Communication and fair distribution

Astri Drange Hole*

June 1, 2008

Abstract

The paper analyses the impact of communication about fairness on individual distribution decisions, and it focuses on three fairness ideals; strict egalitarianism, liberal egalitarianism and libertarianism. A dictator game experiment with production and two treatments, one with and one without pre-play communication, is run. In the communication phase the individuals face three hypothetical distribution situations involving three fairness ideals. They are asked to choose the fairness ideal they think will imply the fairest distribution in the hypothetical situations. The decision is communicated to the opponents in the distribution phase. The study compares data from the two treatments and tests if communication about fairness has an effect and how this effect works. Three models of how communication affects distribution are estimated; the integrity model, the compromise model and the self-serving model.

1 Introduction

Most people show both self- and other-regarding behaviour when they are facing a distribution problem. They are willing to give up income to avoid

*Bergen University College and the Norwegian School of Economics and Business Administration, Bergen, Norway. e-mail: adh@hib.no and astri.hole@nhh.no. I would like to thank Bertil Tungodden, Robert Sugden, Alexander W. Cappelen, Erik Ø. Sørensen, Peter Moffatt, Gorm Grønnevet, Kjetil Bjorvatn, and seminar participants at NHH, the First Oslo Workshop on Experimental and Behavioural Economics, and the ESA 2007 World Meeting for valuable comments. I am grateful to Jan Tore Ynnesdal for technical assistance, and to Daniel Frøyland and Jørgen Krog Sæbø for their research assistance.

large deviations from what they consider fair. However, people disagree on what constitutes a fair distribution of income and many are involved in discussions concerning fairness. A central question then is if and how this debate, which goes on both publicly and privately, affects people's attitude to fairness matters and their opinion of what is fair.

In the paper it is assumed that when people make a distribution decision, they are guided by selfish considerations as well as fairness considerations, and the decision they make depends on their overall fairness consideration and the weight they attach to fairness considerations. I study a distributive situation where the individuals differ in how much they invest and in their rate of return to investment. Investment is clearly within individual control and rate of return clearly beyond individual control. I assume that an individual endorses either strict egalitarianism, liberal egalitarianism or libertarianism. The three fairness ideals differ with respect to which factors one should hold people responsible for.

The aim of the paper is to test whether communication has an impact on people's involvement in matters concerning fairness and on their assessment of fairness, and experimental methods are applied to generate adequate data. I estimate three models of how communication affects people's overall fairness consideration. The three models are the integrity model, the compromise model and the self-serving model.

In the integrity model, an individual's overall fairness consideration is not affected by communication. The model predicts that an individual is committed to his own fairness ideal when he makes his proposal in the distribution phase. In the compromise model, an individual takes his opponent's fairness ideal into account when he proposes a distribution. The model predicts that an individual's overall fairness consideration falls somewhere between his own and his opponent's fairness ideal. In the self-serving model, an individual also takes his opponent's fairness ideal into account when he proposes a distribution, but he does this only when the opponent's fairness ideal justifies a larger share to himself than his own fairness ideal.

I also test two hypotheses on how communication affects the weight people attach to fairness considerations. The two hypotheses are the discursive hypothesis and the affiliation hypothesis. The discursive hypothesis claims that discussing fairness triggers more generous behaviour in general, and the affiliation hypothesis claims that people make higher offers to others if they endorse the same fairness ideal as themselves.

An experiment with two treatments is run. In the first treatment, there

is no pre-play communication while in the second treatment, individuals are allowed to communicate.[1] The participants in the treatment without pre-play communication - the control group - play a dictator game where the distribution phase is preceded by a production phase, while the participants in the treatment with pre-play communication - the experimental group - play a dictator game where the distribution phase is preceded by a production phase and a communication phase.

Communication may have different effects on individual behaviour. In the literature, there has been a focus on how communication can enhance coordination in games with strategic interaction (Joseph Farrell and Matthew Rabin, 1996; Vincent P.Crawford, 1990, 1998; David Sally 1995; Tore Ellingsen and Magnus Johannesson, 2004b), how communication can cause people to make self-serving distortion of justice (Linda Babcock, George Loewenstein, Samuel Issacharoff and Colin F. Camerer, 1993, 1995; Babcock and Loewenstein, 1997) and how communication can narrow the social distance between subjects and elicit a commitment to act less selfishly (Sally, 1995; Johannesson and Erik Mohlin, 2005; Ellingsen and Johannesson, 2004a, 2005).

This paper makes a contribution to the last two issues. I test whether communication causes people to bias their overall fairness consideration in favour of themselves, and also whether communication makes people less selfish and more involved in fairness matters. In addition, the current paper differs from previous studies on communication in the way communication is organized. In Sally (1995) the communication variables are verbal interaction, length of verbal interaction, written messages and prewritten promises. Ellingsen and Johannesson (2004a, 2004b, 2005) and Johannesson and Mohlin (2005) apply free form communication where no restrictions are put on the content of the message and the experimenters do not propose what it may contain. In Babcock et al. (1993, 1995) and Babcock and Loewenstein (1997) there are restrictions on the content, but no specific alternatives are proposed. In the current study reduced form web-based communication is applied, which makes it possible to analyse the communication data quantitatively. In the communication phase the players face three hypothetical distribution situations and three different principles of what constitutes a fair distribution of income. They do not know that the hypothetical distributive situations are like the situations which appear later in the experiment.

[1] The data from the treatment without communication is also analysed in Alexander W. Cappelen, Astri Drange Hole, Erik Ø. Sørensen and Bertil Tungodden (2007).

The implications of the three principles in each of the three hypothetical distributive situations are also presented for the players, and they are asked to choose the principle that they think will imply the fairest distribution in the hypothetical situations. The decision that a player makes in the communication phase is communicated to his opponents in the distribution phase. Hence, the communication variables are the chosen fairness ideal and the distributive implication of this.

The structure of the paper is as follows. In section 2 the fairness ideals and the model are presented. Section 3 describes the experimental design. In section 4 the results are reported, and section 5 concludes.

2 Theory

I study a situation where individuals differ in how much money they invest and in their rate of return on investment. The amount of investment, q_i, is within individual control and the rate of return on investment, a_i, is beyond individual control. The individual rate of return on investment is either high or low, and thus the income generated by an individual i is given by the product $x_i = a_i q_i$. I always consider a two-person setting and the individuals are referred to as person 1 and person 2. My main focus is on how to distribute total income $X(\mathbf{a}, \mathbf{q}) = x_1(a_1, q_1) + x_2(a_2, q_2)$, where $\mathbf{a} = (a_1, a_2)$ and $\mathbf{q} = (q_1, q_2)$, and each individual is to propose an amount of income y to himself and $(X - y)$ to his opponent. I assume that the individuals are motivated by a desire for income and fairness. A fairness ideal, $m^{k(i)}(\mathbf{a}, \mathbf{q})$, specifies the amount that individual i holds to be his fair income.

2.1 The fairness ideals

It is assumed that an individual endorses either strict egalitarianism, liberal egalitarianism or libertarianism. According to the strict egalitarian fairness ideal total income should always be distributed equally amongst the individuals (see, for example, Kai Nielsen, 1985). Hence, inequalities arising from differences in both investment and rates of return should be eliminated; that is, individuals should not be held responsible for either their investment choice or their rate of return.

$$m^{SE}(\mathbf{a}, \mathbf{q}) = X(\mathbf{a}, \mathbf{q})/2 \tag{1}$$

The strict egalitarian view is closely related to the inequality-aversion models in the experimental literature, that assume that people dislike unequal outcomes (see Fehr and Schmidt, 1999).

