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**DOES IT TAKE THREE TO MAKE TWO
HAPPY? AN EXPERIMENTAL STUDY ON
BARGAINING WITH MEDIATION**

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Does it take three to make two happy? An experimental study on bargaining with mediation^a

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Abstract. Mediation is a conflict resolution method in which a third neutral party provides assistance to the conflict parties. The process of mediation as well as any solution to the conflict arising from it is implemented only by the consent of all conflict parties. It is the role of a mediator to stimulate communication that leads to mutual understanding of the feasible conflict outcomes, i.e. to complete information on solution consequences among the parties of the conflict. This information is used by the parties of the conflict to evaluate their own as well as the others' consequences of a proposed solution to the conflict. However, it is not clear whether the information itself, or the way it was obtained (by voluntary participation in a process in which it was collected) leads to a conflict resolution.

This paper concentrates on the bargaining behavior in a conflict, abstracting from the mediators' methods and techniques. We design an experiment where two-person conflicts are resolved in an unstructured bargaining and study whether the way of obtaining information on the relative payoffs influences the conflict resolution process. We also study the demand for such information by individuals with various types of social preferences. This allows us to address the role of self-selection in the mediation process.

JEL classification: D74, C92, K49

Key words: information in unstructured bargaining, conflict resolution, mediation, experiment.

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1 Introduction

Mediation is a conflict resolution method in which a third neutral party provides assistance to the conflict parties. It is also one of the most often discussed alternative dispute resolution techniques nowadays (see e.g. account of the booming industry in *The Economist* [12]). Unlike arbitration, mediation is not outcome-oriented, but rather process-oriented. "The role of the third party (is) to facilitate the disputants' negotiations, not to dictate the outcome. (Welsh [26], p.788)" As defined by mediation practitioners, mediation is out-of-court conflict resolution avoiding confrontation, and stressing consensus instead of power in the bargaining. Voluntary participation and trust in the procedure represent the basic building blocks of a successful mediation.

Layers argue that the process of mediation brings to life procedural justice, fulfilling the need of the negotiating parties to perceive the conflict outcomes as just and fair (see e.g. Welsh [26], p.791). The fairness dimension distinguishes mediation from the litigation process of uncovering facts. The agreements achieved in mediation should be robust to disappointment, regret or envy. As such, the agreements have to refer also to the conflict parties' perceptions of the distributive justice. Here, the information on the payoff consequences of the feasible conflict solutions available to the conflict parties plays a crucial role.

We hypothesize that parties in a conflict do not only look for information on the value of the negotiated outcome for themselves, but also for the other party (parties) involved in the conflict. This information is collected in the process of communication between the parties. In a conflict, however, trust among the parties is usually low and communicated pieces of information are perceived as unreliable. One of the important roles of a mediator is to re-establish trust. It is argued that: "Mediators can control the communication between the parties and can help them to understand one another's positions. (Carnevale and Pruitt [5], p.563)" Translating this statement into economic jargon, mediation results in a trustworthy information exchange among the conflict parties with respect to the payoffs associated with the feasible conflict outcomes for all parties.

In our paper, we focus on these two important points: the effect of the relative payoffs information available in the process of conflict resolution, and the demand for such information expressed by voluntary participation in the mediation process. For simplicity, we omit in this paper the issue of the mediators' practices and methods applied to achieve trust and voluntary truthful information revelation by the conflict parties. We assume that agreeing on mediation implies immediate, full and mutual access to the information on the true preferences of both conflict parties with respect to the material outcomes of all feasible conflict solutions.

Recent theories of motivation proposed in the behavioral economics stress players' propensity to compare their payoffs when they have the relevant information to do so (see Bolton and Ockenfels [4], Fehr and Schmidt [13], Cox and Friedman [8]). For example, the information on relative payoffs has been observed to affect both the type of agreements reached in the ultimatum games, as well as the disagreement rates. Roth and Malouf [19], and Roth and Murnighan [20] found that players bargaining over chips with complete or with private information about the value of chips are more readily accepting low number of chips in the latter case. Similarly, Croson [9], Mitzkewitz and Nagel [17], or Straub and

Murnighan [24] found that not informing responders on the payoffs of the proposer leads to more unequal but more frequent agreements in the ultimatum games. The ultimatum game studies, however, do not capture the fact that many conflicts can be characterized as a search for a "win-win", i.e. a social surplus maximizing solution. (By construction, all agreements in the ultimatum game are efficient.) The importance of such motivation has recently been recognized also in economics, e.g. Charness and Rabin [7], or Charness and Grosskopf [6] observe and argue that a significant fraction of subjects in economics experiments show interest in maximizing the social surplus, even if this is costly to them. It is then not clear which of the motivations, that of achieving equality or efficiency prevails when solving conflicts¹. This question is less interesting in situations where sidepayments can be made among the conflict parties so that both of these goals can be achieved simultaneously. However, many conflicts involve nonmonetary aspects (e.g. questions of pride, hurt feelings, or other nonmarketable "commodities") which essentially disarm sidepayments. In such cases, it becomes important to understand how conflict parties trade-off the objective of achieving an egalitarian outcome with that of achieving a socially efficient outcome. To address this question, we study in this paper only conflicts without the possibility of sidepayments, many of which have the property that egalitarian and socially optimal solutions do not coincide.

In a conflict, the lack of information on the solution consequences for others limits the ability to compare payoffs, and to identify the socially optimal and/or equitable solutions to a conflict. On the other hand, in the presence of such information, conflict parties may disagree what principle (e.g. equity first or efficiency first) to apply when agreeing on a conflict solution. Having such conflicting preferences over which rule to apply is usually triggered by a self-serving bias: an individual prefers to apply the rule that yields a higher material payoff to him/her, depending on the actual conflict situation faced with, see Babcock and Loewenstein [2] or Babcock et al. [3].

Therefore, we claim that providing information on the payoff consequences for others per default is not likely to lead uniformly to a conflict resolution. Conflicts may persist exactly because of the information provided. Similar argument is presented by Loewenstein and Moore [16]. However, when information on preferences over the solutions to a conflict is obtained in the mediation process, one important element is present - that of voluntary participation. In order to analyze the importance of voluntary participation, we will compare in this paper conflict resolution in the presence of information that allows for payoff comparisons under two scenarios: when the information is provided by default to the conflict parties, and when the information is provided only upon mutual consent by the conflict parties, as is the case in mediation.

By now, we sketched two elements of the experiment design: the study of conflicts in which efficiency and equity principle may select different solutions, and the comparison of conflicts in which the information on mutual payoff consequences is given by default, or by voluntary mutual consent of the conflict parties. As a third element, we add the ability to

¹It is usually suggested in the conflict resolution literature that when selecting among many feasible conflict solutions, individuals will look for focal solutions. The notion of focality was introduced by Schelling [22] as a guiding principle to solve coordination problems. It lies outside the game theoretic description of the conflict and relies on the individuals' shared culture or history of social interaction. Both equality and efficiency could be referred to as focal in conflicts.

communicate among the conflict parties. However, we restrict the communication to the anonymous exchange of structured messages with a content referring only to the sender's payoff consequence of the proposed conflict solution. In this way, we avoid complexity of face-to-face communication content, and concentrate only on the information transmission with respect to the payoff consequences of the solution the sender proposes.

The experiment design is as follows. The conflict resolution process is modelled as an unstructured bargaining. Two players have to agree on one outcome from a finite number of feasible outcomes within a pre-determined time period. The players are in a conflict in that the most preferred outcome of one of the players is not the most preferred outcome of the other player. Moreover, the unique feasible egalitarian outcome is not necessarily efficient: we study conflicts where efficiency and equality might not be attainable simultaneously. Sidepayments are not allowed.

In the experiment, the players are anonymous to each other and bargain by sending proposals over computer network which one of the feasible outcomes should become the agreement. No move structure is imposed, but always only the last standing proposal can be accepted by its receiver. When some proposal is accepted by its receiver, this proposal determines the material payoffs for both players. If the bargaining does not lead to an agreement within a predetermined time period, both players receive the same disagreement payoff of zero.

We implement three treatments of this unstructured bargaining which vary the amount of information a player has on the payoffs of the other player. In the Complete Information treatment (CI), both players have complete information about the monetary consequences of every solution candidate. In the Private Information treatment (PI), both players have only partial information about the monetary consequences of every solution candidate. In particular, for every solution candidate, a player only knows the monetary payoff for him/herself. No verifiable information on the payoffs of the other player is available apart from the range from which it is drawn, i.e. both players are informed on the minimal and maximal possible payoff for both players. Additionally, there is an unverifiable information channel available to the players during bargaining. When making solution proposals, each player has to send either a message stating "No message" with the proposal, or a message "This proposal gives to me x points" where x is from the set of feasible valuations of the outcomes to the player. The message has no payoff consequences to its sender, hence it represents cheap talk.

