

A Comparison on Individual and Group behaviour in Ultimatum Game Experiment

Introduction to Neuroeconomics - Project Report

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Abstract—Even though it is commonly known that people and groups behave differently in terms of making economic decisions, the causes of these behavioural variances are still not fully understood. In a context where cheating can be employed to surpass the competition, we empirically compare individual and group behaviour. We can exogenously control the sort of decision maker, the type of competition, and whether the competitor can or cannot cheat, thanks to our architecture. The findings support those of other interactive games in that cheating is significantly more prevalent in inter-group competition than in inter-individual competition. We further demonstrate that expectations about the rival are primarily to blame for this disparity. When competing with another group, groups have different expectations than individuals do, and they take the other group's propensity to cheat very seriously.

Index Terms—Game theory, Ultimatum game

I. INTRODUCTION

While the ultimatum game is a good tool to test important sociological perspectives, like how it illustrates the human unwillingness to accept injustice, doing the same in a group setting helps us understand how people's choices are affected when they have to think of the group as a whole and not just individual profits or losses.

Also, the ultimatum game has been the subject of an experimental study that has mostly examined individual behaviour. There hasn't been any comprehensive research on how groups act in this game.

The Ultimatum game is a classic two-player game. The two players of the game are called the proposer and the responder (depending on what their roles are in the game). A certain portion of a valued product may be offered by the proposer. A response can either accept or reject the offer, inferring that neither of the players receives anything. The only subgame-perfect Nash equilibrium is to accept all offers, even if they are infinitesimally small except zero. In this paper, we talk about what happens if we replace the two individuals playing the game with two groups of people. Some recent studies have found that groups learn more quickly, make decisions that are more complex and payoff-oriented, and are less affected by cognitive constraints, behavioural biases, and social factors.

In this paper, we study experimentally how individuals and groups behave in a competitive setting. Our experimental design allows us to test how the type of actor and the type of competitor affect behaviour and, at the same time, control

for expectations. The setting involves a common real-world trade-off between morally correct behaviour (being honest) and payoff-maximizing behaviour (lying). Examples involving individual decision-making and group decision-making can be found in many different contexts, such as sports, politics, business, or academia. The Volkswagen emission scandal and the Russian doping scandal are examples where cheating occurred in highly competitive environments. Competitive settings create very different incentives to cheat than non-competitive settings because of the inevitable comparison with the competitor. Many competitive settings involve a winner-takes-all aspect that awards only those who perform the best, for example, when candidates compete for a position, prize, grant, or contract. Competition, therefore, intensifies human inclinations to compare themselves with others. As cheating typically takes place secretly, competitors cannot rely on observed behaviour but have to form and use expectations. The important question we ask in this paper thus is whether and how individuals and groups differ in their tendencies to form and use expectations in competitive settings.

II. INITIAL EXPECTATIONS

There are various reasons to anticipate that individuals and organizations would behave in diverse ways. One explanation is that individuals are less aggressive or competitive in groups. This suggests that organizations would be more likely to exploit the receiver position and try to get more for themselves than might be thought to be just. However, if group competitiveness is a trait shared by player 2's groups, those groups would be less likely to accept unfair offers than player 2's less competitive individual individuals. The group condition should have had fewer offers and a larger percentage of rejections than the individual condition, which does not match the findings.

Another theory is that groups are more sensible than individuals, both in terms of what they are prepared to receive and what they are willing to contribute. based on the suppositions that certain individual subjects do not instantly understand the strategic layout of the ultimatum game and that group discussion may help to clarify the assignment. According to the "group rationality" hypothesis, rejection rates in the group treatment would be the same as or lower than those in the individual treatment, while offers would be lower in the group treatment than they would be in the individual treatment.

The idea of a social norm may be invoked by potential discrepancies between groups and individuals as the third and final explanation. According to the social norm theory of the ultimatum game findings, participants have a common understanding of what makes a decent offer in the given situation. Eg. A cross-cultural study by Roth et al. (1991) that compared the behavior in the ultimatum game in the US, Japan, Yugoslavia, and Israel provided significant support for this explanation. Even though the modal offers were in the usual range of 40 to 50 percent in all four countries, they discovered that the subject pools varied significantly. Israeli subjects, for instance, made lower offers than Americans. The crucial point is that Israeli subjects also demonstrated lower levels of acceptability, which is why Israel's rejection rate was comparable to that of the United States.

