Unilateral Face-to-face Communication in Ultimatum Bargaining – A Video Experiment

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EXTENDED ABSTRACT

It is commonly accepted that face-to-face communication increases cooperation and equity across situations. Contributions in public goods and multiple players prisoner's dilemma games increase with pre-play communication. The effect exist even with limited communication, such as text communication (Frohlich & Oppenheimer, 1998) or audio conference (Brosig et. al., 2003), although only full face-to-face (including video-mediated) communication is propitious to induce the full effect.

The aim of this study is to disentangle the direction of the communication to shed light on the driving factors of social-only face-to-face communication induced cooperation and equity in bargaining. We manipulate the direction of the communication by allowing in one treatment for one-sided proposer communication and in the other treatment for one-sided responder communication in the ultimatum game. The study builds on a face-to-face communication ultimatum game experiment proposed by Roth (1995) and a replication using face-to-face video communication by Schmidt and Zultan (2005).

Roth's results show a significant decrease in rejections and increase in mean offers when communication is introduced. Based on these findings, he rejected the communication hypothesis, claiming that his restricted communication treatment precludes strategic communication. Schmidt and Zultan (2005) challenge this interpretation of communication effects. In their study, the use of the strategy method made it possible to extract directly the responders' strategies and compare their use in different treatments. Thus, the similar disagreements rate obtained by Roth (1995) for unrestricted and restricted pre-play communication is shown to result from different processes.

Although the effects of restricted social communication may derive from considerations of social utility, which increases cooperative behavior, in the case of unrestricted communication, when the players can discuss the game, the low disagreement frequency does not stem from increased cooperation, as the responders are in fact acting in a less cooperative manner. Rather, the result derives from strategic coordination on the egalitarian outcome, as evidenced in the significant difference between the likelihood of an exact equal split offer with unrestricted and restricted communication.

The results of the two new social-only unilateral treatments support the argumentation of Schmidt and Zultan (2005). The average offer in the responder-talks treatment was significantly higher than the baseline, whereas the average offer in the proposer-talks treatment was marginally higher than baseline. Although no differences were evident between the average offers made in the two unilateral communication treatments, an examination of the equal split offers reveals that proposers were more likely to offer an equal split when they saw and heard the responder than when they were talking themselves. Responders' data are in line with what we observe in the proposer decisions. Responders were less likely to reject offers when they saw and heard the proposer than when they were talking themselves. This consistent finding, that, seemingly, it is the recipient of the communication who becomes more cooperative, suggests that increased cooperativeness is not driven by reputation effects, which should be evident in the active, and not passive communicator's decisions.

When compared to social-only bilateral communication low disagreement frequencies were not as evident with unilateral pre-play communication, giving support to the hypothesis that increased cooperation and equity is specific to social interaction. Nonetheless, a significant increase in proposers' offers was indeed found even with unilateral communication, particularly for the passive recipient of the communication. Thus, the hypothesis that exposure to relevant others influences social utilities is somehow supported.

1. INTRODUCTION

It is commonly accepted that face-to-face communication increases cooperation and equity across situations. Contributions in public goods and multiple players prisoner's dilemma games increase when pre-play communication is introduced. The effect exist even with limited communication, such as text communication (Frohlich & Oppenheimer, 1998) or audio conference (Brosig et. al., 2003), although only full face-to-face (including video-mediated) communication is propitious to induce the full effect.

Similar results, indicating that face-to-face communication enhances cooperation were obtained in bargaining experiments. When investigating a sealed-bid mechanism with incomplete information, Radner and Schotter (1989) found that face-to-face communication enabled subjects to capture over 99% of the first-best gains from trade, compared to 92% in an equivalent anonymous situation. Data obtained in a classroom experiment show that face-to-face communication can also induce dictators to give more in a dictator game. Notably, it was enough for the recipient to present herself to the dictator in order to obtain higher allocations, although mere identification did not affect the dictators' behavior (Bohnet & Frey, 1999). The effects on the recipient of unilateral communication serve to shed some light on the nature and characteristics of the pre-play communication effects. However, no attempt was made to juxtapose the effects of unilateral communication on the communicator and the recipient.

