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# Evidence from Group Dictator Game Experiments

ITO, Takehiro
Faculty of Policy Studies,
Iwate Prefectural University

OGAWA, Kazuhito
Faculty of Sociology,
Kansai University

SUZUKI, Akihiro
Faculty of Literature and Social Sciences,
Yamagata University

TAKAHASHI, Hiromasa
Faculty of International Studies,
Hiroshima City University

TAKEMOTO, Toru
Faculty of Economics, Tezukayama University

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# Contagion of self-interested behavior: evidence from group dictator game experiments

Takehiro Ito[*], Kazuhito Ogawa[†], Akihiro Suzuki[‡],
Hiromasa Takahashi[§], and Toru Takemoto[¶]

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## Abstract

We examine how group decision-making affects other-regarding behavior in the experimental dictator game. In particular, we examine whether the effects of iteration differ for group decisions versus individual decision-making. Furthermore, we examine whether the difference in the decision-making style (individual or group) changes the social distance between dictators and recipients. We confirm the results of the previous study that a dictator group donates less than an individual dictator does. Our findings are as follows. First, group decisions become more selfish with iteration. Second, a dictator group donates more to a recipient group in the same university than to a recipient group in a different university. These findings are not true for individual decision-making.

*Keywords:* other-regarding behavior, dictator game experiments, group decision-making, iterated decision-making, social distance

*JEL classification number:* C92, D63, D79

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[*]Faculty of Policy Studies, Iwate Prefectural University, 152-52, Sugo, Takizawa, Iwate, Japan

[†]Faculty of Sociology, Kansai University, 3-3-35, Yamatecho, Suita, Osaka, Japan

[‡]Faculty of Literature and Social Sciences, Yamagata University, 1-4-12 Kojirakawa-machi, Yamagata, Japan

[§]Faculty of International Studies, Hiroshima City University, 3-4-1 Ozuka-Higashi, Asa-Minami, Hiroshima, Japan

[¶]Faculty of Economics, Tezukayama University, 7-1-1 Tezukayama, Nara, Japan

# 1 Introduction

Although many decisions in daily life (e.g., which drink to buy or what to eat) are made by individuals, many decisions are also made by groups (e.g., parliaments, board meetings, business meetings, faculty meetings, or family conferences). Therefore, there are many experimental studies of group decision-making (e.g., Kocher and Sutter (2005), Sutter (2005), Rockenbach, Sadrieh and Mathauschek (2007), and Bornstein, Kugler, Budescu and Selten (2008)). We examine how group decision-making affects other-regarding behavior. In particular, we examine whether the effects of iteration are different for group decision-making and individual decision-making. Furthermore, we examine whether social distances differ between group decision-making and individual decision-making.

Dictator game experiments have been reported since Kahneman, Knetsch and Thaler (1986), and many studies on dictator game experiments have since been conducted. In this game, a rational and selfish player would not distribute an amount of money to a recipient. However, in most experiments, a certain proportion of players contribute a positive amount of money. Such behavior is interpreted as other-regarding behavior.

Cason and Mui (1997) and Luhan, Kocher and Sutter (2009) examined whether group decision-making in dictator games is more selfish than individual decision-making. We define a "group dictator game" as a dictator game in which the players are groups, where each group is either a "dictator group" or a "recipient group." Cason and Mui (1997) showed that a dictator group is less selfish than an individual dictator, whereas Luhan et al. (2009) concluded that a dictator group is more selfish than an individual dictator. The method of communication within the dictator group in Cason and Mui (1997) was face-to-face, whereas the method used in Luhan et al. (2009) was online chat. According to Luhan et al. (2009), whether group decision-making is more selfish than individual decision-making depends on anonymity within the dictator group.

Next, we explain the experimental method from Luhan et al. (2009) used to conduct three-round dictator games. Under the team treatment, participants played an individual dictator game in the first and third rounds, and groups of three participants played a group dictator game in the second round. In the control treatment, participants played the individual dictator game in all three rounds. The donations in the second round were significantly lower in the team treatment than in the con-

trol treatment. They concluded that group decision-making is more selfish than individual decision-making is.

