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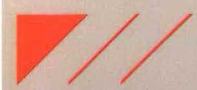

Center
for
Economic Research

No. 9726

STRATEGIC DELEGATION: AN EXPERIMENT

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March 1997

ISSN 0924-7815

Strategic Delegation: An Experiment

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Abstract: This paper examines the effects of strategic delegation in a simple ultimatum game experiment. Our main concern is to examine the way delegation alter the way players think about the game and play it. Specifically, we show that a delegate's offer is more easily accepted by the responder as he is less keen to punish both the principle and the agent. We also show that unobserved delegation by the responder lowers his share as his agent is perceived to be more willing to accept tough offers. These effects identify an additional explanation to the delegation phenomena.

We would like to thank Patric Bolton, Eric van Damme, Martin Dufwenberg, Jos Jansen, Avner Shaked, and Yossi Spiegel for many valuable comments and the CentER for Economic Research at Tilburg University for financial support.

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Strategic Delegation: An Experiment

1. Introduction:

In many types of games players, instead of playing the game themselves, prefer to send agents that play the game on their behalf. Why do players use agents to play games? There are several possible explanations of this phenomena. The first is that in some games, players choose agents who have special skills that make them better players. For example, players may send lawyers to negotiation games in which the knowledge of the law is an important part of the negotiation and may yield an advantage in the negotiation. A second possible explanation for the delegation phenomena is that players may send agents when they are under the impression that these agents are more intelligent or more experienced than they are and therefore may play the game better than they do. This explanation, however, relies on a bounded rationality argument in which some players are more able than others (they can either think faster, calculate all the possible contingencies, think about creative alternatives etc.) and where these abilities are important for playing the game. The third explanation is that delegation may serve as a commitment device; that is, in such cases, the mere possibility of using an agent may give the player an advantage in the game as it allows him to commit to a certain behavior. The role of delegates as a commitment device has been coined in the literature as *strategic delegation* and has been extensively discussed since Schelling (1960)[1].

[1] For the different aspects of strategic delegation see Caillaud, Jullien, and Picard (1995), Fershtman and Judd (1987), Fershtman , Judd, and Kalai (1991), Fershtman and Kalai (1997), Gal-Or (1996), Green (1990), and Katz (1991).

The main structure of a delegation game entails an additional primary stage in the game where players may hire delegates and either give them instructions on how to play the game or sign compensation scheme contracts which reward the delegates according to their performance. The compensation scheme may, or may not, be publicly observable. The possibility of observing the delegate's compensation scheme may drastically affect the outcome of the game. When the agent's compensation scheme is observable and irreversible, it serves as a commitment device manipulating the agent's strategic behavior and consequently the outcome of the game. The observability assumption has drawn harsh criticism in the literature. Critics have claimed that when the compensation schemes are not observable, delegation cannot serve as a commitment device (see Katz (1991)).[2] While the intuition of this claim may be convincing, the formal analysis is not obvious. In a recent paper, Fershtman and Kalai (1997) analyzed simple ultimatum games with unobserved delegation and showed the conditions under which delegation, even when it is unobservable, may affect the outcome of the game.

In this paper we examine the effects of strategic delegation in a simple ultimatum game experiment. Our main concern is to examine the effect of delegation on the way players think about the game and how they play it.[3] We therefore extend the discussion on delegation and consider the possibility that the use of delegates, by itself, may affect the way players perceive the game and consequently the outcome of the game.

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[2] See also Dewatripoint (1988) for a discassion on the role of delegation as a commitment device when the compensation scheme can be renegotiated.

[3] The role of agency in bargaining games was considered also by Schotter, Snyder and Zheng (1995). The main issue in that paper was the effect of agency on the efficiency of the bargaining. That is, do we expect a grater breakdown of the bargaing process when it is executed by agents rather than by the original players themselves.

The standard ultimatum game is a two-player game in which at the first stage, one of the players, denoted as the Proposer, proposes a division of a given pie between himself and the other player. At the second stage, the other player, denoted as the Responder, either "accepts" or "rejects" the offer. Acceptance is followed by executing the division while rejection implies that both players get no share of the pie. This type of ultimatum game has been extensively discussed in the literature (for recent surveys see Camerer and Thaler (1995), Guth (1995), and Roth (1995)). While theory implies that, at equilibrium, the Proposer gets all (or almost all) of the pie, experiments show that most divisions are not so extreme and that the average offer is typically between 30 and 50 percent, with many 50:50 splits. Moreover, low offers (20 percent or less) are frequently rejected.

Into the above ultimatum game setup, we introduce agents that represent either the Responder or the Proposer. We let the players provide compensation schemes (either observable or unobservable) for the agents and then we examine how the game is played and how it differs from the ultimatum game without delegation.

