



Persuasion in experimental ultimatum games

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ABSTRACT

We study persuasion effects in experimental ultimatum games and find that Proposers' payoffs significantly increase if, along with offers, they can send messages which Responders read before deciding. Higher payoffs are driven by both lower offers and higher acceptance rates.

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1. Introduction

Speech is power: speech is to persuade, to convert, to compel. It is to bring another out of his bad sense into your good sense. (Ralph Waldo Emerson, American essayist and poet, 1876).

The opportunity to communicate may be used in bargaining situations to persuade the counterparty into accepting a particular offer. Is such communication effective? The question especially applies to simple interactions under complete information where any verbal communication is viewed as *cheap talk* by traditional economic theory.

We study the effects of one-way communication by Proposers in experimental ultimatum games (UG). A Proposer's message may persuade a Responder to accept a certain offer and, if such *persuasion effects* are anticipated, the Proposer may also adapt the offer. In particular, a Proposer may combine an expectedly persuasive message with a

suitable offer in order to increase the expected payoff. We test the hypothesis that persuasive messages increase Proposers' average payoffs.

There are potentially confounding factors at play: messages may also affect subjects' emotions and perceptions of economic outcomes. For example, a Proposer may experience guilt when making a low offer, and find relief from sending an apology or explanation for the offer. Alternatively, Proposers may enjoy a positive self-image when making a high offer and such a feeling may be intensified by sending a friendly message to the Responder. We refer to such effects as *self-image effects*.

In order to disentangle persuasion and self-image effects, we propose an experimental design with three versions of the UG: a standard UG without communication (treatment N) and two treatments (B and A) in which the Proposer can compose a free form message before submitting the offer. In treatment B the Responder sees the message *before* deciding to accept, while in treatment A the Proposer sees the message only *after* the acceptance decision is made. Thus, persuasion effects are not present in treatment A and differences in outcomes between treatments A and N can be attributed to self-image effects. In contrast, differences between treatments B and N capture both persuasion and self-image effects. We thus identify persuasion effects comparing treatments B and A.

We find that persuasion effects indeed led to an increase in Proposers' payoffs. On average, Proposers' payoffs in treatment B were

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14.5% higher than in treatment A. The increased payoffs were due to both higher acceptance rates and lower offers. The persuasion effect was most pronounced in cases where subjects had experience of the game. We do not find any significant influence of self-image effects on Proposers' offers. Moreover, using the message evaluation methodology put forward in Xiao and Houser (2005), we find that the majority of messages in treatment B were classified as persuasive. Our data suggest that subjects who sent persuasive messages received higher payoffs.

2. Previous experimental evidence

Communication in games has been analyzed earlier in the experimental literature. Rankin (2003) used a UG in which the Responder could request an amount of money before the Proposer made his offer. Rankin found that average offers and Responders' payoffs were lower in the treatment where requests were possible.

The results by Rankin (2003) differ from the finding of a related study by Xiao and Houser (2005), in which Responders in a UG were given the opportunity to send messages along with their decisions to accept or to reject the Proposers' offers. They found that this led to significantly lower rejection rates of unfair offers and observed that people facing unfair economic exchanges could tend to substitute emotion expression for relatively more costly material punishment.

The finding by Xiao and Houser (2005) has been complemented by two further experimental studies. Xiao and Houser (2007) compared a standard dictator game with one in which, after revelation of Dictators' decisions, Receivers had the opportunity to write a message to their respective Dictators. They found that profit-maximizing offers were less frequent when Responders had the opportunity to send messages.

In a related work, Ellingsen and Johannesson (2008) studied pairwise interactions in which a Dictator decided how to split a sum of money between himself and a Receiver, who, thereafter, could send an unrestricted message to the Dictator. They found that donations increased substantially when Receivers could communicate: with verbal feedback, the frequency of zero donations decreased from about 40 to 20%, with a corresponding increase in the frequency of equal splits from about 30 to 50%.

Our work may be seen as complementing the previous studies in that we let Proposers, instead of Responders, communicate. The focus of our study is on the role of persuasion rather than on the effects of emotion expression of Responders. In the light of persuasion, Proposers may have more to gain from communication since they can plea for rationality in the form of subgame perfection.