In the main institutional treatment of the experiment, the Information Demand treatment (ID), the bargaining begins in the set-up of the PI treatment. Both players have only private information on the payoffs, and are allowed to send proposals with messages. Additionally to this, they also can propose information exchange. As soon as both players submit such a proposal, true information on payoff consequences of all solution candidates is made available to both players, i.e. the set-up becomes identical to that in the CI treatment. Hence, ID treatment captures two crucial aspects of mediation as described above: conflict parties obtain information on the preferences over the conflict outcomes of the other party, but only by mutual consent. In this experiment, we assume that this information is complete and corresponds to the true preferences over the material outcomes.

We analyze the data collected in the experiment in the following way. We compare bar-

gaining under complete and private information (CI and PI treatments) asking if providing information on the others' preferences over the conflict solution candidates facilitates or prevents agreements. Then, we address the question of the voluntary participation in the information sharing by comparing the bargaining in the ID treatment when individuals eventually agree on information sharing to the bargaining in the CI treatment. In both these cases, agreements are reached under complete information, but the way this information was obtained differs. Finally, we address the amount and truthfulness of information that is communicated by the subjects themselves in the PI and ID treatments.

With respect to the role of voluntary participation in the information exchange, we point out that two mechanisms could be at play here. On one hand, individuals who agree voluntarily to share information may be signalling their willingness to achieve some agreement. In this sense, they establish a cooperative environment and are more likely to find solutions. On the other hand, it may be the case that a specific type of individuals selects more often to participate in the voluntary information sharing, and this self-selection explains why voluntary participation works. In order to address this point, we, additionally to the bargaining behavior, collected also data on the subjects' preferences with respect to others in a dictator game. This allows us to identify in the subject pool three behavioral types: individuals who choose (1) most of the time the own-payoff maximizing outcome (own-payoff maximizing individuals), (2) most of the time the joint-payoff maximizing outcome (own-payoff maximizing individuals), (2) the joint-payoff maximizing outcome only if it does not imply that the other player earns a higher payoff than themselves, and otherwise the own-payoff maximizing outcome (status oriented individuals). We analyze if some of these behavioral types are more likely to propose information exchange in the ID treatment than others, i.e. whether there is some support for the self-selection hypothesis.

The remainder of this paper is organized as follows: Section 2 presents the experiment design, Section 3 contains behavior hypotheses. We analyze and discuss the data in Section 4. Section 5 concludes.

2 Experiment design

In the Fall semester of 2002, we ran eight experimental sessions at Tilburg University with 158 economics and business students as participants. The language of the experiments was English. The experiments were fully computerized, programmed and conducted with the software z-Tree (Fischbacher [14]). Upon arrival at a session, all subjects were randomly seated at computer cubicles separated by blinds. During the experiment, communication other than via computer was prohibited. In the experiment, all payoffs were in points, and experiment subjects were informed about the exchange rate to real money: 10 points were worth 5 Euro.

In each experimental session we implemented only one experimental treatment (CI, PI or ID treatment), see Table 1. Each subject participated in 10 bargaining rounds, each lasting 2 minutes. Subjects were informed that two out of these 10 rounds would be drawn at random at the end of the experiment (publicly, by one of the subjects) and paid out. The subjects were randomly re-matched into pairs by computer in every round, and informed about this matching rule. We conducted experiments with two different

Session	Number of subjects	Treatment	Bargaining sets (see Appendix 2)
CI-1	20	Complete Information	1 - 10
PI-1	22	Private Information	1 - 10
ID-1a	18	Information Demand	1 - 10
ID-1b	20	Information Demand	1 - 10
CI-2	22	Complete Information	11 - 20
PI-2	18	Private Information	11 - 20
ID-2a	16	Information Demand	11 - 20
ID-2b	20	Information Demand	11 - 20

Table 1: Experimental sessions.

Bargaining sets 1-10	1,3	5,6,8,10	4,9	2,7
Bargaining sets 11-20	13,15	11,14,16,17,18,20	19	12
Unique e¢cient outcome	yes	no	no	yes
Both players strictly prefer any e¢cient outcome to the egalitarian one	yes	no	yes	no

Table 2: Categorization of implemented bargaining sets.

sequences of the bargaining sets (sets 1-10 and sets 11-20), and for each bargaining set sequence, we ran one Complete Information (CI) session, one Private Information (PI) session and two Information Demand (ID) sessions. The implemented bargaining sets can be found in Figure 3 in Appendix 2. In the sequence given in this Figure, sets 1 to 10 were presented to subjects in rounds 1 to 10 in Sessions PI-1, CI-1, ID-1a and ID-1b, and sets 11 to 20 in rounds 1 to 10 to subjects in Sessions denoted PI-2, CI-2, ID-2a and ID-2b.

In Figure 3 presenting the implemented bargaining sets, we point out (i) the egalitarian outcome (in the grey field), (ii) the own-payoff maximizing outcome for each individual (in italics), and (iii) the socially efficient, joint-payoff maximizing outcome (in bold). For any bargaining set we implemented, it holds true that any efficient outcome in the set is strictly preferred to the egalitarian outcome either by both players, or only by one of the players. In the latter case, the other player is indifferent between this efficient outcome and the egalitarian outcome. Moreover, each bargaining set contained either a unique efficient outcome or multiple efficient outcomes. Based on this information, the 20 bargaining sets are categorized in Table 2. Observe that most of the bargaining sets contained multiple efficient outcomes (eliciting coordination problems between the players), and a setup where it is likely that the two players are motivated to apply differing norms (equality or efficiency) as focal, i.e. when only one player prefers some efficient outcome to the egalitarian outcome and not both players. However, in order to prevent learning of the conflict structure in the treatments with complete information, we mixed these types of conflicts with other possible conflicts as can be seen in the Table 2. We also remind here that the disagreement payoff was always the same payoff of 0 points for both players.

After participating in 10 bargaining rounds, all experiment subjects were exposed to a second task - dictator decision-making. This task was performed in each session, disregarding the preceding bargaining treatment. Again, each subject participated in 10

rounds. The same choice sets were given to the subjects in the bargaining and dictator rounds (either sets 1-10 or sets 11-20), but in the dictator task, no bargaining took place. Rather, each subject was informed on payoff consequences of each of the eight solution candidates for both players, and asked to choose one of them to determine the payoffs of both players. Again, the subjects were anonymously re-matched for each dictator round. At the end, one of the 10 rounds was chosen at random by the computer to be the paid round. The payments for the dictator task were given as follows. After the experiment, every subject drew randomly one of two cards - a card with the words "Decision-maker", or a card with the words "Not decision-maker". In the first case, the choice of the subject in the paid dictator round determined his/her own payoffs. In the second case, the choice of the subject's match in the paid session determined subject's payoffs. In this set-up, all subjects first made dictator choices in all 10 rounds before it was determined (i) which round is the paid round, (ii) what is the role of the subject in the paid round (i.e. dictator or passive recipient).

At the beginning of an experiment, the experiment instructions for the bargaining treatment (see Appendix 1) were distributed to the subjects and read aloud. Then, subjects participated in a few trial rounds, for which they were not paid. After finishing the bargaining treatment, instructions for the dictator task were distributed and read aloud. Finally, after completing the dictator task, subjects were anonymously paid out a participation fee of 5 Euro, plus money for points collected in the experiment (for two randomly selected bargaining rounds and for one randomly selected dictator round). On average subjects earned 14.3 Euro in an experiment lasting at most 1,5 hours.

3 Hypotheses

In this section, we present our hypotheses on the role of complete information on the payoff consequences of the feasible conflict solutions, on the role of way by which this information was obtained, and on communication in the bargaining.

First we observe that providing complete information on the payoff consequences of all feasible solutions to both parties by default may lead to delays in bargaining and disagreements due to the self-serving biases in applying the norms of efficiency or equality when searching for the solution of the conflict. Also, when players do not have the relevant payoff information about the other player's payoff, many emotional inhibitors of agreements are removed, e.g. feelings of envy, spite, or retribution to proposals that could be identified as intentionally harming the other player. This leads to our:

Information hypothesis: Disagreements are less frequent and inequalities resulting from agreements are higher in the Private Information treatment than in the Complete Information treatment.

