meritocratic offer, even if he gave choice egalitarian answers in the questionnaire. Gächter and Riedl (2005) also report that subjects see their performance in a real-effort task as an entitlement on which they base their claims in the bargaining. While the offers in our experiment are not totally unrelated to the elicited fairness ideals, most subjects prefer performance-related offers over type-consistent offers if there is a conflict between the two and they are in the better bargaining position in the sense that they have produced the larger share of the surplus. Interestingly, the degree of opportunism is asymmetric in the sense that subjects who contributed less to the joint surplus do not claim the egalitarian share, which would benefit them most. On average those subjects claim 50% of the partner's random earnings but less than 50% of his earnings from other sources. Our results are partly in contrast to the finding in Gächter and Riedl (2006). These authors also find that the egalitarian fairness principle is very unpopular when subjects are asked to assess a distributive situation with production if they are impartial spectators. Instead subjects consider as fair a distribution that is proportional to the inputs under the control of the

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[16] In their experiment, Cappelen et al. (2011) cannot distinguish choice egalitarians and meritocrats. Their category of liberal egalitarians comprises choice egalitarians and meritocrats.
[17] An alternative interpretation is that our set of fairness ideals based on responsibility does not describe well how subjects think about fairness. It may be true that alternative fairness ideals could be relevant as well, but this question is left for future research.

producers, which would correspond to our choice egalitarian and meritocratic fairness ideals. The main difference between their findings and ours is that Gächter and Riedl find a compensating effect in the actual bargaining, which means that subjects are willing to share more equally than their elicited fairness norms would suggest. We do not find that the equal split is especially attractive if subjects are stakeholders, in particular not if they have contributed more to the joint surplus than the partner. But even the subjects that would benefit from the egalitarian distribution, because they have contributed less than half of the total surplus, rarely propose it. As Gächter and Riedl (2006) suggest themselves, their result might be related to the fact that in their experiment the entitlements from the production phase are by design not feasible making the equal split more focal.

The frequently observed deviation of offers from the initial fairness ideals, and the fact that about half of all subjects seem to hold a different fairness ideal after the experiment than before, suggests the presence of opportunism and moral hypocrisy. Rustichini and Villeval (2012) predict moral hypocrisy to be a function of power. Our results confirm that the strong side (i.e. the side that contributed most to the joint surplus) in a bargaining bends the norm in its favor and the weak sides agrees. Strictly speaking both partners in our bargaining have equal power, since everyone has the opportunities to make offers and an offer only become binding when the other side accepts it. However, we consider the low-contributor the weaker partner for two reasons. First, he has contributed less to the joint surplus, potentially for reasons for which he is reliable, putting him in a morally weaker position. Second, a subject with very high earnings in the production phase has a high probability of being the high contributing partner in all bargaining rounds with different partners, whereas a low-performer will be the low-contributor most of the times. This implies that the high-performers have better chances to achieve a high final payoff than the low-performers[18], even if bargaining ends in a disagreement in some rounds. If they regard the expected payoff over all rounds as the threat point instead of the zero in the individual rounds, they have indeed higher bargaining power. We observe that on average high-contributors fully exploit their bargaining power, while the low-contributors refrain from opportunistic claims.

# 6 Conclusions

Our paper contributes to the growing experimental literature on the role of fairness in bargaining. The novelty of our design is to combine unstructured bargaining together with real-effort task in which a surplus is produced with talent, effort and luck. Fairness ideals are elicited using questionnaires before production takes place, and after subjects have taken part in the bargaining. We show that the egalitarian 50:50 split is not an attractive solution for most subjects. This holds

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[18]Since only one of the bargaining rounds is randomly chosen and paid, subjects in principle should try to maximize their utility in each round.