Using a messenger to deliver bad messages (or, in our case, bad offers) is a commonly observed practice. Would a Responder react identically to the same offers if made directly by the Proposer or by the Proposer's messenger or agent? This is not a simple issue. In doing ultimatum game experiments, the outcome usually differs from theoretical subgame perfect equilibrium. Arguments like a taste for fair division[4], norms of behavior, etc., are commonly used in order to explain the deviation from the

[4] The meaning of "fair" and "unfair" is usually exogenously given and determined by the norm of behavior in the society. It may vary across societies, groups, genders, etc..

theoretical predictions (again, see the surveys by Camerer and Thaler (1995), Guth (1995), and Roth (1995)). That is, the Proposer refrains from making an unfair offer as he is afraid that such an offer will be rejected simply on the basis of being unfair. However it is possible that the same Responder is willing to accept the *same* offer from an agent if he knows that it is not the agent who benefits from the unfair division and, moreover, that in punishing the Proposer for an unfair offer, the agent will also be punished automatically. Similarly, would an agent that represents the Responder, be as sensitive as the Responder himself to "unfair" offers? After all there is no reason for the agent to take such offers personally as it is the Responder who is treated unfairly.

Indeed our experiment indicates that the Proposers' payoffs are significantly higher when they use delegates. This is since delegates offers are more easily accepted because the Responder is less keen to punish both the principle and his delegate. Given such a behavior the Proposer optimally provides incentives to his agent to give tough offers. Note that in such a game the Responder has the ability to make "take it or leave it" offers. Thus the advantage from using an agent is not from the ability to use it as a commitment device, but simply because his participation in the game induces a different behavior from the other players i.e., the Responder.

On the other hand, our experiment indicates that unobserved delegation by the Responder lowers his share as his agent is perceived to be more willing to accept tough offers. That is, the willingness of the delegate to punish the Proposer for an "unfair" proposal made to a third party (the Responder) is lower than the willingness of the Responder himself to punish for a direct unfair proposal. Since the Proposer figures

this effect in advance, he concludes that he can make a more greedy proposal with a lower risk of being rejected.

2. Setup and design of the Delegation Game.

We conducted four experimental sessions, administrated in writing, and held in regular class rooms. In sessions 1,..,4 we had 60, 42, 51, 39 participants, respectively (192 in total). Participants were mostly first-year economic students recruited voluntarily in their classes. They were informed that the experiment would consist of two parts, but that they would be informed about the instructions for the second part only after completing the first.

Part I in all sesions was a simple ultimatum game. This was done, first, in order to have a benchmark for comparison with the delegation game, and second, for methodological reasons. In this game, 100 'points' were to be divided between two players, a "Proposer" and a "Responder" [5]. At the first stage of the game, the Proposer proposed a division of the 100 points. If the Responder accepted the division, then both players got their shares. If the Responder rejected the offer, then both players received zero. (The instructions for part I are given in Appendix 1).

Consider now the possible use of delegates in the above ultimatum game. Delegates can be used either by the Proposer or by the Responder[6]. The delegation contract may be either observable or unobservable. Part II of the experiment (which

[5] We used points instead of money in order to have a cake of 100. The conversion rate we used was 5 points = f 1. At the time of the experiment, September 1996, f 1.6=$1.

[6] The possibility exists that both the Proposer and the Responder will employ agents, but we do not consider such a case in this paper.

differed across sessions) examined the following four variations of ultimatum games with delegation.

Delegation by the Proposer: In the first session, hereafter PO game (observable delegation by the Proposer), the Proposer uses a delegate to make the proposal on his behalf. An extra 20 points are available to the Proposer exclusively for use in providing an incentive scheme for the delegate. That is, if after delegating the action and providing the incentive scheme, not all the 20 points are paid to the delegate, none of the original players may claim the remaining points. Under such rules, delegation is costless; The pie to be divided between the Proposer and the Responder remains of the *same* size with or without delegation, which enables a simple comparison between the different scenarios that we investigate.

The procedure for Part II of the first session is as follows: At the first stage, the Proposer hires an Agent and signs a publicly observed compensation contract that specifies the Agent's fee as a function of the number of points the Proposer will receive.[7] At the second stage of the game, the Agent proposes a division of the 100 points and the Responder needs to reply by "accept" or "reject". The final division is similar to the original ultimatum game (Part I) wherein the delegate receives the points according to his compensation scheme, but only if the Responder accepts the proposal (i.e., the payoff to the Agent is also contingent on whether the proposal is accepted or rejected). The instructions for this part are given in Appendix 2.

[7] A variation of this problem would be to compensate the delegate on the basis of the proposal that he is making, independently of whether the offer is accepted or rejected.

The second session of the experiment, hereafter PN game, is the same as the PO game but the delegate's compensation scheme in this case is *not* observed.

The subgame perfect equilibrium of the PO game is as follows: the Proposer provides the Agent with the compensation scheme of paying him 20 points (or any other positive amount) if he proposes 99 points to him and 1 point to the Responder, for any other proposal, the delegate will receive zero points. The delegate indeed offers the division 99:1 and the Responder accepts. The equilibrium of the PN game is the same as that of the PO game.

