The Effects of Room Size in the Dictator and Ultimatum Games

Nicholas Di and Erik Hager

Behavioral and Experimental Economics, Macalester College
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Introduction

The intersection between social preferences and economic behavior has been studied for several decades now and has been the center of numerous recent experiments. It has been a common theme across social preference studies wherein participants in laboratory experiments tend to choose options that do not maximize their own material payoffs when social influences are present. We plan to build on the following compilation of literature by examining how varying the room environment in which dictator and ultimatum games are conducted influences the play of the participants, and whether this treatment effect constitutes a similar social influence to those of previous experiments.

Bechler et al. (2015) head up the research in the field of social preferences with their exploration of the relationship between social distancing effects and bounded self-interest using the ultimatum and dictator games. In the Ultimatum game, two people are assigned as a proposer and a responder. The proposer is asked to split $10 between the two of them. If the responder agrees, both parties get the respective share; however, if the responder disagrees, no one has any money. In the Dictator game, the respondent has no say over the split and the proposer's decision is final. Bechler and his team discovered two interesting findings. First, the proportion of amount offered decreased as the total number of amounts to be split increased. Second, Bechler asked participants to rank how close they are with their counterparts on a scale of -10 to 10 and used the number as a proxy to measure social distance. The team found that proportion offered decreased as social distance increased, meaning the more unfamiliar one was with the other, the smaller the offered proportions became.

However, Gary Charness and Uri Gneezy (2000) found opposite effects than those of Bechler et al. (2015) The team studied how people respond to varying degrees of social distance

and anonymity. The duo based their hypothesis that people are expected to act more favorable toward those with a higher degree of social kinship. Charness and Gneezy ran a 2x2 experiment with the dictator and ultimatum game. The control group played the game without knowing any information regarding their partners while the treatment groups played the games knowing the family name of the other party. They found that providing family names results in more generous allocations compared to complete anonymity in the dictator game. However, revealing the family name did not have a significant effect on the ultimatum game. Charness and Gneezy believe this is the result of how the two different games differ by nature, where the dictator game is based on pure charity and the ultimatum game is based on charity and strategy. Therefore, social distance effects and impulses of generosity might be crowded out by strategic efforts.

There are some papers that study the degree of social distancing, and its impact on proportions offered in experimental games. Kim et al. (2013) based their experiment on an idea where individuals make more self-controlled and far-sighted judgments when using a distant psychological perspective compared to a close psychological perspective. The team uses the Ultimatum Game in the context of psychological distance: where responders are influenced by the abrupt feeling of being unfairly treated when an unfair offer is presented. A way to minimize the tendency to reject unfair offers might be to increase psychological distance so a more objective perspective is considered. They decide to play the Ultimatum Game under hypothetical situations, varying degrees of social distance, to test a hypothesis that increased psychological distance allows responders in the Ultimatum Game to disengage from fairness concerns. After varying degrees of distance from self, best-friend, and stranger, they found that acceptance rates were significantly higher when participants made decisions for a stranger compared to themselves or a best friend.

Another group looked at the differences between negative and positive relationships. Orestis Vravosinos and Kyriakos Konstantinou (2019) look into the asymmetric social distance effects in the ultimatum game by examining both positively and negatively-valenced relationships. The experiment was based in a hypothetical framework, where the participants were playing the ultimatum game against "individuals" based on a relationship scale of -10 to + 10. They found that within positively-valenced relationships, the proposers increase the percentage they offer as the quality of relationship increases - however, they found that the percentage offered was invariant among the negatively-valenced relationships. Furthermore, the group found a negative effect of relationship quality on the minimum acceptable share - which contradicts literature where selfish behavior of player 1 increases the probability of punishment from player 2 when their relationship is closer.

Some researchers examined whether or not there are intrinsic motivations for bounded self interest. Rand et al. (2012) focus on the potential of behavioral evolution as a mechanism by which players of the ultimatum game tend towards fairness, without the need for pressures such as a reputation system to reward such behavior. They show that in several rounds of the ultimatum game played in groups, players selected strategies that were perceived to be superior from past games, while those strategies seen as ineffective died out. They also analyze the introduction of random experimentation mimicking genetic mutations. By the end of the study, the researchers had found that the final strategies adopted through behavioral selection reflected the ideal of fairness, in that proposers offered more than the minimum needed to avoid rejection and responders rejected low nonzero offers. This provides evidence that people may not even require an extrinsic motivation such as monetary reward in order to take actions that demonstrate bounded self-interest. The social preference for fairness leads people to make less than optimal

decisions, and thus, we should expect in our study a certain baseline lack of self-interested decision making