Liberal egalitarianism, on the other hand, defends the view that people should only be held responsible for their choices (Roemer, 1998). A reasonable interpretation of this fairness ideal is to view the fair distribution as giving each person a share of the total income equal to his share of total investment.

$$m^{LE}(\mathbf{a}, \mathbf{q}) = \frac{q_i}{q_i + q_j} X(\mathbf{a}, \mathbf{q}) \tag{2}$$

This principle is equivalent to what has been described as the accountability principle (James Konow, 1996, 2000). It implies that if two persons make the same choice, then the fair solution is to give them the same income. Inequalities due to differences in rate of return should be eliminated; that is, individuals should be held responsible for their investment choice but not for their rate of return. Hence, liberal egalitarianism implies that an unequal distribution of income due to different investment is acceptable, but an unequal distribution of income due to different rate of return is not.

The libertarian fairness ideal lies at the opposite extreme to strict egalitarianism and does not assign any value to equality. According to libertarianism, the fair distribution is simply that each person is entitled to what he has produced (Robert Nozick, 1974).

$$m^{L}(\mathbf{a}, \mathbf{q}) = a_i q_i \tag{3}$$

Therefore, the libertarian solution may involve an unequal distribution of income due to differences in both investment and the rate of return; that is, individuals should be held responsible for both their investment choice and their rate of return.[2]

Even though the three fairness ideals provide different solutions to the distributive problem, it is important to notice that on average they instruct individuals to offer the same amount to the other person. In any distributive situation and for any fairness ideal k, the fair solution would be that person

[2]From equation (1)-(3) we can find that the fair private return from investment, $\frac{dm^{k(i)}}{dq_i}$ is $\frac{a_i}{2}$ under strict egalitarianism, $\left(\frac{3a_i}{4} + \frac{a_j}{4}\right)$ under liberal egalitarianism if individual i and individual j make equal investments and a_i under libertarianism. The different fair private returns from investment provide different incentives to the individual in the production phase. I return to this issue in section 4.1.2.

1 offers $X - m^k$ to person 2 and person 2 offers m^k to person 1, which implies that the average fair offer in the distribution situation is $X/2$.

2.2 Distributive behaviour

Standard economic theory assumes that individuals exclusively pursue their material self-interest and do not care about fairness per se. However, I assume that the individuals have preferences that respond to both monetary payoffs and the perceived fairness of the outcome. In the following analysis it is important to distinguish between a *fairness ideal*, denoted m^k and an *overall fairness consideration*, denoted m^*. m^k is the fairness ideal an individual would endorse if there was no communication, where k denotes strict egalitarianism, liberal egalitarianism, or libertarianism. m^* is what an individual considers fair when proposing a distribution after the communication.

Hence, when proposing a distribution of total income an individual i is motivated by a desire for income and by fairness considerations, and maximizes the following utility function:[3]

$$U_i(y; \mathbf{a}, \mathbf{q}) = y - \frac{\beta_i}{2} \frac{\left[y - m_i^*(\mathbf{a}, \mathbf{q})\right]^2}{X(\mathbf{a}, \mathbf{q})}, \tag{4}$$

where the marginal disutility of deviating from the overall fairness consideration, m_i^*, is increasing with the size of the deviation from this fair amount.[4]

The parameter $\beta_i \geqslant 0$ determines the weight individual i gives to fairness considerations. If $\beta_i = 0$, individual i assigns no importance to fairness considerations, and keeps all the money. $X - m_i^*$ is individual i´s fair offer to individual j. Given an interior solution the optimal proposal in relative terms for an individual depends on his overall fairness consideration and the weight he attaches to fairness considerations:

$$\frac{y^*}{X(\mathbf{a}, \mathbf{q})} = \frac{m_i^*}{X(\mathbf{a}, \mathbf{q})} + \frac{1}{\beta_i} \tag{5}$$

[3] The first element in the utility function captures the self-regarding motive and the second element captures the other-regarding motive (see also Ernst Fehr and Klaus M. Schmidt, 1999; Gary E. Bolton and Axel Ockenfels, 2000; and Cappelen et al., forthcoming.)

[4] A robustness test of the particular functional form is given in the appendix, section 6.1.

2.3 Communication

What determines the overall fairness consideration m^*? Individual i and the opponent individual j have an opportunity to exchange information about fairness ideals before they propose a distribution, and the information exchange can be dealt with in different ways. Individual i´s overall fairness consideration m_i^* may be influenced by his own fairness ideal $m^{k(i)}$ and by his opponent's fairness ideal $m^{k(j)}$. Accordingly pre-play communication may potentially have different effects on individual behaviour. I present three models for how an individual may react to communication; the integrity model, the compromise model and the self-serving model.

$$\text{The integrity model: } m_i^* = m^{k(i)} \tag{6}$$

$$\text{The compromise model: } m_i^* = \alpha_i m^{k(i)} + (1-\alpha_i)[X - m^{k(j)}] \tag{7}$$

$$\text{The self-serving model: } m_i^* = \alpha_i m^{k(i)} + (1-\alpha_i)\max\{m^{k(i)}, X - m^{k(j)}\} \tag{8}$$

It follows that if $m^{k(i)} > X - m^{k(j)}$ the self-serving model and the compromise model coincide, and if $\alpha_i = 1$, all three models coincide.

In the integrity model an individual's overall fairness consideration is not affected by communication. The model predicts that an individual is committed to his own fairness ideal when he makes his proposal in the distribution phase.

In the compromise model an individual takes his opponent's fairness ideal into account when he proposes a distribution. The model predicts that an individual's overall fairness consideration falls somewhere in between his own and his opponent's fairness ideal. More formally individual i´s overall fairness consideration is a convex combination of his and his opponent's fairness ideal, where the parameter α_i represents the importance individual i assigns to his own fairness ideal $m^{k(i)}$.[5]

Alternatively, an individual's reaction to communication may be self-serving. It is well known from the literature that information exchange may cause individuals to make self-serving distortion of justice. They bias

[5] The following example illustrates this. In a distributive situation where $a_i q_i = 4 * 200$ NOK, $a_j q_j = 2 * 100$ NOK and $X = 1000$ NOK the fairness ideals instruct individual i to keep 800 NOK $\left(m^L\right)$, 667 NOK $\left(m^{LE}\right)$ and 500 NOK $\left(m^{SE}\right)$. If individual i is a libertarian, individual j is a strict egalitarian and $\alpha_i = 0.6$, the compromise model predicts that individual i's overall fairness consideration is, $m_i^* = 0.6 * 800$ NOK $+0.4 * 500$ NOK$= 680$ NOK.

their overall fairness consideration in favour of themselves (David M. Messick and Keith Sentis, 1983; Babcock et al.1993, 1995; Rabin, 1994; Babcock and Loewenstein, 1997; Konow, 2000, 2005; Jason Dana, Roberto A. Weber and Jason Xi Kuang, 2004). In the self-serving model an individual also takes his opponent's fairness ideal into account when proposing a distribution, but he does this only when the opponent's fairness ideal justifies a larger share to himself than his own fairness ideal. More formally individual i´s overall fairness consideration is a convex combination of his own and his opponent's fairness ideal when the opponent's fairness ideal is more favourable to individual i than his own.[6]

Given an interior solution, the optimal proposal for each model is as follows:

$$\frac{y^*}{X(\mathbf{a},\mathbf{q})} = \frac{m^{k(i)}}{X(\mathbf{a},\mathbf{q})} + \frac{1}{\beta_i} \tag{9}$$

$$\frac{y^*}{X(\mathbf{a},\mathbf{q})} = \alpha_i \frac{m^{k(i)}}{X(\mathbf{a},\mathbf{q})} + (1-\alpha_i)\left[1 - \frac{m^{k(j)}}{X(\mathbf{a},\mathbf{q})}]\right] + \frac{1}{\beta_i} \tag{10}$$

$$\frac{y^*}{X(\mathbf{a},\mathbf{q})} = \frac{m^{k(i)}}{X(\mathbf{a},\mathbf{q})} + (1-\alpha_i)\max\left\{0, 1 - \frac{m^{k(j)}}{X(\mathbf{a},\mathbf{q})} - \frac{m^{k(i)}}{X(\mathbf{a},\mathbf{q})}\right\} + \frac{1}{\beta_i} \tag{11}$$

If there is no opportunity to exchange information about fairness as in treatment 1, individual i has no knowledge about individual j´s fairness preferences, and we assume that the optimal proposal is in line with the integrity model.