both when the subjects assess the fairness of hypothetical situations concerning other people as impartial spectators and when they are stakeholders in the actual bargaining. The normative judgements as uninvolved observers involve a very strong performance-related view, with about three thirds of all subjects stating that meritocratic or libertarian distributions are fairest. This strong relation between distributions and performance in the real-effort task is also reflected in the offers made in the unstructured bargaining, but mainly for those subjects that were high-performers and quite independently from the normative judgments elicited before the experiment. The behaviour of high-performers is largely self-serving even if it is in contrast to their earlier normative judgements. Low-performers are more willing to make offers in line with their judgements, especially if those judgements were meritocratic. But especially the subjects who favour libertarian distributions as impartial observers claim considerably more, when they would deserve very little according to the libertarian ideal. We hence observe pervasive opportunism in the sense that subjects claim more for themselves in the bargaining than what they should claim if they were consistent with their earlier normative judgements. This opportunism is stronger for high-performers than for low performer and slightly weaker for subjects with more consistent normative judgments than for those with more inconsistent hypothetical choices. In general, however, actual bargaining offers are less determined by hypothetical normative considerations than by the entitlements derived from the real-effort task, which are strongly meritocratic.

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# Appendix

This appendix contains the experimental instructions that were provided as paper handouts and the on-screen instructions. We also provide screenshots of the different phases of the experiment.

All materials are English translations from the German originals. The original versions in German are available from the authors upon request.

## Instructions (Paper handout 1)

*Welcome to this experiment. Please do not talk to any of the other participants from now on and please use the computer for the experiment only.*

*The purpose of this experiment is to study decision-making. You can earn real money in this experiment. . The amount of money you earn is determined by your own decisions and the decisions of other participants. You will learn in the course of this experiment, how your earnings will be determined,*

*The data from the experiment are entirely anonymous and cannot be traced back to participants. At no point in the experiment (during or after) will the other participants or the experimenters learn the choices **you** have made, and how much **you** have earned.*

## Structure of the Experiment

The experiment consists of several parts: a questionnaire at the beginning, the first phase of the experiment, the second phase, and a further questionnaire at the end.

Answering the questionnaires gives you a certain payment of € 4, you can earn additional money in the other two phases of the experiment. We ask you to answer the questions of the questionnaires truthfully, because this is very important for the scientific evaluation of the data.

## Sequence of tasks

First, you complete an on-screen questionnaire. The detailed instructions will be shown on the screen.

After completing the questionnaire you will receive further instructions on paper. These instructions will clarify, what your tasks are and how your payment is determined.

After the second phase of the experiment, you will fill in another questionnaire on screen. You will then be called individually to receive your earnings in cash. Please bring the ID card and the completed and signed payment form. You will receive your earnings in private and anonymously.

So your name cannot be associated with the experimental data available from the database, we add an additional amount between 0 and 1 Euro to your earnings. This is determined at random and added to your experimental earnings.

*The questionnaire will now follow. Please read the instructions on the screen now.*

## On-screen instructions (questionnaire)

### Phase 1: open choice questions

Imagine the following situation:

Two persons A and B have produced an output together. Each of these persons contributed individually (towards this joint output), and each contribution can be measured in terms of money earnings.

Example:

A has contributed 13 EUR, and B 16 EUR.

The total value of the joint output is therefore 29 EUR.

Imagine that it is possible that the sources of the individual contribution can be measured in money. Possible causes are: Talent, Effort, and Luck.

Example

A's contribution can be decomposed into: 8 EUR for Talent, 5 EUR for Effort and 3 EUR for Luck.

Your first task is to specify how you would divide fairly the joint output between A and B.

Example:

Two persons A and B have produced an output in the following way:

| Person | Talent | Effort | Luck | Total |
|--------|--------|--------|------|-------|
| A | 8 | 5 | 0 | 13 |
| B | 5 | 8 | 3 | 16 |
| | | | | 29 |

The total value to divide is 29 EUR. How would you divide this fairly between A and B? On the following screens you will see a succession of such tables. Below the table are two fields, in which you must enter your division. When you have confirmed your choice with OK, you will access the next screen. Please express your honest opinion. There is no right or wrong answer.