Bolton et al. (1995) expand research in the field by testing two hypotheses purported to explain disequilibrium behavior in the ultimatum game, with equilibrium play defined as proposers offering a bare minimum non-zero amount and responders accepting all nonzero offers. First, they examine the supposed effects of anonymity on players' motives, testing whether enforcing total anonymity between players leads to a higher percentage of equilibrium play. Second, they examine the ability to punish those who treat players unfairly, testing whether removing this ability motivates play closer to equilibrium. In their study, a control group exhibited 30% equilibrium play, the anonymous group exhibited 46% equilibrium play, and the group with no ability to punish exhibited nearly 100% equilibrium play. The researchers contend, then, that removing the ability to punish other players explains a significant portion of selfish behavior, as does the social influence of anonymity.

The literature is in relative agreement that players of the dictator and ultimatum games act less selfishly when playing with people they feel less socially distant from. We intend to test whether this effect extends to the varying of the physical environment in which the games are played. We will run instances of the dictator and ultimatum games, some with the participants convened in a large room, and others set in a much smaller room, to examine the effects of the room environment on the amounts offered in each game, as well as the willingness of players to reject various offers. We hypothesize that the large room will act to instill a sense of social distance through the physical distance it creates between the players, in comparison to the small room where players are forced to sit closer together. Akin to the literature, we predict that the

social distance of the large room will lead to lower proposer offers in the dictator game and ultimatum games, as well as a lower tendency to reject offers in the ultimatum game.

Experimental Design

For participants in our study, we recruited 28 students at Macalester College via email. We then reserved two rooms on campus, a big lecture hall and a small nearby classroom, for the day of the experiment. After we compiled a list of participants, we sent out reminders and directions to have everyone report to the big lecture hall with working and charged laptops.

In the big lecture hall, we asked everyone to complete a consent form. The experimenters then explained the rules of the ultimatum and dictator game to everyone in the room using a slideshow, which described how the experiment would be run using the game software on Veconlab for a total of 12 rounds. The first 6 rounds consisted of a dictator game with random matching and the latter 6 consisted of an ultimatum game with fixed matching. For rounds of both types of games, each participant was assigned a role as either a proposer or a responder for the entirety of the experiment. The proposers were asked to split $10 of imaginary money with an unknown responder in all 12 rounds. Responders have no say over the split in a dictator game, so a proposer's decision is final in the first 6 rounds. In an ultimatum game, if a responder agrees to split, both parties get their respective share. However, if a responder rejects an ultimatum game split, neither they nor the proposer who offered the split gets any money. We informed everyone that we will randomly select 4 individuals and pay out 30% of their in-game winnings at the end of the experiment.

We then randomly divided participants into equally-sized control and treatment groups. The 14 treatment group participants were asked to leave the room with one experimenter and

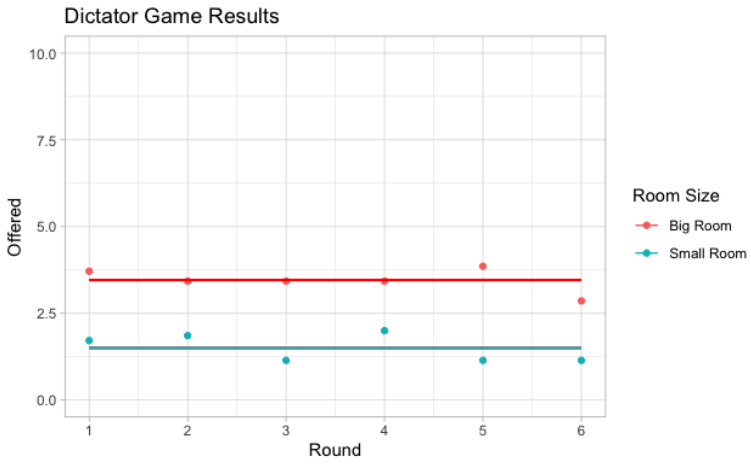
take their laptops to the small classroom in the same building, while participants in the control group stayed in the big room with a different experimenter.

In the big room, we asked the participants to spread out evenly after the treatment group left the big lecture hall. In the small room, there was a circle of tables and all chairs were filled out. We then opened up the Veconlab experiment and both big room and small room participants played the same game within their rooms at the same time. Afterwards, everyone reconvened in the big room and the four random winners were announced.

Results

During the dictator game rounds, the small room offered an average of $1.50 compared to $3.50 in the large room. Within the small room, there also appears to be a greater variation in the amount offered. In the big room, the average amount offered appears to be incredibly consistent. Visualized in figure 1, we can see a notable difference in the red and blue horizontal lines, which represent the average amounts offered in the two rooms.