3 Experimental design

The experiment is a version of a one-shot dictator game with production and two treatments; one without and one with pre-play communication. At

[6]The following example illustrates this. In a distributive situation where $a_i q_i = 2*100$ NOK, $a_j q_j = 4*200$ NOK and $X = 1000$ NOK the fairness ideals instruct individual i to keep 200 NOK $\left(m^L\right)$, 333 NOK $\left(m^{LE}\right)$ and 500 NOK $\left(m^{SE}\right)$. If individual i is a libertarian, individual j is a strict egalitarian and $\alpha_i = 0.6$, the self-serving model predicts that individual i's overall fairness consideration is, $m^* = 0.6*200$ NOK $+0.4*500$ NOK$=$ 320 NOK. If on the other hand individual i is a strict egalitarian, individual j is libertarian and $\alpha_i = 0.6$, the self-serving model predicts that individual i's overall fairness consideration is, $m^* = 0.6*500$ NOK $+0.4*500$ NOK$=$ 500 NOK.

the beginning of the experiment the participants in the treatment without pre-play communication, the control group, were given information about how the production phase and the distribution phase would proceed, while the participants in the treatment with pre-play communication, the experimental group, were also given information about how the communication phase would proceed. Both groups were also given information about how the outcome of the experiment would be determined.

In the communication phase, the participants in the experimental group faced three hypothetical distribution situations and three different principles of what constitutes a fair distribution of income. The implications of the three principles in each of the three hypothetical distributive situations were also presented to them. They were asked to choose the principle they thought would imply the fairest distribution in the hypothetical situations. The participants were also told that the alternative they chose would be communicated to other participants later in the experiment, but that the decision made in this phase would not restrict their choices later in the experiment. The decision that a player made in the communication phase was communicated to his opponents in the distribution phase. The design of the communication phase prevented strategic behaviour in the production phase and thus also any clear incentive to report wrongly.

In the production phase, each participant was given credits equal to 300 Norwegian krone (NOK), approximately 50 US dollars. Production depended on factors both within and beyond individual control; investment was clearly within individual control and the rate of return on investment clearly beyond individual control. In the production phase each participant in both the experimental and the control group was randomly assigned a low or a high rate of return. Participants with a low rate of return would double the value of any investment they made, while those who were assigned a high rate of return would quadruple their investment. The participants were asked to determine how much they wanted to invest in two different one-shot games. Before they made their investment choice, they were told that they would be paired with players with different rates of return. Their choice alternatives were limited to 0 NOK, 100 NOK and 200 NOK, and the total amount invested in the two games could not exceed the initial credit they received. The design with two games was chosen to expose the participants to different situations in the distribution phase. Any money they chose not to invest was added to their total earnings from the experiment, and thus they faced a genuine investment choice.

In the distribution phase, each participant was given information about the other participant's rate of return, investment level, and total contribution before they were asked to propose a distribution of the total income produced by the two. The experimental group was also told which fairness principle their opponent had chosen in the communication phase and the implications of this principle in this particular distribution situation. They were also reminded of their own choice in the communication phase. The participants were not informed about the outcome of the first game before the second game was completed, i.e. they considered the two one-shot games simultaneously. For each participant one of the two proposals (the participant's own or that of the opponent) in one of the two games was randomly selected to determine the final outcome. The total earnings from the experiment were given by the final outcome plus the amount of money not invested. Given that we assume that people's fairness ideals are defined on the final distribution of outcome, the chosen elicitation procedure is incentive-compatible.

At the end of the experiment, the participants were assigned codes and instructed to mail their codes and bank account numbers to the accounts department of the Norwegian School of Economics and Business Administration. Independently, the research team mailed a list including the codes and the total payment to the accounts department, who then disbursed the earnings directly to each participants' bank accounts. This procedure ensured that neither the participants nor the research team were in a position to identify how much each participant earned in the experiment.

The participants were all recruited among first-year students at the Norwegian School of Economics and Business Administration. In the invitation they were told that they would initially receive 300 NOK to use in an experiment that would last about 40 minutes and that their total earnings from the experiment would depend on their choices. They were not informed about the purpose of the experiment. The hourly opportunity cost for most of these students would be about 100 NOK, while the average payout was 447 NOK for the control group and 442 NOK for the experimental group. Each student was only permitted to participate once. In the first treatment we had one session with 20 participants, one session with 12 participants and four sessions with 16 participants, comprising a total of 96 participants, while in the second treatment we had one session with 12 participants and five sessions with 16 participants, comprising a total of 92 participants. The participants were in the same computer lab during a session, but all communication was anonymous and conducted through a web-based interface.

In the distribution phase, the paired players could differ with respect to both their rate of return and their investment, which implies that there were four different categories of distributive situations in the experiment.[7] We have a reasonably even distribution of observations in the four categories in the two treatments. As shown in table 1 there are 94 observations where players are identical with respect to both their rate of return and their investment. In this situation all three fairness ideals imply the same fair distribution, namely that both players get an equal share of the total income. In the situation where the players have the same rate of return but differ in their investment there are 92 observations. In this situation the liberal egalitarian and the libertarian fairness ideals coincide, whereas strict egalitarianism would imply a different view of the fair distribution. In the situation where the players have made the same investment but differ in their rate of return, there are also 92 observations. In these situations both the strict egalitarian and the liberal egalitarian would consider an equal split a fair distribution, while the libertarian would consider an unequal split a fair distribution.

Table 1: Number of observations in each category

	Investment		
Rate of return	Same	Different	Total
Same	94	92	186
Different	92	96	188
Total	186	188	374

Finally, there are 96 observations in the situation where the players differ in both dimensions. In this situation strict egalitarianism and libertarianism imply the same fair offer if the player with a high rate of return is the player with a low investment (100 NOK). If this is not the case, all the fairness ideals imply different offer in this situation.

[7] The players in the experimental group could also differ with respect to the fairness ideal they had reported in the communication phase. This is commented on in section 4.1.3

4 Results

In this section I present some descriptive statistics before I present the results of the statistical tests and the regression estimates.

4.1 Descriptive statistics

The presentation of the descriptive analysis is divided into three parts. I present data from the distribution phase first, then data from the production phase and the communication phase are presented.

4.1.1 Statistics from the distribution phase

Table 2 gives the major statistical features of the data from the distribution phase.