The aim of this study is to disentangle the direction of the communication to shed light on the driving factors of social-only face-to-face communication induced cooperation and equity in bargaining. We manipulate the direction of the communication by allowing in one treatment for one-sided proposer communication and in the other treatment for one-sided responder communication in the ultimatum game. The study builds on a face-to-face communication ultimatum game experiment proposed by Roth (1995) and a replication using face-to-face video communication by Schmidt and Zultan (2005), which are described in the next section. In section 3 we provide hypotheses about the driving forces to interpret possible results in the unilateral communication treatments. The experimental design and the procedure are discussed in detail in section 4. Experimental results are provided in section 5 and conclusions in section 6.

2. RELATED WORK

During the handbook workshop 1990 in Pittsburgh Roth offered two explanations for the 'anomaly' of lower disagreement rates in (ultimatum) bargaining when face-to-face communication is in place. The uncontrolled social utility hypothesis suggests that in the social environment created by face-to-face communication, preferences become hard to control. For example, people will probably be less likely to take advantage of other people who are similar to themselves, or who are part of their in-group (cf. Dawes, 1990). As in most experiments subjects come from the same population, namely students, this factor may be crucial. The communication hypothesis, on the other hand, emphasizes the nonverbal channels available in face-to-face communication. Thus, face-to-face communication is not qualitatively different from written communication, but more efficient as it uses multiple channels, which are usually more reliable than the written or verbal channels alone.

In order to distinguish the effects of these two possible hypotheses, the experiment described by Roth (1995) studied pre-play face-to-face communication in ultimatum bargaining, incorporating a restricted, social only communication treatment. In this treatment the subjects have two minutes to converse before actual play is taking place, same as in the standard unrestricted face-to-face communication treatment. However, in the social communication treatment subjects are not allowed to discuss the game. These two treatments were compared to an anonymous no communication treatment in which only written offers and responses were passed between the subjects.

Roth's results show a significant decrease in rejections (33% in the control treatment, 4% and 6% in the unrestricted and restricted communication treatments, respectively) and increase in mean offers. Based on these findings, Roth (1995) rejected the communication hypothesis, claiming that his restricted communication treatment precludes strategic communication.

However, Schmidt and Zultan (2005) argue that the support for this claim is not unequivocal, since the results do not rule out strategic effects. Firstly, some relevant nonverbal communication is possible even when communication is restricted.

For example, a proposer may learn of a responder's character from her nonverbal behavior, identifying her as someone who would reject a low offer, and therefore makes a relatively high offer. This high offer is, naturally, accepted, hence cooperation is achieved. Alternatively, a proposer who participates in face-to-face communication may become apprehensive of future interactions with the responder, and anticipating reciprocity, makes a relatively high offer. Again, cooperation is achieved due to, in this case, reputation effects, and not alterations in utilities.

Schmidt and Zultan (2005) challenge the previous interpretation of communication effects in ultimatum bargaining. They argue the experiment reported by Roth (1995), applying play method, was not able to uncover responders' strategies, as the observed disagreements rate was driven primarily by the offers made by proposers. Comparison between treatments was meaningless in this respect, as the responders in separate treatments were faced with different decision tasks due to the systematic differences in the offers they received. In their study, however, the use of the strategy method (Selten 1967) made it possible to extract directly the responders' strategies and compare their use in different treatments. Thus, the similar disagreements rate obtained by Roth (1995) for unrestricted and restricted pre-play communication is shown to result from different processes.

Although the effects of restricted social communication may derive from considerations of social utility, which increases cooperative behavior, in the case of unrestricted communication, when the players can discuss the game, the low disagreement frequency does not stem from increased cooperation, as the responders are in fact acting in a less cooperative manner. Rather, the result derives from strategic coordination on the egalitarian outcome, as evidenced in the significant difference between the likelihood of an exact equal split offer with unrestricted and restricted communication.