Furthermore, Luhan et al. (2009) showed that there is no significant difference in donations over the three rounds in the control treatment. However, it is possible that the iteration effect for group decision-making is different from that for individual decision-making. For example, group decision-making may become more selfish as rounds continue. We examine the iteration effect for group decision-making by comparing donations among the rounds in both iterated group and iterated individual dictator games.

On the other hand, we consider participants to have a sense of belonging to their dictator group. Furthermore, this sense of belonging may inspire a sense of belonging to a larger group that contains the dictator group. Conversely, the difference between a dictator group and a recipient group may be emphasized if the recipient group belongs to a different group than that containing the dictator group. For example, a recipient group from a different university than the dictator group may emphasize the sense of belonging to the dictator group. If we consider the sense of belonging as social distance, the Rankin (2006)'s result[1] is applicable. Applying this result, a dictator group should donate less to a recipient group in a different university than to a recipient group in the same university.

In contrast, the individual dictator game does not increase participants' awareness of groups as it does in the group dictator game. Hence, in the individual dictator game, the effect of having a paired recipient in a different university is weaker than in the group dictator game.

By considering this factor, donations to a recipient in the same university in the group dictator game may be greater than to a recipient in a different university, although the same is not true for the individual dictator game. We examine the effect of group decision-making on social distance by testing this point.

The remainder of this paper is organized as follows: In Section 2, we provide the details of our experiment. Section 3 describes the results of our experiment, and Section 5 concludes the paper.

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[1] Rankin (2006) examined the social distance between a dictator and a recipient. He conducted dictator games using a 2×2 factorial design, in which one factor is communicability and the other is anonymity. Each treatment involved eight rounds with random matching. The donation rate was 6% in the anonymous and no-request treatment, 26.3% in the anonymous and request treatment, 39% in the face-to-face and no-request treatment, and 27% in the face-to-face and request treatment. This indicates that a request from the recipient increases the donation rate in the anonymous case but not in the face-to-face case.

# 2 Experiment

## 2.1 Hypotheses

We consider the effect of group decision-making on donations by conducting experiments in which a group of three people act as dictators and play an iterated dictator game. The following three hypotheses are tested to answer our research questions.

HypothesisI: The donation of a dictator group is less than that of an individual dictator.

This hypothesis is derived from Luhan et al. (2009). Although the results in Cason and Mui (1997) suggest that group decision-making is less selfish than individual decision-making, group decision-making is more selfish in Luhan et al. (2009). Luhan et al. (2009) confirms that the reason for the other-regarding behavior is that Cason and Mui (1997) employs a face-to-face experimental design. We conduct our experiments online as in Luhan et al. (2009).

Hypothesis II: In group dictator games, donations decrease over rounds if the decision-making is iterated.

This hypothesis is the most critical one presented in this paper. Luhan et al. (2009) claims that the experience of group decision makes people selfish, so it is natural to consider that people become more selfish after multiple experiences of group decision-making.

Hypothesis III: In group dictator games, a donation to a recipient in a university different than that of the dictators is less than that to a recipient in the same university as the dictators.

In group dictator games, we consider participants to have a sense of belonging to their own dictator group. Furthermore, this sense of belonging may inspire a sense of belonging within a university. In other words, a recipient group being in a different university from the dictator group may increase the social distance between the dictator group and the recipient group. Rankin (2006) concludes that closeness in terms of social distance causes a high donation rate. Applying the result of Rankin (2006), Hypothesis III is derived. Thus, in group dictator games, we anticipate

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| Treatment | Explanation |
|:---:|:---|
| IS | Participants play *individual* dictator games and recipients are in the *same* university as the dictators. |
| ID | Participants play *individual* dictator games and recipients are in a *different* university from the dictators. |
| GS | Participants play *group* dictator games and recipients are in the *same* university as the dictators. |
| GD | Participants play *group* dictator games and recipients are in a *different* university from the dictators. |

Table 1: Descriptions of treatments in this study.

that the donation rate in the case that a dictator and a recipient are in the same university is higher than when they are from different universities.

## 2.2 Experimental design

To test our hypotheses experimentally, we designed a 2×2 experimental approach. The first factor is the type of decision-making (either by an individual or by a group). The second factor is whether the dictator participants are in the same university as the recipient ones. Table 1 summarizes the treatments (IS, ID, GS, and GD).

