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# On the Value of Having the Decision on the Outcome of Others

## An Experiment with Experts

by

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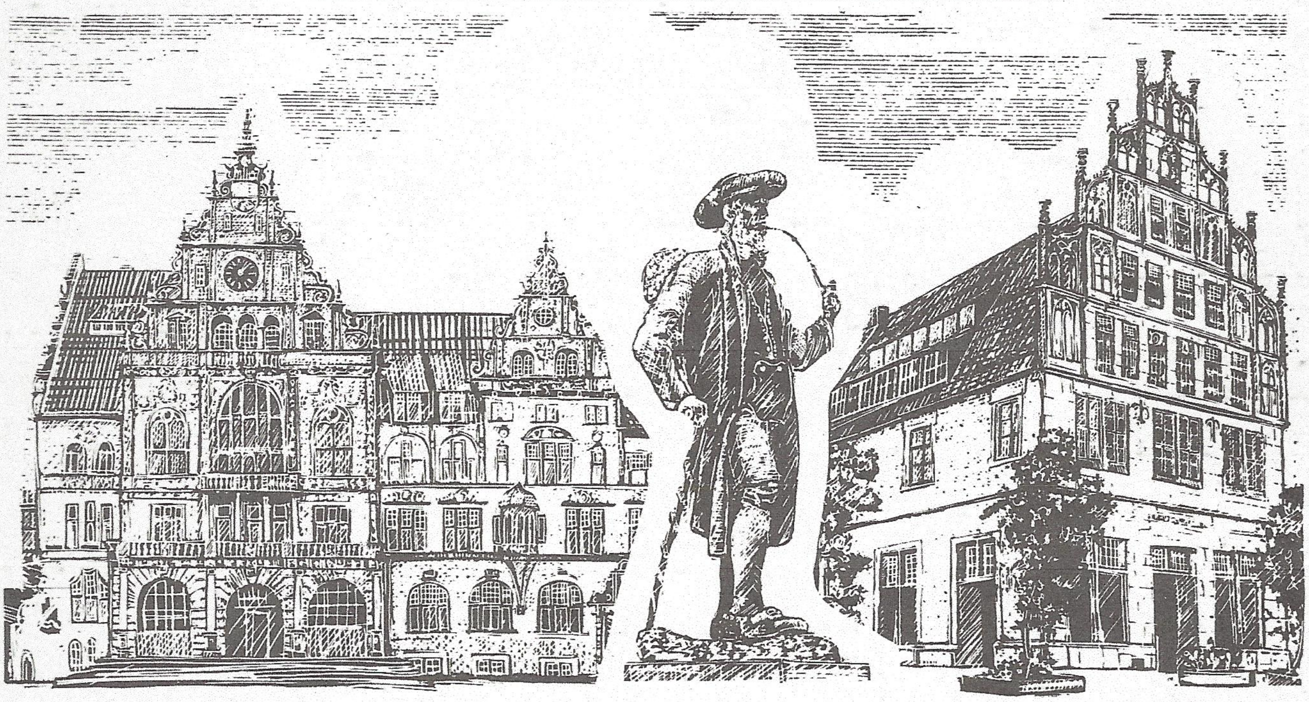

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# ON THE VALUE OF HAVING THE DECISION ON THE OUTCOME OF OTHERS

## AN EXPERIMENT WITH EXPERTS *)

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Summary: This Paper reports on the experimental results of a game with one A-player and 10 (or 9) B-players, where the A-player has the power to decide if all B-players get an amount of 20 $ per person, or if none of them receives anything. Every B-player can offer sidepayments to the A-player conditioned on the case that he receives his 20 $. - This game has been played in 5 parallel groups for 2 subsequent rounds by 53 participants of an international game theory conference. Afterwards a final game of this type was played. - The decision of the A-player was made after 30-minutes of negotiations during which the offers of the B-players had to be given in written form. Communication was unrestricted, any contracts were permitted, but only the offered sidepayments of the B-players to the A-player were made binding by the experimentor. - The positions of the A-player were auctioned before the games, so that those players were selected as A-players who evaluated this position highest. By this auction and a related questionnaire we received information about the evaluation of position A. - The most surprising result was, that 8 of the 10 games of the first 2 rounds resulted with a negative decision of the A-player. It seems that experience worked into the direction of an equal split of the net profit. Correspondingly, offers for position A and the evaluation of position A went down. The main motive to become the A-player seems to have switched from expecting profits to keeping control of the game, and preventing that some "lunatic" took position A, tried high threats, and ended with a negative decision. The observed behavior suggests to distinguish two main types of players, "Egalitarians" and "Others", where the "Others" can be separated into those who evaluate position A higher than B, or lower than B. Among the latter group are the "Epsilonists", who assume that the A-player should accept at an epsilon-amount. Patterns and learning in these groups are described. - The comparably high amounts of rejected (sums of) sidepayments clearly indicate that this game was not solved by its rational solution (epsilon sidepayment to the A-player, and the A-player accepts). Social rules of fairness essentially influenced the results. The question of self commitments is addressed. It seems that they are only possible, when implemented via automatisms supported by social norms.

*) We thank Tom Ferguson, Richard Jensen, Ehud Kalai, Alwin Roth, Steve Turnbull who supervised the experiments in the groups, and Yair Tauman who helped to conduct the experiment.

CONTENTS

# 1. THE EXPERIMENT

## 1.1 THE GAME

The following game has been played by 53 participants of the 1987 Game Theory Conference at Columbus/Ohio in two subsequent rounds of 5 parallel games:

> n+1 players (n=9 or 10) participated in the game. One of them, the A-player, was designated. The other players were called B-players. The A-player had the power to ask the organizer to pay 20 $ to every B-player. To convince the A-player to ask for this payment, the B-players could offer parts of their 20 $ as sidepayments to the A-player. - The experiment can be devided into two parts, the negotiation and the decision.
>
> The negotiation: Before the A-player made his decision, there was a 30 minutes time during which the players could negotiate. Offers of sidepayments were given in a written form and signed. They were invalid, when they were conditioned on anything else but the fact that every B-player received his 20 $. In case of a positive decision of the A-player they were subtracted from the 20 $ of the respective B-player, and given to the A-player. Other commitments were permitted, but their verification was not supported by the experimentor. - There were no restrictions to communication, whispering was allowed, the players were allowed to stand up, walk through the room, leave the room, talk outside, whatever and whenever they wanted. - The negotiation time was known to the players in advance. The end of the time was announced by a countdown of the experimentor. After this countdown no further offers of sidepayments could be made.
>
> The decision: Then the A-player made his decision. He had two options: either "accept": every B-player receives his 20 $, and the A-player receives his sidepayment from every B-player according to the signed offers, or "reject" no B-player receives anything, and the A-player receives no sidepayments.

It should be emphasized that the power of the A-player was only to induce 20 $ to ALL B-players. He could not ask for payment to only part of them.

## 1.2 THEORETICAL APPROACHES

The situation was (intentionally) presented as unstructured as possible. Various structures give rise to various and very different results. The extreme cases are the results

case 1: (0,20,20,... ,20).

This result is obtained by perfect equilibrium of the 3-step model:

step 0: pre-negotiation
step 1: offers of the B-players
step 2: decision of the A-player.

(To obtain this solution, it has to be assumed, that the A-player decides for the payoff to the others, although he does not receive anything, what seems behaviorally strange.)

case 2: (s1+s2+.. +sn,20-s1,20-s2,... ,20-sn), where one si is the smallest money unit, all other sj=0.

These solutions are obtained (besides the solution of case 1) by perfect equilibrium of the same 3-step model, if there is a smallest money unit. Moreover they are obtained as the only solutions in the 4-step model:

step 0: pre-negotiation
step 1: announcement of the A-player, not to agree, if he gets less than a certain amount x
step 2: offers of the B-players
step 3: decision of the A-player,

if it is assumed that the A-player keeps to his announcement as long as he cannot get more by a deviating decision.

case 3: (n*(20-e),e,e,... ,e), where e is the smallest money unit.

This is obtained in the same 4-step model, when the announcement of the A-player in step 1 can be made binding.

A prominent reference point in between is the equal split of the joint payoff. The Shapley Value gives half of the total sum to the A-player.

One of the aims of the experiment was, to find out which game theoretic structure models the observed behavior best, or which structure was given to the situation by the players.

The presentation of extreme cases suggests that the main question of the game is, which power of self-commitment the A-player has, to make his announcement (or threat) in step 1 of the 4-step model believable. Since the opportunity of a binding commitment was not given by the rules, the question was, whether there are social behavioral standarts (which may have been developped by culture, evolution, or elsehow) which force players to keep to their announcements afterwords, even if that is connected with (substantial) monetary losses. (In this context, the question arises, whether the observed behavioral pattern can really be modelled that easily by a 4-step model, stripping the situation down to the question of the power of selfcommitment.)

However, in the range between the extremes, a wide spectrum of alternatives of action was opened, where it was not at all clear, how actions could redefine the problem: For instance, assuming that the decision of the A-player is, to agree if he finally received as much as "the others", how would this decision be, when part of the others left the room ? Would he claim for an equal share of those remaining in the room ? Could the A-player expect to get a share from those, who immediately left the room, and never heard any threat of the A-player (i.e. from those who avoided to take part in step 1) ?

The result of the experiment seems to indicate that the players strongly referred to equal share solutions. The fact that the A-players did generally not make their final decision spontaneously (except for cases with extremely low offers) indicates that self-commitment did not work automatically. It seems that the aspect of feeling to be treated unfairly, normally guided the decision to neglect. From this point of view it was the problem of the A-player 1. to build up enough emotional power to reject if sidepayments were not high enough, 2. to make the others believe this, and 3. to select as high a level of expected sidepayments as possible to perform 1. and 2.

## 1.3 EXPERIMENTAL PROCEDURE AND DETAILS OF THE PAYOFF

By our design we wanted to avoid that participants did - from a social point of view - not accept the privileged position of the A-player, and then tended to split the cake equally. We wanted to implement some kind of "moral right" of the A-player to receive more than the others. We therefore auctioned position A in an English auction before the game was played.

Before the experiment started, the participants were distributed to 5 tables, two of them with 11, three with 10 participants. On each table a separate English auction (to get position A instead of B) was run. Offers were given in written form, it was remarked that it was optimal to give one's true value. In addition to their offers for position A the participants were asked, to give their estimates of the value of being in position A, and the value of being in position B. (This was done to give a hint that by their bid they could evaluate the difference between the two positions, and to make sure that they really observed the corresponding data. Moreover, we wanted to get information about their opinions of the value of position A.) The winner of the auction got position A. He had to pay the amount of the second highest bid on his table in cash from his private money before the negotiation round started. To avoid that the B-players had any information about the price, the A-player had paid, the selected A-players thereafter changed the group, and played with B-players who had taken part in a different auction. Then the game was played as described above.

This procedure was performed in two subsequent rounds. The participants were mixed after the first round. Each group negotiated in a separate room.

Thereafter - according to the wishes of the participants - a final game was played, in which the 20 $ amounts of the B-players were raised up to 50 $. In this game the position of the A-player and of all (in this case 10) B-players were auctioned in the same way as described above.

One day later a final questionnaire was completed by 35 of the 53 participants.

Although the auctions will surely have increased the acceptance of the distinguished role of the A-players, two other effects should be mentioned which restrict the universality of conclusions which can be drawn from the experiment:

(1) By the auction those players were selected as A-players, who evaluated this position highest, and who, moreover, thought that they would be clever enough to verify an according outcome.

By our procedure, we selected those participants as A-players who were self confident with respect to their bargaining skills, and who evaluated position A highest. From some point of view, we selected "optimal advocats" for a high value of position A. - On the other hand, by the winners curse, we selected A-players who possibly overestimated the value of position A, and whose rules of fairness had the highest difference to the fairness standards of the others. From this point of view we maximized potential conflict in the groups.

(2) The outcomes of the A-players and the B-players are not necesserily comparable, since the A-player had sunk costs, which he paid for his position in advance.

Although sunk costs should not matter from a theoretical point of view, behaviorally they did: It seems that the decisions of the A-players were essentially influenced by net profit considerations. For instance, they did not agree to final offers, when they received less than their sunk costs. - Our procedure induced the additional focal points of self commitment: "I will not accept any outcome, where I get less than my sunk costs", and "each of us should receive the same net payoff". - Another problem may have been that the B-players did not pay sunk costs themselves, and therefore could not develop the feeling that - in contrary to rational theories - sunk costs can matter in the decision.

Summing up, the design of the experiment induced additional opportunities of self commitment, and selected most self-confident players for the positions of the A-players. So the whole design favoured high payoffs of the A-players. On the other hand the potential conflict was, so to say, maximized by selecting A-players with highest difference in social norms, and inducing sunk costs which behaviorally seem to work in a way, which cannot be understood by purely theoretical considerations of B-players.