The likelihood of rejections should be lower in group therapy than in individual treatment if groups do, in fact, have a better accurate understanding of the dominant norm. Assume that regardless of whether a participant is acting as an allocator or a recipient, the distribution of fair offers is the same for all of them. The samples of allocators and recipients in a particular experiment may have different norms because they were too independent (and relatively small) draws from that distribution. The expected average difference between an allocator norm and a recipient's norm is smaller and the expected rejection rate is lower the closer these two random samples' means are to one another. Two independent samples from the group distribution are less likely to differ from one another than two samples from the individual distribution because, as was previously argued, the distribution of group norms is narrower than that of individuals. Thus, our third hypothesis predicts that groups would typically offer the same amount as individuals, but that the rejection rate would be lower in the group condition.

To summarize, we consider three possibilities:

- groups are more competitive than individuals
- groups are more "rational" than individuals
- groups are more "normative" than individuals

III. BACKGROUND

We see two reasons for studying group behaviour. First, as pointed out by Messick et al. (1997), in many real-life bargaining situations, the negotiators are groups (such as families, boards of directors, legislatures, or committees) rather than individuals. Second, as we hope to demonstrate studying groups may shed new light on how individual subjects interpret the ultimatum game and how they approach its solution.

This article reports two experiments that compared the ultimatum game played by individuals with the same game played by three-person groups. In the individual treatment, player 1 had to propose a division of x points between himself and player 2, and player 2 had to decide whether to accept or reject the proposal. In the group treatment, the members of the group in the role of player 1 had a few minutes of face-to-face discussion to propose a division of the x points between their group and group 2, and the members of group 2 had a similar

discussion to decide whether to accept or reject the proposal. If the proposal was accepted, each player received an equal share of his group's payoff (each point in the group condition was worth three times that in the individual condition).

Since the strategic structure of the ultimatum game is not affected by this manipulation, the game-theoretic solution for the two treatments is identical—namely, player 1, whether an individual or a group should propose to keep all but a single point, and player 2 should accept this proposal. Of course, we already know that individuals do not behave in this way, and the question that we focus on here is whether the behaviour of groups is any different from that of individuals.

IV. EXPERIMENT DESIGN

Overall, 40 undergraduate and 8 graduate students participated in this experiment which was conducted in multiple sessions as a pen-and-paper experiment at the International Institute of Information technology, Hyderabad. To make the experiment look fair, the roles of "Proposer" and "Responder" were allocated based on a coin toss. The participants of this experiment were mostly 1st-year students, with a few undergraduates being 2nd-year students. Thus the age group was ranging from 17-26 age group. Also, 33 students were males whereas the rest 15 were females.

12 (6 pairs) were assigned to the individual condition and the rest 36 were assigned to the group condition (6 pairs of three-person groups).

Our aim was to make this experiment as anonymous as possible, so we tasked the teams to select one leader from each side whose only role was to take part in the coin toss and decide what role their team wanted to take - proposer or responder. So as the teams didn't know the identity of the opposing team, no biases were made in the judgment. Other than this series of group experiments, we also conducted individual Ultimatum game experiments amongst people in the same environment with the same instructions so that we could understand the differences in the possible choices in a group session and an individual session. In the following subsections, we will describe the two experiments.

A. Individual Experiment

The experiment was done with both participants in separate rooms. The participants were given a detailed set of instructions, and the role of the proposer and the responder were selected randomly by one of the two individuals overseeing the experiment. The proposer is now given two minutes to make a proposal to the other person. One of the most important details was that the amount that was being split was known to both the proposer and the responder (100 in this case). After being given the proposal, the individual now has to either agree to the amount written in the proposal and split it between the proposer and himself or reject the proposal and gain nothing.