Besides looking for the effect of providing information on the payoff consequences to the subjects, we also study how subjects deal with sharing such an information themselves. In particular, we study whether or not the conflict parties in their communication do exchange true information about the material payoffs associated with the feasible outcomes they propose as a solution to the conflict. In the Private Information treatment

as well as in the Information Demand treatment before information exchange is agreed upon, each player has to send with any proposal either "No message" or one of the value messages ("This proposal gives to me ...points"). These messages do not affect player's payments, and as such they are cheap talk. Still, if players believe that others condition their behavior on these messages, they may have an incentive to send the messages strategically, and/or not to report truthfully.

Moreover, while some message has to be send with every proposal, the option "No message" is allowed. Hence, a player can choose to be "silent" on the value of the proposal to him. This has one interesting implication. While the truth of the value-stating cheap talk messages in the one-shot interaction of our experiment is revealed only ex-post, and only for the proposal that becomes an agreement, the reluctance to communicate (or perhaps - the reluctance to lie) is revealed immediately by sending "No message". This message could be perceived as "hostile" but it also allows not to reveal the true value without the need of a lie. This can be important if a player is aware of the fact that true information might be revealed during the bargaining, as it is the case in the Information Demand treatment. From this perspective, strategically communicating players could send quite different messages in the Private Information treatment and the Information Demand treatment, where both players are aware of the option of revealing true information at some moment. Therefore we state:

Communication hypothesis: Compared to Private Information treatment, messages in the Information Demand treatment are (i) more often truthful, and/or (ii) more often resorting to a message that cannot be identified as a lie, but which is still not revealing the value, i.e. to "No message".

The crucial element of mediation, as argued by the mediators themselves, is the fact that the conflict parties voluntarily choose to join the process. Under our focus on the role of information collection in the mediation process, this amounts to expecting differences between the conflict resolution in the Complete Information treatment, and the Information Demand treatment when information exchange is voluntarily agreed upon. We summarize this in:

Voluntary participation hypothesis: When players voluntarily agree on information exchange with respect to the material payoffs associated with all feasible outcomes of the conflict in the ID treatment they solve conflicts more readily than when this information is provided by default in the CI treatment.

The demand for information exchange itself is likely to be determined by players' preferences and expectations. In the experiment, we collected additional information in this area by running dictator games. The data from these games allows us to we state the following auxiliary hypothesis:

Behavioral types hypothesis: The subject pool is heterogeneous. Besides individuals who purely maximize their own material payoff, it also contains individuals who are willing to decrease their own material payoff in order to increase the payoff of the other player. Such individuals choose a joint-payoff maximizing solution, and

this either only if it implies that they earn a higher payoff than the other player (and otherwise they choose for the own payoff maximizing outcome), or even if the opposite is true.

To be more specific, we will categorize the subjects by their choices in the dictator games into the following three behavioral types:

- ² Individually rational type (IR): chooses an own-payoff maximizing outcome at least in 90% of all dictator games;
- ² Joint-payoff maximizing type (EFF): chooses a joint-payoff maximizing, socially efficient outcome at least in 90% of all dictator games;
- ² Status oriented type (STAT): at least in 90% of all dictator games chooses a joint-payoff maximizing outcome if there is such an outcome that gives to him/her a payoff higher than to the other player, otherwise chooses an own-payoff maximizing outcome.

Note that we allow for a small margin of error or experimentation by subjects in defining the behavioral types by choices in at least 9 out of the 10 observed choices in the experiment. Still, some subjects in the experiment will be left out uncategorized by this criteria. We focus on the above three behavioral types as they relate closely to the way information on the payoffs of the other party is used by a bargaining individual. In particular, EFF type individuals are likely to demand information on the payoffs of the other party in order to search for the joint-payoff maximizing outcome, and we expect that the EFF type and SELF type will not be willing to jeopardize agreements in bargaining by refusing to obtain a payoff lower than the other player, while the opposite is true for the STAT type. Analyzing the data we investigate if these three types differ in demanding information exchange in the ID treatment, leading to a self-selection into the process of information exchange which can be related to the type of social preferences held by an individual.

Self-selection hypothesis: Individuals who propose information exchange in ID treatment hold different type of social preferences than those who prefer not to exchange information.

If we can find support for the self-selection hypothesis it would extend our understanding of the processes underlying the voluntary participation hypothesis. It would mean that the whole process of voluntary participation works in mediation as a screening mechanism. If only voluntary participation hypothesis is supported, we still conclude that individuals use the choice to participate in the process as a signal of their willingness to reach an agreement. Hence that any court-ordered or otherwise obligatory mediation is likely to have a different success rate than the pure "voluntary" mediation, at least with respect to the role of information exchange we study in this paper.

Agreement	Treatment	
	CI	PI
Own-payoff maximizing	14/210 (7%)	25/200 (13%)
Efficient, joint-payoff maximizing	136/210 (64%)	137/200 (69%)
Egalitarian	28/210 (13%)	11/200 (6%)
Other	12/210 (6%)	6/200 (3%)
Disagreement	20/210 (10%)	21/200 (11%)
Number of bargaining pairs	210	200

Table 3: Agreements in the Complete and Private Information treatments.

4 Data analysis and discussion

All bargaining outcomes agreed upon in the experiment alongside with the dictator choices made by the same subjects can be found in the Appendix 3.

We first investigate what is the effect of providing complete information to both players on the payoff consequences of all feasible conflict solutions. To do this, we compare the bargaining agreements in the Complete Information and Private Information treatment. In Table 3, we present the frequency of all bargaining agreements in these two treatments by categories (own-payoff maximizing, joint-payoff maximizing, egalitarian, or other agreement), as well as the frequency of disagreements. Observe that in most of the implemented bargaining sets, the own-payoff maximizing individually rational outcome is inefficient: in those games where efficiency and individual rationality coincide for some agreements, we categorize them as individually rational. Also, own-payoff maximizing agreement is meant in the sense that one of the players obtains his/her maximal payoff, not both of the players: in any conflict we study, own-payoff-maximizing outcome for one player implies a low payoff for the other player.

We find that the disagreement rates are low in both Complete Information and Private Information treatment. Only 20/210 (10%) of bargaining rounds in the Complete Information, and 21/200 (11%) of bargaining rounds in the Private Information treatment end up in disagreement. In the Table 4, we extend this information by the type of proposals that were left standing out in conflicts that ended up in disagreement. In this way we can see that even though the disagreement rate is similar across the two treatments, the proposals that were "rejected" when the players did not reach an agreement are different. Under Complete Information, the standing out proposals are mostly efficient and the conflict is about which efficient outcome is to be agreed upon. In the Private Information treatment, players who fail to agree on one outcome are most often in a situation where at least one player insists on obtaining his/her maximal feasible payoff - implying a very low payoff for the other player (even though this is not known to the proposing player). It seems that in these cases players would be better off if they'd be informed on the payoffs to the other player in order to recognize that their proposal is hardly acceptable to the other player.

Speaking about agreements, most of them (around two thirds) are efficient in both the Complete Information and Private Information treatment. We want to stress particularly the fact that in the Complete Information treatment, only few agreements are (inefficient)

Standing proposals at disagreement	Treatment	
	CI	PI
Own-payoffs maximizing	7/40 (18%)	19/42 (45%)
Efficient, joint-payoffs maximizing	21/40 (53%)	10/42 (24%)
Both	1/40 (3%)	1/42 (2%)
Other	11/40 (28%)	12/42 (29%)
Number of disagreeing players	40	42

Table 4: Standing proposals when a bargaining round ends in disagreement.

egalitarian agreements. The egalitarian outcomes are generally not taken as focal in conflicts that we study: namely in conflicts where players can earn some surplus over the egalitarian outcome, even though unequal payoffs result from such agreements.

Observation 1: Both in the Complete Information treatment and in the Private Information treatment, the most frequent bargaining outcomes are efficient and disagreement rates are low.

It seems that providing complete information to the players did neither help nor harm them in their ability to reach an agreement. However, we found evidence that providing complete information leads to a different dynamics compared to the private information scenario. Many agreements, see Table 5, take place in the last seconds of a bargaining round (this is similar to previous unstructured bargaining experiments, see Roth et al. [21]) Thereby, reaching an agreement in the last seconds is more likely under Complete Information (60% of all player pairs agree in the last 30 seconds of the bargaining), than under Private Information (39% of all player pairs agree in the last 30 seconds of the bargaining), see Table 5. Last second stand-offs take places more often when the players are aware of the payoffs that are at stake.

