

Studying the Decision Making Mechanism in Organizational Context Through the Behavioral Game Theory According to Cognitive Psychology

Research Article

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Received: July 26, 2017 | **Published:** November 20, 2017**Abstract**

An interdisciplinary effort in recent years between neurology, psychology and economics is studying the neural connections associated to decision making and reacting through the behavioral game theory. This study generally deals with the instruments used by cognitive neuroscience applications to ponder behaviors of individuals, how cognitive neuroscience is used to examine interaction between employees and how it can be used to model social dynamics with examples from the relevant literature while evaluating the effects of these studies on individuals and society. The first part includes new theories and scientific findings in the fields of business management, economy and psychology. The research part includes the procedures, statistical results and findings of the test we applied. The reactions within the economic decision making process were examined by the ultimatum game which was used experimentally within the framework of behaviorist fame theory. In the research section, reactions in economic decision-making process according to the relations and social roles were examined experimentally by using the mini-ultimatum game. The last part evaluates the practical outcomes of these studies and possible effects on fields like business management and economy. We also mention about an outline and contextual constraints for the possibility of conducting these studies in Turkey. According to findings, similar results were found almost every scenario for the alternatives of "manager" and "unknown person" while the same condition is not observed for the alternatives of "manager" and "colleague". Considering the decisions of working relations as decisive in the decisions of participants, we expected that "manager" and "colleague" scenarios would be similar while these findings indicated that decisions are determined by social relations regardless of being within a working environment or not. The results of the experiment show that the decisions of participants are shaped by their relations rather than their social roles.

Keywords: Experimental economics; Behavioral game theory; Ultimatum game; Social choice; Organizational behaviors; Working environment; Social roles

Introduction

Traditional economic theory is based on the idea that people take rational decisions and act to maximize profits. However, this approach fails to explain some findings which caused economists to question these basic assumptions during the course of time. Researches reveal that individuals don't only try to act logically when taking their decisions, but also include their experience, education, welfare levels and social roles into decision making process. It is possible that these researches would change the face of fields like informatics, economy, management, ergonomics and ethics and expand our philosophical knowledge [1]. With their research program on decision making processes and especially on shortcuts used in this process, Tversky & Kahneman [2] drew attention to points where people go away from rationality when making decisions. Studies reveal that humans do not only try to act rationally when taking economic decisions, but also include their experience, education, welfare levels and social roles into decision making process. It is possible that these researches would change the face of social sciences [1].

The social dimension of this approach - in essence - can also be studied by looking through a more radical perspective at the test protocols of the ultimatum game which are general used in experimental economy. Another social parameter which may affect the ultimatum game is the existence of the experimenter. In the ultimatum game, there are numerous variations like players mutually change their places, it is played against computer and within pre-determined scenarios, and it is known that the opponent takes decisions other than his own control. However, the protocol is explained to players by an experimenter in almost every study and players know that their decisions will be known by this experimenter. In other words, it is almost impossible to get the ultimatum game out of its social content. Therefore, the mechanisms we use to explain the findings should always include a social dimension. We already face this approach more frequently. For example, with a similar approach, Beugré [3] models the ways of people to build their equity judgment and their reactions to relevant circumstances based on the neuroscience fields of neuroeconomy, organizational justice and social cognition.

Work environment is naturally an environment where it is expected and even crucial to take rational decisions. However, the studies show that even this crucial importance doesn't always lead persons to take rational decisions. On the other hand, studies on decision making and systematic faults show that these faults are common but avoidable. Elbanna & Child [4] present one of the comprehensive models on taking strategic decision. According to this model, reasoning, intuition and political behavior are decisive in the effectiveness of strategic decisions. In addition, this relation is open to effects from the quality of decision, environmental factors and qualities of the organization.

In the point where the disciplines of psychology and economy cross, ask similar questions and try to find answers through similar methods, it is seen that literature on experimental economy develops rapidly. In a study defining the areas where cognitive psychology and industry and organization psychology do and may cross, Hodgkinson [5] states that there is an increasing importance of studies towards overcoming some cognitive constraints of people by including ergonomics as well. Based on this requirement, a collateral benefit of this study will be a conclusion on the ways of environmental conditions (social conditions are represented by superior-subordinate relation particularly in this study) to affect the said decision making mechanisms and forming a basis for the works to change or improve these conditions to ensure expected behavior.