## 1.4 THE 500 $ GAME

This game has been played after the first two rounds. It involved 10 B-players. The amounts for the B-players were 50 $ instead of 20 $. All positions (of the A-player and the 10 B-players) were auctioned in an "English auction" among all remaining 35 participants. The bids for both positions were given jointly. It seems, that it can be taken for sure that the participants trusted into the expertise of the experimentors that the auction was run in an incentive compatible way, so that they could give their true evaluations of the positions. However, it happened that after the selection of the A-player (who had to pay the price of the second highest bid), the other participants were ranked according to their bids for position B. Correctly, the participants with the ten highest bids were selected. But it happened, that the first selected B-player had to pay the price of the bid of the second, the second had to pay the price of the bid of the third, etc. Thereby the B-players payed different amounts for position B, what gives some interesting additional results below. (It would have been incentive compatible, if all selected players payed the same price, namely that of the highest bid of those players who were not selected. But, apparently, no B-player noticed this.)

The results of this game are easily reported: The players agreed to an EQUAL SHARE OF THE NET PAYOFFS. This was arranged as follows. Every player gave his sunk costs. These amounts were summed up. The remainder was devided by the number of players. This gave 25 $ for every player, and a remainder of 3 $. This rest was given to the A-player.

An interesting point is that not all players reported their sunk costs correctly. Two players gave less, and two gave more than their true values. All other players gave correct sunk costs. There is no doubt that those B-players who gave less than their correct sunk costs did that willingly. They afterwards reported, that they did so in order to increase the attractivity of a positive solution by increasing the involved total "net payoff" which could be split.

## 2. BRAIN STRUCTURE AND SELF COMMITMENT

The most surprising results of the experiment were the many rejections by the A-players, although substantial amounts had been offered. (Bids and decisions are given in Table 14 at the end of this paper.) To understand this result better, it seems necessary to give some information about individual decision making processes, and the possible ways, in which self commitments may be implemented by using evolutionarily or culturally developped structures in the brain.

### 2.1 MODELING INDIVIDUAL DECISION MAKING PROCESSES

As far as we know, there presently is no convincing complete model of individual decision making in the literature, which carefully models the details of decision making. Authors from the behavioral side do usually not model details of the process. Detailed process models are usually more speculative, and their results are closely related to the modelling of artificial intelligence. Here we give some basic ideas of a model developped by BRUNWINKEL to explain decision making behavior in complex consumer decisions. (A more detailed introduction into this model is given in BRUNWINKEL, 1991.)

A decision process can be modeled by the following three elements:

1. framing, 2. structuring, 3. selecting

FRAMING: One of the problems for the decision maker is, to realize what he has to (or can) decide for. What might be the consequences of actions he takes. Are there given fixed conditions which have to be fulfilled. This gives the frame of the decision. (This frame may be changed during the decision process: New alternatives or additional conditions may be found during the process. Partial problems can be isolated and solved separately, and thereafter give fixed conditions for the subsequent process. Subframes can be selected, and a decision can be found within these, etc.)

STRUCTURING: The objects in consideration (alternatives, criteria, principles,..) have to be structured: Relations of type "if A then B" and "if A then not B" have to be detected, similarities have to be recognized, parts of the problem may to be separated, the problem itself may be reduced by applying certain conclusions. This process involves and connects items on different levels of analysis and meta-analysis. Moreover, the recognized relations and drawn conclusions can be implemented according to rational as well as emotional criteria.

SELECTING: At the end of the process of structuring the decision maker has to select one (or several) objects of his structured decision space. Part of this selection can be (and in complex decision situations usually is) done during the decision process, thereby giving the decision new frames, or new structural elements. Nevertheless, the final decision always seems to be a selection between remaining alternatives, where criteria are ordered lexicographically in order to obtain unique decisions. (This final ordering of criteria is sometimes very rigid compared to the fine and detailed analysis performed during the decision process, may be it is done on a higher level of meta-analysis.)

ERROR AVOIDANCE: To avoid errors, it seems that individuals are used to fuzzy perceptions of data, social norms and conclusions, knowing and somehow registrating the inexactness of their analysis. Moreover, there is tolerance with respect to group opinions, which seems to be necessary to aggregate individual opinions to social decisions and obtain consensus of the group.

A decision making process is a sequence of phases of framing, structuring, reframing, restructuring, partial decisions, etc.

It seems to be a useful hypothesis, that the general process follows criteria of rationality, where the rationality, however, does not only refer to the solution of the decision problem, but also to the interior organisation of the decision process. In this context time limitations, and - first of all - the limitations of the short term memory must be mentioned.

Within the LONG TERM MEMORY all facts, and meta-facts on arbitrary levels, including facts about feelings, etc. are stored. With respect to the considerations here, long term memory has practically no capacity constraints. However, the problem of the long term memory is, that its facts are not easily accessable. It seems that they can be reached either directly by pointers, or indirectly by using a path through "the structured landscape of information", where logical and emotional relations of pieces of information can be used to take this path. (It is not clear, to which extend this path can be taken willingly. From psychoanalysis is known, that some facts can be very difficult to access, and it seems that by some interior organisation the brain can even close the access to parts of the memory, when they contain unsolvable problems or conflicts.)

In the SHORT TERM MEMORY a limited set of about 5 pointers can be stored. These can be used to reach certain points of the long term memory immediately, including numbers to which mathematical routines are applied.

It seems, that more complex information can only be held by implementing information switches in the long term memory, by which additional information can be reached by using paths (willingly).

There is no doubt that not only information, but also pointers which immediately cause specific (physical or process-organizating) actions can be stored and included in paths. Moreover it is well known that part of brain processing is organized by routines, which may be modelled by fixed paths through the brain. (Thus the implementation of quite complex routines, as car driving, is possible which can even run parallel to other processes, until certain signals claim for conscious decisions.)

Structuring, (re)framing and taking parts of the decision may, in this context, be seen as the preparation of parts of paths through the "jungle of information". Negotiations permit to give information about the own decision structure, and to influence the decision structure of all participants of the negotiation.

We would like to remark, that observed behavior sometimes suggests to model intra-individual decisions as a negotiation problem of different intra-individual decision makers (as for instance "it" and "superego"), who perform their respective actions in a strategic way. In this context the multilateral decision of an n-person game can be seen as a natural extension of intra-individual decisions, where some decision makers are from "outside". One day it might be possible to describe negotiation processes as strategic problems on connected (individual) information networks.

## 2.2 RESULTS OF TWO-PERSON ULTIMATUM GAMES (ONE A-PLAYER, ONE B-PLAYER)

In the context here, three main arguments influence the decision process of such games:

(1) the RATIONAL ARGUMENT which says, that a player should accept any positive monetary payoff

(2) different STANDARDS OF FAIRNESS which claim that the decision maker should not agree, when the standard is not fulfilled

(3) the COMMITMENT (or REPUTATION) ARGUMENT which says that a player should verify threats posed within the negotiation process

Results of one shot two-person ultimatum games show, that the rational argument is not applied, even not in situations where the players do not know the personal identities of their respective partners. Moreover, most of these games were performed without negotiations (in some of the experiments the partner did not even exist), but nevertheless the A-player rejected quite essential amounts. It was quite sure that he rejected, when he received less than 250 of a total joint outcome of 1000. More than 90 % of the observed (and accepted) offers are between 300 and 500 of 1000. In all studies with nonnegligable payoffs the A-player received less than the B-player. (For a review of experimental results of ultimatum games see GÜTH, 1988.)

The experimental results permit the following interpretation:

In his decision, the A-player refers to the equal split (i.e. 500 of 1000). He is not willing concede to more than "one step" below this amount.

"One step" can be half of the reference point, or one "step of prominence" below the reference point. The size of a "step of prominence" depends on the exactness of the analysis by the decision maker, which is connected with the uncertainty about the correct decision by the prominence selection rule (see ALBERS/ALBERS 1984, or ALBERS/LAING 1990). From other experiments it is known, and the data indicate that, in the situation here, a "step of prominence" is 10% or 20% of the total of 1000, i.e. 100 or 200.

Table 1 shows the main prominent solution principles, including the idea, to give only an epsilon-amount to the A-player, which is clearly not supported

TABLE 1: Results of two-person ultimatum games (normalized to 1000 to the B-player)

| principle (idea) | exactness of analysis*) | sidepayment to A-player | observed decision of A-player |
|---|---|---|---|
| epsilon (= 1 step) of 1000 | 10 % | 100 | reject |
| epsilon (= 1 step) of 1000 | 20 % | 200 | mostly rejected |
| half of reference point | | 250 | more rejections |
| 1 step below reference point | 20 % | 300 | depends |
| 1 step below reference point | 10 % | 400 | accept |
| reference point | | 500 | accept |

*) given by the quotient "1 step" / total amount

by any experiment. - The idea of epsilon-amounts of mathematical analysis is, that it is greater zero. Behaviorally, the perception of a number to be greater than zero implies, that it is observed as different from zero on the level of exactness used by the player in his analysis. Observations from other experiments and empirical studies suggest, that players normally do not select a level of exactness, which permits to perceive more than 20% as equal to zero.

Within this approach of explanation the final payoff is a measure of the inexactness, with which the situation is structured (or with which the B-player expects the A-player to percieve the situation). At the same time it is a measure of the degree of certainty (or supposed certainty) of the A-player that he is "right", when he applies the equal split fairness standard.

The result is based on the equal share principle assuming a social tolerance of the A-player. It would be interesting to know, whether, by adequate arguments, the A-player can avoid that the B-players expect him to have this tolerance. On the other hand, there might be also rational arguments which support a reduction below 500. In fact, the discount might be rationally motivated by the advantage of the B-player to put the ultimatum.

There are two ways of transferring the equal share reference point to the situation with more than one B-player, namely the general rules of fairness

(a) the A-player receives half of the joint payoff, and every B-player receives an equal share of the remainder

(b) the A-player (and every B-player) receives an equal share of the joint payoff

Again modifications have to be made according to social tolerance, which, however, may permit a reduction of the payoff of the A-player as well as a reduction of the payoffs of some B-players. May be that these B-players can be forced to take over part of the sidepayments that the other B-players do not give. Although additional sidepayments of B-players have a different quality, than the "enforced" tolerance of the A-player, several participants of the experiment gave these additional sidepayments as B-players, and explicitly explained their high offers of sidepayments by saying that they did this to replace missing offers of others.

The experimental outcomes clearly support rule (b). However, there was space for negotiations, since rule (b) could be applied to total or net payoffs, and since it was not completely clear, how the rule had to be modified, when some B-players left the room.

## 2.3 IMPLEMENTATION OF SELF COMMITMENTS

It is our opinion that pure self commitments generally do not work, when it is afterwards more profitable, not to keep to these commitments. It seems that men are too rational, to commit themselves to arbitrary actions which are not rational in the moment, when they shall be enacted.

On the other hand it would make sense that nature (by evolution) has provided men with the power of (self) commitment, when this commitment is advantageous for the society to which the individual belongs. Moreover, it would make sense that our social system has developped methods to use such commitments in favour of the social system. Such methods may be implemented by education. They may be of the kind that evolutionary automatisms are used as uncontrollable routines by identifying the conditions under which the automatism starts with certain states of society, and connecting the end points of the automatisms with certain social reactions.

Assuming that such evolutionary automatisms exist, which have been adjusted to certain social situations by education in the society, then the central problem of a self commitment has to be, to identify a given situation in a self-convincing way as the starting point of an automatism. Thereby the self commitment looses the property of being correctable by rational criteria. (In the diction of cognitive dissonance: a situation has to be created, where the principle of "social coherence" outrules rational criteria.)

At this point we refer to the results of section 3.1. In fact negative net profit (i.e. price below payed costs) can make a person "mad" (this is criterion A zo reject of section 3.1). It also is a reasonable social criterion that the A-player should not receive the lowest net payoff (criterion B to reject of section 3.1). The person to which criterion C applies seems to give a very good example of a self commitment by linkage with a mechanism given by education or society.

Besides this opportunity to implement self commitments even in one shot games, in reality there are usually additional opportunities of self commitment, especially when threats are connected with some general reputation. There is no doubt that reputation was a non-negligable aspect of the experiment. (Note that it can make sense for a society to implement a mechanism involving reputation even when this mechanism does not check, whether the situation has one shot character or not. For the society it may be even better that the mechanism is applied also in cases, where the actors do not meet again later. May be, it is a reputation of the whole society, which is useful, and kept thereby.)