Do we expect any strategic delegation in games PO and PN? In these games, the Proposer does not need the agent as a commitment device. According to the structure of the game itself, the Proposer has the power to make "take it or leave it" offers. In such a case, the possibility of using a delegate does not benefit the Proposer. Our first hypothesis is based on this intuition; That is, the outcome of the PO and the PN games would be the same as the outcome in the regular ultimatum game.

The competing hypothesis is that the Proposer may benefit from the use of a delegate. The rationale for such a hypothesis is that the Proposer may use the delegate as a shield that allows him to indirectly give, by means of the delegate, bad offers. That is, if the Proposer suggests a division in which he takes most of the points he runs the risk that the Responder will "reject" the proposal in order to punish him for an "unfair" offer. It is not clear that the Responder will react the same to an "unfair" offer that comes from a third party. Moreover, if the Responder rejects the offer, he punishes not only the original Proposer but also the "innocent bystanding" agent. That is, if we accept the view that players may choose to punish offers that are unfair, even

at some cost to themselves, it is nontheless unclear whether they are willing to punish players who are not to be blamed. In such a case, the delegate may be viewed as a *hostage*.

We do not have a specific hypothesis for the PN game as the above "hostage" argument also holds for this case. The question is, of course, if it is possible to use the agent as a hostage even when the contract with him is unobservable.

Delegation by the Responder: In the third session of the experiment, hereafter RO game, it is the Responder who is using a delegate that will respond to the offer made by the Proposer. The Responder may use the extra 20 points to provide the agent's incentive scheme. The RO game proceeds as follows: At the outset of the game, the Responder signs a *publicly observed* contract with the delegate. At the second stage the Proposer, after observing the delegate's compensation scheme, makes his proposal of the division of the 100 points. At the last stage, the delegate either accepts or rejects the offer.

The fourth session of the experiment, hereafter RN game, is the same as the RO game but in this case the delegate's compensation scheme is *unobserved*. That is, the Responder is using an agent but the compensation scheme that he provides to this agent cannot be observed by the Proposer.

For the RO game the theory indicates that the specific order of moves implies a transfer of all the "power" to the Responder who, by providing the delegate's compensation scheme at the first stage becomes the first mover and thus gains the ultimatum power. That is, while without the use of delegates the subgame perfect

equilibrium is that the Proposer offers a division in which he receives 100 (or 99) points, to which the Responder agrees, the subgame perfect equilibrium in the RO game is that the Responder provides the agent with the compensation scheme of paying him 20 points if he accepts an offer of at least 99 points and zero otherwise. Thus, as game theory suggests, the possibility of the Responder using strategic delegation implies that at the subgame perfect equilibrium, he gets almost all the amount to be divided.

Regarding this part of our experiment, the first hypothesis that we examine is that the use of observable delegation, as in the RO game, affect the outcome of the game by providing an advantage for the Responder. For such a case, we will examine the basic intuition provided by the theoretical analysis.

In considering the role of observability we compare the outcomes of the experiment of the RO game with that of the RN game in order to examine three competing hypotheses. The first one is that delegation, when it is unobservable, is in-affective and thus the outcome of the RN game will not be significantly different from the outcome of the original ultimatum game. This hypothesis is in the spirit of Katz (1992), who argues that in the RN game, delegation does not affect the outcome of the game; in particular, the Responder cannot benefit from strategic precommitment. The (rational agent) equilibrium of this game, as suggested by Katz, is that the Responder provides the compensation scheme: "I will give you 20 points as long as you accept any positive offer". The Proposer then offers the division of 99 to himself and 1 for the Responder and the delegate will "accept" such a proposal.

The second hypothesis is that the Responder may benefit from using an agent even when the incentive scheme he provides is not publicly observed. This hypothesis is in the spirit of Fershtman and Kalai (1997), who showed that commitment via delegation may be beneficial even when the delegation is unobservable and the players have the option to play the game themselves. The potential for such benefits depends on the type of delegation (incentive versus instructive), the possibility of repetition, and the probability of observability.

The third competing hypothesis is that the Responder will be *worse off* from using an agent. That is, once the Proposer uses an agent and the incentive scheme is unobserved, the proposals that he will get will be lower, as will his expected payoffs[8]. In such a case the Responder will be clearly better off without using an agent.

3. Results

The basic question in each of the four types of delegation games, in our experiment, is whether the use of a delegate changes the outcome of the game and under what circumstances a Proposer (or Responder) may expect to benefit (or suffer) from the use of a delegate. The outcome of our experiment is described in Appendix 3, Table A1, in which we present all the proposals that were made in each of the four games, including proposals that were rejected. In Table 1, below, we present the average proposal and the average payoffs (taking into account the rejections) for each part of our four games.

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[8] We wish to delay the rationale for such an hypothesis to our discussion section.

	PO Game	PN Game	RO Game	RN Game
Without Agent:				
Ave. Proposal	56.67	55.71	57.69	55.50
Ave. profit for Proposer	47.67	49.52	49.23	48.00
Ave. Profit for responder	38.96	40.96	39.23	42.00
With Agent:				
Ave. Proposal	64.50	59.29	47.06	66.92
Ave. profit for Proposer	60.50	52.86	39.41	57.69
Ave. profit for Responder	36.50	40.00	48.82	26.93

Table 1: The average proposal and the average payoffs in the four games. (The numbers are the prob of a result larger than $|z|$, where z is the test statistic).