**Screenshot 1**
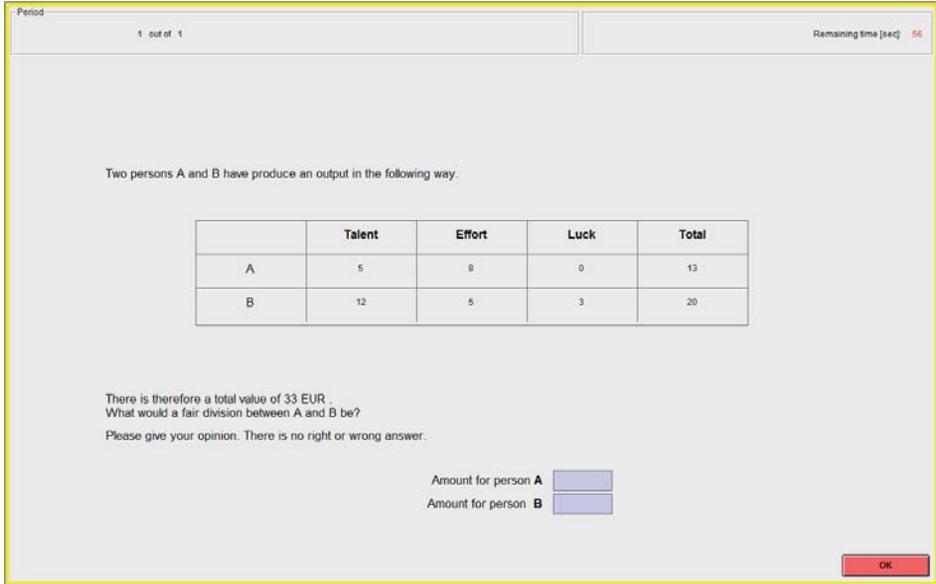


## Phase 2: open choice questions

Your task is now slightly different. Once more, there is a table that displays a given output. The lines in the table display five different divisions for this output.

A has produced a contribution of 13 EUR, B has produced 16 EUR. The total value of the combined output is therefore 29 EUR.

Please choose now the division which you regard as being the fairest. Click with your mouse in the corresponding field. When you have confirmed your choice with OK, you will access the next screen.

**Screenshot 2**



# Instructions (Paper handout 2)

## *Experiment*

The experiment consists of a **production phase** and a **distribution phase**.

In the production phase, you will generate an amount of money, which will be credited to an account.

In the distribution phase, you will be matched randomly with one another participant who generated a sum of money during the production phase in the same manner as you.

With this other experiment participant (counterpart) you will divide the total amount of money among yourselves. More information about the distribution phase will be given after the production phase.

## Production phase

The production phase has three parts, in which you can earn money that is credited to your account. During this phase, you belong either to group H or group T. Both groups are of the same size. The allocation to these two groups is decided at random by the computer. Which group you have been

allocated to will be displayed on the screen. In Parts 1 and 2 of the production phase, the group affiliation does not matter.

In Part 1 and Part 2, you will perform tasks for which you will receive points. At the end of each part, a ranking of all participants will be created according to the points earned in this part of the experiment. Participants will be ranked in three groups. The participants in the highest third will earn 12 EUR that will be credited to the account. Participants in the middle third of the ranking will earn 8 EUR, and participants in the lowest third will earn EUR 5.

Example:

Suppose you performed in a way such that you are in the middle third of the distribution in the first phase, and in the top third in the second phase. Then you have earned 8 EUR + 12 EUR = 20 EUR that will be credited to the account.

*The production phase will now begin. Please read the instructions on the screen now.*