## 2.4 STRATEGIC RECOMMENDATIONS FOLLOWING FROM 2.1 - 2.3

The considerations of the 3 preceding sections suggest the following conclusions concerning the strategic behavior of the players:

There seems to be no doubt that it is most advantageous for the A-player, to give a fairness rule, and to announce to "get mad", if the rule is not kept by the proposals of the B-players. The aim of the A-player will then be, to find out a rule with the following properties:

- the fairness rule must be such that the B-players believe that the A-player "gets mad", if it is not kept
- among all fairness rules with this property, it should give maximal payoff to the A-player

The (counter-) strategy of the B-players can be

- to avoid self commitments of the A-player by breaking automatisms; this can be done by creating (new) arguments which prevent that the automatism can immediately be applied, or that the consequences of the automatism are immediately performed, i.e. an additional switch of rational or emotional control.
- to give alternative structures of social criteria, which support the offers of the B-players as adequate or fair; here it might be possible that by joint proposal of a (nearly) acceptable alternative by all B-

players, the social flexibility of the decision maker can be used to implement a solution which is favourable for the B-players.
- in cases where reputation works, to stress out that the A-player HAS some "social reputation", which he can destroy by his decisions; if possible, the B-players may give arguments, why the A-player will not damage his "commitment-reputation" by the actions, the B-players want him to do; (they may give reasons to make an exception, or why the situation cannot be generalized).

In the experiment there were extended and sometimes heated discussions concerning moral criteria, and there have been different forms of threats used. There were extended attempts of the B-players, to implement rationality into the cognitive structures of the A-player. Cognitive linkages have been tried to build up or to break, from different points of view. But essential psychological mistakes in treating the respective other side have also been made.

The result of the (short) learning process of the experiment may be seen in the behavior of the final 500 $ game. 6 of the 10 B-players of this game had been A-players in one of the preceding rounds. So it was really experience from both sides which influenced the behavior of the B-players in this game:

I have never (neither in experiments nor in business negotiations) observed or participated in a negotiation which was handled with that much care to avoid any confrontation. To me it seemed, as if some explosive was in the air, which might be incended by the slightest careless movement. The first aim/result of the discussion was, to agree upon a net equal share distribution. It was not easy for the B-players, to convince all of their group of this solution. Some wanted to give the A-player less. The verification of this solution was started when the discussions on the concept still went on. By giving their sunk costs, the players - even when not yet willing - supported the implementation of the net equal share solution.

There was a high social pressure within the group of B-players, to agree to the solution. From this point of view, the situation was not unsimilar to the situations involved in experiments showing the phenomenon of cognitive dissonance. On the other hand, we cannot exclude that also rational analysis might have recommended possible deviators to agree to the net equal split principle after it had reached the state of a "solution which was almost agreed upon".

## 2.5 SOCIAL NORMS AND SELF COMMITMENT IN THE AUCTION DESIGN

The fact that position A had been auctioned before the game, restricts possible arguments of self commitment. In the auction it was the optimal strategy of the A-player to bid the difference of the values of positions A and B. He usually received the position for a bit less than that. From that point of view the A-player should perceive an equal split of the net benefits as (near to) fair.

As the winner of the auction he had revealed himself as someone who evaluated position A high. Moreover, he had invested into his belief to receive a reasonable amount, and could now even loose money, when his profit was too low.

By paying the difference of the estimated values of the positions, he had (not necessarily consciously, but factually) given away that part of his payoff, by which it should be higher than that of the B-players. He had thereby reduced the game to a game with equal net payoffs. From that point of view, there were no arguments left, to give him more than a net equal share. On the other hand, the result of the experiment shows, that there also were no social norms which could convince the A-player, to take (essentially) less than that (compare criterion B of rejection, section 3.1).

From another point of view the equal net share solution seems perverted: Why does a player, who afterwards asks for equal net shares, bid anything ? Why does not he bid zero and take his equal share of the total sum, not reduced by the auction price to the experimentor. Several participants thought and argued like that. We come back to this point in section 3.10 Ethic Principles.

Looking at the data, it can be easily seen, that in only 2 of 10 cases the A-player received more than a net equal share (group 2 of round 1, and group 4 of round 2). The corresponding sums of sidepayments were 35 and 31, the net payoffs were 30 and 21. Since the prices paid for the auctions which had taken place in the respective groups of the B-players were 41 and 20 (while the A-player had only paid 5 and 10), it seems very reasonable that the B-players overestimated the price player A had paid, and were thinking that the net payoffs of their arrangements were near net equal share.

There is also another information which can be taken from the auction: Assume, every bid in the auction is justified by a corresponding social norm, which assigns the corresponding payoff to the A-player. Since the winner gets the auction at the second highest offer, he knows that in his auction group only one bidder besides him has a social norm, which permits the price paid, namely that player who settled the price by his bid. 9 of 10 B-players do not have that type of norm, and by their bidding reveal, that they do not think that a behavior of the A-player will be successful, if he asks for that high an amount. This indicates that the winner has only a low chance to convince the negotiation group of his norm. His only chance seems to be, to convince the others, that he will apply his norm, and reject, and thereby cause them to give sufficiently high bids.

Summing up, the procedure complicates the analysis by opening higher degrees of reflection. On the other hand, there is some advantage connected with the procedure: we received the information about the evaluation of the positions from the participants in quite a reliable way from their bidding and the related questions.

## 3. OBSERVED BEHAVIOR

### 3.1 SOURCES OF REJECTION

None of the five games of the first round ended with a positive decision of the A-player. Only two of the five games of the second round, and the 500 $ game of the third round, ended with a positive decision.

The main reasons for these failures seem to be

A that the A-player was not offered a positive net outcome (this already explains 4 of the 8 failures, 2 of them in round 1, 2 in round 2)

B that the A-player was offered the lowest net outcome of all (10 or 11) players of the game (this explains 2 more of the 8 failures)

C that the A-player was offered a substantial net outcome (maximal net outcome of all players of the game), but had a standard of fairness, which was not fulfilled by his payoff (this explains the last two failures)

We remark, that principle C, which applies in two times, involves the same participant as A-player in both cases. It seems indeed surprising, that this participant rejected although he received the highest net offers of all A-players. This strongly suggests that this player had a strong social criterion, which caused him to reject. We therefore asked him for his reasons. His argument was that - if the threat of the A-player did not work - then the nuclear deterrence would not work either. It seems that he had linked the problem with another problem, for which he had already an automatism implemented which intrinsically "forced" him to reject. In fact, this player must have been quite convincing in his position, since he received the highest net offers of all A-players, and the second and third highest absolute offer.

TABLE 2: The decision of the A-players

| | round 1, group: | | | | | round 2, group: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| sum of sidepayments | 16 | 35 | 34+8 | 11.5 | 26 | 28.3 | 29 | 21.5 | 31 | 12 |
| paid by A-player | 15 | 5 | 30 | 40 | 28 | 11 | 15 | 25 | 10 | 20.07 |
| highest bid among B-players 2) | 5 | 30 | 40 | 28 | 15 | 20.07 | 25 | 15 | 11 | 10 |
| net payoff of A-player | 1 | 30 | 4+8 | -28.5 | -2 | 17.3 | 14 | -3.5 | 21 | -11.97 |
| highest net payoff of B-player | 20 | 18.5 | 20 | 18 | 18 | 18 | 19 | 20 | 20 | 20 |
| lowest net payoff of B-player | 18 | 15 | 8 | 10 | 10 | 17 | 10 | 14 | 15 | 18 |
| decision of A-player | rej | rej | rej | rej | rej | acc | acc | rej | rej | rej |
| criterion to reject | B | C* | B | AB | AB | | | AB | C* | AB |

*) Priciple C has been applied in both cases by the same participant as A-player
2) The A-player changed the group after the auction. He usually paid a price that was different from the highest bid of the B-players in the negotiation group.

In every case, the sum of offered side-payments to the A-player was clearly higher than a "mathematical epsilon". That the A-players did not accept these, cannot be explained in terms of purely rational behavior.

Analysing the game as a one-shot game, from the rational point of view the players should forget their sunk costs and maximize their profit. Commitments made during the negotiation phase to force others to increase their offers, could be broken after the last offer of the others was made, as long as a positive outcome was reached.

The deviations from rational behavior, and the fact that social norms guided the decision process instead, spontaneously suggests a comparison to the phenomenon of cognitive dissonance, where rational cognitive conclusions are also rejected in favour of socially consistent behavior.

## 3.2 BIDS TO ENTER POSITION A INSTEAD OF B

There were at least three kinds of motives to enter position A :

(1) the player evaluated his estimated payoff in position A higher than in position B

(2) the player liked to get the power of (or liked to enter the more interesting) position A

(3) the player wanted to take position A himself, in order to avoid that somebody else got it, who then refused to agree

ad (1): It is reasonable to bid for position A (instead of B) if this position is evaluated higher. From a rational point of view, it makes sense to bid the difference of values, when it can be expected to receive the position at a price below the bid. On the other hand, the A-player should recognize, that it might be really difficult to convince the B-players of a certain moral standard (concerning the payoff of the A-player), when this standart is implicitly "evaluated as reasonable" by the bids of only two of the players of the auction group.

Some information about the influence of motives (2) and (3) may be drawn from the following table:

TABLE 3: Bids to enter position A (instead of B):

| | number of bids that were HIGHER than the estimated | EQUAL to difference | LOWER than of values | total |
|---|---|---|---|---|
| round 1 | 4 | 3+5+5 *) | 15 | 32 |
| final questionnaire | 8 | 14+8 *) | 7 | 27 |

*) 5 of the 13 "equal to"-cases of round 1, and 8 of the 22 cases of the final questionnaire had no difference of values and a bid of 0. - 5 cases of round 1 had a bid of "epsilon", and an estimated difference of 0, They are also evaluated as "equal to".

Comparing the bids of the first round (before the game had been played) and the data of the final questionnaire (after all games had been played) one gets the impression that the players bid more carefully before round 1 (alpha= 1.3%)*). This may be a consequence of feeling unsure about the estimates of the outcomes. Those candidates, who did bid more than the difference of estimated values in the first round are candidates of motive (2), since it seems not reasonable, that the players were guided by motive (3) before the game was played. However, it seems plausible that even more players had this motivation, but did nevertheless bid below the difference of estimates since they were not

*) All levels of significance refer to FISHER's exact test (one sided), which we selected according to the low numbers of cases. The alpha-values give the probability of the obtained and more extreme results under the 0-hypothesis (that the classification criteria of the lines and columns of the 4x4 table are independent). Although the conditions of the test are not fulfilled, the alpha-values may be taken as indicators for the possible incorrectness of the result.

sure about their estimation. These considerations permit the suggestion that more than 12 % (= 4 of 32) had motive (2), and that more than 30 % (=8 of 27) had motive (2) or (3).

In the final questionnaire a higher proportion of players was willing to bid more than the difference of estimates (alpha= 9.6%, comparing extreme groups gives alpha= 5.5%). Although the respective second data are only answers to a questionnaire (and not combined with the commitment to take position A, when the auction was won), the result is reasonable: the players had a stronger belief in their own estimates, and therefore did not have to reduce their bids according to safety arguments. Moreover, motive (3) ("avoid that somebody else rejects") may now have become important. (Concrete discussions concerning the bidding behavior in the 500 $ game of round 3 involved motive (3).)

### 3.3 EVALUATION OF THE POSITIONS

To understand the data of the estimates of values of positions A and B better, it may be mentioned that the corresponding sums eA + 10eB (or eA + 9eB) is not always 200 (or 180) (eA and eB denote the estimates of value of positions A and B, e= "estimate"). Some participants' data give essentially lower sums, even below 100. This may reflect the uncertainty about the given estimates, and/or the uncertainty about the final decision of the A-player.

Assuming that experienced players bring the game to a positive end every time, our interest is, to get information about the (adequate) amount player A will get. In this context the participants' evaluations of the positions can help us. But we have to "clean" the data in a way that the estimates sum up to nx10 (where n is the number of B-players), more precisely that eA+10eB equals 200. It seems reasonable to transform the data in a proportional way. This gives the transformed values eA* = eAx200/(eA+nxeB) (n the number of B-players).

By this measure of value of position A, the participants can be separated into three groups:

group 1 ("Egalitarians"): $18 \le A^* \le 20$
group 2 ("Others"): $A^* < 18$ or $A^* > 20$

and as a subgroup of the "Others":

group 3 ("Epsilonists"): $A^* = 0$ or epsilon

(We extended the "Egalitarians" from the "strict Egalitarians" with $A^* = 200/11 = 18.18$ up to those players who by some rule of thumb obtained $A^* = 18$ or 20.)

Table 4 gives an overview over the sizes of these groups, and the distribution of A* in the group of "Others".

It can be easily seen that the shares of players in the three groups did not change essentially. But of the 24 participants who gave data eA and eB before the first round, and filled out the questionnaire after the last round, there were 8 changes between the groups, namely 4 from "Egalitarians" to "Others", and 4 from "Others" to "Egalitarians".