In the first part of Table 1, we present the results for the first part of the experiment, in which players played the ultimatum game without delegation. In the second part of the table we present the average proposal and payoffs (to both the Proposer and the Responder) in the four delegation games that we studied. Before elaborating on these results, it would be useful to describe the distribution of the proposals that were made in each variation of the delegation game. This is done in Figure 1.

Before turning to a more formal testing of our results, we provide a pairwise comparison of the outcomes of the ultimatum games of the different games (see Appendix 4). Our test indicates that there is no significant ex-ante difference between the groups.

Now we turn to test our hypothesis regarding the different effects of delegation. To do so we compare, for each game, the outcomes of Part I (the ultimatum game) with

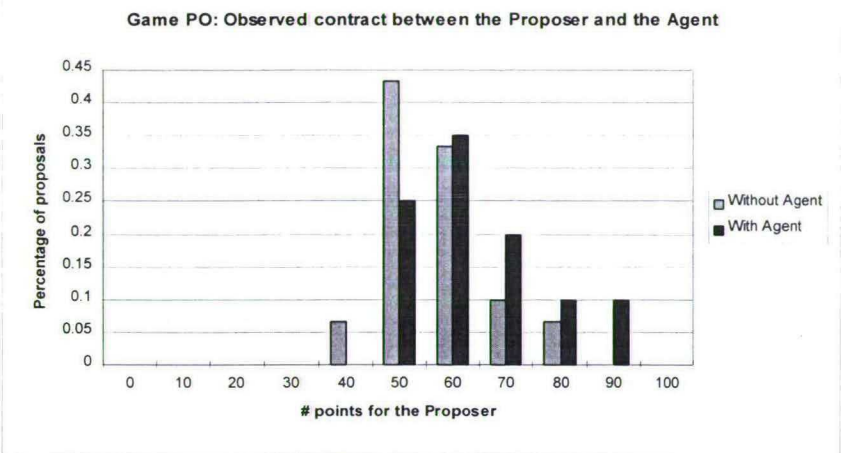
the outcomes of Part II (the delegated game). For comparison, we use the Mann-Whitney U test. We report the test results in Table 2.

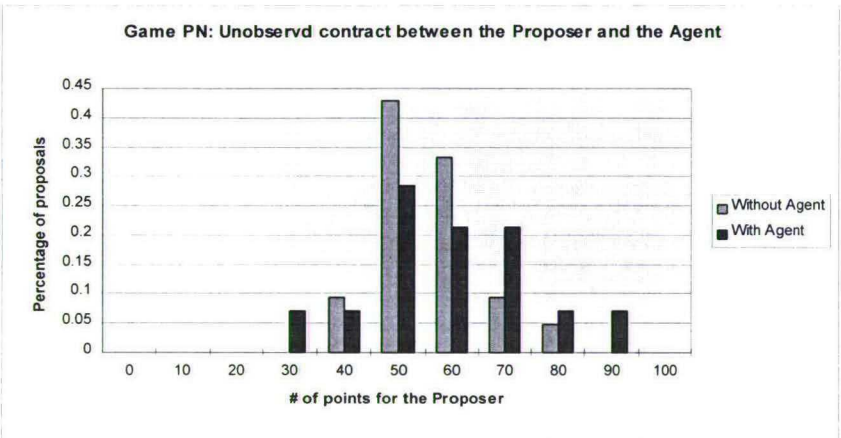
	PO Game	PN Game	RO Game	RN Game
Profit-Proposer	.0119	.5007	.0455	.0682
Profit-Responder	.1273	.6616	.0483	.0326
Proposal	.0349	.4588	.0254	.0224

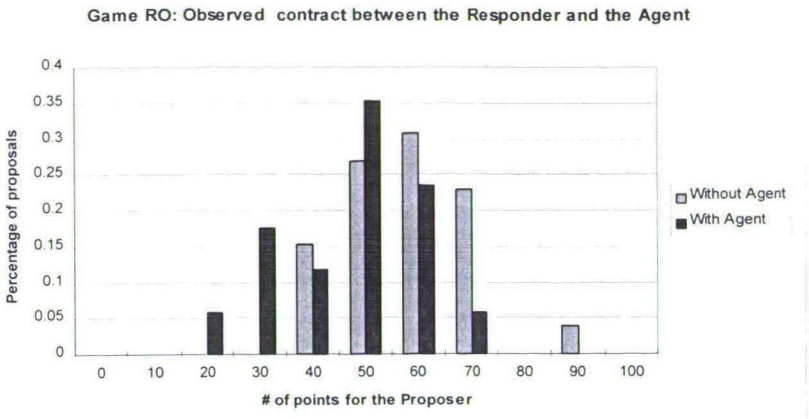
Table 2: Mann-Whitney U tests with pairwise comparisons of the medians of outcomes in Part I and Part II of each game. (The numbers are the prob of a result larger than $|z|$, where z is the test statistic).