In all treatments, the experimenters conducted the dictator game for three rounds. However, the participants did not know the number of rounds in advance. The experimenters gave each participant in the dictator role JPY 800 as an endowment in each round.[2] A dictator participant decides on an amount of money to donate to the recipient. The roles given to the participants did not change during the treatment, but the dictator was randomly matched with a recipient in each round. The participants in the dictator role were informed about this in their instructions.

In the treatments with the same university (IS and GS), participants were assigned a dictator or recipient role randomly before the experiment began. The experimenter assembled participants in separate rooms according to role. In the treatments with different universities (ID and GD), the experimenter assigned the dictator role to students from one university and the recipient role to students from another university.

In the treatments with the group decision-making condition (GS and GD), the procedure was almost the same as for the individual decision-making condition (IS and ID). The differences in the procedures for the two conditions were as follows. A

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[2]JPY 800 was worth between USD 7 and USD 9 according to the exchange rate at the time of the experiments.

| Treatment | Yamagata Univ. | Hiroshima City Univ. |
|:---:|:---:|:---:|
| IS | 15 | 21 |
| ID | 23 | 19 |
| GS | 24 | 27 |
| GD | 24 | 27 |

Table 2: The number of participants in the dictator role

player was not an individual but a group of three participants. The experimenters randomly reconstructed each dictator and recipient groups in each round. The experimenters gave each participant in the dictator role JPY 800, that is, the total endowment for a dictator group was JPY 2400 each round. The experimenters requested that the participants in the dictator group agree on the amount of money donated to the recipient group paired with that dictator group. The participants in each dictator group determined their opinion about the donation through a 5-minute online chat. We did not specify how groups had to arrive at an agreement.[3] Each recipient group received a donation from the dictator group, and the donated money was divided equally among the participants in the recipient group.

Our dictator game experiment is different from that in Luhan et al. (2009) because of the following point. In Luhan et al. (2009), the participants in the dictator role played a group dictator game after they had played an individual dictator game. In our experiments, the participants in group dictator games had not previously played individual dictator games and vice versa. Furthermore, Luhan et al. (2009) classified dictator participants into tertiles based on the donation amount in the first round and subsequently formed groups by picking a participant from each tertile. On the other hand, we chose groups of dictators randomly.

## 2.3 Overview

Four treatments were conducted at Hiroshima City University and Yamagata University from October 2007 to December 2009. Table 2 indicates the number of participants in the dictator role from each university by treatment. All participants were undergraduate students, and each participant could participate in only one treatment in the dictator role. In the IS and GS treatments, the participants in the dictator role and those in the recipient role entered different rooms, and so the dictators were not in contact with any recipients before, during, or after a treat-

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[3]The experimenters decided to not reward the participants in any dictator group that failed to agree on the donation, although this situation was not encountered.
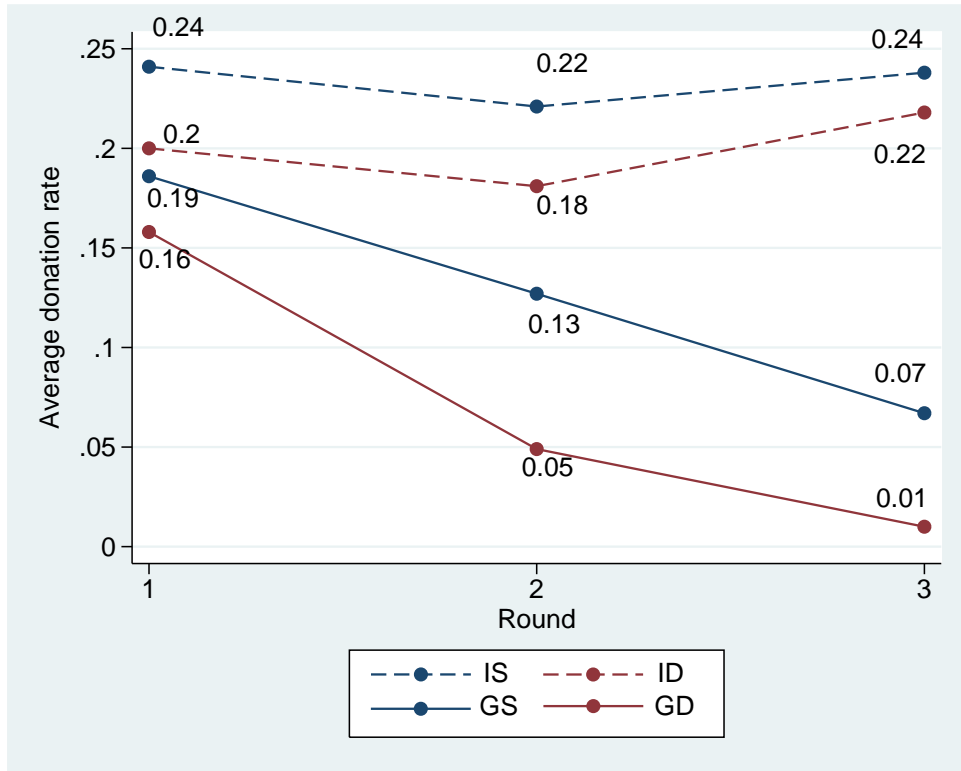
Figure 1: Average donation rate