Within the group of "Others" the evaluation A* of position A went clearly down. (The median shifted from 45.0 to 23.2 (alpha= 1%), where the latter result is

TABLE 4: The three groups of players, and their "opinions" about the adequate outcome A* of the A-player

| | A* | # of participants before first round | # of participants after last round |
|---|---|---|---|
| group 1 ("Egalitarians") | 18 - 20 | 18 | 15 |
| group 2 ("Others") | 1 - 7 | - | 2 |
| | 8 - 17 | - | 3 |
| | 21 - 29 | 3 | 6 |
| | 30 - 39 | 2 | 5 |
| | 40 - 49 | 4 | 1 |
| | 50 - 59 | 1 | - |
| | 60 - 69 | 3 | - |
| | 70 - 79 | - | - |
| | 80 - 89 | 1 | - |
| | 90 - 99 | 1 | - |
| | >=100 | 2 | - |
| | total group 2 | 17 | 17 |
| median of A* in group 2 | | 45.0 | 23.2 |
| group 3 ("Epsilonists") | 0 or epsilon | 1 | 2 |

not far away from the equal share range (18 - 20). This indicates that the equal share argument became more relevant, and increasingly influenced the opinion in this group. - Accordingly the bids for position A in this group of "Others" went down (cf. 3.8, below).

## 3.4 BIDS OF THE 500 $ GAME

Some conclusions concerning the intended profits of the players can be drawn by comparing the "sums of bids" (for all positions), i.e. bA+10bB (b = "bid") with the "sums of estimates" eA+10eB. Such estimates have been given before the first game , and in the final questionnaire. Bids for both positions have only been made for the 500 $ game of round 3.

As long as no discounts are made (which might accord to expected rejections) the sum of estimates should equal the total sum of involved money of a game, i.e. 10x20 = 200 $ in the normal 200 $ game.

The median of the sums of estimates was 198 of possible 200 (i.e. a discount of only 2 %) throughout the game (see table 7). This indicates that more than half of the players did either not see a high probability of rejections by the A-player, or that this did not influence the expected values they gave.

The median of the sums of bids, bA+10bB, of the 500 $ game was 111 of 500 (i.e. a discount of 78 %). The highest sum of bids over all players was 275 (i.e. a discount of still 45 %). This means that really high discounts have been made.

(We observed discounts of 50 % in several other experiments, where positions of the Apex-game were auctioned.) The fact, that the discounts here are higher, indicates that additional considerations have been made. (May be that the high rejection rate (7 of 10 = 70%) of the preceding games was one reason for the low bids.)

TABLE 5: Bids of the 500 $ game (round 3)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bid to be A | 2) | 2) | 31 | 31 | 30 | 30 | 26 | 25 | 25 | 21 | 20 |
| bid to be B | 17.07* | 11.01* | 21* | 7 | 22* | 5 | 11* | 25* | 10 | 6 | 10 |
| A+10B | 223.77 | 161.11 | 251 | 101 | 250 | 80 | 136 | 275 | 125 | 81 | 120 |
| A-B | 36 | 40 | 10 | 24 | 12 | 25 | 15 | 0 | 15 | 15 | 10 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| bid to be A | 17.37 | 15 | 12 | 11.01 | 10 | 10 | 10 | 10 | 5 | 5 | 1 |
| bid to be B | 12.14* | 5 | 10 | 11.01* | 10 | 6 | 5 | 2 | 5 | 3 | 10 |
| A+10B | 138.77 | 120 | 112 | 121.11 | 110 | 70 | 60 | 30 | 58 | 35 | 101 |
| A-B | 5.23 | 10 | 2 | 0.0 | 0 | 4 | 5 | 8 | 3 | 2 | -9 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bid to be A | 1 | .25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -inf |
| bid to be B | 1 | 0 | 26* | 20* | 10* | 5 | 5 | 3 | 1 | .5 | 0 | 0 | 0 |
| A+10B | 10 | .25 | 260 | 200 | 100 | 50 | 50 | 30 | 10 | 5 | 0 | 0 | 0 |
| A-B | 0 | .25 | -26 | -20 | -10 | -5 | -5 | -3 | -1 | -.5 | 0 | 0 | - |

*) The bids marked by "*" are the winners of the auction, including the A-player
2) The values marked with a "2)" are between 50 and 55

## 3.5 IMPLICITLY INTENDED ADDDITIONAL NET PROFIT IN POSITION A

Although rational analysis concludes that players should bid up to the difference of the values of position A and B, it cannot necessarily be expected that this is behaviorally true. It seems more reasonable, that players intend to receive a profit, that they make some discount to avoid losses in case of errors, or that they make discounts according to risk aversity. Since it is not possible to distinguish these phenomena in the experiment, we collect them, and subsume them under "intended additional net profit". Compared to a risk neutral rational analysis, this extra profit can be used to compensate disadvantages of fuzzy payoffs and possible errors in the own analysis. - A measure for the "intended additional net profit in position A" is the amount which is left from the difference of the expected payoffs in position A and B, after the additional costs to enter position A (instead of B) are subtracted:

(intended additional net profit) := eA - eB - bid =
(expected payoff in position A) - (expected payoff in position B) -
- (bid for position A)

There are three main results concerning intended additional profits or losses in position A:

TABLE 6: "Intended additional net-profit" in position A

| intended net profit | before first round | | | after last round | | |
|---|---|---|---|---|---|---|
| | Egalitarians | Others | total | Egalitarians | Others | total |
| < -10 | - | 1 | 1 | 1 | 2 | 3 |
| -6 to -10 | - | - | - | 1 | 1 | 2 |
| -1 to -5 | 1 | 2 | 3 | 2 | 2 | 4 |
| 0 or epsil. | 12 | 1 | 13 | 9 | 4 | 13 |
| 1 to 5 | 3 | 4 | 7 | 1 | 4 | 5 |
| 6 to 10 | - | 3 | 3 | - | 1 | 1 |
| 11 to 20 | - | - | - | - | 1 | 1 |
| > 20 | - | 5 | 5 | - | - | - |
| median | 0 | 5.5 | 0 | 0 | 0 | 0 |

(1) there is an essential proportion of players who are willing to take losses (8 of 28 = 29% in the final questionnaire)

(2) "Egalitarians" do in general neither want profits nor take losses their distribution of intended profits or losses is essentially less spread (alpha= .002%)

(3) among the "Others", unexperienced players preferably want profits, experienced players preferably take losses (12 of 16 = 75% of the un-experienced players want profits, only 6 of 15 = 40% of the experienced, alpha= 7.8%)

ad (1): It was quite surprising, how many players were willing to take losses. We already mentioned the motives (2) "like to have power", and (3) "avoid wrong decision of other" in section 3.1.

ad (2): The data before round 1 show that "Egalitarians" in general do not intend positive profits, while the "Others" do. Indeed, "Egalitarians" have less problems insofar, that they need not put discounts to their result according to possible errors or fuzzy analysis. Their concept is mathematically easy and socially clear. The social aspect does not involve subjective evaluations, it is rigid and connected with a point prediction.

ad (3): In the group of "Others", the shift of the "intended additional net profit" between the beginning and the end of the experiment is surprising. Why is an increasing number of players willing to act with an expected negative net profit? The reason might be that the relevance of motive (3) "avoid wrong decision of other" increased. On the other hand the experiment may have taught the participants that it was practically impossible to realize more than a net equal share.

Note in this context that an intended additional net profit of zero is related to net equal shares of the players. From this point of view, the result here again supports the high tendency towards net equal shares.

### 3.6 THE SELECTED A-PLAYERS

In our experiment those players are selected as A-players who evaluated position A highest.

Of the five A-players of the first round (all of which had the experience of rejecting the offered side payments of the B-players) two afterwards changed their minds and did not again make high bids for position A. Two of the three others again became A-players in round 2.

2 of the 8 players, who had position A either in round 1 or 2, left the experiment after the second round (it was late). In the following auction for the eleven positions of the 500 $ game of round 3 all remaining 6 former A-players gave bids that were high enough to enter the game as participants. All of them became B-players. So a majority of the B-players of the last round had been in position A before.

It is interesting to realize that the games which ended with a positive decision of the A-player where just those, in which at least one former A-player participated as a B-player, while all other games with no former A-player in the position of a B-player ended with a negative decision. May be that B-players, who have been in position A before, know better, how to handle the A-player.

Another interesting phenomenon is that B-players who had been A-players before, or became A-players later give clearly higher shares of their 20 $ to the A-players as long as they are consistent in their higher evaluation of position A:

In the first round it happened in three cases that a player offered a sidepayment of 1o $ or more to the A-player. Two of these three became A-players in the following round. - In round two it happened only once that a B-player offered a sidepayment of 10 $ or more. This participant had been A-player in the round before. The other two A-players of round 1 who did not get position A again changed their minds in round 2. They did not bid high amounts for position A and within their respective groups offered the lowest sidepayments to the A-player. - That A-player of round two, who had given low offers in position B in round 1 tried to convert the game. He threatened the B-players that he would only accept, if he got 15 $ from each of them, and left the room. (The answer was 6 offers of 2 $ and 3 free riders. He rejected.)

The question raises, whether it can be at all advantageous to take position A in a game where position A is auctioned, and the B-positions are not (as in our games of round 1 and 2). The main result of the experiment seems to be that it is quite difficult, but just about possible, to obtain a better net result in position A than in position B (implying that there is no conflict in the group, which causes the A-player to reject).

In fact, there were only two cases where the net profit of the A-player was higher than the highest of the B-players, namely 1. in round 1, group 2, and 2. in round 2, group 4 (cf. Table 2). In case 1., the price that the A-player had paid, was extremely low. If the A-player would have paid the price, of the auction at that group, then his net payoff would have only been 5 $ (instead of 30 $) which would have been the lowest net outcome of this negotiation group. By applying the same procedure in case 2., a transformed net payoff of still 20 $ is reached.

This result indicates that it is indeed a good strategy to take position A in order to get control of the situation, thereby keep a chance to receive a maximal net payoff, and avoid being rejected in position B.

## 3.7 LEAVING THE ROOM

During the first round 36 of 47 B-players (= 77%) gave their offers to the A-player, and then left the room (or left the room without making any offer). Some of them made joint offers: namely 1 $ each (7 players of group 4, one of these 7 returned later)), 2 $ each (8 players of group 1, 9 players of group 5, one of them returned within the game), 3 $ each (5 players of group 2). In round 2, significantly less players left the room (less than 10, and one A-player). No player left the room in the final 500 $ game. It seems that the B-players learned that they increased the aggressivity of the A-player by leaving.

One might have the idea that leaving the room has the effect that the A-player makes his decision according to the social situation of the remaining players. The extreme case is that the A-player is left with one B-player, who for instance offers 10 $ of his 20 $ to the A-player. Although this would be quite a fair offer in a two-person ultimatum game, the results of the experiment suggest that the A-player will probably not accept, since this offer does neither fulfill the acceptance condition A nor B (see section 3.1). (This way of behavior is also excluded by the auction design: By the amounts of their bids the A-players have to refer to a specific anticipated future decision situation; the fact that (by acceptance rule A) they can "commit" (or in fact, by some automatism are commited) not to accept negative net payoffs, does ex post exclude that only a low number of B-players bid, since the sum of their offers would not be high enough to pass acceptance rule A.)

Leaving the room has also been tried by an the A-player (in one case of round 2). Here the A-player asked for 15 $ and left the room. However this caused the lowest contribution of the B-players, namely a total sum of 12, while in the other games of round 2 the sums were 28.3, 29, 21.5, and 31.

## 3.8 EXPERIENCE

Table 7 presents the influence of experience to different estimates, bids, and related data. The participants are devided in "Egalitarians" (where $.9 < eA/eB < 1.1$), and "Others". It seems reasonable to devide the others in those, who think that the A-player will get more than the B-player, and those who think that the B-player will get more.

(This criterion gives the same groups as the criterion defined in section 3.3. To draw conclusions about learning, we restrict our considerations throughout this section to those participants who gave values eA for at least 2 times. - In the tables the players are listed according to the groups they belong to before the first round. The players within the groups are ordered according to their estimates eA of value of position A.)

Experience of the group of "Others with eA-eB>=10" (12 players)

This is the group of players who evaluated position A as clearly better than position B. It is not surprising that all of them had estimates eA above 20. During the game, all of them reduced their high estimates of position A (mean from

59.1 to 19.5, median from 47.5 to 20, alpha= 0.25%). 3 of the 12 players of this group changed their mind, and become "Egalitarians". 9 players stayed within the group of "Others", but change to the opinion that eA-eB<10. 3 of them even switched to the opinion that eB>eA. This unsureness of opinion seems to be typical for the group of "Others", except from the "Egalitarians" (Compare "Others with eA-eB<10"). - Accordingly, the "preference of position A over position B" (eA-eB) went down (mean from 47.6 to 5.2, median from 45 to 2, alpha= .10%). At the end there were only 3 of the 12 players, who evaluated this difference higher than 10, while all of them did so before the games started. Accordingly 8 of the 11 reduced their bids (mean from 23.8 to 10.9, median from 28 to 6; those 2, who did not reduce their bids, had bids of 0 all the time). It seems interesting that several players of this group gave bids, which were essentially lower than their (high) differences of estimates. Some of them even bid 0. 3 players gave bids below 2 in the first round, 5 gave bids below 2 in their final data. 7 were willing to bid more than 20 in the beginning, none of them in the final questionnaire (alpha= .06%). (It should be noted that (a small) part of the reduction of eA and bA results from the fact that the probability of a negative decision of the A-player was evaluated a little bit higher at the end of the experiment. However this effect is comparably low. Most of the explanation seems to be related to the fact that the experienced players of this group saw less chances of threats.)