People cannot behave rationally due to the limitations of memory, interest and neurology, inadequacy of education and practice and conditions which don't avail possibility calculation. Rationality can be divided into three: absolute rationality where risk and benefit can be precisely calculated, dependent rationality that uses inventive methods (heuristics) to make decisions and bounded rationality (social and cultural rationality) emerging from social benefit from Uslu [6]. Game theory is the method that is used in the field of experimental economics to study social and cultural rationality. Ultimatum game is an experiment based on game theory which has been frequently used in the field of neuro-economy and the investigation of the human fairness recently [7-10]. The Ultimatum game includes an initial bonus to be split between two players, one of which is the offer owner and the other is the responder. In this single shot game, the participant who is proposing a section for dividing the donation and the responder then has the option to accept or reject the offer of the proposer. In the game, the proposer decides how much money to offer. If the responder accepts the offer, the responder receives the bid amount and the offer owner holds the remainder of the offer. If the responder rejects the offer, then no player will receive anything.

Experimental Protocols and Findings in the Ultimatum Game

The ultimatum game among the experiment protocols frequently used in the field is observed in the triangle of rational decision making, economic decisions and social relations. Ultimatum game developed by Güth et al. [11] is an experiment based on game theory which has been frequently used in the field of behavioral economy. It is based on dividing a certain amount

of money between two players only in one round. One of the players is expected to divide this amount into two by a ratio of his choice and offer this division to the other player. After first player makes his offer, other player may accept or reject this offer. If the second player accepts the offer, both players hold what they have but if the second player rejects the offer neither players can take anything. The expected result through the rational decision making processes which are the basis of traditional economic theory is that the first player offers the smallest amount other than zero and the second player accepts this offer. However, many studies that are done with this protocol demonstrate that the median value of the offers is usually 50% and average value is usually between 40% and 45% [12] Some studies show that people with a medium welfare level hardly say that they would not offer any money to the other players. The tendency of not giving share to the other player is higher among the subjects with low and high welfare level compared to the subject with medium level welfare.

Obtaining similar results in almost all studies based on the ultimatum game and various variations of it makes one think that decision making mechanisms are affected by the same factors almost universally. However, an intercultural study with small scale societies [12] provides a serious test to his assumption. Ultimatum game was played by participants in 15 small scale societies in various parts of the world. The reason of selecting this participant profile is the fact that different social rules apply in these societies than the market rules in the big scale, industrialized societies. When the ultimatum game was played under these conditions as suggested by researchers, findings were different than the overall literature of ultimatum game. An interesting finding in this study is that if the market conditions of the studied society are similar to those in industrialized societies and if cooperation based interaction in daily life is higher, then the behavior of the members of that society focuses on offers observing the interests of the other player. These findings, although not presenting absolute evidence, show that behaviors of players in the ultimatum game are shaped by the social and environmental effects. In another study, although they are aware that it will be costly for them, participants chose the punish inequality. If participants are to accept, they may choose rejection of options that would break inequality in favor of them. Clearly, they prefer 50% rather than 80% to be offered to them. All subjects, including women, were found to offer mainly 50% equal share which reduces the ratio of rejection. It was also found that there was a difference in terms of equal division in the mini-ultimatum game (Figure 1) between women and men [13].

The experiment results of the ultimatum games indicated that the generosity of the players is altruist behaviours rather than strategic ones [14]. However, the punishment behaviour in the ultimatum game can be understood while this cannot be explained by the direct altruist behaviour. On the other hand, the feeling of blind trust where the karma kind understanding where doing good things will bring good things seems pointless from the perspective of economics while it is also possible that total efficiency is higher than the communities without these beliefs in addition to the fact that these behaviour patterns are effective in various cultures and societies [15].

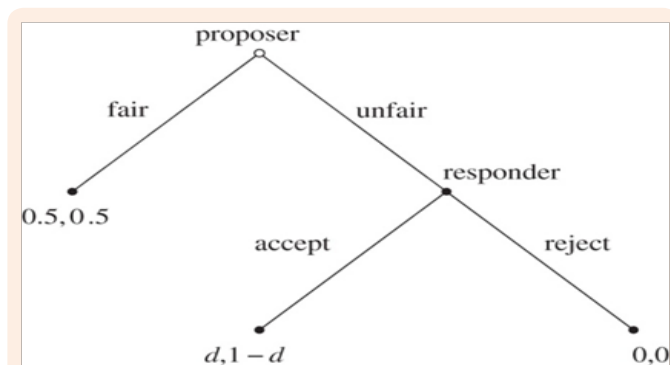


Figure 1: The mini-ultimatum game in extensive form [14].