ment. The amount paid to the participants ranged from JPY 0 to JPY 2400. We used z-Tree (Fischbacher (2007)) as the application software for the experiment. In the IS and GS treatments, the z-Tree server was setup at Yamagata University, and each z-Tree client was connected to the server via the Internet.

# 3  Experimental results

Figure 1 summarizes the average donation rate for each round and treatment. Cumulative distributions of donation rates for each treatment are shown in Figure 2. These figures seem consistent with our hypotheses. That is, the donation rates in the GS and GD treatments were lower than those in the IS and ID treatments (Hypothesis I), the donation rates in the GS and GD treatments decreased as the rounds progressed (Hypothesis II), and the donation rate in the GS treatment was higher than that in the GD treatment (Hypothesis III). In this section, we verify our three hypotheses and calculate some statistical results.[4]

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[4] From the questionnaire after the experiment, we found that two participants in one group might not have understood the experimental instructions in the first round of the GD treatment. However, the results of the study did not change regardless of whether we conducted an analysis with that group.
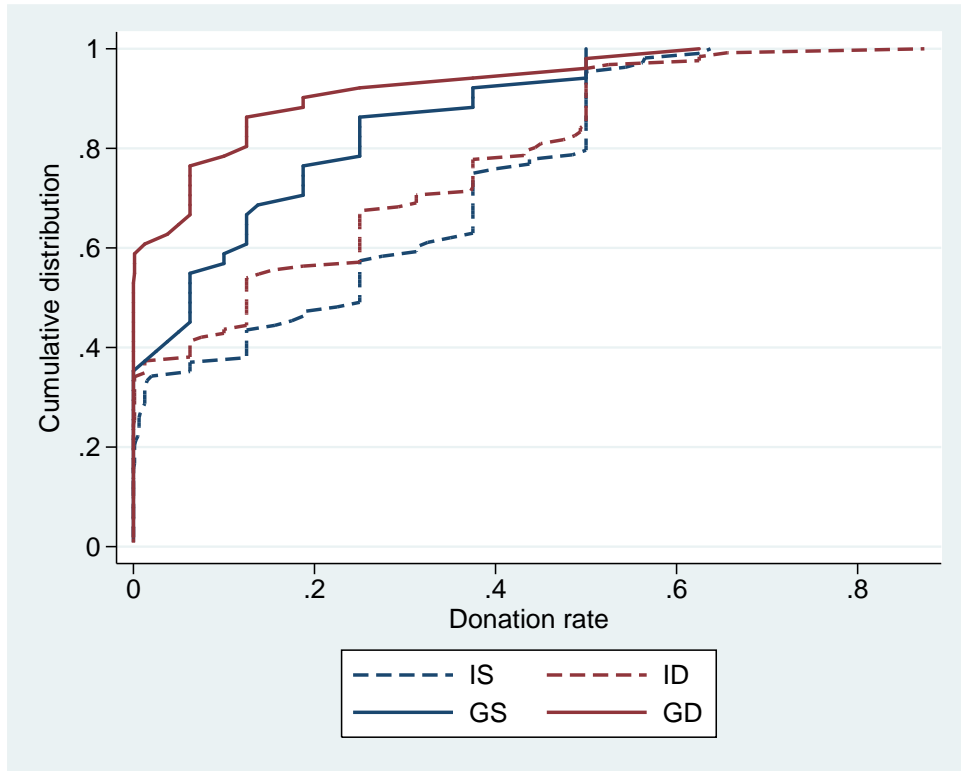
Figure 2: Cumulative distribution of donation rates for each treatment