Experience of the group of "Egalitarians" (15 players)

These players normally evaluate eA and eB between 18 and 20, where by the given numeric structure of the problem the integer solution is 20-2=18 for the B-players and 10x2=20 for the A-player. According to the different group sizes in the experiment, some players thought of a game with 9 B-players, and thereby calculated a value of 9x2=18 for the A-player. Accordingly, the preference of A over B (eA-eB) was between 0 and 2 in this group, and usually no player did bid more than 2 to enter position A instead of B. Except from those players who changed types, it happened in 4 cases (from 3 players) that players of this group bid more than 2 (they bid 5 or 6). The corresponding data suggest, that these players thought of a net equal split, and gave bids to enter position A, in order to avoid that somebody else became A-player, and made a bad decision. - It is surprising that the players of this group usually did not evaluate the sum of outcomes essentially below 200 (except from 3 cases in round 1, and 2 in round 2). Experienced "Egalitarians" possibly have a high confidence in a positive result of the decision of the A-player. (But this result could also be an artefact, since their evaluations of positions A and B (eA and eB) are first made by the rational calculations (eB=20-2=18, eA=10x2=20), then it needs a next step of thinking, to reduce the result of the calculation according to the probability that the A-player might reject. This second step might be forgotten when the questionnaire is spontaneously answered. "Others" might evaluate position A more by intuition, and thereby immediately include the probability of a rejection.)

Experience of the group of "Others with eA-eB<10" (7 players)

Two of these players (the two last) seem not to have seen any advantage in position A, and therefore tried to avoid to enter (or bid for) this position. Their data indicate that their ideas about the game were strongly influenced by the idea that it should be sufficient to offer some epsilon-amount to the A-player to cause him to accept ("Epsilonists"). (Accordingly their offers of sidepayments to the A-player were 0;0 for one of them, and 0;1 for the other.)

TABLE 7: Experience (Development of some personal characteristics) ***)

| round | est. value position A 1 | 2 | 4 | *) | preference eA-eB 1 | 2 | 4 | *) | sum of est. eA+10eB 1 | 2 | 4 | *) | bid to became A instead of B 1 | 2 | 4 | *) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "Others", eA-eB>=10: | | | | | | | | | | | | | | | |
| | 100 | 20 | 20 | - | 90 | 2 | 2 | - | 200 | 200 | 200 | o | 60 | 0 | (20) | - |
| | 100 | | 8 | - | 90 | | -8 | - | | | 168 | | 0 | 0 | 0 | o |
| | 99 | | 20 | - | 86 | | 2 | - | 209 | | 200 | - | 2 | 3 | 0 | - |
| | 70 | | 10 | - | 60 | | -5 | - | 170 | | 160 | - | 25 | 25 | 15 | - |
| | 60 | 40 | 40 | - | 45 | 25 | 25 | - | 210 | 190 | 190 | - | 41 | 37.5 | 11 | - |
| | 50 | | 30 | - | 40 | | 20 | - | 150 | | 130 | - | 31 | 16 | 16 | - |
| | 50 | | 15 | | 35 | | -3.5 | - | 190 | | 200 | + | 28 | 21 | 10 | - |
| | 45 | 30 | 15 | - | | | 3 | | | | 135 | | 30 | 17 | 12 | - |
| | 40 | 22 | 18 | - | 25 | 7 | 0 | - | 190 | 172 | 198 | -/+ | 0 | 0 | 0 | o |
| | 40 | | 35 | - | 25 | | 20 | - | 190 | | 185 | - | 30+ | 20+ | 20 | - |
| | 30 | 15 | | - | 18 | 5 | | - | 150 | 115 | | - | 15 | 1 | | - |
| | 25 | | 4 | - | 10 | | 1.5 | - | 175 | | 29 | - | (27) | 11 | 2 | - |
| mean | 59.1 | 25.4 | 17.5 | | 47.6 | | 5.2 | | 183.4 | | 179.5 | | 23.8 | 10.9 | 8.6 | |
| median | 47.5 | 22 | 20 | | 45 | | 2 | | 190 | | 185 | | 28 | 13.5 | 6 | |
| | "Egalitarians" (.9<eA/eB<1.1): | | | | | | | | | | | | | | | |
| | 20 | | 20-s | - | 2 | | 0 | o | 200 | | 220-s | - | 2 | 6 | 6 | + |
| | 20 | 18 | 18 | - | 2 | 0 | 0 | o | 200 | 198 | 198 | o | .25 | .25 | 0 | o |
| | 20 | | 30 | + | 2 | | 13 | + | 200 | | 200 | o | 2 | 2 | 13 | + |
| | 20 | | 25 | + | 1 | | 8 | + | 210 | | 195 | - | 0 | 0 | 3 | + |
| | 20 | (10) | 30 | + | 0 | 10 | 13 | + | 220 | (10) | 200 | - | 2 | 5 | 10 | + |
| | 18 | | 20 | o | 0 | | 0 | o | 198 | | 220 | + | 0 | 5 | 1 | +/- |
| | 18 | | 18 | o | 0 | | 0 | o | 198 | | 198 | o | 0+ | 0+ | 0 | o |
| | 18 | 15.5 | 20- | o | 0 | 0 | 0 | o | 198 | 170.5 | 220- | + | 0 | 6+ | -20+ | +/o |
| | 18 | | 18 | o | 0 | | 0 | o | 198 | | 198 | o | 0 | 0 | 0 | o |
| | 18 | | 18 | o | | | 0 | o | | | 198 | | 0 | 0 | 0 | o |
| | 18 | 18 | | o | 0 | 0 | | o | 198 | | 198 | o | 0+ | 0+ | | o |
| | 18 | | 18 | o | | | 0 | o | | | 198 | | 0 | 0 | 0 | o |
| | 14.5 | 12.1 | 22.5 | - | 0 | 0 | 5 | + | 159.5 | 133.1 | 197.5 | - | 0+ | 0+ | 5 | + |
| | 7 | | 17 | + | 0 | | 0 | o | 77 | | 187 | + | 0 | 0 | 0 | o |
| | 2 | 18 | | + | 0 | 0 | | o | 22 | | 198 | + | 0 | 5 | | + |
| mean | 16.6 | | 19.4 | | 0.5 | | 3.0 | | 175.3 | | 201.7 | | 0.4 | 2.0 | 2.9 | |
| median | 18 | | 20 | | 0 | 0 | 0 | | 198 | | 198 | | 0 | 0+ | 0 | |
| | "Others", eA-eB<10: | | | | | | | | | | | | | | | |
| | (5) | | 18+ | | 5 | | 0+ | - | (5) | | 198 | + | 5 | 10 | (20) | + |
| | 0/10 | | 20 | + | | | 2 | | | | 200 | | 5 | 7 | 2 | - |
| | 12 | | 21 | + | 4 | | 5 | o | 92 | | 181 | + | 1 | 1 | 0 | o |
| | 18 | 15 | 3 | - | 3 | -3 | -6 | - | 168 | 195 | 93 | +/- | 4 | 1 | 1 | - |
| | 2 | | 10 | + | 1 | | 0 | - | 12 | | 110 | + | 0 | 20 | 0 | +/o |
| | (-20) | -20) | 0+ | + | | | -20+ | | | | 200 | | 0 | 0 | -20+ | (o) |
| | 0+ | | 0+ | o | | | -20+ | | | | 200 | | -inf | -inf | -inf | o |
| mean**) | 6.2 | | 10.3 | | 3.3 | | -5.6 | | 90.7 | | 168.9 | | 2.1 | 5.6 | 0.5 | |
| median | 5 | | 10 | | 3.5 | | 0 | | 92 | | 198 | | 1 | 1 | 0 | |
| | all cases of this table: | | | | | | | | | | | | | | | |
| mean**) | 29.5 | | 17.4 | | 19.4 | | 2.2 | | 168.6 | | 187.6 | | 8.6 | 5.6 | 4.2 | |
| median | 19 | | 18 | | 2.5 | | 0 | | 198 | | 198 | | 1 | 2 | 1 | |

*) the column below the "*)" refers to the development in time: +,-, or o
**) negative estimates eA, and negative bids bA are set to zero
***) The table is restricted to participants with at least 2 eA-values
(.) Terms in brackets are ecluded from the analysis (see footnote next page).

The data indicate that these players kept this opinion throughout the game. - AS far as we can obseve, all of the 5 remaining players of this group did change their opinion in one way or another: 3 of them increased their evaluation eA of position A (from 5;12;2 to 20;21;10), one reduced it (from 18 to 3) (one missing value). 3 did finally become "Egalitarians". One of the 5 switched to evaluate eA below eB, but (somehow inconsistently) still gave positive bids to enter position A. This gives the overall impression that - except from the "Epsilontists" - the players of this group are really not sure in there evaluation of the situation. - It seems worth the remark that the lower evaluation of eA by the "Others with eA-eB<10" is not a result of a higher expected probability of rejections. (In fact there is no significant difference of eA+10eB between this group and "Others with eA-eB>10, where (eA+10eB)/200 may be used to measure of the expected probability of rejections.)

The main results about experience are

1. "Egalitarians" and "Epsilonists" seem quite firm in their opinion about the evaluation of position A, "Others" seem to be quite unsure:

   - "Epsilonists" keep being "Epsilonists" (no change, but only 2 cases).
   - "Egalitarians" are quite firm in their evaluation of position A (4 changes = 27%, all to "Others with eA-eB<10").
   - "Others with eA-eB>=10" are quite unsure in their evaluation (3 switched to "Egalitarians", 3 afterwards evaluated eB>eA, 2 switched to "Others with eA-eB<10"; 8 changes = 73 %; the difference to "Egalitarians" is significant alpha= 2.6%).
   - "Others with eA-eB<10" (excluding "Epsilonists") are quite unsure in their opinion (3 switch to "Egalitarians", 1 switches to evaluate eA<eB; 4 changes = 80%, alpha= 5.8% for the difference to the "Egalitarians", the difference of "ALL Others except Epsilonists" to Egalitarians is significant with alpha= .90%).

2. The evaluation of position A goes down, but "Egalitarians" keep their evaluation, or even increase it:

   - The estimate eA of the value of position A goes down (mean from 29.5 to 17.4), but this effect is not significant for the group of all participants.
   - Less of the players, who are not "Egalitarians" throughout the game, evaluate position A higher than 25 (from 11 of 22 to 4 of 22, alpha= 2.7%).
   - Only 4 of the 14 "Egalitarians" (with corresponding data) change their estimation of the value of position A. Different from opinion changes in the other groups, these 4 increase eA/eB (alpha= .1% for the difference to other groups).

3. The evaluation of the "advantage" eA-eB of position A over B goes down, but remains constant (or even increases) for "Egalitarians":

   - Within the group of players who estimate position A essentially higher than B (eA-eB>=10) the estimation of the "advantage" eA-eB changes drama-

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(.) Explanation to excluded data of Table 7: We excluded those bid data, where the participants did eventually bid "to become A" instead of bidding "to become A instead of B" (i.e. cases with bid>=eA AND bid>>eA-eB). In the sum- and eA-data we excluded cases, where the net-value eA-eB was given instead of eA. These were two cases with eB=0 (and sum below 20), and two cases with eA=-20.

tically with experience (mean of eA-eB from 47.6 to 5.2, median from 45 to 2, alpha= .1%).
- Essentially less players see an "advantage" greater than 20 (from 8 to 1, alpha= .1%).
- 11 "Egalitarians" do not change their evaluation of the "advantage". Those 4 who do, increase eA-eB for 5 to 11 $.
- For details see Table 8.

4. But about the same proportion of players still evaluates position A higher than B:

   - The proportion of players who bid more than 2 $ to enter position A instead of B remains constant (from 11 to 8+2) ("Egalitarians" bid up to 2 $ to enter position A).
   - The proportion of players, who evaluate position A for more tha 2 higher than B goes down only slightly (from (14 of 28) to (9 of 31) (alpha= 20%), 2 "enter" from, 2 "turn" to the contrary evaluation).
   - The size of the group of "Egalitarians" (who evaluate positions A and B as nearly equal) is about constant (from 15 to 17, 6 "enter", 4 "leave").
   - The group of players who estimate position B better than A remains small, but seems to increase (from 2 to 6).

5. Players remain optimistic with respect to a positive decision of the A-player:

   - In spite of the high proportions of negative decisions of the A-player, the sum of estimates of payoffs (eA+10eB) is at the end about as high as in the beginning (mean from 173.4 to 178.7). This implicitly estimates a proportion of between 11 and 14 % failures. The median remains constant (at 198), and nearly reaches the maximum of realistic prognosis (i.e.200).