In order to test for these differences, we calculate for each bargaining game (i.e. for each of the bargaining sets 1-20) the average time it takes to reach an agreement for those player pairs who reached an agreement. Using these pairwise observations in the Complete and Private Information treatment, we run Wilcoxon signed rank test and reject the zero hypothesis of equal bargaining time in the Complete and Private Information treatment at $p=0.067$.

Observation 2: Agreements in the Complete Information treatment are delayed compared to the Private Information treatment.

Observation 1 and 2 give a mixed support to our information hypothesis. By all practical means, providing information on the payoffs of both conflict parties does not prevent, only delays an agreement. However, we cannot say how many of the agreements in the experiment are due to the deadline type of environment generated by the predetermined period within which an agreement had to be reached in the experiment. In reality, the deadlines can often not be set in such a credible way, and therefore it is interesting to observe that providing more information leads to delays in bargaining.

Time of bargaining agreements	Treatment	
	CI	PI
First quarter of 2 minute bargaining	25/210 (12%)	26/200 (13%)
Second quarter of 2 minute bargaining	28/210 (13%)	31/200 (16%)
Third quarter of 2 minute bargaining	10/210 (5%)	45/200 (23%)
Fourth quarter of 2 minute bargaining	127/210 (60%)	77/200 (39%)
Disagreements	20/210 (10%)	21/200 (11%)
Total (player pairs)	210	200

Table 5: Time of bargaining agreements in Complete Information and Private Information treatment.

Treatment	Any e¢cient outcome is strictly preferred to the egalitarian outcome		
	by one player only	by both players	Total player pairs
PI	83/128 (64%)	60/72 (83%)	143/200 (72%)
CI	77/137 (56%)	67/73 (92%)	144/210 (68%)
Total player pairs	160/265	127/145	410

Table 6: E¢cient agreements in games where only one or both players strictly prefer the e¢cient outcome to the egalitarian outcome.

As mentioned before, we found quite a few egalitarian agreements in the Complete Information treatment. However, at closer look we see that the relevance of the egalitarian norm is influenced by the point whether both players strictly prefer in terms of material payoffs to apply the e¢ciency norm over the egalitarian norm, or only one of the players. In Table 6 we present the frequency of e¢cient agreements in games where any e¢cient outcome is strictly preferred to the egalitarian outcome by both players, and in games where any e¢cient outcome is strictly preferred to the egalitarian outcome by one player only. In the second case, the other player is indifferent in terms of payoffs between this e¢cient outcome and the egalitarian outcome². In the Complete Information treatment, players succeed nearly exclusively to agree on the e¢cient outcome when they both strictly prefer in terms of material payoffs any e¢cient outcome to the egalitarian outcome. But when an e¢cient outcome is strictly preferred by one player only, disagreements and egalitarian outcomes prevail more frequently, and the frequency of e¢cient outcomes drops nearly to one half. We do not observe such a sharp drop in the Private Information treatment.

This observation is supported and extended by a logit regression on the agreements in the CI treatment and PI treatment using data as in footnote 3 (see Table 7). The dependent variable equals 1 if a reached agreement was e¢cient, and equals 0 otherwise. The explanatory variables include game characteristics strictboth (which equals to 1 if both players strictly prefer agreeing on an e¢cient outcome compared to the egalitarian

²Excluded from Table 6 are games where e¢ciency and individual rationality select the same agreement for at least one player. Hence, included are bargaining agreements from games using bargaining sets 1,3,4,6,7,9,11,12,13,15,17,18,19.

	B	S.E.	Wald	df	Sig.	Exp(B)
strictboth	0.628	0.324	3.754	1	0.053	1.874
strictboth by CI	1.476	0.481	9.429	1	0.002	4.377
efnocoor	-0.299	0.346	0.748	1	0.387	0.741
efnocoor by CI	-0.570	0.411	1.921	1	0.166	0.565
deltaef	-0.247	0.132	3.512	1	0.061	0.781
deltaef by CI	-0.193	0.087	4.874	1	0.027	0.825
constant	1.672	0.444	14.201	1	0.000	5.322
-2Log likelihood =514.756						
Nagelkerke R ² = 0:190						

Table 7: Logit regression to explain efficient agreements in the Complete and Private Information treatment.

outcome, and equals to 0 if only one player does), *efnocoor* (which equals to 1 if the bargaining set contains a unique efficient outcome, and equals to 0 otherwise) and an inequality term *deltaef* (the absolute difference of the payoffs attained in the efficient outcome). The dummy variable *CI* equals 1 for observations in the Complete Information treatment, and 0 otherwise.

We find that the positive coefficient *strictboth* is highly significant only when interacted with the *CI* dummy. The odds ratio of the efficient outcomes significantly increases when both players strictly prefer the efficient outcomes to the egalitarian outcome only in the Complete Information treatment, not in the Private Information treatment. Similarly, inequality implied by the efficient outcome (*deltaeff*) decreases the efficiency odds ratio in the Complete Information treatment. Coordination problems do not affect significantly the odds of an efficient agreement.

The higher propensity to agree on an efficient outcome under complete information in the conflict when both players strictly (and not only weakly) prefer such an outcome to the egalitarian outcome can be explained by the players' self-serving interpretation of what constitutes a "fair" agreement. The egalitarian norm is invoked by a player when there is nothing to gain by sustaining unequal position towards the other player. However, when the payoff of the egalitarian outcomes is inferior to the payoff of the efficient outcome, inequality resulting from the efficient agreement does not prevent players from achieving efficiency. Similar self-serving interpretation of norms has been previously documented, e.g. by Babcock and Loewenstein [2], Babcock et al. [3] or Kagel et al. [15], and discussed in the context of conflict resolution, see Deutsch [11].

Observation 3: Players apply the egalitarian and efficiency norms in a self-serving way.

In the Complete Information treatment, the efficient outcomes are nearly exclusive when any efficient outcome is strictly preferred to the egalitarian outcome by both players. However, if one player is indifferent between the egalitarian outcome and an efficient outcome preferred by the other player, the frequency of the efficient outcomes sharply drops to half. This is not the case in the Private Information treatment.

To summarize, providing complete information on the payoffs of all feasible conflict

Messages stating	Treatment	
	PI	ID
- higher value than true value	59/2031 (0%)	10/1220 (1%)
- lower value than true value	1472/2031 (72%)	437/1220 (36%)
- true value	331/2031 (17%)	151/1220 (12%)
- "No message "	169/2031 (1%)	622/1220 (51%)
All messages	2031	1220

Table 8: Messages in Private Information and Information Demand treatment.

solutions slows down the agreements (Observation 2). Efficient agreements are most frequent in both Complete and Private Information treatment (Observation 1), but in the Complete Information treatment less so when any efficient outcome is strictly preferred to the egalitarian outcome by one player only, and not by both players (Observation 3). Players possibly apply different norms in a self-serving manner when solving the conflict.

Let us now address the way information on payoffs associated with the feasible conflict outcomes is communicated among the conflict parties, when such information is not available to them. In a conflict, individuals usually communicate about what a particular solution means to them. In out-of-court dealings, however, little of this information is verified. In our experiment, subjects in the Private Information treatment and in the Information Demand treatment also had at their disposal such a channel of unverified communication. With every proposal how to solve the conflict, each individual had to attach a message indicating how many points he/she will receive if this proposal becomes the agreement, but a silent message "No message " was also allowed.

All messages sent in the Private Information treatment (sessions PI-1 and PI-2), and the Information Demand treatment (sessions ID-1a, ID-1b, ID-2a, ID-2b) can be found in Appendix 3 in Figure 8 and Figure 9, respectively. The summary of all messages with respect to their truthfulness is presented in Table 8.

In both treatments with cheap talk, the communication follows the same pattern: players who do not reveal their proposal value truthfully do not randomize among all available messages, but tend to select a message indicating a lower value than their true value. In order to account for the fact that players' value-stating message choices are constrained to the interval of feasible values, we looked at the value-stating messages sent with value proposals 2 to 9, where we considered only the messages stating a value lower or higher by one point than the true value to the message sender. If players randomize or tremble around the true value, we would in both cases expect that the frequency of messages one point above and below the true value is the same. However, 268/305 (88%) of the value-stating messages ("This proposal gives to me ... points") in the Private Information treatment and 84/87 (97%) of the value-stating messages in the Information Demand treatment from this one-point neighborhood of the true value are one point below the true value.

Observation 4: The value-stating messages indicate most frequently a value lower than the true value of the proposal both in the Private Information treatment and in the Information Demand treatment.