PO Game: When the Proposer uses an agent with an observable compensation scheme, the average proposal went up from 56.6 to 64.5 and the average payoffs to the Proposer went up from 47.6 to 60.5 (see Table 1). Observing Table 2, it is evident that when using a delegate, the Proposer gave significantly (at a .95 level of significance) higher proposals (a larger share to himself and a lower share to the responder), and their profits were significantly higher as well.

PN Game: From Table 1 one can see that when the Proposer uses an agent but the compensation scheme is unobserved, the average proposal went *up* from 55.7 to 59.3 while the Proposer's payoffs increases from 49.5 to 52.8. These changes are in the same direction as in the PO game but, as indicated in Table 2, these changes are not significant.


Game PO: Observed contract between the Proposer and the Agent
Percentage of proposals
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 10 20 30 40 50 60 70 80 90 100
points for the Proposer
Without Agent
With Agent


Game PN: Unobservd contract between the Proposer and the Agent
Percentage of proposals
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 10 20 30 40 50 60 70 80 90 100
# of points for the Proposer
Without Agent
With Agent



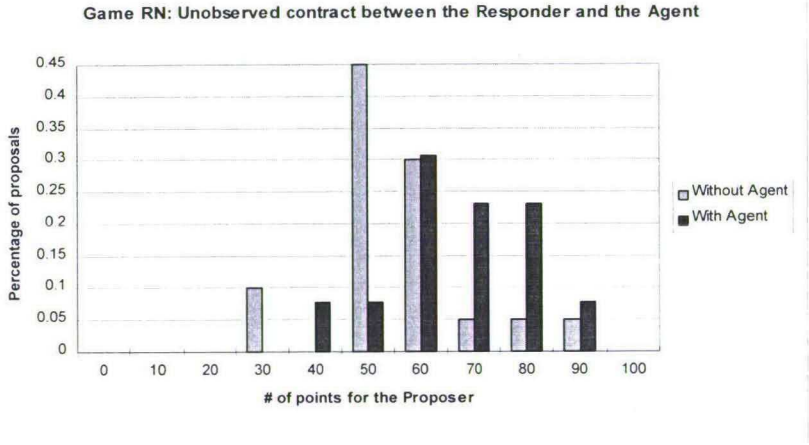


Figure 1: The distribution of proposal that were made in each variation of the delegation game.

RO Game: When the Responder uses an agent and the contract is observable, the average proposal *declines* from 57.7 to 47.0, the average payoffs of the Proposer *declines* from 49.2 to 39.4 while the Responder's average payoffs increase from 39.2 to 48.8. From Tables 1 and 2 we thus learn that the use of a delegate by the Responder significantly improves both the proposals that he receives and his payoffs he makes provided that the agency contract is observable.

RN Game: In the RN game, the Responder uses an agent but the agency contract is unobserved. From Tables 1 and 2 we learn that the unobserved delegation induces significant changes in the offers made and the payoffs received by both players. The average proposal *increases* from 55.5 to 66.9, the Proposer's average payoff *increases* from 48.0 to 57.7, while the Responder's average payoffs decreases from 42.0 to 26.9[9]. Surprisingly, the effect of unobserved delegation, in this case, is in the opposite direction than in the RO case, in which the agency contract is observable. Thus, the use of an agent with unobserved contract makes the Responder *worse* off.

4. Discussion: The different effects of delegation.

In the regular ultimatum game, it is the Proposer who has the power to make "take it or leave it" offers, therefore, the theory suggests that he will receive all the surplus. In such a case, there is no role for agency as a commitment device. Yet the results of our PO session indicate that the Proposers' payoffs are significantly higher when they use agents.

[9] One of the two rejections in Part II of game RN is problematic. The Proposer in this observation offered a division of 60:40; the Responder offered the Agent 20 points for accepting this offer (contract 6 in Appendix 5d), yet the Agent rejected the proposal. We report on on all our observations, but note that the 'spirit' of the above discussion would not change even if we did not take this observation into account.

This result implies that an additional explanation for the effectiveness of delegation exists. In the regular ultimatum game, the Proposer realizes, when making his offer, that he might be punished for making an "unfair" offer. He also understands that although the Responder is willing to punish him for an "unfair" proposal, this willingness decreases in the presence of a delegate because punishing the Proposer would imply punishing an "innocent" delegate as well. In other words, the Proposer uses the delegate as a hostage. Note that indeed in the PO session, four out of 30 (i.e. 13%) proposals were rejected in the ultimatum game, but only one out of 20 (i.e. 5%) in the game with the agent-although the overall proposals were significantly higher in the delegated game.

In the PN game we did not identify any significant effect of delegation. Casual observation of Figure 1 indicate an increase in the variance of the offers. We however prefer at this stage, not to draw any specific conclusion from this part of the experiment beyond the statement that the observability of the incentive contract changes the way players play the game.