Table 2: Descriptive statistics of offer made to opponent, by treatment

Treatment	NC	C	NC	C
Variable	Absolute	Absolute	Relative	Relative
Mean	229	280	0.271	0.309
Median	200	200	0.292	0.333
Mode	0	0	0	0.5
St. dev	219	243	0.219	0.229
Min	0	0	0	0
Max	800	800	0.75	0.8
n	190	184	190	184

Note: NC refers to the treatment without pre-play communication: the control group. *C* refers to the treatment with communication: the experimental group. The variables *Absolute* and *Relative* are offer made to opponent in NOK and in percentage of total income produced in each particular distributive situation

The average relative offer in the group without pre-play communication is 27.1 percent which is slightly more than usually observed in standard dictator games without production (Colin F. Camerer, 2003; John H. Kagel and Alvin E. Roth, 1995). In the same group maximum offer in relative terms is 75 percent. In the group with pre-play communication the average and maximum relative offers are 30.9 percent and 80 percent, respectively.

Zero is the minimum offer in both groups, and it is also the most frequent offer in the control group, while in the experimental group the most frequent relative offer is 0.5.[8]

Figure 1 shows the cumulative distribution of relative offers made.

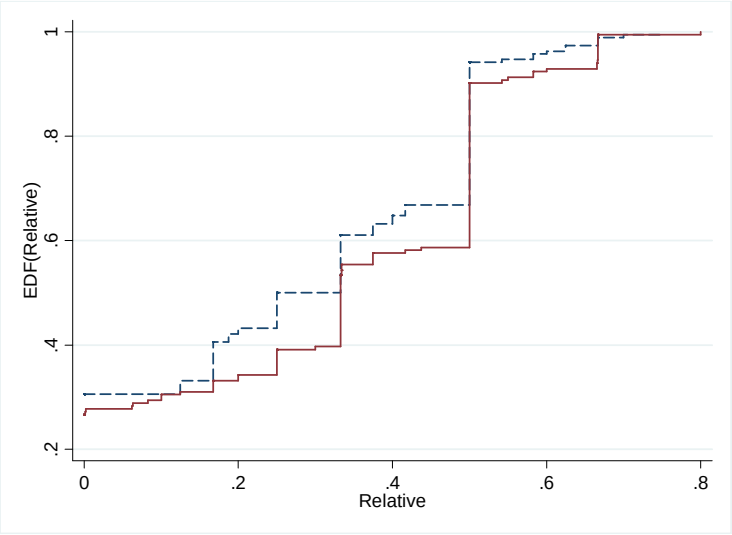


Figure 1: Cumulative distribution of offer in relative terms, by treatment
Note: Offers are calculated relative to total income produced in each particular distributive situation. The dotted and the straight lines are for the control and the experimental group, respectively.

As can be seen from the figure there are more masses around the lower values of offer in the control group than in the experimental group. 50 percent of the offers in the control group were 0.25 of total income or less and 5.8 percent of the offers are 0.5 of total income or more. The corresponding percentages for the experimental group are 39.1 and 9.8. In figure 1 it is also interesting to notice that 27.2 percent of the observations in the control group are participants who shared the production equally, and 30.5 percent of the observations are participants who offered nothing to the opponent. For the experimental group the corresponding percentages are 31.5 and 26.6.

The impression from figure 1 and table 2 is that people on average are more generous when there is a pre-play communication phase than if not. The fact that the most frequent amount taken by a player in a game is 600

[8]The full distributions of offer are shown in the appendix, section 6.2.

NOK in the control group and 400 NOK in the experimental group also supports this impression.[9]

4.1.2 Statistics from the production phase

Table 3 reports data from the production phase.

Table 3: Empirical distribution of investment in the two games

	Game 2			
Game 1	0	100	200	Total
0	2	1	1	4
100		13	91	104
200	1	77	·	78
Total	3	91	92	186

The empirical distribution of investment in the two games is only slightly different in the two treatments. Two participants, both in the experimental group, kept the whole endowment of 300 NOK. One participant in the control group invested only 100 NOK. 15 participants, 10 from the control group, invested 200 NOK. 13 of the 18 participants who did not invest the whole endowment were assigned a low rate of return.[10] In both treatments the remaining 168 participants invested the full endowment of 300 NOK, reasonably evenly distributed between (200,100) and (100, 200).

The participants were given the option of investing 0 NOK to make the investment decision real, and as some participants opted for no investment in one or both games, it was also perceived as such. However, most participants invested the full amount. Hence, the investment incentives caused by the

[9]It is also interesting to notice that when individuals decide how to distribute income, it matters to them how the contribution to total production came about. The correlation in the experimental group between the individuals' proposals in the distribution phase and a) their own investment decisions, b) their opponents' investment decisions, c) their own rate of return and d) their opponents' rate of return are $r(y_i, q_i) = .5164$, $r(y_i, q_j) = .2711$, $r(y_i, a_i) = .4703$ and $r(y_i, a_j) = .2847$, respectively. The corresponding numbers for the control group are .5245, .4058, .4222 and .4018.

[10]In the experimental group the fairness ideals were evenly distributed amongst the participants who either invested nothing or kept 100 NOK: 2 reported the strict egalitarian ideal, 2 reported the liberal egalitarian ideal and 3 reported the libertarian ideal.

three fairness ideals do not seem to have affected the choices in the production phase.

4.1.3 Statistics from the communication phase

Table 4 reports the distribution of reported fairness ideals in the communication phase. Only 15 participants reported strict egalitarianism as the fairest ideal, while the remaining 77 participants were evenly distributed between the liberal egalitarian and libertarian ideals.

Table 4: Reported fairness ideals

Fairness ideal	Frequency	Percent
Strict egalitarianism	15	16.3
Liberal egalitarianism	39	42.4
Libertarianism	38	41.3
Total	92	100

Table 5 gives the number of observations of participants who have reported the same fairness ideal as their opponent in the communication phase and the number of observations of participants who have reported a different fairness ideal to their opponent.

Table 5: Observations by reported fairness ideal and the implication of the ideal

	Implication		
Fairness ideal	Same	Different	Total
Same	60	·	60
Different	70	54	124
Total	130	54	184

The number of observations where the distributive implications of the fairness ideals reported by a participant and his opponent are the same and the number of observations where the distributive implication of the fairness ideals reported by a participant and his opponent are different are also reported in table 5. There are 124 observations of participants who have reported different fairness ideal than their opponent in the communication

phase. For 70 of these observations the different ideals imply the same fair distribution, while for 54 observations the different ideals imply different fair distribution. In the next section the variation in data reported in table 5 is utilized in order to test the effect of communication on distribution.

4.2 Analysis

The participants in the experimental group offer more to their opponent in the distribution phase than the participants in the control group. In this section I test if the difference is statistically significant.

4.2.1 Does communication matter?

I test if pre-play communication is more than just cheap talk (Rabin, 1990; Farrell and Rabin, 1996). When individuals make their decision in the distribution phase the first order condition equation (5) in section 2.2 predicts that both the weight (β_i) they attach to fairness considerations and their overall fairness consideration (m_i^*) matter. Hence, if communication has an effect on distributive behaviour, this may be explained by a change in both factors. I test first if communication has an effect on β_i. Next I test if communication has an effect on m_i^*.

Effect on the weight attached to fairness Two hypotheses on how communication may affect the individual weight attached to fairness considerations are tested: the discursive hypothesis and the affiliation hypothesis. The discursive hypothesis is that individuals who have had the opportunity to exchange information about fairness give more importance to the matter than individuals who have not had this opportunity. The idea is that discussing fairness triggers a greater concern for fairness in general. The affiliation hypothesis is that individuals make higher offers to opponents who endorse the same fairness ideal as themselves than to opponents who endorse a different fairness ideal.