3. Experimental design

We invited 76 students from Tilburg University to participate in our experiment. Subjects were divided into 6 sessions, taking place in CentERLab. Subjects were given aloud and written instructions of the experiment.

At the beginning of the experiment, subjects were randomly assigned the role of either Proposers or Responders. In each treatment every Proposer was randomly matched with one different Responder. The Proposer had to decide how many points X between 0 and 100 to offer to the Responder. The Responder then learned the Proposer's offer and could either accept or reject it. In case of acceptance, the Responder's payoff was X points, and the Proposer's payoff was $100 - X$ points. In case of rejection, both subjects earned 0 point.

We employed three different treatments:

1. *N (no communication)*: A standard UG without communication
2. *B (Responder got message before her decision)*: The Proposer sent a message together with the offer which the Responder read *before* deciding to accept or to reject.
3. *A (Responder got message after her decision)*: Like B, but the Responder read the message *after* deciding to accept or reject.

Table 1
Proposers' payoffs across treatments.

Treatment	Proposers' average payoffs	Standard deviation
N	42.87	27.23
A	41.71	26.31
B	47.76	27.06

The experiment used a within design where all subjects in a session played each of three different treatments at one time. Subjects knew in advance that there would be three different treatments and that in each treatment they were going to be matched with a different opponent, but they did not know the content of the subsequent treatments in advance. Moreover, subjects kept the same role of Proposer/Responder across all three treatments. There was no feedback to Proposers during the experiment: Proposers were informed about their Responders' decisions in each treatment only at the end of the experiment. To control for order effects, we employed a counterbalanced design containing the following six sequences with different orderings of the treatments: *NAB*, *NBA*, *ANB*, *ABN*, *BNA*, and *BAN*.

We designed and ran the experiment using *z-Tree* (Fischbacher, 2007). A show-up fee of 2.50€ was paid to subjects. In addition, participants received their pay-out of one randomly drawn game converted at a rate of 0.10€ per point. The 76 participating subjects spent about half an hour in the lab and earned on average 6.60€ each.

4. Results

Table 1 shows Proposers' average payoffs in the three treatments. In line with our hypothesis, average payoffs in treatment B were 14.5% larger than in treatment A. Since payoffs strongly differed between accepted and rejected offers, standard deviations were quite high, however.

Within subjects, 15 of the 38 Proposers received higher payoffs in treatment B than in treatment A, while only 6 Proposers had lower payoffs; for 17 Proposers payoffs were the same. A one-sided sign test confirms the hypothesis of positive persuasion effects at a 95% significance level (p -value = 0.039). The persuasion effect appears to be driven by a combination of lower offers and increased acceptance rates. Of the 15 Proposers who achieved higher payoffs in treatment B than in treatment A, 9 made lower offers in treatment B. The remaining 6 subjects made the same offer in both treatments, but this offer was only accepted in treatment B.

The full distribution of offers and acceptance rates across treatments is shown in Table 2. Average offers were slightly lower and average acceptance rates were slightly higher in treatment B than in both treatments A and N. In particular, for low offers, acceptance rates were higher in treatment B. Treatments A and B display very

Table 2
Offers and acceptance rates across treatments.

Offer	Treatment N		Treatment A		Treatment B	
	No. of offers	Accept. rate	No. of offers	Accept. rate	No. of offers	Accept. rate
10			1	0	1	1
20	1	1	1	1	2	1
25	1	1	2	0	1	1
30	9	0.55	7	0.43	8	0.63
32	1	0				
35	3	0.33	4	0.5	5	0.4
40	8	0.63	7	0.86	9	0.78
45	3	1	2	1		
50	11	1	13	1	11	1
55			1	1		
56	1	1				
60					1	1
Avg. offer/accept. rate	39.8	0.74	39.6	0.74	38.4	0.79

Table 3
Average Proposer profits, offers and acceptance rates of experienced and inexperienced Proposers by treatment and message classification.