Figure 1:



We regressed the amount offered in the dictator game from proposers onto an indicator variable for the small room while controlling for variations in rounds, as shown in equation 1. The following coefficient of interest is displayed in Table 1, Column 1. We can interpret the following regression as: on average, if the proposer was in the small room, the amount offered decreased by 1.95 dollars compared to the big room. This effect is about 57% of the average amount offered in the big room. This treatment effect is significant at all levels greater than 1%.

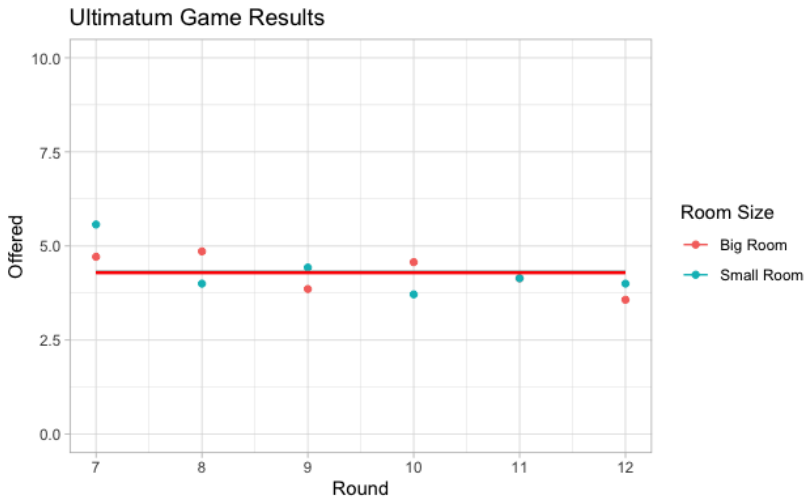
Equation 1:

$$Dictator\ Amount\ Offered\ =\ \beta_0 + \beta_1 SmallRoom\ + \beta_2 Round\ +\ \varepsilon$$

For the ultimatum game on the other hand, offer differences appear negligible. The small room offered an average of 4.30 compared to 4.29 in the large room. Within the small room, there also seemed to be a greater variation in the amount offered as well. In the big room, the average amount offered seemed to be more consistent. Visualized in figure 2, we cannot see a notable difference between the red and blue horizontal lines.

For the ultimatum game, we regress the amount offered in the ultimatum game from proposers onto an indicator variable for small rooms while controlling for variations in rounds as shown in equation 2. The following coefficient of interest is displayed in table 1 column 2. We can interpret the following regression as: on average, if the proposer was in the small room, the average amount offered increased by 0.02 dollars compared to the big room during the ultimatum game. This effect is about 0.2% of the average amount offered in the big room.

Figure 2:



Equation 2:

$$Ultimatum\ Amount\ Offered\ =\ \beta_0 + \beta_1 SmallRoom\ + \beta_2 Round\ +\ \varepsilon$$

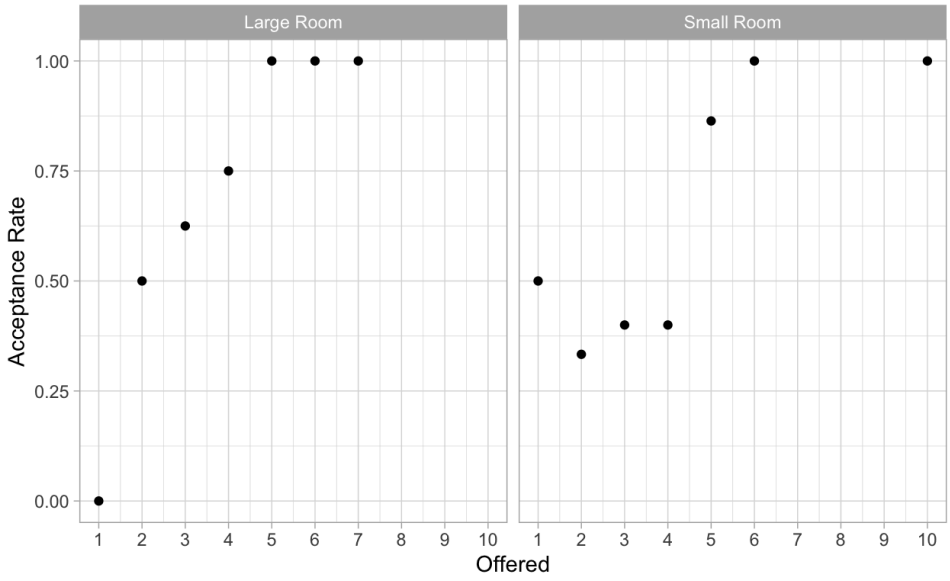
Table 1:

	(1)	(2)
	Dictator Game	Ultimatum Game
Small Room Effect	-1.9524***	0.02381
	(0.0000122)	(0.939)

*** p<0.01, ** p<0.05, * p<0.1

Using our data, we can also examine the acceptance rate behavior across the rooms. In figure 3, we can see the different acceptance rates with respect to the amount offered. The graphs are then divided by room size. Initially, we can see that offers of 2,3 and 4 dollars seemed to have a lower acceptance rate compared to the big room.