In the RO game, it is the Responder who uses an agent. In such a case, the agent serves as a commitment device. At the first stage of the game, the Responder signs an observable compensation scheme with the agent, which allows him to commit not to accept certain offers. Indeed, game theory suggests that the equilibrium for this game is such that all the surplus accrues to the Responder. Our experiment indicates a significant effect in the same qualitative direction. The Responder benefits from the delegation and his expected payoffs increase significantly.

We find the outcome of the RN part of the experiment the most surprising. For this part, we identified initially three competing hypothesis. The first one is that RN

delegation does not affect the outcome of the game. The Responder cannot use the agent as a commitment device because the incentive contract is not observable. The second hypothesis is that even without observability there is some commitment value in delegation; therefore, the Responder will benefit from the use of agents. We found out that we can reject these two hypothesis and that, to our surprise, the Responder should expect to end up *worse off* from using an agent with unobserved contract. The explanation we suggest for this result is that the willingness of the delegate to punish the Proposer for an "unfair" proposal *made to a third party* (the Responder) is lower than the willingness of the original Responder to punish for a direct unfair proposal. Moreover, the Proposer figures this effect in advance, and concludes that he can make a more greedy proposal with a lower risk of being rejected.

The above result is in contrast to Katz (1991) and Fershtman and Kalai (1997). Katz (1991) argues that the use of a delegate with an unobserved contract will not influence the outcome of the game (i.e., the outcomes will be similar to those of the ultimatum game). Fershtman and Kalai (1997) predict that, in many cases, the use of a delegate influences bargaining even if the contract is unobserved, and thus the effect of some delegations is in the direction of the RO prediction.

Note that while our experiment examines a game with unobserved delegation, it cannot be viewed as an experiment that evaluates the different claims of Katz (1991) and Fershtman and Kalai (1997). It has already been well established that the outcome of ultimatum bargaining experiments differs from the theoretical subgame perfect equilibrium of this game. Thus, observing a difference in the outcomes of the RO and the RN games may be due to the frequently observed deviation of these experiments

from the equilibrium prescribed by game theory rather than an indication of the theoretical role of unobserved delegation. To our opinion, the contribution of those experiments that compare the outcomes of the RO and RN games with the original ultimatum game without delegation is to see to what degree the use of delegation is helpful and whether players take advantage of strategic delegation even when it is unobservable.

Comparing the incentive contracts provided in the RO game and in the RN game indicates that the Responder indeed understands the role of delegation as a commitment device. In the RO game the Responders provided an "aggressive" incentive contracts. Observe that the median value for which he is giving all the 20 points to the agent is the amount of 80 to the Responder. In the unobserved case the Responder realizes that the unobservability implies that agency does not have a commitment value, and the median value for the agent to receive all the 20 points decrease to 20 (see the table in Appendix 5d).

5. Concluding Remark.

In this paper, we have described an experiment designed to analyze the effect of delegation on the outcomes of ultimatum games. The main conclusion of this experiment is that delegation significantly changes the outcome of the game. Beyond the standard explanations of strategic delegation, our experiment suggests that the introduction of an additional player, the agent in our case, changes the players' perceptions regarding the norm of behavior and what constitute a fair division in the game they are playing. These

suggestions may be extended beyond the scope of ultimatum games and delegation. There are many games in which the strategic interaction may determine the entrance of a new player into the game; for example, in market games in which entry deterence is possible and the firms' actions may affect the possibility of entrance. In such cases, changes in the set of players may affect the players' perception about the (fair) norm of behavior or other behavioral rules that the players prefer to obey. Such perceptions affect the way that these type of games are played, and therefore changing these perception should be discussed in a strategic context.

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Appendix 1: The introduction and instructions for part I

Introduction

The instructions are simple, and if you follow them carefully you may earn a considerable amount of money that will be paid to you in cash at the end of the experiment. 60 students participate in this experiment. Each of you is about to get an envelope with a number. This is your registration number. Please look at it and then put it back in the envelope without letting anyone else see it. At the end of the experiment you will be asked to show the registration number you have in the envelope to the experimenter, and he will pay you according to your performance. Do not forget to write your registration number on all the forms that you will get.

The experiment consists of two parts.

Instructions for part I

In this part, 100 points is to be divided between two persons: the "Proposer" and the "Responder". At the end of the experiment, each of the two persons will get 20 cents for each point he will have.

A proposal about how to divide the 100 points between the two persons is made by the Proposer. Upon receiving the proposal the Responder is asked to respond by either accepting or rejecting it.

(a) If the Responder accepts the proposal, then both he and the Proposer are paid according to the proposal.

(b) If the Responder rejects the proposal, then both persons are paid 0 points.

The procedure for Part I is as follows: 30 students will be selected randomly to play the role of the Proposer in this part. Each Proposer will get a form on which he is asked to indicate his proposal to the Responder. The proposal must be in multiples of 10 (0, 10 ,

20, 30, etc.). For example, either 0 to the responder and 100 to the proposer, or 10 to the responder and 90 to the proposer, etc.