The discursive hypothesis The individual weights attach to fairness considerations are unobserved, but as the three fairness ideals on average instruct individuals to distribute total income equally, any difference in average offer to opponent between the control group and the experimental group

should reflect a difference in the average weight attached to fairness considerations.[11]

I perform a two-sample *t test* of the null hypothesis that the population means of offer made to opponent in relative and absolute terms are the same for the control group and the experimental group. It is assumed that the two populations have unequal variances, and a one-tailed test is applied. Table 6 reports the results of the tests.

Table 6: Test of the null hypothesis that the mean offers are the same in the two treatments

Variable	Absolute	Relative
Difference	- 50.79	- 0.038
p-value	0.035	0.053

Note: The variables *Absolute* and *Relative* are offer made to opponent in NOK and in percentage of total income produced in each particular distributive situation. *Difference* refers to the difference between the population means of offer made to opponent in the control group and in the experimental group.

The data seems to support the discursive hypothesis. For offer made to opponent in absolute terms the null hypothesis can be rejected at 5 percent level, and for offer made to opponent in relative terms the null hypothesis can be rejected at 10 percent level. Despite the fact that the information exchange is non-binding and has no monetary pay-off implication, the participants act on average more generously when they have changed information about hypothetical distribution situations compared to not having had this opportunity. Hence, communication increases the weight individuals attach to fairness considerations.

I now turn to a robustness analysis of this observation. The difference in average offer to opponent between the experimental group and the control group is not necessarily a good measure of the average weight attached to fairness considerations between the groups, if the two groups are unequally restricted by corner solutions or subjects in the experimental group behave

[11] This is correct if people do not behave opportunistically and if the two groups are equally restricted by corner solutions, which I return to shortly. See also the appendix, section 6.3.

opportunistically. I will consider each of the two issues in turn. First, the number of corner solutions in each group may serve as a proxy for how restricted the two groups are. There are 49 corner solutions in the experimental group and 58 in the control group. Hence, the issue of corner solutions is not important in this analysis. Second, to deal with the problem of opportunistic behaviour I provide a more refined test of the discursive hypothesis.

There are 130 observations where the reported fairness ideal of both players implies the same distribution (see table 5). Hence, the three first order conditions equations (6)-(8) in section 2.3 coincide and the optimal proposal is in line with the integrity model. Accordingly, if there is a difference in the average offer between the control group and the players in the experimental group whose reported fairness ideals imply the same distribution, the difference can only be due to a change in the weight attached to fairness considerations.

I perform a two-sample *t test* of the null hypothesis that the population means of offer made to opponent in absolute and relative terms are the same for the control group and for the group of players in the experimental group whose reported fairness ideal implies the same distribution. The *t test* is one-tailed, and I assume that the two populations have unequal variances. Table 7 reports the results of the tests. For offer made to opponent in absolute terms the null hypothesis can be rejected at 5 percent level, and for offer made to opponent in relative terms the null hypothesis can be rejected at 10 percent level. Hence, the conclusion that the data supports the discursive hypothesis seems to be robust.

Table 7: Test of the null hypothesis that the mean offers are the same in the two groups

Variable	Absolute	Relative
Difference	- 47.97	- 0.037
p-value	0.039	0.073

Note: The variables *Absolute* and *Relative* are offer made to opponent in NOK and in percentage of total income produced in each particular distributive situation. *Difference* refers to the difference between the population means of offer made to opponent in the control group and the group of players in the experimental group who reported fairness ideal that implied the same distribution.

The affiliation hypothesis The affiliation hypothesis is tested on a subset of the full sample. I compare the 60 observations of participants who have reported the same fairness ideal as their opponent in the communication phase with the 70 observations of participants who have reported a different fairness ideal as their opponent but with the same distributive implication (see table 5). Accordingly the only difference between the two groups is that in group 1 the players endorse the same fairness ideal as their opponents and in group 2 the players endorse a different fairness ideal than their opponents. I perform a two-sample *t test* of the hypothesis that the population means of offer to opponent are the same for group 1 and group 2. The *t test* I run assumes that the two populations have unequal variances. The alternative hypothesis is one-sided. The result is reported in table 8. The null hypothesis can not be rejected. In fact the sign contradicts the alternative hypothesis. There is no affiliation effect. An individual offers on average more to an opponent who endorses a different fairness ideal than himself even when restricted to the situations were the distributive implications are the same.

Table 8: Test of the null hypothesis that the mean offers are the same in the two groups

Variable	Absolute	Relative
Difference	- 92.23	- 0.061
p-value	0.983	0.932

Note: The variables *Absolute* and *Relative* are offer made to opponent in NOK and in percentage of total income produced in each particular distributive situation. *Difference* refers to the difference between the population means of offer made to an opponent who endorses the same fairness ideal and an opponent who endorses a different fairness ideal with the same distributive implication.

Effect on the overall fairness consideration To test the effect of communication on the overall fairness consideration, I estimate the three models presented in section 2.3. The amount of money a player keeps in the distribution phase relative to total income is regressed on the distributive implication of his and his opponent´s choice of fairness ideal in the communication phase. Since there is an unobserved weight attached to fairness considerations, which is assumed to be uncorrelated with the fairness ideal an individual endorses,

and since 26.6 percent of the participants keep the whole joint production, I run a random effect censored (tobit) regression.[12] The regression results are reported in table 9.

Table 9: Random effect tobit results

y-share on	IM	CM	SM
constant	.413	.384	.388
	(.055)	*(.051)*	*(.050)*
own ideal	.667	0.565	.704
	(.082)	*(.134)*	*(.082)*
opponent's ideal		.143	
		(.138)	
max ideal			.232
			(.182)
sigma - u	.281	.296	.292
	(.028)	*(.029)*	*(.029)*
sigma - e	.111	.106	.107
	(.010)	*(.009)*	*(.009)*
log likelihood	- 21.733	-20.305	- 20.217

Note: *IM* stands for integrity model. *CM* stands for compromise model. *SM* stands for self-serving model. *y-share* refers to the amount of money a player keeps in the distribution phase relative to total income. *Own ideal* and *opponent's ideal* refer to the distributive implication of the player's and his opponent's choice of fairness ideal in the communication phase. *Max ideal* refers to the positive difference between the distributive implication of the opponent's and the player's choice of fairness ideal. *Sigma-u* and *sigma-e* are the standard deviations for individuals and games, respectively. Standard errors in parentheses.

In all the three models the individuals' own fairness ideal is important when they propose a distribution. From the estimation of the compromise model and the self-serving model we see that the opponents' report on fairness

[12] To deal with panel data and unobserved effects I apply regression with a complex error structure. Two error terms are included in the econometric models. One error term u_i is person specific and common to each individual, but differs between them. The idiosyncratic error term e_{ig} is game specific and unique to each of the individuals in each game. I use the subscript g for game. The econometric model I have applied is: $y_{ig} = \max(a + bx + u_i + e_{ig})$ where $u_i \backsim N(0, sigma\ u)$, $e_{ig} \backsim N(0, sigma\ e)$ and $cov(u_i, e_{ig}) = 0$. The random effect assumption is justified in section 4.2.2.

in the communication phase also seems to be important for the individuals when they propose a distribution.

Hence, there seems to be an effect of communication on an individual's overall fairness consideration. The individuals take the opponent's reported fairness ideal into account when they propose a distribution. The effect of the opponent's report on fairness is strongest in the self-serving model, which also has the highest log likelihood value.