B. Group Experiment

In the group condition, two groups (3 participants each) were recruited at a time. The groups did not know the identities

S.No.	% taken
1	60
2	45
3	60
4	50
5	70(R)
6	40
Mean	54.17

TABLE I
% OF THE AMOUNT TAKEN BY THE PROPOSER IN INDIVIDUAL EXPERIMENTS

S.No.	% taken
1	65
2	50
3	75
4	60
5	70
6	60
Mean	63.33

TABLE II
% OF THE AMOUNT TAKEN BY THE PROPOSER IN GROUP EXPERIMENTS

of the members of the opposing group, and each group was shown to a separate room. One of the groups was given the allocator/proposer (player 1) instructions, and the other the recipients (player 2) instructions. The members of the group in the role of player 1 were told that they had up to ten minutes of free discussion to reach a joint decision as to how to divide 300 points between their group and group 2. They were also told that the members of group 2 would have a similar discussion to decide whether to accept or reject their proposal. Except for the ten minutes time limit for reaching a decision, there were no specific instructions as to how the group's decision should be made.

V. RESULTS

The results of both the individual experiment and the group experiments are given in the tables above.

Fig. 1. Box plot of Individual Offers



Fig. 2. Box plot of Group Offers

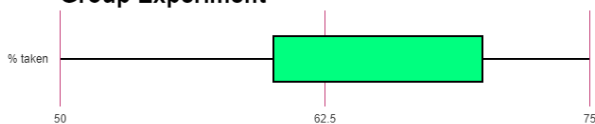


Table 1 shows the demand made by 6 individuals and Table 2 shows the demand made by 6 groups. The mean demand is also calculated in both of the tables. The rejected demands have a label R attached to them.

As you can see that groups demanded an average of 63.33 percent of the total, whereas the average individual demand was only 54.17 percent. Also, as you can see the median from the box plot the median in the individual condition is 55 and 62.5 in the group condition.

Only a single proposal was rejected in the individual condition and none in the group condition. The minimum demands made were 40 and 50 in individual and group conditions respectively. The maximum demands made were 70 and 75 in the individual and group conditions respectively.

VI. ANALYSIS

In both studies, it was discovered that when acting as the proposer, groups demanded more than individuals did. The average gap between the group and individual expectations was actually fairly considerable, amounting to 9.16 percent of the total. According to the demand distributions, 50 percent of the individual allocators offered 50 percent or more of the split, as opposed to only 16.66 percent of the groupings. 50 percent of the people made demands of 60 percent or more compared to 83.33 percent of the groupings.

The rate of refusals in the two treatments was equally low, with one offer being declined in the individual condition and none in the group condition, despite the fact that groups were significantly less charitable than people. This suggests that organizations were not only willing to accept less than individuals but also to contribute less. The one proposal of 70-30 made in the individual treatment was rejected, whereas two such proposals (70-30 and 75-25) made in the group treatment were accepted, even though we do not have enough observations to draw a firm conclusion.

This pattern of findings favors the alternative hypothesis over the hypothesis that groups are more rational than individuals. Remember that lower offers in the group treatment should have been accompanied by higher rejection rates if groups were more competitive than individuals. Alternatively, the mean offer in the two treatments should have been the same if groups had a better understanding of the dominant social norm.

As was previously said, one explanation for why groups offer and accept less is that groups comprehend the strategic structure of the game and, in particular, the strategic advantage connected to the allocator's position, better. This theory is supported by the fact that just two individual allocators—one in each experiment—offered to distribute more than 50 percent of the total while none of the groups did so.

The fact that groups in the allocator role consider the decision rule that the recipient group is likely to use when generating their proposal offers a slightly different explanation for the same pattern of results. In particular, it's possible that group members make lower offers because they believe that

in order for their proposal to be accepted, it only needs to be approved by the majority of people in the opposing group.

VII. LIMITATIONS

The study's major drawback was its small sample size. The significance of our results is influenced because this sample is not representative of the entire population.

The study's use of fictitious money was a key factor as well. We were forced to make do with the idea of fictional money because we lacked the necessary Ethics board certifications and could not actually give the participants money. As a result, people may have acted with more altruism because they realized they had nothing to gain by betraying or cheating their counterparts.

To investigate this impact, it would be intriguing to observe the variations in replies when actual money is presented. Another good point to explore in this field would be to analyse the discussions that take place in the groups to reach a common decision. This will help us understand the mentality of the various participants and why they want to propose or accept the said amount even though it might make them earn less profit.

VIII. REFERENCES

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