TABLE 8: Changes in evaluation of "advantage" eA-eB of position A over B

| | | | eA-eB, estimates after experience | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | eA-eB | < 0 | 0-2 | 3-5 | 6-9 | 10-20 | >20 | all |
| esti-mates before first game | "Others", (eA-eB>=10) | >20 | 3 | 3 | | | 2 | 1 | 9 |
| | | 10-20 | | 1 | 1 | | | | 1 |
| | "Others" (eA-eB<10) *) | 6-9 | | | | | | | 0 |
| | | 3-5 | 1 | 1 | 1 | | | | 3 |
| | "Egalitarians"*) | 0-2 | | 11 | 1 | 1 | 2 | | 11 |
| | "Epsilonists" | < 0 | 2 | | | | | | 2 |
| | | all | 6 | 16 | 3 | 0 | 2 | 1 | 29 |

*) One of the "Others with eA-eB<10 had eA-eB=1, but was no "Egalitarian"

## 3.9 SIDEPAYMENTS

It seems that the A-players tend to agree, when they receive 3 $ from every B-player (cf. group 1, round 2). Giving unanimously the same offers will probably announce to the A-player that the solution is generally assumed to be fair.

Higher offers of single B-players may announce that they do not agree with the applied standard of fairness.

The strategy of forming a subgroup with the A-player with net equal shares:

As mentioned in section 2.4, a different strategy could be, to build up a close personal contact of one to three B-players with the A-player, and then arrange an equal share within this smaller group. The idea is, thereby to reduce the reference-group, to which the equal share norm is applied. - This approach has not been explicitly applied, but sometimes part of the players tried to compensate missing contributions of others. In these situations criterion B of section 3.1 ("A rejects if his net payoff is the least of all players") seems to be relevant. From this criterion follows that the A-player does not reject as long as the net payoffs of the B-player(s) with the highest sidepayment(s) are not greater than his net payoff (i.e. as long there is at least a net equal share between the A-player and his "partners").

When the A-player did not reject by criterion B, then criterion C ("special standard of fairness which commits the A-player") can still be applied. This is also related to the behavior of the B-players. If they blaim the A-player (what sometimes has been done), this might create a social situation in which the A-player feels (or is) commited to reject, or this might help to shortcut or balance rational arguments. Indeed - according to the reports - the negative decisions of the A-player by criterion C in round 2 has been highly influenced by the fact that one player refused to offer any sidepayment, and the way how he did so. In the other decision involving criterion C, the A-player said after his decision that he would have accepted, if a specific other player had offered a sidepayment of 5 instead of 3. (He did not mention the 4 other players who also had offered only 3, and he also did not mention that player, who had even offered only 1.5).

However, it should be mentioned that the high payoffs of selected B-players were not part of a rational joint strategy of the B-players, but sometimes even desparate efforts of singular B-players (or groups of B-players) who tried to save their payoff. The fact that one player even raised his bid from 12 to 20 in the final minute indicates that for some players the aim may have even been to save the social situation, rather than their payoff.

There are some more remarks to this strategy: 1. The selected design of this experiment (where the A-player has to bid for his position in advance) does not support a solution like this, since the paid sunk costs connected with the condition of positive net outcome essentially restricts possible arrangements of this type. 2. Our data indicate that the fact, that other B-players receive as low net-payoffs as the A-player, does not seem to convince the A-player to accept: There were 4 cases, where this argument might apply, but 3 of them ended with a rejection. ‹These cases were: group 1.2 (with A:30, 3 times B:15, rejected), group 1.3 (with A:12, one B:zero, one B:9, one B:12, rejected), group 2.1 (with A:14, one B:10, one B:15, accepted), group 2.4 (with A:21, 5 times B:15, rejected) (all net payoffs).› In all cases the strategies were not implemented in an optimal way. In group 1.3 the A-player argued (later, to the experimentor) that the final additional offer of the B-player (who increased his offer from 12 to 20, and thereby reduced his net profit to 0) was "samewhat too late"; but it may also be suggested that this specific offer could not increase the social pressure on the A-player, because this B-player had a net payoff of zero anyway.

In this context the question is interesting, whether it is advantageous to form a union of the B-players, or not. This question has been asked in the final questionnaire. We received 32 answers, of which 11 saw an advantage for the union (although 4 of them not in every case), 6 evaluated it as disadvantageous to form the union, 15 had the opinion that it should not make a significant difference (11 "+" or "(+)", 15 "=", 6 "-"). Some players remarked that such a union can also be disadvantageous, probably meaning that it might not be successful when it blocs against the A-player and offers too low amounts. One player mentioned that the union can be advantageous for the A-player too, probably addressing that thereby free riding is excluded.

Table 9 shows the sidepayments of rounds 1 and 2 by types.

The general impression is that sidepayments are below 10 (with one exception at 20, and one at 11 which can be behaviorally perceived as "equal to" 10, or as 10 plus small discount according to circumstances). The border of 10 does behaviorally make sense as half of the amount a B-player receives. The next tough step of prominence below 10 is 5, this gives the next border, which for most players seemed difficult to pass (only 6 of the 86 offers of sidepayments are greater than 5). 5 was the highest amount, that a group of players agreed upon to offer (5 players in round 2, group 4). The next relevant border was 3. 36 players (of the 49 who made at least one offer) did never make an offer greater than 3, while 13 did so (2 of them twice, 3 were A-players the other time).

3 of the 6 players, who were in both positions, A and B, made offers that were higher than 5, namely 10,10,11. (two of the other three players changed their types after the first round (where they were A-players), and evaluated position A in the following two rounds very low. The other made a low side-payment be-

TABLE 9: Sidepayments of players (by types)

| | "Egalitarians" .9<eA/eB<1.1 | | | "Others" eA-eB>=10 | | | "Others" eA-eB<10 | | | "Others" "Epsilonists" | | | all | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| round | 1 | 2 | 1+2 | 1 | 2 | 1+2 | 1 | 2 | 1+2 | 1 | 2 | 1+2 | 1 | 2 | 1+2 |
| 20 | 1 | | 1 | | | | | | | | | | 1 | | 1 |
| 11 | | | | | 1 | 1 | | | | | | | | 1 | 1 |
| 10 | | | | 1 | | 1 | 1 | | 1 | | | | 2 | | 2 |
| 8 | | | | | | | 1 | | 1 | | | | 1 | | 1 |
| 6 | | 1 | 1 | | | | | | | | | | | 1 | 1 |
| 5 | 2 | 3 | 5 | | 2 | 2 | | | | | | | 2 | 5 | 7 |
| 4 | .5 | 1 | 1.5 | | | | | | | | | | .5 | 1 | 1.5 |
| 3 | 4 | 6.8 | 10.8 | 2 | 3.5 | 5.5 | | 2 | 2 | | | | 6 | 12.3 | 18.3 |
| 2 | 9.5 | 6.2 | 14.7 | 5 | 2.5 | 7.5 | 2.5 | 2 | 4.5 | 1 | 1 | 2 | 18 | 11.7 | 28.7 |
| 1 | 3 | | 3 | 2 | 3 | 5 | 2.5 | 1 | 3.5 | 1 | 2 | 3 | 8.5 | 6 | 14.5 |
| 0 | | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 3 | 4 | 5 | 9 |
| mean | 3.4 | 3.0 | 3.2 | 2.5 | 3.0 | 2.8 | 3.2 | 1.6 | 2.4 | .8 | 1 | .9 | 2.8 | 2.6 | 2.7 |
| medi | 2 | 3 | 2.9 | 2 | 2.5 | 2 | 1.8 | 2 | 2 | .5 | 1 | 1 | 2 | 2.5 | 2 |

TABLE 9: MAXIMAL SIDEPAYMENTS OF PLAYERS (BY TYPES) *)

| max. offered side-payment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 11 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| "Egalitarians" | | | | | | | | | | | |
| never in position A | | 1 | 5.3 | 6.7 | 1 | 4 | 1 | | | | 1 |
| "Others", eA-eB>=10: | | | | | | | | | | | |
| once in position A 2) | 1' | | 1.5' | .5' | | | | | 1' | 1' | |
| never in position A | | 2 | 3 | 3 | | 2 | | | | | |
| "Others", eA-eB<10: | | | | | | | | | | | |
| once in position A | | | | | | | | | 1' | | |
| never in position A | | 1.5 | 2.5 | 2 | | | | 1 | | | |
| "Others", "Epsilonists" | | | | | | | | | | | |
| never in position A | 1 | 2 | 1 | | | | | | | | |
| all | 2 | 6.5 | 13.3 | 12.2 | 1 | 6 | 1 | 1 | 2 | 1 | 1 |

*) noninteger frequencies refer to noninteger offered sidepayments (example: 2.5= .5x2 + .5x3) - the table contains two entries of every player who was never in position A

2) two players of this group switched to low eA-eB, they offered 0 and 2.5 in the next game

fore being A-player.) This means that (except from the offer 20) all offers above 8 came from former or later A-players. In fact, it makes sense that those players who are willing to make the highest side-payments, also give the highest bids to enter position A.

There seems to be a correlation between "high sidepayments", "once in position A", "high bids to enter position A", and "high difference of estimates eA-eB". Indeed, 7 of the 8 players who entered position A recruited from the group of "Others with eA-eB>0". Surprisingly, not all players of this group gave high bids to enter position A, but (as we mentioned above) 2 of these 4 later became "Egalitarians", one even evaluated "eA<eB" later, of the fourth we do not know, since there are no later data concerning his type. So it seems that only players with not that firm an opinion violate the correlation of "high eA-eB" and "high bids". (The only player who was once in position A, and did not make high side-payments, had a low difference eA-eB.)

Generally the data give the impression, that among the group of "Others" those give higher sidepayments, who estimate eA-eB higher, and who bid higher. Those who bid more than 2 are 10 of 24 = 42 % (if eA-eB>=10), 5 of 15 = 33 % (if eA-eB<10), and 0 of 8 = 0 % (for "Epsilonists", the difference of the first to the last group is significant with alpha= 3.5%). Accordingly the proportion of free riders (side-payment of zero) increases: 2 of 24 = 8 % (if eA-eB>=10), 3 of 15 = 20 % (if eA-eB<10), and 3 of 8 = 38 % (for "Epsilonists", alpha= 8.5%, first to last group). This indicates that free riding is, so to say, the "natural extreme of low bids", and there seems to be no special quality assigned to free riding.

The group of players who tend to give the highest sidepayments are the "Egalitarians". Their proportion of bids greater 2 is 21 of 38 = 55% (alpha= .03% comparison with the "Others"), among them there are practically no free riders 1 of 38 = 3% (alpha= 5.2% comparison with the "Others"). This is not surprising, since their characteristic is the social attitude of equal sharing. It seems

TABLE 10: Maximal sidepayments of players (by types)

| max. offered side-payment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 11 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| "Egalitarians" never in position A | | 1 | 5.3 | 6.7 | 1 | 4 | 1 | | | | 1 |
| "Others", eA-eB>=10: once in position A 2) | 1' | | 1.5' | .5' | | | | | 1' | 1' | |
| never in position A | | 2 | 3 | 3 | | 2 | | | | | |
| "Others", eA-eB<10: once in position A | | | | | | | | | 1' | | |
| never in position A | | 1.5 | 2.5 | 2 | | | | 1 | | | |
| "Others", "Epsilonists" never in position A | 1 | 2 | 1 | | | | | | | | |
| all | 2 | 6.5 | 13.3 | 12.2 | 1 | 6 | 1 | 1 | 2 | 1 | 1 |

*) noninteger frequencies refer to noninteger offered sidepayments (example: 2.5= .5x2 + .5x3) - the table contains two entries of every player who was never in position A

2) two players of this group switched to low eA-eB, they offered 0 and 2.5 in the next game

reasonable that some of them can easily be convinced of net equal-sharing, so that the higher offers are explained. However, a reasonable part of them is not willing to take this net-argument, and in both rounds keeps the sidepayments not greater than 2 (5 of these 20 players = 25 %, alpha= 3.5% compared to the "Others"), or at least below 3 (7 of 20 = 35 %).

The group of players who tend to give the highest sidepayments are the "Egalitarians". Their proportion of bids greater 2 is 21 of 38 = 55% (alpha= .03% comparison with the "Others"), among them there are practically no free riders 1 of 38 = 3% (alpha= 5.2% comparison with the "Others"). This is not surprising, since their characteristic is the social attitude of equal sharing. It seems reasonable that some of them can easily be convinced of net equal-sharing, so that the higher offers are explained. However, a reasonable part of them is not willing to take this net-argument, and in both rounds keeps the sidepayments not greater than 2 (5 of these 20 players = 25 %, alpha= 3.5% compared to the "Others"), or at least below 3 (7 of 20 = 35 %).

## 3.10 ETHIC PRINCIPLES

Although moral is not directly addressed by the experiment, it may be asked, whether there is a standard of behavior, which maximizes the social success of the group. (Such a standard is a candidate for a moral principle for this type of situations.)

Assuming risk aversion, and assuming that no B-player knows his position before he has to decide on the standard, it is easily concluded that every B-player has to get the same amount (symmetry). The question remains what the A-player should get.