The estimated values of the parameters in the three models are not fully in accordance with the assumed restrictions on the parameters in the theoretical models, which probably reflects that there is a certain degree of heterogeneity in the population with respect to how people deal with communication. The opportunity to exchange information about fairness ideals may motivate some individuals to bias their overall fairness considerations in favour of themselves, while others may be encouraged to show integrity and commit to their own reported fairness ideal, and still others may prefer an overall fairness consideration that is a compromise solution, somewhere in between their own and their opponent's reported fairness ideal.

4.2.2 Is the weight attached to fairness independent of fairness ideal?

In the regression in table 9, I apply a random effect estimator. The individual weight attached to fairness considerations, β_i is person specific and as such a fixed effect. However, what turns it into a random effect is that β_i is assumed to be independent of the fairness ideal, $m^{k(i)}$, an individual endorses, i.e. $cov(m^{k(i)}, \beta_i) = 0$. In order to support the random effect assumption I provide table 10, which gives three indicators of the distribution of the weight individuals attach to fairness considerations, sorted by fairness ideal.

Column 1 reports the percentage of players who offered nothing to their opponent, indicating a low weight attached to fairness considerations. 34.2 percent of the professed libertarians offered nothing to their opponent. The corresponding percentages for those who selected strict egalitarianism and liberal egalitarianism as the fairest ideal are 23.3 and 20.5, respectively. A possible explanation of the high percentage of professed libertarians who offered nothing, is that the amount justified by libertarianism as the fair amount to keep is often closer to total income produced than the amount justified by strict egalitarianism and liberal egalitarianism.[13]

[13]The following example illustrates this fact. In a distributive situation where $a_i q_i =$

Column 2 reports the percentage of participants who offered less to their opponent than the fair distribution they reported in the communication phase, indicating a medium weight attached to fairness considerations. Column 3 reports the percentage of players who offered exactly the amount they reported as fair in the communication phase, indicating that these players attach a high weight to fairness considerations.

Table 10: Indicators of the value of the parameter β, sorted by fairness ideal

	$m \leq y = X$	$m < y < X$	$m = y < X$	$m < y < X$
Fairness ideal	Percentage	Percentage	Percentage	$\frac{y-m}{X}$
Strict egalitarianism	23.3	40.0	36.7	.255
Liberal egalitarianism	20.5	24.4	55.1	.170
Libertarianism	34.2	31.6	34.2	.238
Observations	49	55	80	55

Note: X is total income produced. m is the fair distribution a player has chosen in the communication phase. y is money kept in the distribution phase. $\frac{y-m}{X}$ is average deviation in relative terms from the fair distribution.

Column 4 reports the average deviation in relative terms from the fair distribution. From the first order condition equation (5) in section 2.2 it can be seen that for participants, who attach the same weight to fairness considerations, the deviation from the fair distribution will be the same. Hence, if the weight individuals attach to fairness considerations is independent of the fairness ideal they endorse, equation (5) predicts that the average offer should be the same. As shown in table 10 the average deviation in relative terms from the fair offer is almost the same for the strict egalitarians and the libertarians, although one might expect that the strict egalitarians would give more weight to fairness considerations than the libertarians.

$4 * 200$ NOK, $a_j q_j = 2 * 100$ NOK and $X = 1000$ NOK the ideals instruct individual i to keep 800 NOK (m^L), 667 NOK (m^{LE}) and 500 NOK (m^{SE}). Assume that each person attaches the same weight to fairness considerations, which amounts to taking 250 NOK more than the amount corresponding to their overall fairness consideration. In this distributive situation the libertarian ideal will instruct individual i, the proposer, to take all, but the strict egalitarian ideal and the liberal egalitarian ideal will not, although each person attaches the same weight to fairness considerations.

The general picture emerging from table 10 given that we should expect some noise in the data, is that for the integrity model there are no large systematic differences in the distribution of the weight attached to fairness between the fairness ideals, indicating that the weight individuals attach to fairness considerations is independent of the fairness ideal they endorse, and if so the random effect assumption may to a certain extent be justified.[14]

5 Concluding remarks

The aim of this paper has been to analyse the effect of communication on the individual weight attached to fairness considerations and on individual assessment of fairness in situations involving production. The information exchange in the communication phase is non-binding and it has no monetary pay-off implication, but it turns out as more than cheap talk; pre-play communication has a statistically significant effect on individual behaviour in the distribution phase. Individuals, who have had the opportunity to exchange information about fairness ideals, act on average more generously than individuals who have not had this opportunity. The information exchange has an impact on both the weight individuals attach to fairness considerations and on their overall fairness considerations. The weight individuals attach to fairness considerations increases as a result of communication and the increase is statistically significant. Regression results indicate that communication also has an impact on an individual's overall fairness considerations and that there is a certain degree of heterogeneity in the population with respect to how most people process information. Some individuals bias their overall fairness consideration in favour of themselves, while others commit to their own reported fairness ideal, and still others prefer an overall fairness consideration that is a compromise solution, somewhere in between their own and their opponent's reported fairness ideal.

The paper focuses on three fairness ideals which are the most prominent in the literature. However, as 30.5 percent of the observations in the control group and 26.6 percent of the observations in the experimental group are participants who offered nothing to their opponent, one may also put forward the argument that people think it is fair to take all. The most

[14] The same can be shown for the compromise model and the self-serving model. The general picture emerging from table 10 is the same when I analyse the 130 observations where the reported fairness ideal of both players implies the same distribution.

congenial of the three fairness ideals considered in the paper for people who think it is fair to take all, is libertarianism and thus for this group the fair choice in the communication phase is libertarianism. This could also be a possible interpretation of the high percentage of professed libertarians in the experimental group who offered nothing to their opponent.

The impact of pre-play communication on individual distributive behaviour may potentially be due to framing. There is always the aspect that variation in the presentation of a scenario may change behaviour. However, simple design, as in the current study, reduces potential framing effects. The framing issue is also a matter of external validity, and further research is required to gain a better understanding of the context dependent way in which people handle decision problems and the extent to which the findings obtained in the laboratory generalise to real-world settings.

6 Appendix

6.1 Robustness test of the estimated parameters: three specifications of the utility function

I assume quadratic disutility in the deviation from the overall fairness consideration because it is more in line with data from dictator game experiments than the linear disutility. The symmetric disutility assumption is not crucial in a dictator game like the one in this study because almost all the participants offer less than what they report to be the fair amount. Alternative formulations of the loss function are tested below.