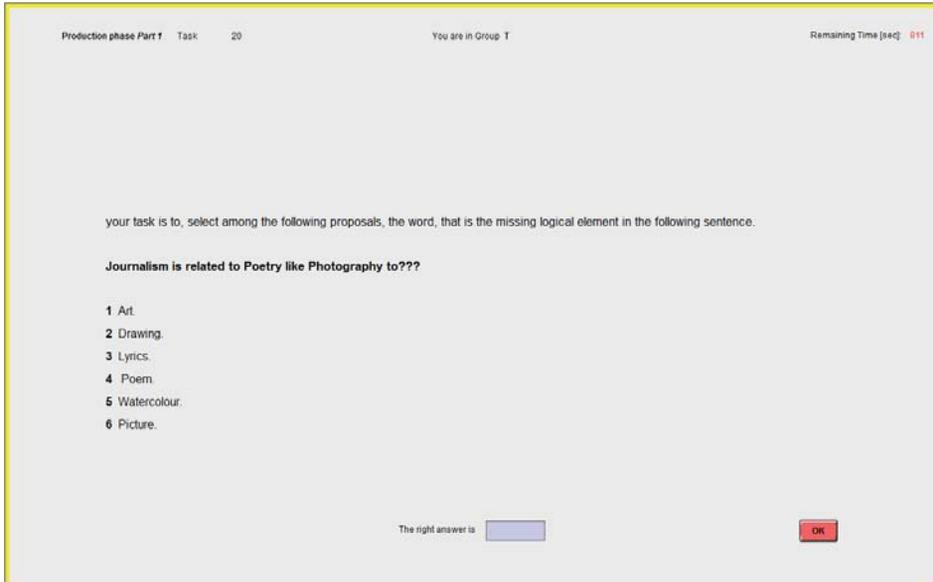## On-screen instructions (production phase, talent)

You are now in the first part of the production phase of the experiment. You are in group T (H).

You must now solve a brainteaser. You will see several tasks, and you have 15 minutes in total. Then this part of the experiment will be over.

Under each task, you see an entry field in which you are prompted to enter your solution. You must click on OK to confirm the entry and advance to the next screen. When you have clicked on OK, you can no longer change your answer, nor return to this screen.

For each correct answer you will earn a point. For each wrong answer, a point will be deducted from your earnings. If you do not want to give an answer, leave the field blank and press OK. You will then earn nothing for this task.

**Screenshot 3**

your task is to, select among the following proposals, the word, that is the missing logical element in the following sentence.

**Journalism is related to Poetry like Photography to???**

1 Art.
2 Drawing.
3 Lyrics.
4 Poem.
5 Watercolour.
6 Picture.

The right answer is          OK

## On-screen instructions (production phase, effort)

You are now in the second part of the production Phase. You still are in group T (H).

You must now solve a numerical exercise. You will see on your screen rows of zeros and ones. Please count the number of ones and enter your answer into the input box. By clicking OK, you will confirm your answer and move on to the next screen. When you have clicked OK you can no longer change your answer, nor access this screen again.

You have for this task a total of fifteen minutes. If you like, you can finish this task before the end of the 15 minutes. To do this, press the STOP button. Once you have pressed this button, you can no longer take part in this task. While you wait for others to finish the task, you may deal with personal matters, as long as you do not disturb the other participants.

For each correct answer you will earn a point. For each wrong answer, a point will be deducted from your earnings. If you do not want to give an answer, leave the field blank and press OK. You will then earn nothing for this task.

**Screenshot 4**



Production phase *Part 2*   Task   1                    You are in group T          Remaining Time [sec]: 094

How many Ones have thoses two lines?

1  1  0  1  0  1  1  0  1  0
1  0  0  1  1  1  0  0  0  0

Exit Task              The number of Ones is [      ]              OK

## On-screen instructions (production phase, luck)

You are now in the third part of the Production phase. You are still in group T (H).

A participant will be chosen at random to throw a coin. When the coin falls on Tail, all members of group T earn 3 EUR more, that will be credited to their Production account. The other group earns nothing.

When the coin falls on Head, all members of group H earn 3 EUR more, that will be credited to their Production account. The other group earns nothing.

**Screenshot 5**



The **Production phase** is now over.

The coin toss was Tail

So you have earn in this part of the Production phase **3 EUR** .

| | Brain Teaser | Number Counting | Coin Toss | Total |
|---|---|---|---|---|
| Your Performance | | | 3 | |

Continue

# Instructions (Paper handout 3)

## Distribution Phase

This phase consists of 5 identical rounds. You will in each round be matched with another randomly chosen participant. You will not meet any participant more than once and will not know the identity of any of the participants you are matched with.