		Total		No message		Persuasion		Apology		Friendliness		Other	
		Inexp	Exp	Inexp	Exp	Inexp	Exp	Inexp	Exp	Inexp	Exp	Inexp	Exp
A	Mean offer	39.2	39.8	40.6	40.0	47.0	35.0			50.0	41.7		27.5
	Mean profit	37.5	43.7	26.3	38.3	53.0	40.6		0.0	50.0	48.3		72.5
	Accept	0.67	0.77	0.50	0.67	1	0.67		0	1	0.89		1
	Messages	1	1	0.50	0.14	0.31	0.41		0.04	0.06	0.41		0.13
B	Mean offer	38.8	38.3	41.3	36.0	36.7	36.2	30.0		50.0	50.0		
	Mean profit	39.2	51.7	43.8	50.0	40.8	52.6	0.0		50.0	50.0		
	Accept	0.67	0.85	0.75	0.80	0.67	0.82	0		1	1		
	Messages	1	1	0.34	0.20	0.50	0.65	0.08		0.08	0.15		
N	Mean offer	38.9	40.2	38.8	40.3								
	Mean profit	44.6	42.1	45.3	41.7								
	Accept	0.75	0.73	0.75	0.73								
	Messages	1	1	1	1								

Note: The Inexp category contains inexperienced subjects in the first round of the experiment while the Exp category contains the experienced subjects in rounds two and three of the experiment. Acceptance denotes the fraction of accepted offers. Messages denotes the fraction of Proposers who sent messages of that category.

similar aggregate outcomes. Taken together, our finding indicates the presence of persuasion effects, while no systematic self-image effects can be found.

4.1. Messages and experience effects

Despite the absence of information about Responders' behavior between treatments, Proposers could in principle still gain experience about the game. To address the effects of experience we divided our data into two subsamples based on whether subjects had experience of the game. We refer to subjects as *inexperienced* in the first decision round and as *experienced* thereafter.

We also gave a closer look at the content of the messages, following the methodology in Xiao and Houser (2005). We invited 22 subjects from Magdeburg University, Germany to independently classify the 56 messages into one of four categories: *Persuasion*, *Friendliness*, *Apology* or *Other*. Evaluators were paid 5€ for showing up and could earn additional 10€ if their classification matched the most common classification for a randomly drawn message.

For inexperienced and experienced subjects, Table 3 reports the fraction of messages according to the most common message classification, and the corresponding average offers, profits and acceptance rates.¹ The first column reports results over all types of messages. Experience did not seem to affect Proposers' profits in treatment N, while it did in the communication treatments. The effect was especially strong in treatment B, in which average profits for inexperienced Proposers were 39.2 compared to 51.7 for experienced.^{2, 3}

Moreover, experienced subjects decided more often to send messages to Responders in the communication treatments. The data hence suggests an interaction between experience and the persuading capability of Proposers. Further insights may come from the content of the messages. Most messages in treatment B were classified as persuasive while in treatment A, messages were more evenly

distributed among friendly and persuasive messages. Moreover, in treatment B the number of persuasive messages increased as subjects got experienced. For experienced subjects, a persuasive message in treatment B led to higher acceptance rates and average profits than for inexperienced subjects. Interestingly, offers between experienced and inexperienced subjects were similar. Thus the observed increase in profits seemed to be due to the higher number and effectiveness of the persuasive messages.⁴

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¹ There were no ties in the classification of messages.

² Within-subject comparison between treatments B and A was not significant for the inexperienced group and borderline significant (one-sided sign test p -value: 0.0592) for the experienced group.

³ Another issue related to experience is whether Proposers made different offers following treatment B. To address this issue we compared the offers in round 2 of sessions with order ANB and NAB with sessions with order BAN and BNA. For session ANB and NAB treatment B was last and the subjects in round 2 did not yet experience it. For sessions BAN and BNA treatment B was first and the subjects in round 2 therefore already experienced it. By only looking at round 2 data, the exposure to treatment B was varied keeping the order in the sequence constant. Proposers' offer following B was on average 40.4 compared to 37.7 for Proposers not having experienced B. Hence, there was no clear effect on offers from having experienced treatment B.

⁴ The fact that acceptance rates differ across treatments also rules out the alternative hypothesis that, independently of treatments, Responders were more prone to accept a given offer when experienced. In particular, average acceptance rates went down with experience (even though average offers increase) in treatment N whereas the opposite was true for the communication treatments. This is in line with a previous UG experiment with no communication reporting no effect on acceptance rates from experience (Abbink et al., 2004).