I examine the effect on the estimated parameters of three specifications of the utility function. M-1 represents the utility function applied in the main body of the paper. The regression results of this specification are reported in table 9 in section 4.2.1. M-2 defines utility in terms of relative deviation from the fairness ideal, and M-3 defines utility in terms of absolute deviation from the fairness ideal.

$$\text{M-1:} \qquad U_i(y;\mathbf{a},\mathbf{q}) = y - \frac{\beta_i}{2}\frac{\left[y-m_i^*(\mathbf{a},\mathbf{q})\right]^2}{X(\mathbf{a},\mathbf{q})}$$

$$\text{M-2:} \qquad U_i(y;\mathbf{a},\mathbf{q}) = y - \frac{\beta_i}{2}\left(\frac{y-m_i^*(\mathbf{a},\mathbf{q})}{X(\mathbf{a},\mathbf{q})}\right)^2$$

$$\text{M-3:} \qquad U_i(y;\mathbf{a},\mathbf{q}) = y - \frac{\beta_i}{2}\left[y-m_i^*(\mathbf{a},\mathbf{q})\right]^2$$

Given an interior solution the optimal proposals for the three specifications of the utility function are:

$$\text{M-1:} \qquad \frac{y^*}{X(\mathbf{a},\mathbf{q})} = \frac{m_i^*}{X(\mathbf{a},\mathbf{q})} + \frac{1}{\beta_i} \implies \frac{y^*}{X(\mathbf{a},\mathbf{q})} - \frac{m_i^*}{X(\mathbf{a},\mathbf{q})} = \frac{1}{\beta_i}$$

$$\text{M-2:} \qquad \frac{y^*}{X(\mathbf{a},\mathbf{q})} = \frac{m_i^*}{X(\mathbf{a},\mathbf{q})} + \frac{X}{\beta_i} \implies \frac{y^*}{X(\mathbf{a},\mathbf{q})} - \frac{m_i^*}{X(\mathbf{a},\mathbf{q})} = \frac{X}{\beta_i}$$

$$\text{M-3:} \qquad \frac{y^*}{X(\mathbf{a},\mathbf{q})} = \frac{m_i^*}{X(\mathbf{a},\mathbf{q})} + \frac{1}{X\beta_i} \implies y^* - m_i^* = \frac{1}{\beta_i}$$

M-1 is insensitive to scaling of m and X. Hence, for a given $\boldsymbol{\beta}$ the deviation from the fair demand in relative terms is constant. In M-2 the deviation from the fair demand in relative terms - for a given $\boldsymbol{\beta}$ - is proportional to total income produced. In M-3 the deviation from the fair demand in absolute terms- for a given $\boldsymbol{\beta}$ - is constant.

The tests are reported in table A1.

Table A.1: Robustness tests of the random effect censored regressions.

y-share on	IM -2	IM -3	CM -2	CM -3	SM -2	SM -3
constant	.475	.366	.458	.351	.461	.315
	(.060)	*(.054)*	*(.062)*	*(.055)*	*(.063)*	*(.058)*
own ideal	.652	.642	.548	.527	.678	.683
	(.081)	*(.082)*	*(.136)*	*(.138)*	*(.084)*	*(.086)*
opponents's ideal			.132	.146		
			(.140)	*(.141)*		
max ideal					.236	.283
					(.184)	*(.185)*
X	-.00006		.00006		-.00006	
	(.00003)		*(.00003)*		*(.00003)*	
1/X		43.245		42.161		38.808
		(19.425)		*(19.065)*		*(19.418)*
sigma - u	.283	.280	.286	.282	.278	.294
	(.075)	*(.027)*	*(.028)*	*(.027)*	*(.025)*	*(.035)*
sigma - e	.109	.109	.107	.107	.107	.108
	(.009)	*(.009)*	*(.009)*	*(.009)*	*(.009)*	*(.010)*
log-likelihood	-19.544	-18.689	-19.104	-18.168	-19.120	-18.715

Note: *IM* stands for integrity model. *CM* stands for compromise model. *SM* stands for self-serving model. *y-share* refers to the amount of money a player keeps in the distribution phase relative to total income. *Own ideal* and *opponent's ideal* refer to the distributive implication of the player's and his opponent's choice of fairness ideal in the communication phase, respectively. *Max ideal* refers to the positive difference between the distributive implication of the opponent's and the player's choice of fairness ideal. The explanatory variables are in relative terms, and the denominators are total income produced in each particular distributive situation. *X* is total income produced. *sigma-u* is the standard deviation between individuals. *sigma-e* is the standard deviation between games. Standard errors in parentheses.

From table A1 we see that for all the three communication models the M-2 and the M-3 specifications of the utility function have only a small impact on the estimates. Also there is only a marginal change in the log-likelihood values.

6.2 Full distribution of offer in absolute and relative terms

Table A2 gives the empirical distribution of offer made to opponent in NOK in the experimental group and in the control group.

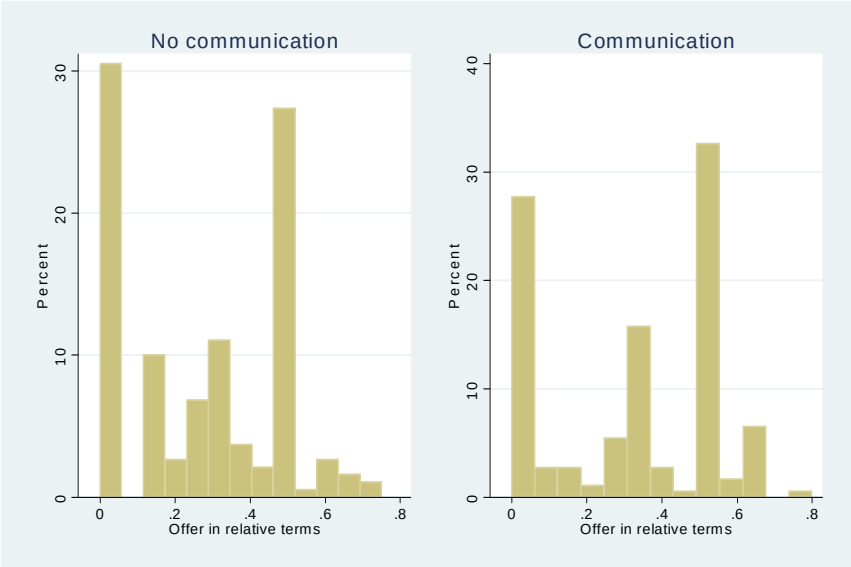
Table A2: Empirical distribution of offer in absolute terms, by treatment

	Frequency		Percent		Cumulative	
Offer	NC	C	NC	C	NC	C
0	58	49	30.53	26.63	30.53	26.63
1		2		1.09		27.72
50		2		1.09		28.80
100	15	8	7.89	4.35	38.42	33.15
150	3		1.58		40.00	
200	39	32	20.53	17.39	60.53	50.54
250	1		0.53		61.05	
267		4		2.17		52.72
300	25	11	13.16	5.98	74.21	58.70
333		2		1.09		59.78
350		2		1.09		60.87
400	23	32	12.11	17.39	86.32	78.26
500	6	5	3.16	2.72	89.47	80.98
533		3		1.63		82.61
550		1		0.54		83.15
600	8	16	4.21	8.17	93.68	91.85
650	1	1	0.53	0.54	94.21	92.39
667		2		1.09		93.48
700	3	1	1.58	0.54	95.79	94.02
750	1		0.53		96.32	
800	7	11	3.68	5.98	100	100
	190	184	100	100		

Note: NC refers to the treatment without pre-play communication: the control group. *C* refers to the treatment with communication: the experimental group.

Figure A1 shows the empirical distribution of the offer made to the opponent in the percentage of total income produced in each particular distributive situation, in the experimental group and in the control group.

Figure A1: Empirical distribution of offer in relative terms, by treatment



6.3 Self-serving bias and corner solutions

In this section I explain how self-serving behaviour and restrictions by corner solutions can interfere with the measure of the difference in average weight attached to fairness considerations.

6.3.1 Self-serving bias

An individual's reaction to communication may be self-serving. There is a possibility that an individual opportunistically chooses the fairness ideal that benefits him most in any particular distributive situation. If there is self-serving bias at work, the difference in average offer to opponent between the experimental and the control group is not necessarily a good measure of the difference in average weight attached to fairness considerations between the two groups. The following example illustrates this fact. To make the example as simple as possible I assume extreme self-serving behaviour.