After the Proposers will make their choice we will collect all the forms in a box, and let each of the 30 Responders students to pick randomly one form out of the box. The Responder will not be able to know what is written on the form before choosing it, and will never know the identity of the Proposer with whom he was matched (he will only know the registration number of that person). The Responder is asked to indicate on the form whether he accepts or rejects the proposal. We will collect the forms and write down the payment for each student for this part (using the registration numbers). Then part II will start. You will get the instructions for part II after part I will be over.

Appendix 2: The instructions for part II of game PO

Instructions for part II

This part is similar to part I, but this time the Proposer can not make the proposal himself. Instead, the Proposer must hire an "Agent" to make the proposal on his behalf. First, each Proposer will write a contract with an Agent. The Agent will see the contract before deciding how much to propose to the Responder. After the Agent will make the proposal the Responder will see **both** the proposal and the contract between the Proposer and the Agent. Then, the Responder will be asked to decide whether to accept or reject the proposal.

In order to pay the Agent, the Proposer gets 20 points (which he can use only to pay the Agent). If the Proposer offers the Agent less than 20 points, then the rest of the points are lost.

The procedure for Part II is as follows: 20 students will be selected randomly to play the role of the Proposer in this part. Each of them will get a form with the following table

Payment from the Proposer to the Agent

# points for the Proposer	0	10	20	30	40	50	60	70	80	90	100
# points to the Agent											

In each column the Proposer is asked to write how much to pay the Agent if he gets for him the corresponding number of points. That is, if according to the agents proposal this amount of points will be given to the Proposer. For example, in the column of 90, the Proposer is asked to write how much to pay the Agent if he gets for him 90 points, etc. After all the Proposers will fill out this table on the form, we will collect the forms in a box.

We will then select randomly 20 students out of the remaining 40 to play the role of the Agent. Each Agent will pick randomly one form out of the box, and observe the table that the Proposer he is matched with made. The Agent is now asked to make a proposal to the Responder. The forms will be collected again in the box.

Each of the remaining 20 students will be a Responder. Each will randomly pick one form out of the box and observe both the Agent's payment table and the proposal made by the Agent. Then he is asked to decide whether to accept or reject the proposal. The Responder is asked to indicate his choice on the form.

To summaries, the procedure is as follows:

The Proposer	→	**The Agent**	→	**The Responder**
Writes a contract with the Agent		Observes the contract and makes a proposal		Observes both the contract and the proposal and decides whether to accept or reject the proposal

Remarks:

(a) The payment from the Proposer to the Agent does not have to be in multiples of 10.

(b) If the proposal that the Agent makes is rejected, then all persons, including the Agent, get 0 points for Part II.

We will then collect all the forms, find out how much money each of you earned in Part I and Part II, and pay each of you privately. This will end the experiment. If you have any question please raise your hand and one of the experimenters will come to you.

Appendix 3: The Proposals

	PO Game		PN Game		RO Game		RN Game	
#	Without Agent	With Agent	Without Agent	With Agent	Without Agent	With Agent	Without Agent	With Agent
1	80*	90	80	90*	90*	70*	90*	90
2	80	90	70*	80	70*	60*	80	80
3	70*	80*	70	70	70	60	70	80
4	70	80	60*	70	70	60	60*	80
5	70	70	60	70	70	60	60	70
6	60*	70	60	60	70	50	60	70
7	60*	70	60	60	70	50	60	70
8	60	70	60	60	60*	50	60	60*
9	60	60	60	50	60	50	60	60*
10	60	60	60	50	60	50	50	60
11	60	60	50	50	60	50	50	60
12	60	60	50	50	60	40	50	50
13	60	60	50	40	60	40	50	40
14	60	60	50	30	60	30	50	
15	60	60	50		60	30	50	
16	50	50	50		50	30	50	
17	50	50	50		50	20	50	
18	50	50	50		50		50	
19	50	50	50		50		30	
20	50	50	40		50		30	
21	50		40		50			
22	50				50			
23	50				40			
24	50				40			
25	50				40			
26	50				40			
27	50							
28	50							
29	40							
30	40							
Ave. profit Proposer	47.67	60.5	49.52	52.86	49.23	39.41	48	57.69
Ave. profit Responder	38.96	36.5	40.96	40	39.23	48.82	42	26.93
Average proposal	56.67	64.5	55.71	59.29	57.69	47.06	55.5	66.92

Table A1: The Proposals made by subjects. The proposals that were rejected are with a *.

Appendix 4: Comparing the population in the four games.

We use the nonparametric Mann-Whitney U test based on ranks in order to test whether the samples of the outcomes come from populations having the same median. This is the appropriate test because the distributions are not normal. We report the test results in Table A2.