The amounts of money that you and your counterpart have earned in the production phase are credited in each round to a joint account. Your task is to divide the total amount in the joint account between yourselves (i.e. you and your counterpart).

The computer will randomly select one of these five rounds and implement this distribution at the end. You and your counterpart will earn those amounts of money that you have divided among yourselves in this randomly chosen round. In addition, you will receive the payment for the questionnaires, i.e. that is EUR 4.  If the random round that was selected is one in which you and your partner could not agree on a distribution of the money in the joint account, you will both just get the show-up fee.

In each round, you and your respective counterpart have five minutes to agree on a distribution. During this time anyone can propose an amount of money they would like to receive. The remainder

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of the money in the joint account (if any) will go to the other person. During the distribution phase, you and your partner see the following screen.

| | Thinking | Counting | Coin | Total |
|---|---|---|---|---|
| You | 5 | 5 | 0 | 10 |
| Other | 8 | 12 | 3 | 23 |
| Joint | 13 | 17 | 3 | 33 |

Remaining time [sec]: :

**Your offers**

| # | You | Other |
|---|---|---|
| 1 | 16.5 | 16.5 |
| 3 | 16 | 17 |

**Current offer**

| # | You | Other |
|---|---|---|
| 3 | 16 | 17 |

**Possible distributions**

| You | Other |
|---|---|
| 15 | 18 |

Offer

Calculate    You    15

**Other's offers**

| # | You | Other |
|---|---|---|
| 2 | 10 | 23 |

**Current offer**

| # | You | Other |
|---|---|---|
| 2 | 10 | 23 |

Accept

The numbers on the above picture refer to the steps below.

1. The table in the upper left corner of the screen contains the total amount in the joint account and the respective contributions by you and your partner to this amount (excluding the payment for the response to the questionnaire).

2. If you want to suggest a distribution to your counterpart, you must enter the amount you want to get in the "you" field on the left side. This amount cannot exceed the total amount in the joint account. You can specify values with one decimal. Please enter a comma (,) as a period (.).

3. When you press the button "Calculate", the field "Possible distributions" then shows the amount that would go to you and your counterpart. You can calculate several possible distributions by following this procedure.

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4. In the table "Possible distributions" you can then select one of these distributions with the mouse. If you click on the button "Offer", your allocation proposal is then sent to your counterpart. Your proposal will be on the right side of the table for the other participant and on the left in your table under the field "your offers".

5. Your counterpart has the same opportunities as you and may at any time propose divisions. His proposals are shown on your screen on the right side of the table in the middle of the screen displayed under the field "Your counterpart's offers". There is no set order for the allocation proposals. You and your partner can make suggestions any time

6. You or your partner can accept the last proposal made by one of you by selecting the offer of the other person under "Current offer" with the mouse and then clicking the "Accept" button. Doing so terminates the distribution round, and the accepted division becomes binding.

If in an offer is accepted before the end of the allocated five minutes, you and your counterpart must wait until all participants have completed this round. Only then will you be matched with a new participant.

*If none the proposed allocations are accepted, the recorded payoff in this round for both participants is EUR 0.* If at the end of the distribution phase this round happens to be selected by the computer, you and your counterpart will only receive the show-up fee.

You can always change your last proposed allocation, as long as the other participant did not accept your proposal already. To do so, just choose a new potential distribution and press "Offer". Your new proposal appears just under the old proposal in the table and is now the active proposal. Old proposals remain in the table, but can no longer be accepted. New proposals can be smaller, larger or equal to the old proposal.

7. During the distribution phase, you can send your counterpart messages. Your counterpart can also send you messages. Your messages must not reveal your identity, and must not contain threats or other inappropriate content. These messages will be monitored by the experimenter. If you violate these instructions, you will receive no money at all and will be excluded from future experiments. You can type your message in the blue chat box at the bottom of the screen and then submit it by pressing the Enter or Return key ↵.

*The division phase starts now. Please read the instructions on the screen.*