3. HYPOTHESES

Communicating players are usually simultaneously participating in two roles, as the active communicator and as the passive recipient of the communication. Therefore, the perceived effects of communication on decision making may be attributed to processes, which are particular to but one of the two roles. By using video conference technology, applying unilateral, or one-way pre-play communication, we are able to disentangle the effects of the two roles. As this is an initial,

exploratory attempt to understand the face-to-face communication effects, we have no solid theory to rely upon, but, rather, several hypotheses to interpret possible results in the new unilateral communication treatments introduced here.

Hypothesis A: The social effects rely on social interaction. Therefore, no effects will be evident in the unilateral communication treatments.

Hypothesis B: Minimum social exposure or elimination of anonymity is enough to produce the social effect. Hence, the effects will be evident to the same degree in all of the video communication treatments, including the unilateral ones.

Hypothesis C: Empathy and consideration for the other's interests, induced by social exposure to them drive the communication effects. Consequently, effects will be evident for the receiving side of the unilateral communication, and not for the active communicator.

Hypothesis D: The social effects rely on reducing social distance by eliminating anonymity, since a player who is exposed to others perceives the game as a repeated one and is susceptible to reputation effects. Accordingly, effects will be evident only for the active side of the unilateral communication, and not for the passive communicator.

4. EXPERIMENTAL DESIGN AND PROCEDURE

Subjects participate in an ultimatum game (Güth et. al, 1982) in either play or strategy method. Compared to Roth's experiment, a no-feedback design is used, thus subjects are unaware of the consequences of their decisions until the very end of the session (in play method this is true for proposers only). Furthermore, subjects do not know the game they are about to play when they engage in pre-play face-to-face communication in the first round.

The effects of the social nature of face-to-face communication are examined by separating the directions of communication. On the basis of the experiment described in Schmidt and Zultan (2005) two new treatments are created. In one the responder sees and hears the proposer via video interface for a two minutes pre-play communication period, whereas in other the proposer sees and hears the responder for a two minutes pre-play communication period. In both treatments the communication is restricted to non-game, social only content. The unilateral treatments are compared to the baseline published in Schmidt and Zultan (2005).

The experimental procedure was as follows: First, the four proposers plus reserve arrived. They were shown the names of the invited responders and asked whether they knew any of them. A participant that recognized the name of a potential partner received the show-up fee and was dismissed to allow one of the reserves to take his place. Four proposers were then led into one sound-proof cabin each. Cabins are equipped with a computer, a video camera, a separate video screen and a microphone. A quarter of an hour later, four responders plus reserve arrived and the same procedure was conducted. Recordings were made of the four proposers and four responders, each player-type on one quadruple screen, for use when players are rating their partners at a later stage.

Participants were given written instructions (see Schmidt and Zultan, 2005), which were announced to be the same for both proposer and responder roles. Instructions were split into general instructions and game specific instructions. The participants were told that they would play a 2-players game and received general instructions only. The active communicator in the unilateral communication treatments was adviced to make some notes for his talk (see appendix). Then pre-play communication started, so communication was done before knowing the exact game in the first round. Afterwards the game instructions stated the assigned roles according to cabin numbers, so that every participant could tell her role by the number on the cabin door. After reading the instructions pertaining to the rules of the game and the communication setup, participants could ask clarifying questions, which were answered in private in each cabin. Subjects had to fill out a quiz. The experiment did not start before all participants had answered all questions correctly.

The video conference was implemented as follows. In the unilateral treatment only the communicating participant was seen and heard. However, both participants observe the same picture. Thus, the beginning and ending of the communication stage was indicated for all participants by the screen coming on and off. After the specified two minutes of pre-play communication were over, all video and audio connections were terminated.

In the ultimatum game a pie of 9 € had to be distributed. The proposers were asked to indicate their offer, which was restricted to a vector of $x_2 = \{0.5, 1.0, \ldots, 8.0, 8.5\}$. Responders were asked either to accept or reject the offer in the play method sessions or to fill in a strategy vector, conditioning their response on the possible offers in the strategy method (Selten, 1967) sessions without knowing the actual proposal. In case the responder accepts, both players receive the distribution specified by the proposer. In case the responder rejects, both get nothing. For the strategy method the 17 different offers were presented in random order each on a separate screen. Finally, subjects could see an overview of the complete decision vector and make changes. The decisions were computerized using zTree (Fischbacher 2007).