	Game 1 and 2	Game 1 and 3	Game 1 and 4	Game 2 and 3	Game 2 and 4	Game 3 and 4
Profit-Proposer	.8934	.6873	.9526	.8139	.8449	.6657
Profit-Responder	.7449	.8630	.9842	.6378	.7543	.8767
Proposal	.7814	.7116	.7215	.5562	.9169	.5062

Table A2: Mann-Whitney U tests with pairwise comparisons of the medians of outcomes in the ultimatum game by sessions. (The numbers are the prob of a result larger than $|z|$, where z is the test statistic).

From Table A2 we learn that, with a .95 level of significance (actually, even at .5 level of significance) we cannot reject the hypothesis that each of the two samples compared are from populations with the same median.

Appendix 5: The incentive contracts in the four games.

Amount for the Proposer	0	10	20	30	40	50	60	70	80	90	100
1	0	10	**20**	20	20	20	20	20	20	20	20
2	0	5	10	15	**20**	20	20	20	20	20	20
3	0	0	10	15	**20**	20	20	15	15	10	10
4	0	5	10	15	18	**20**	18	0	0	0	0
5	0	0	0	5	10	**20**	15	10	5	0	0
6	0	0	0	0	0	15	**20**	10	0	0	0
7	0	0	5	5	10	10	**20**	10	0	0	0
8	0	0	5	5	5	10	10	**20**	20	20	20
9	0	0	0	0	0	10	15	**20**	0	0	0
10	0	0	0	0	0	0	0	**20**	0	0	0
11	0	2	4	6	10	15	18	19	**20**	20	20
12	0	2	4	6	8	14	16	18	**20**	20	20
13	0	2	4	6	8	10	15	18	**20**	20	20
14	0	2	4	6	10	12	15	17	**20**	20	20
15	0	2	4	6	8	10	12	15	**20**	20	20
16	0	0	0	5	5	5	10	15	**20**	20	15
17	2	4	6	8	10	12	14	16	18	**20**	20
18	2	8	5	7	0	19	13	16	0	2	3
19	8	8	10	10	11	14	14	15	15	18	18
20	9	5	0	7	8	4	3	10	15	9	3

Appendix 5a: The contracts of game PO.

Amount for the Proposer	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1	**20**	20	20	20	20	20	20	20	20	20	20
2	0	5	10	15	**20**	20	20	20	20	20	20
3	0	3	9	15	**20**	20	20	20	20	20	20
4	0	8	10	12	18	**20**	20	20	20	20	20
5	0	4	**8**	12	16	**20**	16	12	**8**	4	0
6	0	0	5	5	15	18	**20**	5	5	0	0
7	0	5	**8**	10	12	15	**20**	20	20	20	20
8	0	0	0	0	5	10	**20**	20	20	20	20
9	0	3	7	10	13	15	19	**20**	20	20	20
10	0	0	0	**8**	10	15	18	**20**	10	10	10
11	0	0	5	5	10	10	15	**20**	20	20	20
12	0	0	0	0	5	10	15	**20**	20	20	20
13	0	2	4	5	6	**8**	10	15	**20**	20	20
14	0	2	4	6	8	10	12	14	16	18	**20**

Appendix 5b: The contracts of game PN.

Amount for the Responder	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1	5	10	15	**20**	10	5	10	15	0	10	20
2	0	5	10	15	18	**20**	20	20	20	20	20
3	0	5	10	10	15	15	**20**	20	20	20	20
4	0	0	0	0	0	0	**20**	20	20	20	20
5	0	1	1	2	2	5	5	**20**	2	1	0
6	0	0	0	0	0	0	0	**20**	20	20	20
7	0	0	0	0	0	0	0	**20**	20	20	20
8	0	0	4	6	10	10	16	18	**20**	20	20
9	0	1	4	10	13	14	15	15	**20**	20	20
10	0	0	0	0	0	5	10	15	**20**	20	20
11	0	12	15	15	16	16	18	18	19	**20**	20
12	0	2	5	10	10	15	15	15	15	**20**	20
13	0	3	4	5	11	12	14	17	18	19	**20**
14	0	2	4	6	8	10	12	14	16	18	**20**
15	0	2	4	6	8	10	12	14	16	18	**20**
16	0	15	15	15	15	15	15	15	15	15	**20**
17	1	1	1	1	1	1	2	5	10	15	**20**

Appendix 5c: The contracts of game RO.

Amount for the Proposer	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1	**20**	20	20	20	20	20	20	20	20	20	20
2	**20**	20	20	20	20	20	20	20	20	20	20
3	0	**20**	20	20	20	20	20	20	20	20	20
4	0	10	**20**	20	20	20	20	20	20	20	20
5	0	10	**20**	20	20	20	20	20	20	20	20
6	0	5	**20**	20	20	20	20	20	20	20	20
7	0	0	**20**	20	20	20	20	20	20	20	20
8	0	0	**20**	20	20	20	20	20	20	20	20
9	0	0	0	0	0	**20**	0	0	0	0	0
10	0	11	12	13	14	15	16	17	18	19	**20**
11	0	2	4	16	18	19	12	14	16	18	**20**
12	0	2	4	6	8	10	12	14	16	18	**20**
13	0	2	4	6	8	10	12	14	16	18	**20**

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