Consider two groups, a control group and an experimental group, and a situation where individual i is an egalitarian and individual j is a libertarian in both groups. The individuals in both groups also attach the same weight to fairness considerations which amounts to taking 100 NOK more than the amount corresponding to their overall fairness consideration. Moreover assume that everyone in the experimental group behaves opportunistically.

Suppose that the individuals face a distributive situation where $a_i q_i = 4 * 200$ NOK, $a_j q_j = 2 * 100$ NOK and $X = 1000$ NOK. The libertarian ideal instructs individual i, the proposer, to keep 800 NOK and the strict egalitarian ideal instructs individual i, the proposer, to keep 500 NOK. In this distributive situation individual i in the control group offers 400 NOK, while individual j offers 700 NOK. The average offer is 550 NOK. In the experimental group, due to extreme self-serving, individual i offers 100 NOK and individual j offers 400 NOK, and the average offer is 250 NOK.

With self-serving bias at work the difference in average offer between the the control group and the experimental group is 300 NOK. This indicates a difference in the average weight attached to fairness considerations between the two groups, which - since everyone takes 100 NOK more than the amount corresponding to their overall fairness consideration, does not exist. Hence, in this example the difference in average offer to opponent between the two groups is not a good measure of the difference in the average weight attached to fairness considerations between the two groups.

6.3.2 Corner solutions

Communication may cause changes in the prevalence of fairness ideals in such a way that the experimental group and the control group are not equally restricted by corner solutions, and if so the difference in average offer to opponent between the two groups is not necessarily a good measure of the difference in average weight attached to fairness considerations between the two groups. The following example illustrates this fact.

Consider two groups - a control group and an experimental group - and a situation where communication has caused a change in the prevalence of fairness ideals in such a way that everyone in the experimental group is a libertarian, and everyone in the control group is a strict egalitarian. The individuals in both groups also attach the same weight to fairness considerations which amounts to taking 300 NOK more than the amount corresponding to their overall fairness consideration.

Suppose that the individuals face a distributive situation where $a_i q_i = 4 * 200$ NOK, $a_j q_j = 2 * 100$ NOK and $X = 1000$ NOK. The libertarian ideal instructs individual i, the proposer, to keep 800 NOK and the strict egalitarian ideal instructs individual i, the proposer, to keep 500 NOK. In this distributive situation individual i in the experimental group offers 0 NOK, which is a corner solution, and individual j offers 500 NOK. The average offer is 250 NOK. In the control group individual i offers 200 NOK and individual j offers 200 NOK, and the average offer is 200 NOK.

The difference in average offer between the experimental group and the control group is 50 NOK. This indicates a difference in the average weight attached to fairness considerations between the two groups, which - since everyone takes 300 NOK more than the amount corresponding to their overall fairness consideration, does not exist. Hence, in this example the difference in average offer to opponent between the two groups is not a good measure of the difference in the average weight attached to fairness considerations between the two groups.

References

[1] **Babcock, Linda; Loewenstein, George; Issacharoff, Samuel; and Camerer, Colin F.** "Self-serving assessment of Fairness and Pretrial Bargaining " *Journal of Legal Studies*, 1993, 22 (1): 135-59.

[2] **Babcock, Linda; Loewenstein, George; Issacharoff, Samuel and Camerer, Colin F.** "Biased Judgement of Fairness in Bargaining" *American Economic Review*, 1995, Vol. 85 No 5: 1337-1343.

[3] **Babcock, Linda and Loewenstein, George**. "Explaining Bargaining Impasse: The Role of Self-Serving Biases" *Journal of Economic Perspectives*, 1997, Vol. 11 No 1: 109-126.

[4] **Bolten, Gary E. and Ockenfels, Axel.** "ERC: A Theory of Equity, Reciprocity, and Competition" *The American Economic Review, 2000, Vol. 90 Issue 1: 166-193.*

[5] **Camerer, Colin F.** *Behavioral Game Theory: Experiments in Strategic Interaction.* Princeton: Princeton University Press, 2003.

[6] **Cappelen, Alexander W.; Hole, Astri Drange; Sørensen, Erik Ø.; Tungoddden, Bertil.** "The pluralism of fairness ideals: An experimental approach" *The American Economic Review,* 2007, Vol. 97, No 3: 818-827.

[7] **Crawford, Vincent P**."Explicit Communication and Bargaining Outcomes" *American Economic Review. Papers and Proceeding*, 1990, 80, 213-219.

[8] **Crawford, Vincent P.** "A Survey of Experiments on Communiction via Cheap Talk" *Journal of Economic Theory*,1998, 78, 286-298.

[9] **Dana, Jason; Weber, Roberto A.; and Kuang, Jason Xi.** "Exploiting moral wriggle room: Behavior inconsistent with a preference for fair outcome" Mimeo, Carnegie Mellon University, 2004.

[10] **Ellingsen, Tore and Johannesson, Magnus.** "Promises, Threats, and Fairness" *Economic Journal, 2004a,* 114, 397-420.

[11] **Ellingsen, Tore and Johannesson, Magnus.** "Is There a Hold-up Problem" *Scandinavian Journal of Economics*, 2004b, 106, 475-494).

[12] **Ellingsen, Tore and Johannesson, Magnus.** "Does impartial deliberation breed fair behaviour?" *Rationality and Society*, 2005, 17(1) 116-136.

[13] **Farrell, Joseph and Rabin, Matthew.** "Cheap Talk" *Journal of Economic Perspectives*, 1996, Vol. 10, No 3, 103-118.

[14] **Fehr, Ernst and Smith, Klaus M**. "A theory of fairness, competition, and cooperation" *The Quarterly Journal of Economics, 1999,* (817-868).

[15] **Johannesson, Magnus and Mohlin, Erik.** "Communication: Content and Relationship" Forthcoming in *Journal of Economic Behavior and Organization, 2005.*

[16] **Kagel, John H. and Roth, Alvin E.** *Handbook of Experimental Economics.* Princeton: Princeton University Press 1995.

[17] **Konow, James.** "A positive theory of economic fairness" *Journal of Economic Behavior and Organization*, 1996, vol. 31, 13-35.

[18] **Konow, James.** "Fair Shares: Accountability and Cognitive Dissonance in Allocation Decisions," *American Economic Review*, 2000, vol. 90, no. 4 (September), pp. 1072-1091.

[19] **Konow, James.** "Blind Spots: The Effects of Information and Stakes on Fairness Bias and Dispersion," *Social Justice Research*, 2005, vol. 18, no. 4 (December), pp. 349-390.

[20] **Messick, David M. and Sentis, Keith.** "Fairness, preferences and fairness bias" In David M. Messick and Karen S. Cook, eds., *Equity Theory: Psychological and Sociological Perspectives.* New York: Praeger, 1983 pp. 61-94.

[21] **Nielsen, Kai.** *Equality and Liberty***.** Totowa, NJ: Roman and Allanheld, 1985.

[22] **Norzick, Robert**. *Anarchy, State and Utopia.* New York: Basic Books, 1974.

[23] **Rabin, Matthew.** "Cognitive dissonance and social change" *Journal of Economic Behavior and Organization, 1994,* 23, pp. 111-194.

[24] **Roemer, John E**. *Equality of Opportunity.* Harvard University Press. 1998.

[25] **Sally, David.** "Conversation and cooperation in social dilemmas. A Meta analysis of experiments from 1958-1992. *Rationality and Society,* 1995, Vol. 7 No. 1:58-92.