Another interesting point is to observe the differences between communication in the Private Information treatment where the truthfulness of the sent messages is verified only ex-post and only for the proposal that eventually becomes the agreement, and communication in the Information Demand treatment. In this treatment, namely, subjects are communicating "in the shadow of verification". As soon as they both agree to exchange information in the bargaining, they are able to verify the truthfulness of all the value messages received so far from the other communicating player. Previously Croson et al. [10] found in the context of ultimatum games that ex-post verification may lead changes in the bargaining behavior. However, in their study, the players were not informed about the fact that their messages will be verified at some moment. In our experiment, the players in the Information treatment were aware of the fact that agreeing to exchange information implies that their messages will be verified. Do they take into account this possibility? We found that truthful messages are rare in the Private Information treatment: only 331/1862 (18%) of the value stating messages ("This proposal gives to me ... points") convey the true value. The frequency of truthful messages among the value-stating messages in the Information Demand treatment is somewhat higher - 151/598 (25%). And, there is a striking difference in the use of the message "No message": in the Private Information treatment, only 1% (169/2031) of all messages are "No message", while in the shadow of verification in the Information Demand treatment, "No message" is sent in 622/1220 (51%) of the cases.

Observation 5: When communicating in the shadow of verification, messages are more likely to correspond to the true values, and players resort much more often to silence instead of randomizing among the value messages.

Both of these observations are in favor of the communication hypothesis that individuals communicate strategically in the Information Demand treatment, taking into account the possibility of verification.

Now, we turn to analyze the Information Demand treatment. First, in Table 9 we present all agreements reached in this treatment, in cases when information exchange was agreed upon (column ID with), and when it was not agreed upon in the bargaining (column ID w./o.). Again, most of the agreements are efficient in both cases, but the frequency of egalitarian agreements is much higher when information exchange is agreed upon.

In Table 10, we present the demand for information on the payoffs for the other player, in particular the timing of the first proposal to exchange information, and the timing of information exchange agreements. We found that across all rounds, the proposal to exchange information is never made in 298/740 (40%) cases, and overall 149/370 (40%) of all player pairs end up their bargaining after an information exchange. We observe that:

Observation 6: Less than half of all conflicts end up with players exchanging voluntarily verifiable information. Among the subjects who demand information, 245/442 (55%) do so within the first 30 seconds of the bargaining. Two thirds of these agreements on exchange of information are reached in the first minute of the bargaining, and more than half of these in the first 30 seconds of the bargaining.

Agreement	Treatment	
	ID w./o.	ID with
Own-payoff maximizing	29/221 (14%)	8/149 (6%)
Efficient, joint-payoff maximizing	146/221 (66%)	87/149 (58%)
Egalitarian	12/221 (5%)	42/149 (28%)
Other	12/221 (5%)	2/149 (1%)
Disagreement	22/221 (10%)	10/149 (7%)
Number of bargaining pairs	221	149

Table 9: Agreements in the Information Demand treatment without and with an agreement on information exchange.

Time of information exchange proposals	First proposal	Agreement
First quarter of 2 minute bargaining	245/740 (33%)	61/370 (16%)
Second quarter of 2 minute bargaining	126/740 (17%)	51/370 (13%)
Third quarter of 2 minute bargaining	56/740 (8%)	30/370 (8%)
Fourth quarter of 2 minute bargaining	15/740 (2%)	7/370 (2%)
None	298/740 (40%)	221/370 (60%)
Total (37 player pairs per 10 rounds)	740 (100%)	370 (100%)

Table 10: Information exchange proposals in the Information Demand treatment.

What is the effect of providing information on bargainers' payoffs by mutual agreement of the bargainers as compared to when the information is always provided from the start? In Table 9, we found that most of the agreements end up to be efficient agreements in the Information Demand treatment, however the frequency of egalitarian outcomes increases when information exchange is agreed upon, it seems at the cost of the inefficient agreements and disagreements. We also found some evidence on difference in when an agreement is reached, see Tables 5 and 11. We test for the differences in time taken to reach a bargaining agreement in the Complete Information treatment and in the Information Demand treatment where Information exchange was agreed upon. For each of the 20 implemented bargaining sets we compute an average time to reach an agreement, and found that Wilcoxon signed rank test does not allow us to reject the zero hypothesis of equal bargaining time, $p=0.263$. However, when we restrict attention only to those bargaining pairs in the Information Demand treatment, who agreed on information exchange within the first minute of bargaining, we found support for rejecting the zero hypothesis of equal bargaining time, $p=0.030$.

Observation 7: Obtaining information on payoffs for the other player by mutual consent of players (in the Information Demand treatment) speeds up agreements as compared to the case this information is provided by default (in the Complete Information treatment), but only if information exchange was agreed upon early in the bargaining.

In observation 2 we stated that agreements are delayed in the Complete Information treatment compared to the Private Information treatment. In Observation 7 we

Time of bargaining agreements	Treatment	
	ID w./o.	ID with
First quarter of 2 minute bargaining	31/221 (14%)	6/149 (4%)
Second quarter of 2 minute bargaining	23/221 (10%)	25/149 (17%)
Third quarter of 2 minute bargaining	45/221 (20%)	33/149 (22%)
Fourth quarter of 2 minute bargaining	100/221 (45%)	75/149 (50%)
Disagreements	22/221 (10%)	10/149 (7%)
Total (player pairs)	221	149

Table 11: Time to reach an agreement in Information Demand treatment.

Behavioral type	Among all subjects	In the classi...ed subgroup
Individually rational (IR)	36/156 (23%)	36/79 (46%)
Joint-payo α maximizing (EFF)	26/156 (17%)	26/79 (33%)
Status oriented (STAT)	17/156 (11%)	17/79 (21%)
Not classi...ed	77/156 (49%)	na
All subjects	156 (100%)	79 (100%)

Table 12: Behavioral types based on dictator game.

now present that prompt voluntary participation in the information exchange speeds up agreements. In the light of this evidence we conclude that in the line with voluntary participation hypothesis, it is not the information per se facilitates agreements in the bargaining but the way this information was obtained.

Observing that voluntary participation in the information exchange is an important factor that affects the way payo α information shapes the bargaining process, we also have to address the extending hypothesis that the voluntary participation works via self-selection. Accordingly, we first have to address the behavioral types in the subject pool.

Each experiment subject participated in 10 rounds of dictator decision-making. In this task, the dictators were asked to choose one out of 8 solution candidates to determine the payo α for themselves and a passive recipient. We used the strategy method to collect the data: each subject made 10 decisions as a dictator, each time randomly re-matched to one another subject in the pool. The assignment of the dictator/recipient roles as well as the choice of the paid round was implemented at the end of the experiment.

The individually rational, own-payo α maximizing choice in every dictator round implies large inequality between the dictator and the recipient, and is in most of the games we implemented inefficient. Are the dictators willing to decrease own payo α to some extent in order to increase the payo α of the recipient? In Figure 1, we present all choices made in the dictator task followed by each of the three treatments. Independent of the preceding treatment, the dictators choose the individually rational, own-payo α maximizing outcome in approximately half of the cases. In the other half of all cases, however, dictators indeed decrease own payo α below the payo α of the individually rational outcome. Conditionally on doing so, they opt most of the time for the joint-payo α maximizing outcome.

The assignment of the 156 experimental subjects to the three behavioral types is presented in the Table 12.

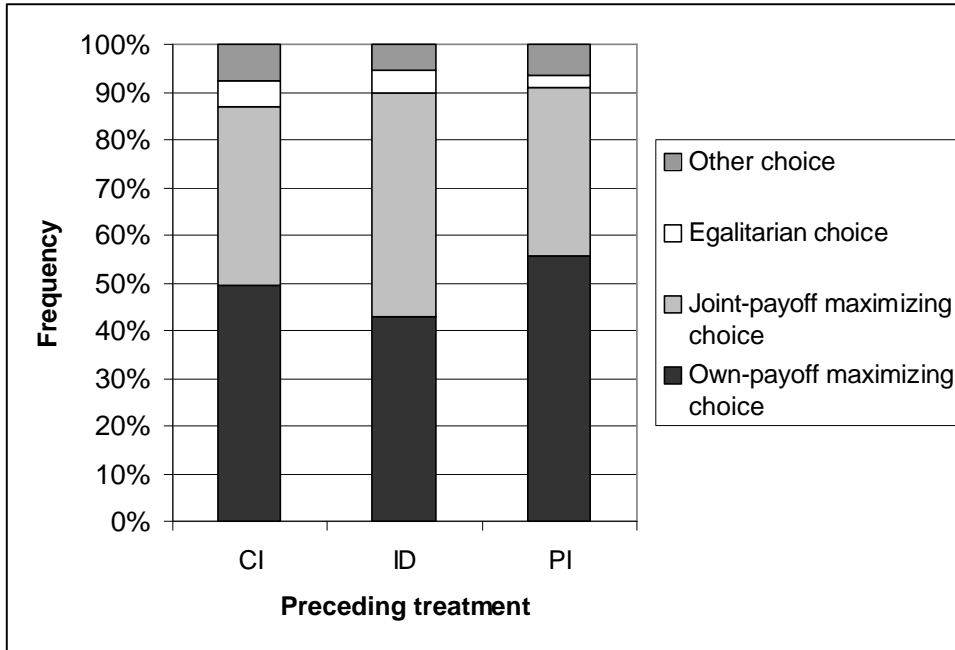


Figure 1: Dictator choices in sessions following the three treatments.