## 3.1 Effects of group decision-making

Cumulative distributions of donation rates for the group dictator games (the GS and GD treatments) and for the individual dictator games (the IS and ID treatments) are shown in Figure 3. The average donation rate for groups was 0.10, and the average donation rate for individuals was 0.26. A $t$-test ($p < 0.01$) and a Wilcoxon rank-sum test ($p < 0.01$) suggests that groups donated less than individuals did. These tests support Hypothesis I.

## 3.2 Effects of Iteration

Cumulative distributions of donation rates for each round of group dictator games (the GS and GD treatments) are shown in Figure 4. The Kruskal–Wallis test indicates that the donation rate differed significantly between rounds ($p < 0.01$).

The average donation rate for groups in Rounds 1, 2, and 3 were 0.17, 0.09, and 0.04, respectively. Tukey's HSD test suggests that groups donated less in Rounds 2 and 3 than in Round 1 (($p < 0.05$) and ($p < 0.01$), respectively) although the difference in the donation rates between Rounds 2 and 3 was insignificant.

On the other hand, no significant difference in the donation rates of individuals
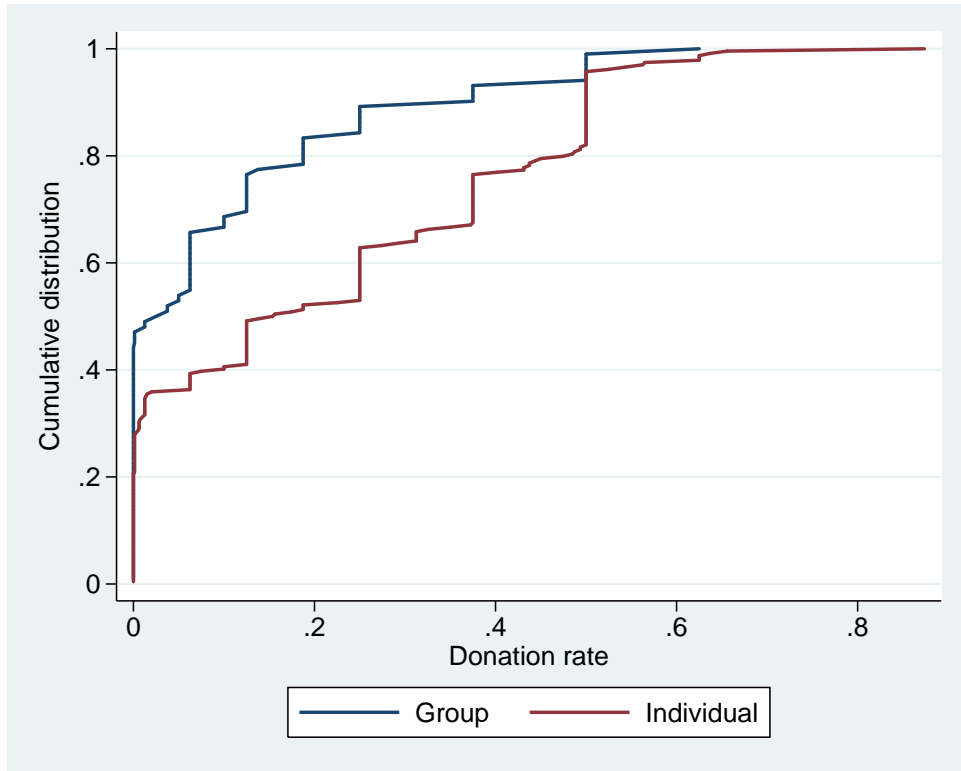
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Figure 3: Cumulative distribution of donation rates for individual dictators and dictator groups

between rounds was detected using a Friedman test. Cumulative distributions of donation rates for individual dictators (the IS and ID treatments) in each round are shown in Figure 5.