In the lab, people refuse unfair offers in the Ultimatum Game even in single-shot decisions, if they are not likely to meet again with the person who submitted the offer [11,16]. Players who face unfair offer by opponents experienced increased activation in the bilateral preinsula, front part of the cingulate cortex and dorsolateral prefrontal cortex [17]. The activations of the front part of the insula and the dorsolateral prefrontal cortex increase against an unfair offer. If the insula activation is higher than the activation of the prefrontal cortex, the subjects tend to reject the offer and vice versa [18]. In a mutual process of economical decision making, individuals who previously played the role of their opponents and were allowed to make a choice learned the judgment process and tended towards more rational selections taking the interests of both parties into consideration than those who didn't assume the roles of their opponents yet. There are

significant differences between non-experienced and experienced players. While many experienced responders choose strategies that are monotonically rational and characteristic of most ultimatum game results (accepting high offers and rejecting low ones), almost as many others display a tendency towards "hyper-fairness" (rejecting offers that are too low and too high). Both experienced and non-experienced proposers, in turn, seem to take this into account with an unusually high proportion of 50/50 splits [19]. The results obtained don't comply with the economic individual defined by the classical economy theory and but reveal qualities evaluating circumstances socially and reacting as a result of internal judgment processes [19].

Method and Experiment Design

In the experimental part of the study, participants were asked to play the Ultimatum Game and it was attempted to determine the social preference and general altruism level heuristically. Convenience sampling method was used to make more than 850 participants play the ultimatum game. Participants first filled in a form to determine demographic qualities. Then participants played the Ultimatum Game successively against one of the 4 different opponents. Subjects faced the ratios (Table 1) offered under 5 different successive scenarios against one of the 4 different opponents namely one unknown person chosen by computer, a manager, a colleague or a neighbor. Subjects didn't move forward to a new scenario without completing any one scenario. In the first scenario, the opponent was told that he had only one choice to present to the participant and asked whether to accept or not an offer of 20 TL. In the next 4 scenarios, subjects were asked to state what they would do if one of the two options was selected and offered to them.

Table 1: Percentage of Participants Who Accepted Offers against the Scenarios Presented.

		1 st Scenario	2 nd Scenario	3 rd Scenario	4 th Scenario	5 th Scenario
Offered to the subject		80 take, 20 give	100 take, 0 give	80 take, 20 give	20 take, 50 give	80 take, 20 give
Alternative Offer		-	80 take, 20 give	50 take, 50 give	80 take, 20 give	100 take, 0 give
Unknown Person	Acceptance Ratio	38%	14%	37%	58%	40%
Manager/Superior		43%	17%	38%	65%	50%
Colleague		0/054	30%	"045	55%	55%
Neighbor		71%	50%	65%	60%	66%

Results

Average age of 885 subjects participating in the study is 36. Enrolled subjects were 56% male. The results of statistical analyses show that individuals don't only try to act reasonably but also add their feelings and social roles to the judgment processes before taking decisions. Employees tend to take decisions that have significant statistical difference against the persons with whom they have social relations like their colleagues or neighbors compared to the persons they don't know.

In the ANOVA difference analyses we made for the comparison of groups, there is no difference among groups in the scenarios where participants offer one of two options to their opponents. The first scenario of the participants which is a game where

opponents have only one option to offer 20 (without alternative) has statistical difference among groups (F=15,965 p=.000). As a result of the Scheffe test, there was no difference among those who received offers from managers and unknown persons (p=.852), while there was a difference among those who received offers from colleagues and those who accepted or rejected the offers of unknown people (p=.01) and among those who received offers from neighbors (p=.000). There was no difference between managers and colleagues (p=.287). Single alternative 20 was rejected by more than 60% participants against unknown persons while the rejection ratio among neighbors gets lower than 30%.

The differences among the reactions of participants revealed similar results also in the next scenario. When opponents offer

0 among the alternatives where they can offer 20 or 0, there is statistical difference ($F=24,695$ $p=.000$) among groups with respect to the acceptance and rejection ratio. As a result of the Scheffe test, there was no difference among those who received offers from managers and unknown persons ($p=.912$), while there was a difference among those who received offers from colleagues and those who accepted or rejected the offers of unknown people ($p=.001$) and among those who received offers from neighbors ($p=.000$). On the other hand, there was no difference between managers and colleagues ($p=.07$), while this scenario can be repeated in future works due to the acceptable difference of 10%. More than 85% participants reject 0 instead of 20 against unknown persons while the acceptance/rejection ratio for neighbors is 50%.