Observation 8: The subject pool is heterogeneous. We are able to categorize around one half of all subjects in one of the three systematical behavioral types. Among the categorized individuals, 46% are of the IR type, 33% are of the EFF type and 21% are of the STAT type.

This observation is in line with the work of other authors, see e.g. Andreoni and Miller [1]. Allowing for some errors, they found that 47% of their subject pool is consistent with own-payoff maximization, corresponding to our IR types, while 53% of the pool maximizes the joint-payoff or the payoff of the lowest-payoff earning individual, corresponding to our EFF and STAT types.

There is not a clear prediction on the demand for information with respect to the behavioral types we identified in the dictator task. Both EFF and STAT type individuals might want to base their decisions on the payoffs of the other individual in order to reach efficient agreements. However, not asking for information exchange may be preferred by any behavioral type if it is suspected that the additional information could have negative effects on the bargaining (e.g. triggering envy). In Figure 2, we plot for each bargaining round the fraction of individuals of a particular type who did not demand information exchange in that round. It seems that in the second half of the experiment, the proposals to exchange information are made least frequently by the STAT type individuals, but this difference is not statistically significant when we include all observations³.

³Wilcoxon signed-rank test for paired observations of "no demand for information exchange" frequency in 10 bargaining rounds by the three behavioral types gives no support for rejecting equal demands: $p_{IR|STAT} = 0.102$, $p_{IR|EFF} = 0.102$.

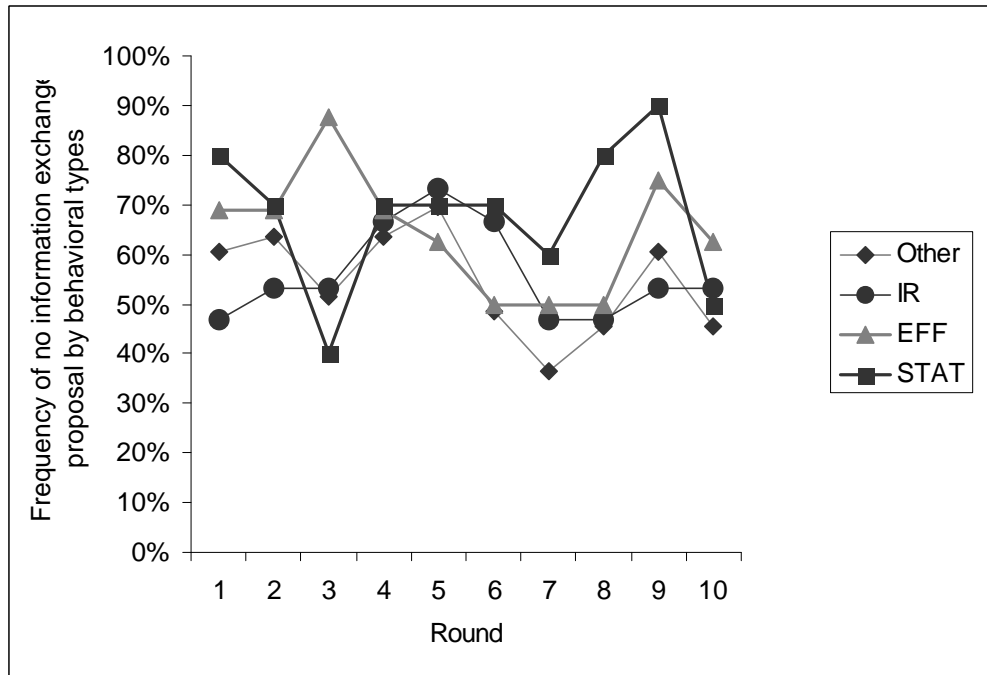


Figure 2: Fraction of individuals per behavioral type who did not demand information exchange in a given round.

Observation 9: We found no statistically significant differences between the behavioral type's demand for information exchange in the ID treatment.

Hence, using the data we collected, we cannot lend support to our self-selection hypothesis.

5 Conclusions

Communication in a conflict is very often plagued by low trust and reliability. However, clarifying positions in a conflict and providing truthful information on the preferences over the feasible conflict outcomes is a necessary condition for arriving at mutually agreeable and efficient solutions. Mediators claim that one of their important tasks is to guarantee an environment in which trust is re-established and communication becomes trustworthy.

In this paper we study this aspect of mediation in conflict resolution: namely that of providing an environment in which true information on the conflict outcome consequences is made available to the conflict parties. Additionally, we study whether the information itself, or the way it is provided (by mutual agreement or by default) matters.

We test our hypotheses experimentally in an unstructured bargaining environment. Players in the subject pool are matched anonymously 10 times into pairs and each time given 2 minutes to agree on one out of eight feasible solution candidates. All interaction takes place via computer network. In the Complete Information treatment, information

on the payoffs outcomes for both players is provided, while in the Private Information treatments, only information on one's own payoffs outcomes and a cheap talk communication channel is available to each player. In the Information Demand treatment, players bargain as in the Private Information treatment until (and if) both of them send a proposal to exchange information voluntarily. In that case, the Complete Information treatment scenario is established.

We found that providing complete information by default in the unstructured bargaining delays agreements compared to the bargaining under private information condition, obtaining partial support for our information hypothesis. It is often claimed that equality will be sought by bargainers as an "obvious" solution to a conflict. We observe that this is not necessarily the case when equality does not imply efficiency. When egalitarian solutions are inefficient, we found that it matters whether both players or one player only obtain for any efficient outcome a payoff higher than the egalitarian payoff. In the latter case, efficient outcomes are half as frequent as in the former case. It seems that the egalitarian norm is applied by the player who cannot improve his/her payoff by agreeing on an efficient outcome while the norm of efficiency is applied by the player who can improve. This self-serving application of different solution norms leads to a higher frequency of inefficient outcomes (including disagreements) than when both players can benefit from applying the efficiency norm.

Communication in a conflict is usually an exchange of cheap talk messages without verifiable facts. We assume that mediators coaching communication between the conflict parties act to the effect of verifying the communicated information. In the experiment, we found support for our communication hypothesis: people react strategically to the option of asking for information verification. When they face such an option (as it is in the Information Demand treatment), they report their value of a proposal more often truthfully than in the Private Information treatment. Moreover, they very frequently prefer to be silent (sending "No message") to sending a message that is not truthful and could be verified as such later in the bargaining.

Finally, we observe that there is a substantial, though not full demand for information on the payoffs of the other conflict party. All in all, some 40% of all bargaining rounds end up with agreement on information exchange. Most of these information exchange agreements take place early in the bargaining. Comparing agreements reached in the Complete Information treatment to those in the Information Demand treatment after information exchange was established, we found a shorter time of interaction in the latter case, but only when we consider those bargainings with information exchange where the voluntary consent to information exchange was provided early in the bargaining (in the first minute of the two-minute bargaining session). Voluntary participation does matter, however with the caveat that the signal of willingness to exchange information is given without too much hesitation.

To obtain some more detailed information on the motivation of our subject pool, we used a second experiment task - dictator decision making. Each experiment subject was asked to choose a payoff for oneself and an anonymous other individual in the session in 10 rounds. Using this data, we succeeded to categorize one half of our subjects according to their other-regarding preferences into own-payoff maximizing, joint-payoff maximizing and status oriented behavioral types. We also found that the type of choices made in the dic-

tator games is very similar across the three bargaining treatments, giving us behaviorally homogeneous pool across the treatments. However, we fail to find support for connection between demanding information exchange in the Information Demand treatment and the type of social preferences identified in the subject pool.

Experienced mediators claim that mutual agreement by participating conflict parties is a necessary condition for successful mediation. They also voice worries about court-ordered or obligatory pre-trial mediation, by claiming that these miss the main point. Part of this concern might be supported by our observation that providing information by default in the Complete Information treatment delays agreements compared to the Private Information treatment, while providing the same information - without too much hesitation - by voluntary and mutual request of the conflict parties speeds up the agreements in the Information Demand treatment compared to the Complete Information treatment.