The left side of Table 3 reports the results of Tobit regression for the donation rates of the dictator groups.[5] The dependent variable was the group donation rate, and the independent variables were $SameUniv$ (a dummy variable equal to 1 if the recipient is from the same university as the dictator and 0 if the recipient was from a different university than the dictator[6]), $R2$ (a dummy variable equal to 1 if the group donates in Round 2 and 0 otherwise), and $R3$ (a dummy variable equal to 1 if the group donates in Round 3 and 0 otherwise). The censoring points are 0 and 1. The right side of Table 3 reports the results of a random-effect Tobit regression on donation rates of individual dictators. The dependent variable, the independent variables, and the censoring points are the same as in the Tobit regression of donation rate for groups.[7]

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[5] Because the dictator groups are reconstructed in each round, these are not panel data.

[6] In this regression, $SameUniv = 1$ for those in the GS treatment and $SameUniv = 0$ for those in the GD treatment.

[7] In this regression, $SameUniv = 1$ for those in the IS treatment and $SameUniv = 0$ for those

| Variable | Tobit, GS vs. GD | | Random-effect Tobit, IS vs. ID | |
| | Coefficient | Robust standard errors | Coefficient | Standard errors |
| --- | --- | --- | --- | --- |
| $SameUniv$ | 0.100** | 0.047 | 0.048 | 0.055 |
| $R2$ | -0.118** | 0.055 | -0.029 | 0.020 |
| $R3$ | -0.216*** | 0.060 | 0.002 | 0.020 |
| $Constant$ | 0.085* | 0.050 | 0.168*** | 0.039 |
| $\sigma$ | 0.205*** | 0.020 | | |
| $\sigma_u$ | | | 0.226*** | 0.023 |
| $\sigma_e$ | | | 0.119*** | 0.007 |
| Obserbations | 102 | | 234 | |
| Log-likelihood | -20.865 | | 21.265 | |
| $F_{(3,99)}$ / $\chi^2_{(3)}$ | 6.202 | | 3.705 | |

*, **, and ** indicate 10%, 5%, and 1% significance, respectively. The censoring points are 0 and 1.

Table 3: Estimation results for donation rates

As shown in the left side of Table 3, the coefficients of $R2$ and $R3$ are significantly negative. Furthermore, an F-test ($p < 0.1$) indicates that these coefficients are significantly different. However, the right side of Table 3 shows that the same effect of iteration is not detected for individual decision-making.[8] Thus, the statistical tests and the regression analyses support Hypothesis II.

## 3.3 Effect of social distance

Cumulative distributions of donation rates for the GS and GD treatments are shown in Figure 2. The average donation rates for these treatments were 0.13 and 0.07, respectively. A one-tailed $t$-test ($p < 0.05$), a two-tailed $t$-test ($p < 0.1$), and a Wilcoxon rank-sum test ($p < 0.05$) suggest that a dictator group donates more to a recipient group in the same university than to a recipient group in a different university.

On the other hand, the average donation rates for individual dictators in the IS and ID treatments were 0.23 and 0.20, respectively. No significant difference was detected between donation rates for the IS and ID treatments.

The left side of Table 3 shows that the coefficient $SameUniv$ is significantly positive, whereas the coefficient $SameUniv$ on the right side of Table 3 is insignificant but also positive. This result is consistent with Hypothesis III.

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in the ID treatment.