The reactions of participants had a similar tendency in the next scenario. There is statistical difference ($F=10,733$ $p=.000$) among groups with respect to acceptance or rejection ratio when the opponents offer 20 among the alternatives of 20 or 50. As a result of the Scheffe test, there was no difference among the ratios of those who accept the offers against unknown persons, managers and colleagues and the acceptance ratio was below 50%, there was a significant difference less than 1% among those who received offers from neighbors and other groups where acceptance ratio was 65%.

There was no statistical difference ($F=0,948$ $p=.417$) among groups when opponents offered 80 among the alternatives of 20 or 80. More than 40% of participants rejected the offer of 80 against unknown persons while the rejection ratio of managers is 33%.

There was statistical difference ($F=8,585$ $p=.000$) with respect to the acceptance or rejection ratio of players when opponents offered 20 among the alternatives of 0 or 20. As a result of the Scheffe test, there was no difference among the ratios of those who received offers from unknown persons and managers ($p=.218$) while there was a difference with respect to choices among those who accepted or rejected offers of unknown persons, those who received offers from colleagues ($p=.02$) and from neighbors ($p=.000$). On the other hand, there was a significant difference between those who used options against neighbors and those who used preference only against unknown persons ($p=.000$). While 60% of participants rejected 20 TL against unknown persons while the rejection rate for neighbors was less than 35%.

Within the framework of classical economy, the rationality approach where the people would maximize their interests in every circumstance doesn't match with our findings and it is shown that people take decisions according to the situational factors, conditions they face, roles they take and their experience (Table 1). The acceptance ratio of the players with respect to the offers of their opponents increases from unknown persons towards the persons in their social environment (Figure 2).

Since the fourth scenario is a mirror alternative, it may have been easier to pair the deciding participants with the opposite subjects in this scenario (Figure 2), but the cognitive reasons of these differences should be examined by repeating this scenario order under MR device for functional imaging.

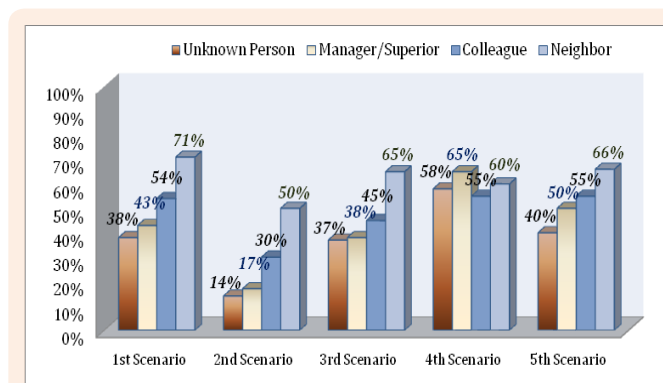


Figure 2: Accepted Offers against the Scenarios Presented.

Conclusion and Discussion

According to findings, similar findings were found almost every scenario for the alternatives of "manager" and "unknown person" while the same condition is not observed for the alternatives of "manager" and "colleague". Considering the decisions of working relations as decisive in the decisions of participants, we expected that "manager" and "colleague" scenarios would be similar while these findings indicated that decisions are determined by social relations regardless of being within a working environment or not. The decisions of participants are shaped by their relations rather than their social roles.

Within the framework of traditional economic theory, the rationality approach where the people would maximize their interests in every circumstance doesn't match with our findings and it is shown that people take decisions according to the situational factors, conditions they face, roles they take and their experience. People are social beings, use different decision making strategies and evaluate the previously learned behaviors as well. The conflict that needs to be examined here can be considered as the asymmetry between personal choices, demographic qualities and rules. That is, although the rules were introduced to foresight and limit the choices of individuals, real choices can be re-organized according to rules which make it impossible for the rules to serve the intended goals.

The most important tangible constraint of the study is the fact that the experiment was not played with real money, however, the results of this study form an important infrastructure to design scenarios to be played with real money. One of the basic criticisms on the experimental studies of economic decision making is that the experiments in a laboratory environment may systematically vary from the behaviors in real life. The second important constraint of the study is the fact that the results were not supported by fMR data. However, this process is caused by the fact that this study area is an emerging area in Turkey as we particularly mentioned in the discussion section. Functional MR studies towards cognitive behaviors require a separate process design and specialism in different disciplines.

Acknowledgement

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Conflict of Interest

None.

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