Four rounds, each including a communication stage and a play stage, were played, so that each proposer played with each responder in a perfect stranger matching design. No feedback was given between rounds. After four rounds were played, the participants who where recipients of unilateral communication, received forms on which to rate the four players they have observed using the semantic differential (Osgood et al., 1957). Recipients of communication were shown the still picture of all four participants they had played with, which was recorded at the beginning of the session. At the end subjects received feedback of the decisions of their four partners. One round was randomly chosen for the actual payoff. The participants were paid out in cash and left the laboratory. Proposers left immediately, whereas the responders had to wait a quarter of an hour in their cabins. This assured that no two participants who were assigned to the two roles ever met outside the video conference.

The sessions were conducted in the video laboratory of the Max Planck Institute in Jena, Germany (Schmidt and Baumann, 2004) in June 2002 (play method) and in November 2003 (strategy method). To prevent the influence of possible gender specific communication effects it was decided to use either male or female subjects. In a pilot experiment it turned out that male subjects were self-conscious in the unilateral treatments; therefore, the experiment recruitment was done only from female students of Jena University via email using an online recruitment system (Greiner 2004). About one half of the students were bachelor-level and one half master-level students. Less than 15% of the subjects studied Business and Economics. For each session, we invited 8 subjects (4 proposers and 4 responders) plus two reserves to cover no-shows. Altogether 48 subjects participated in 6 unilateral communication sessions which lasted about 90 minutes each. In each session one round was randomly determined for pay-off. Average total pay-offs were 7.88 € for proposers and 7.06 € for responders including a 4 € show-up fee.

Table 1: Proposers' decisions

Treatments	Mean offers (share of total pie)	Standard error	Number of observations[2]	Frequency of equal splits $x_2=4.50 €$	Frequency of near-equal splits $x_2=4.50\pm0.50$
Baseline: [1] No communication	0.345	0.134	32	0.22	0.34
Bilateral comm.: [1] Unrestricted	0.467***	0.077	32	0.75[xxx]	0.78[xxx]
Bilateral comm.: [1] Restricted	0.451***	0.073	32	0.37	0.81[xxx]
Unilateral comm.: Proposer talks	0.395*	0.133	48	0.15	0.54[x]
Unilateral comm.: Responder talks	0.403**	0.136	48	0.29	0.58[xx]

[1] Schmidt and Zultan (2005).

[2] Proposer data of play and strategy method sessions have been combined. In the experiment the decision environment for proposers in both methods was equal beside the knowledge of the responder decision method.

* Higher than baseline, p<0.1, Mann-Whitney test, one-sided.

** Higher than baseline, p<0.05, Mann-Whitney test, one-sided.

*** Higher than baseline, p<0.01, Mann-Whitney test, one-sided.

[x] Higher than baseline, p<0.1, χ^2 test, one-sided.

[xx] Higher than baseline, p<0.05, χ2 test, one-sided.

[xxx] Higher than baseline, p<0.01, χ2 test, one-sided.

Table 2: Responders' decisions

Treatments	Disagreement frequency	Number of observations	Average threshold (share of total pie, strategy method only)[2]	Standard errors	Number of observations
Baseline: [1] No communication	0.125	32	0.367	0.08	16
Bilateral comm.: [1] Unrestricted	0.063	32	0.467[+++]	0.13	16
Bilateral comm.: [1] Restricted	0.029	32	0.244***	0.12	16
Unilateral comm.: Proposer talks	0.238	48	0.300	0.15	16
Unilateral comm.: Responder talks	0.271	48	0.400	0.19	16

[1] Schmidt and Zultan (2005).

[2] Out of the strategy vectors obtained over all treatments all offer vectors were monotonic between the equal split and the minimum offer. Therefore we reduce the vector to the acceptance threshold, defined as the lowest offer accepted.

[+++] Acceptance threshold higher than baseline, p<0.01, Mann-Whitney test, one-sided.