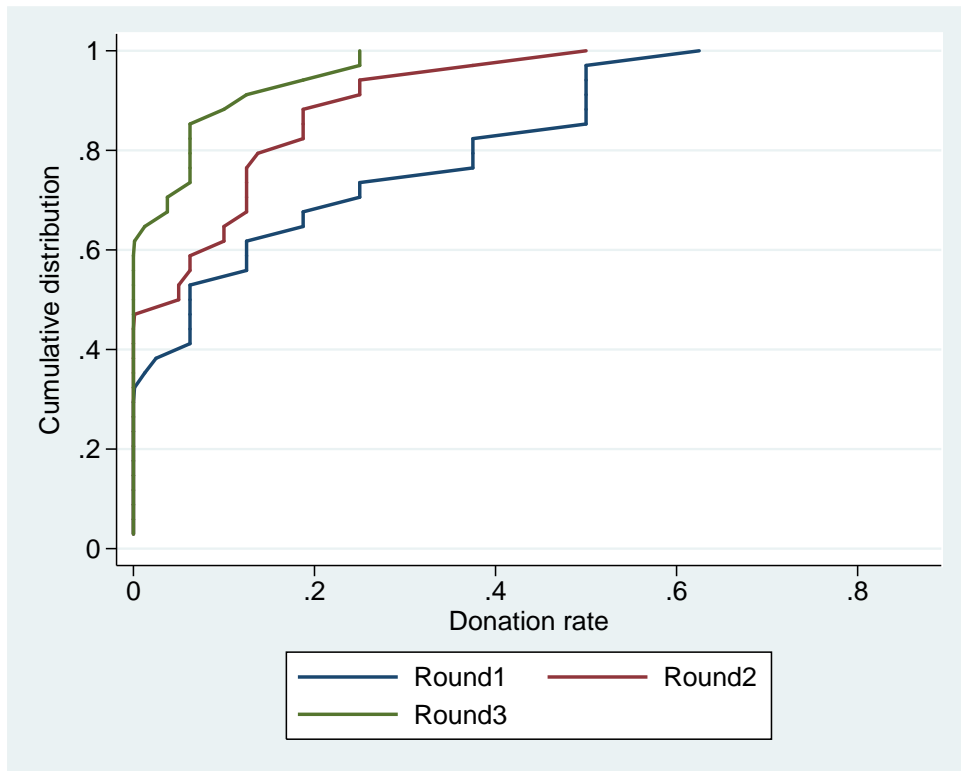[8]We obtained the same result from the Tobit regression.

Figure 4: Cumulative distribution of donation rates for each round of group dictator games

# 4 Discussion

One of our main results is that in the group dictator games (the GS and GD treatments), the donation decreased as round went on, whereas in the individual dictator game (the IS and ID treatments), the donation remained unchanged throughout the rounds. The largest difference between group and individual dictator games was that in a group dictatorship, more than one opinion was heard. Additionally, the amount of opinions which each participant of a group dictatorship had heard increased as the rounds continued in the GS and GD treatments because the group member changed every round. Therefore, knowing others' opinions is the main reason for the difference between the results in the group and individual dictator games.

Thus, knowing others' opinions triggers the decrease in the donation. This suggests that self-interested behavior spreads by contagion among participants in the group dictator games. We examine group contagion of self-interest behavior in more detail.

We investigate the effects of the decisions made in the previous round in a different way. The three members of a group in the second and third rounds were each in
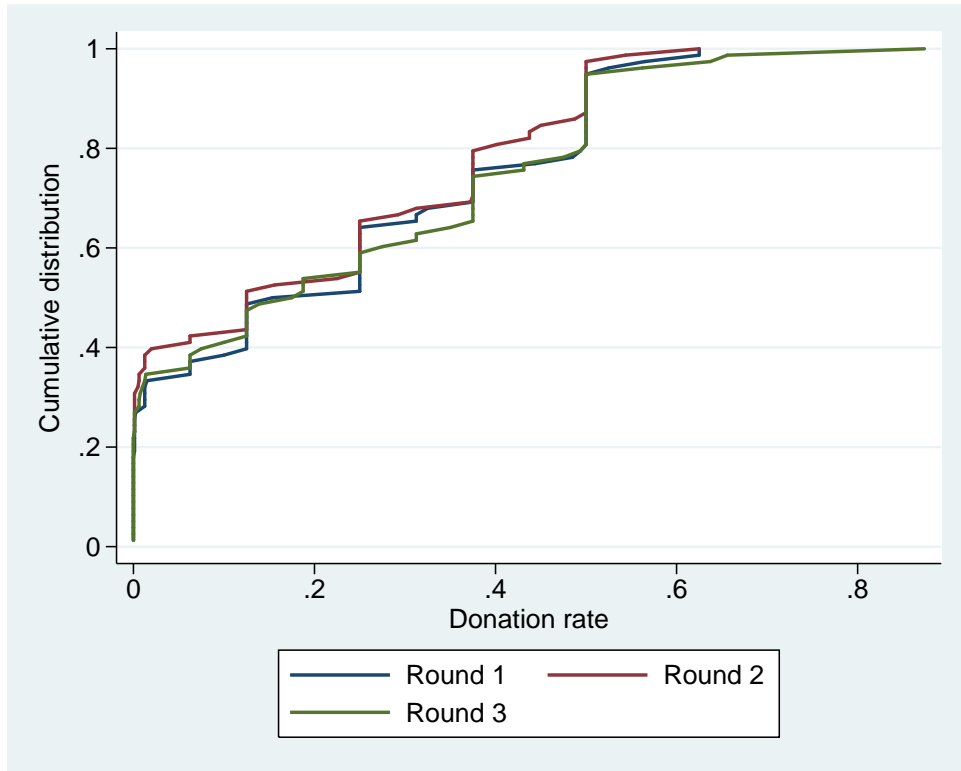
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Figure 5: Cumulative distribution of donation rates for each round of individual dictator games