To conclude, this paper presents evidence that not information itself matters - we have documented that having more information may lead to self-serving interpretation of norms for choosing a conflict solution, and delay agreements. However, providing the same information in bargaining voluntarily and promptly seems to speed up agreements. Voluntary participation matters as it allows individuals to signal their willingness to resolve the conflict.

6 Appendix 1 - Instructions for participants

INTRODUCTION (All treatments): You will now participate in an experiment on economic decision-making. The experiment will last approximately 1 hour. You will be paid after the experiment. No other participant will learn how much you earned.

You will be paid 5 EURO for your participation plus any additional earnings you will make in the experiment. How much you earn crucially depends on your decisions in the experiment. During the whole experiment, you are not allowed to talk to other participants. Disobeying this rule results in your exclusion from the experiment.

In the following experiment, you will participate in 10 sessions. Each session will last maximum 2 minutes, and you will be matched to one of the other participants in the experiment. You will not learn the identity of this person. Note that you will be matched to a new person in each session. We now describe the run of one session:

ONE SESSION (All treatments): A session lasts maximum 2 minutes. During this time, you and the other person can agree which one out of 8 solution candidates will determine the outcome of this session. Note that if you and the other person do not reach an agreement within 2 minutes, both of you receive 0 points for this session.

At the beginning of each session, you first learn for each of the 8 solution candidates (A, B, C, D, E, F, G, H), how many points you (in CI treatment only: and the other person) receive if you and the other person agree on this solution candidate. In each session, there will be 8 solution candidates, but the points you and the other person may receive for each of them will change in every round! However, in any session, the solution candidates are such that you or the other person never receive less than 1 point or more than 10 points with any of the solution candidates. (Two examples were presented at this point.)

We now describe what you do in a session: At any moment of time in a session, you are able (i) to

send a solution proposal to the other person, (ii) to receive a solution proposal from the other person, and (iii) to accept the last solution proposal received from the other person.

As soon as you or the other person accept a received solution proposal, this solution proposal is the agreement of this session. That means, agreement is reached either when the other person makes a solution proposal to you and you accept it; or you make a solution proposal and the other person accepts it. You may make as many solution proposals as you wish, but the other person can always accept only the last proposal that you made. Similarly, you may accept only the last proposal that you received from the other person.

(The following paragraph was provided in the Private Information [PI] treatment and Information Demand [ID] treatment): With every solution proposal you send to the other person, you also send an accompanying message to the other person. The message informs the other person how many points you would receive for the solution proposal you are sending if it becomes the agreement of the session. Similarly, you also receive an accompanying message from the other person with every solution proposal he or she is sending specifying how many points the other person would receive for this solution proposal if it becomes the agreement of the session. You can send or receive any of the following messages: No message; This proposal gives me 1 point;...;This proposal gives me 10 points. Please note: It is your decision what message you send - the information will not be checked by us. You can send any of the messages with any of the proposals. The messages do not affect your earnings.

(The following paragraph was provided in the Information Demand [ID] treatment only): Additionally to the actions described above, at any moment of time in a session, you and the other person are able to propose information exchange. If you and the other person both propose information exchange, you and the other person are informed how many points you and the other person receive for every solution candidate. If you propose information exchange, you can withdraw this proposal at any time, unless the other person meanwhile also proposes information exchange. You and the other person may make as many information exchange proposals and withdrawals as you wish, but in the moment there is information exchange proposal from you and the other person at the same time, the information exchange is established for the rest of this session. From this moment on, the only message you can send, will be "No message". Any other messages are meaningless and will not be allowed. Similarly, you will not be allowed to send information exchange proposals anymore. Please note that every session starts without information exchange. The proposal or withdrawal of a proposal for information exchange does not affect your earnings - it is your choice. Every session ends either with or without information exchange depending on the choices of you and the other person.

EARNINGS (All treatments): You and the other person will receive points according to the agreement. Note that if you and the other person do not reach an agreement within 2 minutes of the session, both of you receive 0 points for this session. During the experiment, all your earnings are in points. At the end of the experiment, you will be paid real money for the points you earned in two out the 10 sessions you participated in. These sessions will be determined at random at the end of the experiment. The exchange rate is: 1 point = 50 cents; 10 points = 5 EURO.

Please, raise your hand if you have questions at this moment. Note however that we do not answer questions of the type "what shall I do in the experiment?" - it is your own decision. We, however, are happy to answer questions on how to use the computer to make your decisions. The experiment will now begin with four test sessions to make sure that everybody understands how the points are earned. These test sessions are not relevant for your payments. After the four test sessions, the experiment begins and you will participate in 10 real sessions.

	Trial 1,3		Trial 2,4		Set 1		Set 2		Set 3		Set 4		Set 5		Set 6		Set 7		Set 8		Set 9		Set 10	
	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2
A	9	2	8	3	4	5	8	4	6	7	<i>5</i>	<i>5</i>	1	<i>10</i>	1	<i>10</i>	3	5	6	7	6	9	<i>10</i>	3
B	4	9	4	10	7	4	4	8	8	3	7	6	6	2	6	9	4	3	3	7	<i>10</i>	2	5	8
C	5	5	5	5	3	6	<i>5</i>	<i>5</i>	3	4	<i>10</i>	2	4	3	9	6	9	2	<i>6</i>	<i>6</i>	1	7	<i>5</i>	<i>5</i>
D	2	3	2	6	<i>5</i>	<i>5</i>	7	5	3	8	2	<i>10</i>	6	7	<i>7</i>	<i>6</i>	5	6	7	6	3	1	8	5
E	1	2	7	2	7	6	1	7	<i>5</i>	<i>5</i>	6	7	7	6	<i>6</i>	<i>6</i>	5	5	<i>10</i>	2	2	4	6	4
F	4	7	7	6	1	9	1	1	7	3	1	2	5	1	5	4	6	8	7	1	9	6	1	5
G	3	5	3	9	3	4	4	5	1	1	3	9	<i>6</i>	<i>6</i>	<i>10</i>	1	<i>6</i>	<i>6</i>	3	2	<i>5</i>	<i>5</i>	3	1
H	7	4	5	6	9	1	3	4	4	5	5	4	5	4	4	3	2	9	2	4	2	<i>10</i>	2	4

	Trial 1,3		Trial 2,4		Set 11		Set 12		Set 13		Set 14		Set 15		Set 16		Set 17		Set 18		Set 19		Set 20	
	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2	pl1	pl2
A	9	2	8	3	<i>5</i>	<i>5</i>	6	7	4	5	1	5	<i>5</i>	<i>5</i>	1	9	2	9	4	7	8	6	8	4
B	4	9	4	10	3	7	<i>10</i>	2	7	4	<i>10</i>	2	8	3	<i>4</i>	<i>4</i>	8	5	2	<i>10</i>	4	7	4	8
C	5	5	5	5	5	8	1	7	3	6	6	8	2	9	3	2	4	6	9	4	<i>10</i>	3	<i>5</i>	<i>5</i>
D	2	3	2	6	6	4	3	1	<i>5</i>	<i>5</i>	5	7	<i>10</i>	1	9	1	1	2	2	4	3	<i>10</i>	7	5
E	1	2	7	2	1	<i>10</i>	2	4	7	6	3	9	6	9	<i>10</i>	2	5	8	4	9	<i>5</i>	<i>5</i>	1	7
F	4	7	7	6	8	5	<i>6</i>	<i>6</i>	1	9	8	6	1	5	5	1	9	2	<i>10</i>	2	6	8	1	1
G	3	5	3	9	1	7	5	6	3	4	4	6	1	<i>10</i>	4	8	<i>5</i>	<i>5</i>	<i>4</i>	<i>4</i>	5	4	4	5
H	7	4	5	6	9	1	2	<i>10</i>	9	1	<i>6</i>	<i>6</i>	5	2	2	<i>10</i>	3	5	3	9	3	5	3	4

Figure 3: Bargaining sets 1-10 and 11-20.

7 Appendix 2 - Bargaining sets

All bargaining sets implemented in the experiment can be found in Figure 3. The payoffs to player 1 (pl1) and player 2 (pl2) in the figure are given in points. In the figure, we point out (i) the egalitarian outcomes in grey fields, (ii) the own-payoff maximizing outcomes for each individual in italics, and (iii) the efficient, joint-payoff maximizing outcomes in bold. The eight feasible agreements are denoted A to H.