*** Acceptance threshold lower than baseline, p<0.01, Mann-Whitney test, one-sided.

5. RESULTS

The average offer in the responder-talks treatment was significantly higher than in the baseline, whereas the average offer in the proposer-talks treatment was marginally higher than in baseline (see Table 1). Although no differences were evident between the average offers made in the two unilateral communication treatments, an examination of the equal split offers reveals that proposers were more likely to offer an equal split when they saw and heard the responder than when they were talking themselves ($\chi^2=2.987$, p<0.1, two-sided, see Table 1).

Responders' data are in line with what we observe in the proposer decisions. Responders were less likely to reject offers when they saw and heard the proposer than when they were talking themselves (albeit not reaching significance, see Table 1). This consistent finding, that, seemingly, it is the recipient of the communication who becomes more cooperative, suggests that increased

cooperativeness is not driven by reputation effects, which should be evident in the active, and not passive communicator's decisions. It is also in line with the interpretation of Roth's (1995) unrestricted treatment, which seems to reveal the influence of the responder's threats.

In order to assess whether subjects' decisions were dependant on the characteristics of the other player they saw, the average offers made to each responder and the average acceptance thresholds encountered by each proposer were computed. No significant differences were found between different (active) communicators who played in the same treatments.

Next, the correlation between the general impression rating and the decision (either proposer's offer or responder's acceptance threshold) of the rater was tested. As the ratings were given at the end of each session, it is impossible to determine whether a positive correlation indicates that a positive impression leads to cooperative behavior, or that the decisions influenced the final ratings. Surprisingly, no correlation was found in any of the unilateral sessions.

6. CONCLUSIONS

Schmidt and Zultan (2005) conclude that pre-play face-to-face communication effects may be the outcome of both strategic and social-affective processes, depending on the protocol of the communication. Game-relevant communication affects the strategic considerations of the players, whereas social communication may induce cooperative behavior through affective processes. The influence of the protocol may come about by means of inducing different frames for the interaction. When players are making a decision following a bargaining discussion, they become more sensitive to the strategic considerations, and conversely, when the decision making follows a social talk, the players become more sensitive to social cues and norms.

This interpretation is in line with the results obtained with unilateral pre-play communication. As the unilateral communication in the experiment was restricted to social content, its effects can be assumed to be of an affective-social nature, thus evident primarily in the decisions of the receiver of the communication, who is exposed to the other player, hence more readily mentally constructing the situation within a social context than the active communicator.

When compared to social-only bilateral communication (Schmidt and Zultan, 2005) low disagreement frequencies were not as evident with unilateral pre-play communication, giving support to the hypothesis A that increased cooperation and equity is specific to social interaction. Nonetheless, a significant increase in proposers' offers was indeed found even with unilateral communication, particularly for the passive recipient of the communication. Thus, the hypothesis C that exposure to relevant others influences social utilities is somehow supported. The evidence supporting the complementing hypothesis D, stating that the exposed, active communicator becomes susceptible to reputation effects, hence acting more cooperatively, exists marginally only for the proposers.

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APPENDIX

The translated instructions are published in Schmidt and Zultan (2005). The unilateral communication treatments used the following additional instructions, which are an extension of appendix A1, Schmidt and Zultan (2005).

Unilateral responder (proposer) talks treatment, restricted communication:

At the beginning of each round participants of type Y(X) can communicate with the assigned participant of type X(Y) via video conference for 2 minutes. Only participant X(Y) may hear and see Y(X). Participant Y(X) is able to see her own picture, but is unable to see or hear participant X(Y)! Type Y(X) is not allowed to talk about the content of the experiment. This will be controlled by us. Any attempt to break this rule will result in exclusion from payments. After the initial 2 minutes of communication are over, you will be handed a separate sheet that describes the content of the game.

Additional instructions for unilateral restricted treatments, active communicators:

In case you see your own picture on your screen please start to talk. When, after 2 minutes of communication, your picture will disappear from the screen, you can stop talking. Type X(Y) is not able to see and hear you anymore. During the two minutes of communication please turn your face towards the camera and not to the screen.

Before the communication phase, please note down a couple of remarks you might want to talk about for 2 minutes. In case you have no idea we present a couple of ideas in alphabetical order below:

- Party
- Sports
- University
- Weather