The auction was presented in a way that every participant could bid or not, where the minimum bid was zero. So, to make the game start, it was necessary that someone made a bid (of at least 0). This is only reasonable, when the standard gives the A-player AT LEAST THE SAME outcome as to the B-player, i.e. at least an equal share. (Otherwise the game would not be played, and the society would not receive any money from the experimentor.)

On the other hand, when the standard of behavior gives the A-player more than an equal share, then the players bid the difference of value between the A- and B-player to enter position A. But thereby the total profit of the society is reduced, since the experimentor receives the price of the auction.

Following these arguments, the ethic standard should suggest to make an equal split of the sum of payoffs.

The next question is, whether this standard can be made stable against invadors, who apply another strategy, or if the group of those, who keep to the standard, can be exploited by others. What behavior should the society recommend against deviators ?

Let us first consider a deviating A-player. A deviation means that his bid is higher than zero. How can B-players react to that:

strategy 1 "let him take the loss": give the deviator that amount that the moral principle says (namely an equal share of the total involved sum)

strategy 2 "split the loss evenly": subtract his sunk costs and split the rest evenly

strategy 3 "give him a net payoff which is less than if he had kept to the moral principle, but try that he accepts"

TABLE 11: Strategies selected by the "Egalitarians"

| strategy | sidepayment | cases in round *) 1 | 2 | 1+2 |
|---|---|---|---|---|
| "free rider" | s=0 | - | 1 | 1 |
| "offer below moral principle of bidding" | 0<s<2 | 3 | - | 3 |
| 1 "let him take the loss" | s=2 | 8 | 5 | 13 |
| 2 "split the loss evenly" | 2<s<=3.5 | 5 | 7 | 11 |
| 3 "net payoff to A below 20, try he accepts" | here:4<=s | 3 | 6 | 8 |

TABLE 12: Strategies selected by the "Others"

| strategy | side-payment | cases of "Others" in round: eA>eB 1 | 2 | 1+2 | eA<eB 1 | 2 | 1+2 | Eps'nists 1 | 2 | 1+2 |
|---|---|---|---|---|---|---|---|---|---|---|
| "free rider" | s=0 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 3 |
| "offer 1" | 0<s<2 | 2 | 3 | 5 | 3 | 1 | 4 | 1 | 2 | 3 |
| 1 "let him take the loss" | s=2 | 5 | 2 | 7 | 2 | 2 | 4 | 1 | 1 | 2 |
| 2 "split the loss evenly" | 2<s<=3.5 | 2 | 4 | 6 | - | 2 | 2 | - | - | - |
| 3 "net payoff to A <20, try he accepts" | here:4<=s | 1 | 3 | 4 | 2 | - | 2 | - | - | - |

All of these strategies support a stabilization of the moral principle with respect to the A-player, i.e. with respect to the bidding in the auction. And all of these strategies have been applied in the experiment. Table 11 shows for the group of "Egalitarians" (whose evaluation principle corresponds to the ethic norm considered here) that just these 3 strategies have been slected mostly. For experienced players, all of these 3 strategies are about equally important. Learning seems to increase the proportion of strategies 2 and 3 (alpha= 9.9%).

It seems interesting that the strategies of the others, who revealed different ethic principles (by their bids), tend more into the direction of low sidepayments (alpha= .15%). This is not surprising for those "Others", who evaluate position A below position B (the difference is significant with alpha= .02%). But even among those "Others", who evaluate position A higher than position B, the proportion of participants who offer less than 2 is slightly higher (not significant, alpha= 6.4%). However, it should be noticed that for these players strategy 1 already gives a lower offer than the ethic norm (revealed by the bid) indicates.

Assuming that the bid "reveals" the ethic principle of the bidder, "Others" who evaluate position A higher than B, do in 58 % (= 14 of 24 cases) offer below their revealed ethic principle. "Egalitarians" do so in only 11 % (= 4 of 38 cases; the difference between the groups is significant with alpha= .36%). This suggests the conclusion, that during the negotiation phase the class of "Others" tries to imitate other players with ethic norms even below the equal share: It seems reasonable, that these try to imitate, when they see what sidepayments the other players of their group offer, and since they deviate from their revealed principle anyway, it also makes sense that some of them even go further down than to the attitudes of the "Egalitarians". On the other hand, the "Egalitarians" seem quite stable in their attitude, and are not that easily willing to "forget" their ethic principle in order to obtain personal profits.

It is essentially more difficult to find a reasonable strategy against B-players who deviate. Ideas of such strategies by the A-player are

strategy 1 "punish every deviator": reject as long as there is a player who offers less than 2 $

strategy 2 "ask the group of B-players for a joint payoff of 20 $": reject if the sum of sidepayments is below equal share

The behavioral relevance of these principles cannot be checked by the experimental results, since the A-player never had the standard considered here. But the fact, that the A-player accepted in game 2, round 2 at bids 10,5,3,3,2,2,1,1,1,1 indicates, that strategy 1 does not seem to be applied. But compensation of missing contributions seems possible.

We have no idea, how the B-players could punish a deviating B-player in a way which permits a reasonable rational strategic explanation.

Although it appears to be very difficult to find behaviorally reasonable strategies which might have forced B-players, not to deviate, the proportion of free riders (who offered sidepayments of 0) was only 11 % (5 free riders in round 1, 6 in round 2, where 3 of the 6 in round 2 reacted on the A-player who left the room), and the proportion of those players who - in a negative way - deviated from the strategy of the ethic principle considered here (who offered sidepayments below 2) was 28 % (15 in round 1, 12 in round 2). This result seems to support the hypothesis that phenomena determined the behavior which cannot be explained by purely rational analysis neglecting social interaction.

In this context it is interesting to ask, whether the behavior of subjects can be consistently characterized by an ethic principle or behavioral rule. Here we consider bid and sidepayment. When both are implemented by the same ethic principle, then the sidepayment should (assuming symmetry) fulfill the condition: bid = difference of payoffs = (sidepayment x n) - (20 - sidepayment), i.e.

(*) sidepayment = (bid+20)/(n+1) (where n+1 is the number of all players)

Table 13 gives an overview, how many participants made a higher/lower/equal sidepayment compared to condition (*). The main results are:

- in the mean, the sidepayments are about as high as the revealed ethic principle prescribes
- "Egalitarians" offer sidepayments which are nearly never below those, corresponding to the revealed ethic principle (alpha= .7%, comparing the frequencies of the extreme cases "sidepayment >.." and "sidepayment <..")
- "Others who evaluate position A higher than B" in the mean tend to offer sidepayments around the value corresponding to their revealed ethic principle (alpha= .5% for the difference to "Egalitarians", again comparing the frequencies of the extreme cases).
- "Others who evaluate position A lower than B" tend to offer less than their ethic principle prescribes (alpha= .016% for the difference to "Egalitarians"; the difference to the first group of "Others" in round 2 is not significant: alpha= 18%, according to the low numbers.)

TABLE 13: Are the implicit ethic principles behind bid and sidepayment the same? 1)

| round 1 | Egalitarians .9<eA/eB<1.1 | Others eA>eB | Others eA>eB | Eps'nists eA<=eps. | total |
|---|---|---|---|---|---|
| sidepayment > (bid+20)/(n+1) | 8 | 2 | 2 | - | 12 |
| sidepayment = (bid+20)/(n+1) | 8 | 4 | 2 | 1 | 15 |
| sidep't<(bid+20)/(n+1),bid>0 | 1 | 5 | 4 | 1 | 11 |
| bid<=0 2) | (2) | (1) | - | (2) | (5) |
| **round 2** | | | | | |
| sidepayment > (bid+20)/(n+1) | 10 | 4 | 1 | - | 15 |
| sidepayment = (bid+20)/(n+1) | 8 | 5 | 2 | 1 | 16 |
| sidep't<(bid+20)/(n+1),bid>0 | 1 | 3 | 4 | 2 | 10 |
| bid<=0 2) | - <------- | (1) | - | (1) | (2) |

1) Same ethic principles <==> sidepayment = (bid+20)/(n+1) (rounded to integers)

2) This is the group of players who bid nothing and offer no sidepayments. The ethic principle behind no sidepayments conforms with bids of -20, which were not allowed. So the cases of this line might be adequately subsumed as "sidepayment = (bid+20)/(n+1)"

## 4. TABLES

TABLE 14: Detailed Tables of the games

ROUND 1 GROUP 1

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 2 | 2 | 2 | - | - | 2 | 2 | 2 | 2 | 2 | |
| bid to be A | 25 | 0 | 5 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 31 |
| est.value A | 70 | +-20 | 0to10 | 20 | - | - | 0 | 20+ | - | 18 | 99 | 50 |
| est.value B | 10 | - | - | 2 | - | - | - | - | - | - | 11 | 10 |

sum of sidepayments 16
paid by A-player 15 decision of A-player "reject"

ROUND 1 GROUP 2

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 1.5 | 3.5 | 3 | 5 | 3 | 3 | 5 | 3 | 5 | 3 | |
| bid to be A | 31 | 4 | 1 | 0 | 2 | .05 | 15 | 27 | .01 | 2 | 30 | 41 |
| est.value A | 50 | 15 | 20 | 18 | 20 | 18 | - | 25 | 18 | 20 | 40 | 60 |
| est.value B | 10 | 15 | 18 | 18 | 18 | 18 | - | 15 | 18 | 20 | 15 | 15 |

sum of sidepayments 35
paid by A-player 5 decision of A-player "reject"

ROUND 1 GROUP 3

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 11 | 8 | - | - | 1 | 12+8 | 2 | - | - | |
| bid to be A | 41 | 30 | 2 | 0 | 0 | 3 | ? | 40 | -inf. | 0 | 44 |
| est.value A | 60 | 45 | - | 20 | - | 3 | 18 | 10 | 2eps | 100 | - |
| est.value B | 15 | - | - | - | - | - | 18 | - | - | - | - |

sum of sidepayments 34+8
paid by A-player 30 decision of A-player "reject"

ROUND 1 GROUP 4

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 2.5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| bid to be A | 44 | 0 | 0 | 0 | 28 | .01 | .01 | 1 | 0 | 0 | 60 |
| est.value A | - | 18 | 2 | 18 | 50 | 17.77 | 50 | 12 | 7 | -.5 | 100 |
| est.value B | - | 18 | 2 | 18 | 15 | 17.77 | 20? | 8 | 7 | 20 | 10 |

sum of sidepayments 11.5
paid by A-player 40 decision of A-player "reject"

ROUND 1 GROUP 5

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 2 | 2 | 2 | 2 | 2 | 10 | 2 | 2 | 2 | |
| bid to be A | 60 | 10 | .01 | 5 | 0 | 0 | 0 | 15 | .01 | 0 | 25 |
| est.value A | 100 | 35 | 14.4 | 5 | 20 | 40 | 2 | 30 | 18.99 | 19 | 70 |
| est.value B | 0 | 15 | 7.82 | 0 | 19 | 15 | 1 | 12 | 20 | 18 | 10 |

sum of sidepayments 26
paid by A-player 28 decision of A-player "reject"

TABLE 14 (continued)

ROUND 2 GROUP 1

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 3 | 3 | 3 | 3 | 3 | 3 | 2.8 | 2 | 3 | 2.5 | |
| bid to be A | 20 | 0 | 1 | .05 | 20.07 | 6 | .01 | 0 | 0 | 10 | 2.5 | 21 |
| est.value A | - | - | - | - | - | - | - | +-20 | 20 | - | - | - |
| est.value B | - | - | - | - | - | - | - | - | 18 | - | - | - |

sum of sidepayments 28.3
paid by A-player 11 decision of A-player "accept"

ROUND 2 GROUP 2

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 1 | 3+2 | 2 | 10 | 1 | 2 | 3 | 1 | 1 | 3 | |
| bid to be A | 17 | 5.01 | 5 | 9 | 25 | 21 | 7 | 0 | 0 | 0 | .03 | 37.1 |
| est.value A | 30 | - | 10 | - | - | - | - | - | 20 | - | 18 | 40 |
| est.value B | - | - | 0 | - | - | - | - | - | 20 | - | 18 | 15 |

sum of sidepayments 29
paid by A-player 15 decision of A-player "accept"

ROUND 2 GROUP 3

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 3 | 0 | 2 | 0 | 2.5 | 3+3 | 1 | 4 | 3 | |
| bid to be A | 37.51 | 3 | 1 | 5 | -inf | nickel | 0 | 0 | 6.01 | 15 | 17 |
| est.value A | 40 | - | 15 | 18 | - | 18 | - | 22 | 15.5 | - | 30 |
| est.value B | 15 | - | 18 | 18 | - | 18 | - | 15 | 15.5 | - | - |

sum of sidepayments 21.5
paid by A-player 25 decision of A-player "reject"