8 Appendix 3 - Experiment data

Here we present all bargaining outcomes in CI, PI and ID treatment (see Figures 4-6, respectively), and all dictator choices (see Figure 7). In these figures, we present (i) the egalitarian outcomes in grey fields, (ii) the own-payoff maximizing outcomes for each individual in italics, and (iii) the efficient, joint-payoff maximizing outcomes in bold. The eight feasible agreements are denoted A to H.

All messages sent in the Private Information treatment (sessions PI-1 and PI-2), and the Information Demand treatment (sessions ID-1a, ID-1b, ID-2a, ID-2b) can be found in Tables 8 and 9, respectively. The true value of the proposal to the message sender is shown in the first line, and the message sent is shown in the first column. The dark grey shaded area contains messages with a value lower than the true value of the proposal to the sender. The truthful messages are in the bold labelled boxes.

	Agreement									Total
	None	A	B	C	D	E	F	G	H	
Set 1	0	0	0	0	0	20	0	0	0	20
Set 2	2	0	0	8	8	0	0	2	0	20
Set 3	0	18	2	0	0	0	0	0	0	20
Set 4	0	0	12	0	0	8	0	0	0	20
Set 5	4	0	0	0	8	6	0	2	0	20
Set 6	4	0	4	2	10	0	0	0	0	20
Set 7	0	0	0	0	2	0	12	6	0	20
Set 8	2	6	0	4	8	0	0	0	0	20
Set 9	0	6	0	0	0	0	14	0	0	20
Set 10	0	0	4	4	12	0	0	0	0	20
Set 11	8	4	0	6	0	0	4	0	0	22
Set 12	4	12	0	0	0	0	4	2	0	22
Set 13	0	0	0	0	0	22	0	0	0	22
Set 14	2	0	0	4	0	0	8	0	8	22
Set 15	2	4	2	0	0	14	0	0	0	22
Set 16	0	4	6	0	0	2	0	10	0	22
Set 17	2	0	8	0	0	8	2	2	0	22
Set 18	4	2	0	8	0	4	0	4	0	22
Set 19	2	12	0	0	0	0	8	0	0	22
Set 20	4	2	4	0	12	0	0	0	0	22

Figure 4: Complete Information treatment: All agreements (CI-1 session with Sets 1-10 and CI-2 session with Sets 11-20).

	Agreement									Total
	None	A	B	C	D	E	F	G	H	
Set 1	0	0	0	0	0	20	0	0	0	20
Set 2	2	0	0	8	8	0	0	2	0	20
Set 3	0	18	2	0	0	0	0	0	0	20
Set 4	0	0	12	0	0	8	0	0	0	20
Set 5	4	0	0	0	8	6	0	2	0	20
Set 6	4	0	4	2	10	0	0	0	0	20
Set 7	0	0	0	0	2	0	12	6	0	20
Set 8	2	6	0	4	8	0	0	0	0	20
Set 9	0	6	0	0	0	0	14	0	0	20
Set 10	0	0	4	4	12	0	0	0	0	20
Set 11	8	4	0	6	0	0	4	0	0	22
Set 12	4	12	0	0	0	0	4	2	0	22
Set 13	0	0	0	0	0	22	0	0	0	22
Set 14	2	0	0	4	0	0	8	0	8	22
Set 15	2	4	2	0	0	14	0	0	0	22
Set 16	0	4	6	0	0	2	0	10	0	22
Set 17	2	0	8	0	0	8	2	2	0	22
Set 18	4	2	0	8	0	4	0	4	0	22
Set 19	2	12	0	0	0	0	8	0	0	22
Set 20	4	2	4	0	12	0	0	0	0	22

Figure 5: Private Information treatment: All agreements (PI-1 session with Sets 1-10 and PI-2 session with Sets 11-20).

	Agreement									Total
	None	A	B	C	D	E	F	G	H	
Set 1	4	0	0	0	0	30	2	0	2	38
Set 2	8	0	2	16	10	0	0	0	2	38
Set 3	2	30	0	0	2	0	2	0	2	38
Set 4	4	2	14	2	0	16	0	0	0	38
Set 5	2	2	0	0	26	2	0	6	0	38
Set 6	2	2	8	12	8	4	0	2	0	38
Set 7	6	0	0	0	0	0	26	4	2	38
Set 8	2	8	2	4	20	2	0	0	0	38
Set 9	2	16	0	0	0	0	14	2	4	38
Set 10	6	0	14	2	12	2	0	0	2	38
Set 11	4	2	2	18	0	0	8	0	2	36
Set 12	0	26	0	0	0	0	10	0	0	36
Set 13	2	0	0	0	2	32	0	0	0	36
Set 14	2	0	0	18	0	4	6	0	6	36
Set 15	2	0	0	0	0	34	0	0	0	36
Set 16	6	0	16	0	0	2	0	12	0	36
Set 17	4	0	4	0	0	16	2	10	0	36
Set 18	0	8	0	6	0	8	2	12	0	36
Set 19	6	16	0	0	0	0	14	0	0	36
Set 20	0	4	8	10	14	0	0	0	0	36

Figure 6: Information Demand treatment: All agreements (ID-1a, ID-1b sessions with Sets 1-10 and ID-2a, ID-2b sessions with Sets 11-20).

	Agreement									Total
	A	B	C	D	E	F	G	H		
Set 1	0	2	1	5	42	18	1	11	80	
Set 2	23	32	1	22	2	0	0	0	80	
Set 3	40	24	0	15	0	1	0	0	80	
Set 4	1	15	25	21	13	0	4	1	80	
Set 5	25	0	0	12	39	0	4	0	80	
Set 6	14	23	24	4	2	0	13	0	80	
Set 7	0	0	18	0	0	35	10	17	80	
Set 8	37	3	2	16	22	0	0	0	80	
Set 9	21	11	0	0	0	25	3	20	80	
Set 10	27	38	2	11	1	1	0	0	80	
Set 11	5	0	25	1	16	18	0	11	76	
Set 12	39	14	0	0	0	8	0	15	76	
Set 13	0	0	0	2	41	21	0	12	76	
Set 14	0	15	25	1	12	19	0	4	76	
Set 15	3	4	0	19	40	0	10	0	76	
Set 16	1	4	0	0	30	0	21	20	76	
Set 17	12	28	0	0	23	11	2	0	76	
Set 18	0	14	20	0	24	15	3	0	76	
Set 19	17	0	20	14	3	22	0	0	76	
Set 20	22	31	4	19	0	0	0	0	76	

Figure 7: Dictator choices: (CI-1, PI-1, ID-1a, ID-1b with Sets 1-10 and C-I2, PI-2, ID-2a, ID-2b with Sets 11-20).

	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8	Value 9	Value 10	Total
No message	0	0	0	1	9	13	42	24	27	53	169
Message 1	1	0	0	1	0	1	0	1	2	2	8
Message 2	0	0	0	2	2	4	2	2	0	0	12
Message 3	0	0	1	1	10	7	10	6	8	6	49
Message 4	0	0	0	24	22	16	46	25	20	19	172
Message 5	0	0	0	1	77	57	107	88	89	93	512
Message 6	0	0	0	0	3	74	79	69	142	104	471
Message 7	1	2	0	0	3	22	85	71	94	161	439
Message 8	1	0	0	0	2	5	3	38	38	64	151
Message 9	0	0	0	0	0	4	2	3	22	1	32
Message 10	0	0	0	1	0	0	0	1	5	9	16
Total	0	0	0	1	0	0	0	1	5	9	2031

Figure 8: Private Information Treatment: All messages (PI-1 and PI-2 sessions).

	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8	Value 9	Value 10	Total
No message	35	0	0	0	40	75	171	89	102	110	622
Message 1	0	4	0	1	0	2	0	0	0	3	10
Message 2	0	0	1	0	0	0	0	0	1	0	2
Message 3	0	0	0	0	1	2	0	0	0	0	3
Message 4	0	0	0	2	4	4	5	9	6	7	37
Message 5	0	1	0	0	25	11	48	19	24	39	167
Message 6	0	0	0	0	0	37	51	45	57	41	231
Message 7	0	0	0	1	0	2	39	7	15	26	90
Message 8	0	0	1	0	0	0	1	14	6	3	25
Message 9	0	0	0	1	0	0	0	0	14	0	15
Message 10	0	0	0	2	0	1	0	0	0	15	18
Total	35	5	2	7	70	134	315	183	225	244	1220

Figure 9: Information Demand treatment: All messages before information exchange is agreed (ID-1a, ID-1b, ID-2a, ID-2b sessions).

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