Figure 3:



We use a logistic regression to model the log odds of accepting certain amounts offered. We also interacted the amount offered with room size, hypothesizing that the amount offered will influence acceptance rate depending on which room the offered was made. For our analysis, we decided to exclude one observation that we reasonably thought was an outlier among the dataset. The regression results of equation 3 are displayed in table 2.

Equation 3:

$$Log\ Odds\ Acceptance = \beta_0 + \beta_1 SmallRoom + \beta_2 Offered + \beta_3 SmallRoom\ X\ Offered + \varepsilon$$

Table 2:

	(3)
	Acceptance Rate
Offered	1.7277**
	(0.00293)
Small Room	1.8896
	(0.430)
Offered X Small Room Interaction	-0.7940
	(0.214)

*** p<0.01, ** p<0.05, * p<0.1

Out of the three variables of interest, we have one statistically significant parameter at the using a threshold of .05: the amount offered. We can interpret this as an increase in 1 dollar of amount offered has 462.76% more odds of the responder accepting than not accepting. On average, the small room, controlling for the amount offered, has an overall average higher acceptance rate compared to the big room, however this difference is statistically insignificant along with the interaction term. In the small room, controlling for the amount offered, we will see a 555.35% increase in odds of accepting the offer in the small room compared to the big room. This increase in odds is not significant at any reasonably significant level. Thus, we do not have enough evidence to reject the null hypothesis that room size does not influence the acceptance rate.

Discussion and Limitations

The hypothesized treatment effect of room size is not statistically significant for either proposer or responder behavior in our iterations of the ultimatum game. It is possible that these findings reflect what Kim et al. (2013) touch on in their paper, in that the strategic nature of the game crowded out feelings of generosity or attachments to fairness, the social preference mechanisms by which we would expect room size to alter participants' play.

In the dictator game, however, we found a surprising and statistically significant effect: proposers in the big room offered substantially higher amounts than those in the small room. This contradicts our hypothesis that larger room size would act as a proxy for greater social distance, and thus correlate with a preference for selfish behavior in the form of lower proposer offers. There are a number of possible reasons we experienced this effect, and we would like to offer some conjectures with a bit more detail in an attempt to explain its occurrence.

One possible explanation for this effect is pure chance, since one of the limitations of our study is that it involved a relatively small sample size of 28 participants. Even though there shouldn't have been a systematic difference between individuals in the treatment and control groups due to a random assignment process, it is possible that members of the small room were *ex ante* more inclined toward selfish behavior than those in the big room.

Another possible explanation for the effect we found is the limitation that our study was not controlled to isolate our treatment effect perfectly. Namely, the fact that different experimenters were conducting the experiment in the two rooms presents a means by which the effect of the difference in room size was not perfectly isolated. As Levitt and List (2007) point out in their paper about the effects of social preference experiments, subjects of such studies often behave differently as a function of the scrutiny of experimenters. They quote Duane P.

Schultz (1969), remarking that the experimenter-experimentee relationship is akin to that of "parent and child, physician and patient, or drill sergeant and trainee." It is possible that proposers in the big room felt inclined to signal their prosocial nature to the experimenter in the form of higher offers with the intent of pleasing him, while the experimenter in the small room did not elicit as much of this type of effect.

Finally, it is possible that the effect did stem from the room environment, but not through the particular social distance mechanism we had anticipated. Such an effect, however, is not supported by any existing social preference literature, and could only be considered speculation at this point in time.

Concluding Remarks

In conclusion, we were not able to recreate the social distance effects found in previous social preference literature through our manipulation of the room environment in dictator and ultimatum games. We were, however, able to produce a statistically significant difference in dictator game offers between the big and small rooms we used. We are unable to give a definitive answer as to what caused higher offers in the bigger room — though we were able to conjecture about a few possibilities, including that of an experimenter-experimentee scrutiny effect. Ultimately, it would be of interest to us to further explore the effect we found, and perhaps try to replicate our dictator game results with a slightly different empirical approach

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