ROUND 2 GROUP 4

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | 1 | 3 | 5 | 5 | 2 | 5 | 5 | 5 | - | |
| bid to be A | 16 | 0 | 5 | 1 | - | 2 | 5 | 11 | 5 | 0 | 20 |
| est.value A | - | - | - | - | - | - | - | - | - | - | - |
| est.value B | - | - | - | - | - | - | - | - | - | - | - |

sum of sidepayments 31
paid by A-player 10 decision of A-player "reject"

ROUND 2 GROUP 5

| | A | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | winner of auction |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sidepayment | | - | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | |
| bid to be A | 21 | .01 | 1 | 0 | 0 | 10 | .01 | 0 | 0 | 10 | 16 |
| est.value A | - | - | 15 | - | - | - | 12.0 | - | - | - | - |
| est.value B | - | - | 10 | - | - | - | 12.0 | - | - | - | - |

sum of sidepayments 12
paid by A-player 20.07 decision of A-player "reject"
remark: A-player asked for 15 $ from every B-player and left the room

TABLE 15: Sidepayments, bids, estimated values, and answers to questionnaire

| round 1 | | | | | | round 2 | | | | | round 3 | | | | questionnaire | | | | | more by union | eA if 40 $ to all B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| side pay | bid | eA -eB | eA | eB | eA+ 10eB | side pay | bid | eA -eB | eA | eB | bA -bB | bA | bB | bA+ 10bB | bid | eA -eB | eA | eB | eA+ 10eB | | |
| "eA"=expected.payoff.of.A "bid"=bid.to.get.posit.A.instead.of.B "bA"=bid.for.position.A | | | | | | | | | | | | | | | | | | | | "D"=double | |
| "others", eA-eB>=10: | | | | | | | | | | | | | | | | | | | | | |
| A | 60 | 90 | 100 | 10 | 200 | 0 | 0 | 2 | 20 | 18 | - | -- | -- | --- | (20) | 2 | 20 | 18 | 200 | + | "?" |
| 0 | 0 | - | 100 | -- | --- | 1 | 0 | - | -- | -- | - | -- | -- | --- | 0 | -8 | 8 | 16 | 168 | = | <>30 >D |
| 2 | 2 | 86 | 99 | 11 | 209 | 3 | 3 | - | -- | -- | -9 | 1 | 10 | 101 | 0 | 2 | 20 | 18 | 200 | + | same<D |
| A | 25 | 60 | 70 | 10 | 170 | xx | 25 | - | -- | -- | 0 | 25 | 25 | 275 | 15 | -5 | 10 | 15 | 160 | - | 30 >D |
| A | 41 | 45 | 60 | 15 | 210 | A | 37.5 | 25 | 40 | 15 | zz | zz | 11+ | zz | 11 | 25 | 40 | 15 | 190 | (+) | 1.5x<D |
| A | 44 | - | -- | -- | --- | 2 | 2.5 | - | -- | -- | -20 | 0 | 20 | 200 | 3 | 10 | 27 | 17 | 197 | = | 45+<D |
| 1 | 0+ | 40 | 50 | 10 | 150 | 2 | - | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| A | 31 | 40 | 50 | 10 | 150 | A | 16 | - | -- | -- | zz | zz | 11 | zz | 16 | 20 | 30 | 10 | 130 | = | 70 >D |
| xx | 30 | - | 45 | -- | --- | A | 17 | - | 30 | -- | 5.2 | 17.4 | 12.1 | 139 | 12 | 3 | 15 | 12 | 135 | ? | >D |
| 1 | 28 | 35 | 50 | 15 | 190 | 1 | 21 | - | -- | -- | 24 | 31 | 7 | 101 | 10 | -3.5 | 15 | 18.5 | 200 | - | >D |
| 2 | 0 | 25 | 40 | 15 | 190 | 1 | 0 | 7 | 22 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 18 | 198 | = | 40 >D |
| 3 | 30+ | 25 | 40 | 15 | 190 | 3 | 20+ | - | -- | -- | zz | zz | 17+ | zz | 20 | 20 | 35 | 15 | 185 | - | 70 D |
| 2 | 10 | 20 | 35 | 15 | 185 | 5 | - | - | -- | -- | 2 | 5 | 3 | 35 | - | - | -- | -- | --- | | |
| 2 | 15 | 18 | 30 | 12 | 150 | 2 | 1 | 5 | 15 | 10 | -5 | 0 | 5 | 50 | - | - | -- | -- | --- | | |
| 3 | 15 | - | -- | -- | --- | 3 | 15 | - | -- | -- | 15 | 25 | 10 | 125 | 15 | 13 | 30 | 17 | 200 | + | 80 >D |
| xx | 40 | 10 | -- | -- | --- | A | 21 | - | -- | -- | 0 | 11+ | 11+ | 121+ | - | - | -- | -- | --- | | |
| 5 | (27) | 10 | 25 | 15 | 175 | 5 | 11 | - | -- | -- | - | -- | -- | --- | 2 | 1.5 | 3-5 | 2-3 | 29 | (+) | 50 >D |
| "egalitarians" (.9<eA/eB<1.1): | | | | | | | | | | | | | | | | | | | | | |
| 5 | 2 | 2 | 20 | 18 | 200 | 3 | 6 | - | -- | -- | 10 | 31 | 21 | 241 | 2/10 | 0 | 20-s | 20-s | 220-s | +AB | |
| 4 | 1 | 2 | 20 | 18 | 200 | 5 | 1 | - | -- | -- | 0 | 1 | 1 | 11 | - | - | -- | -- | --- | | |
| 2 | .25 | 2 | 20 | 18 | 200 | 2 | .25 | 0 | 18 | 18 | .24 | .25 | 0+ | .35 | 0 | 0 | 18 | 18 | 198 | + | D |
| 2 | 2 | 2 | 20 | 18 | 200 | 2 | 2 | - | -- | -- | - | -- | -- | --- | 13 | 13 | 30 | 17 | 200 | | 70 >D |
| 2 | 0 | 1 | 20 | 19 | 210 | 3 | 0 | - | -- | -- | 8 | 30 | 22 | 250 | 3 | 8 | 25 | 17 | 195 | = | D |
| 5 | 2 | 0 | 20 | 20 | 220 | 5 | 5 | 10 | (10) | (0) | 10 | 15 | 5 | 65 | 10 | 13 | 30 | 17 | 200 | - | 40 <D |
| 2 | 0 | - | 20 | -- | --- | 3 | 5 | - | -- | -- | 0 | 0 | 0 | 0 | - | - | -- | -- | --- | | |
| xx | - | 0 | 18 | 18 | 198 | 5 | 5 | - | -- | -- | 4 | 10 | 6 | 70 | 1 | 0 | 20 | 20 | 220 | = | |
| 2 | 0+ | 0- | 19- | 19 | 209- | 3 | 0+ | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| 3 | 0+ | 0 | 18 | 18 | 198 | 3 | 0+ | 0 | 18 | 18 | - | -- | -- | --- | - | - | -- | -- | --- | | >D |
| 3 | 0+ | 0 | 18 | 18 | 198 | 3 | 0+ | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| 1 | 0+ | 0 | 18 | 18 | 198 | 0 | 0+ | - | -- | -- | 0 | 5 | 5 | 55 | 0 | 0 | 18 | 18 | 198 | = | 36 D |
| 2 | 0 | 0 | 18 | 18 | 198 | 4 | 6+ | 0 | 15.5 | 15.5 | - | -- | -- | --- | -20+ | 0 | 20- | 20- | 220- | = | 40-D |
| 1 | 0 | 0 | 18 | 18 | 198 | 5 | 5 | - | -- | -- | 0 | 10 | 10 | 110 | - | - | -- | -- | --- | | |
| 3 | 0 | 0 | 18 | 18 | 198 | 2 | 0 | - | -- | -- | 25 | 30 | 5 | 80 | 0 | 0 | 18 | 18 | 198 | = | 40 >D |
| 2 | 0+ | 0 | 14.5 | 14.5 | 159.5 | 2 | 0+ | 0 | 12.1 | 12.1 | -1 | 0 | 1 | 10 | 5 | 5 | 22.5 | 17.5 | 197.5 | +/- | |
| 2 | 0 | - | 18 | -- | --- | xx | 0 | - | -- | -- | -3 | 0 | 3 | 30 | 0 | 0 | 18 | 18 | 198 | = | |
| 1 | 0 | 0 | 7 | 7 | 77 | 2 | 0 | - | -- | -- | -5 | 0 | 5 | 50 | 0 | 0 | 17 | 17 | 187 | - | D |
| 2 | 0 | 0 | 2 | 2 | 22 | 2 | 5 | 0 | 18 | 18 | - | -- | -- | --- | - | - | -- | -- | --- | | |
| "others", eA-eB<10: | | | | | | | | | | | | | | | | | | | | | |
| 2 | 5 | 5 | (5) | (0) | (5) | 3 | 10 | - | -- | -- | - | -- | -- | --- | (20) | 0+ | 18+ | 18- | 198 | = | <>36 D |
| 2 | 5 | - | 0/10 | -- | --- | 2 | 7 | - | -- | -- | 5 | 21 | 6 | 81 | 2 | 2 | 20 | 18 | 200 | = | 40 D |
| 1 | 1 | 4 | 12 | 8 | 92 | 3 | 1 | - | -- | -- | - | -- | -- | --- | 0 | 5 | 21 | 16 | 181 | (+) | D |
| 1 | 4 | 3 | 18 | 15 | 168 | 0 | 1 | -3 | 15 | 18 | 10 | 20 | 10 | 120 | 1 | -6 | 3 | 9 | 93 | + | 18 >D |
| 1 | 3 | - | (3) | -- | --- | 2 | 10 | - | -- | -- | 2 | 12 | 10 | 112 | 10 | 0 | 18 | 18 | 198 | | 150 >D |
| 0 | 3 | - | -- | -- | --- | 1 | 5+ | - | -- | -- | 5 | 10 | 5 | 60 | 3 | ? | 0net | 10 | ? | = | 0net |
| xx | 2 | - | -- | -- | --- | 0 | 10 | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| xx | 0 | 1 | 2 | 1 | 12 | A | 20 | - | -- | -- | - | -- | -- | --- | 0 | 0 | 10 | 10 | 110 | = | |

(table continued next page, including legend)

TABLE 15 (continued)

| round 1 | | | | | | round 2 | | | | | round 3 | | | | questionnaire | | | | | more by union | eA if 40 $ to |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| side pay | bid | eA -eB | eA | eB | eA+ 10eB | side pay | bid | eA -eB | eA | eB | bA -bB | bA | bB | bA+ 10bB | bid | eA -eB | eA | eB | eA+ 10eB | all B | all B |
| "eA"=expected.payoff.of.A "bid"=bid.tc.get.posit.A.instead.of.B "bA"=bid.for.position.A | | | | | | | | | | | | | | | | | | | | "D"=double | |
| "others", eA-eB<10, continued "epsilontists": | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0 | - | -- | -- | --- | 2 | 0 | - | -- | -- | -10 | 0 | 10 | 100 | 0 | -8 | 5 | 13 | 135 | - | =<D |
| 1 | 0 | -20.5 | -.5 | 20 | 199.5 | 1 | 0 | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| 0 | 0 | - | (-20) | -- | --- | 1 | 0 | | (-20) | -- | -26 | 0 | 26 | 260 | -20+ | -20+ | 0+ | 20- | 200 | = | D |
| 0 | -inf | - | 0+ | -- | --- | 0 | -inf | - | -- | -- | -inf | -inf | 0 | -inf | -inf | -20+ | 0+ | 20- | 200 | (+) | D |
| group cannot be specified: | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0 | - | +-20 | -- | --- | 3 | 0 | - | +-20 | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |
| 0 | 0 | - | 0 | -- | --- | 0 | 0 | - | -- | -- | 8 | 10 | 2 | 30 | - | - | -- | -- | --- | | |
| 2 | 0 | - | 0 | -- | --- | 3 | 0 | - | -- | -- | -.5 | 0 | .5 | 5 | - | - | -- | -- | --- | | |
| 0 | 0 | - | -- | -- | --- | 0 | 0 | - | -- | -- | - | -- | -- | --- | - | - | -- | -- | --- | | |

side pay — conditional sidepayment as B-player
bid — bid to get position A instead of position B
eA, eB — estimated value of position A, B
bA, bB — bid to get position A, B
union all B — "is a B-players union advantageous?", where: "+" = advantageous, "-" = not advant., "=" = no difference
40 $ all B — "what is eA, when all B-players receive 40 $ insrtead of 20 $?" where: "D" = double,
20+, 20-,.. — abbreviation for "20+epsilon", "20-epsilon",.. where epsilon < .05
inf — infinity
(.) — terms in brackets are estimates given as eA-eB instead of eA, bids given as bA instead of "bid to become A instead of B", and corresponding sums
xx,zz — These data have been erased to avoid identification. The data which have been replaced by xx are 20,11,10,10,8,6,2
remark: — offers of sidepayments have been rounded in the presentation of the table to avoid identification, 1.5 to 1 (1 case), 2.5 to 2 (3 cases), 3.5 to 4 (1 case)

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