different groups in the previous round. Thus, a group in the current round has donation experience accumulated from three groups in the previous round. The average (median) of these experienced donations is called the average (median) donation in the previous round (ADPR (MDPR)). We investigate whether the agreed donation in the second (third) round is higher than the average donation in previous round.

These results are shown in Table 4. The number of groups whose donation is higher than ADPR, same as ADPR, and lower than ADPR are 4, 1, and 29, respectively. In the third round, these become 3, 5, and 26, respectively. Similarly, the agreed donation in the second (third) round is compared to the MDPR, as shown in Table 5. The number of groups which had higher donations than the median, same as the median, and lower than the median in the second round were 7, 5, and 22, respectively, while the numbers in the third round were 6, 13, and 15, respectively. These results are consistent with the idea that contagion in self-interested behavior causes donations to decrease as rounds progress in group dictator games.

| | Higher than ADPR | | Same as ADPR | | Lower than ADPR | |
|---|---|---|---|---|---|---|
| | 2nd round | 3rd round | 2nd round | 3rd round | 2nd round | 3rd round |
| GS | 4 | 2 | 0 | 2(1) | 13 | 13 |
| GD | 0 | 1 | 1 | 3 | 16 | 13 |
| Total | 4 | 3 | 1 | 5(1) | 29 | 26 |

Table 4: Comparison of donations with ADPR

| | Higher than MDPR | | Same as MDPR | | Lower than MDPR | |
|---|---|---|---|---|---|---|
| | 2nd round | 3rd round | 2nd round | 3rd round | 2nd round | 3rd round |
| GS | 5 | 4 | 1 | 4(2) | 11 | 9 |
| GD | 2 | 2 | 4 | 9 | 11 | 6 |
| Total | 7 | 6 | 5 | 13(2) | 22 | 15 |

Table 5: Comparison of donations with MDPR

# 5 Conclusion

In this study, we examined whether the effects of iteration are different between group and individual decision-making. Furthermore, we examined whether the social distance that players feel depends on the type of decision-making. Our original findings are as follows. First, as rounds progress, group decisions become more selfish than in the previous round, although the same is not true for individual decisions. Second, a dictator group donates more to a recipient group in the same university than to a recipient group in a different university, although the same is not true for individual decision-making. This result suggests that group decision-making affects how people perceive social distance. We also confirm that, as indicated in Luhan et al. (2009), a dictator group donates less than an individual dictator does.

We consider the reason for the first result to be the change in understanding of the social norms related to fairness or generosity. In the case of the group decision, the participants know others' opinions about fairness or generosity. In dictator games, there are some generous participants (but only a few). We consider their understanding of social norms to become more self-interested after hearing self-interested opinions. Gino, Ayal and Ariely (2009) reports that one person's behavior affects another person's behavior through changing their understanding of social norms related to dishonesty. In Gino et al. (2009), it is shown that unethical behavior by a confederate induces unethical behavior from other participants. We consider the same to be true of social norms related to fairness or generosity.

However, it is also reported in Gino et al. (2009) that unethical behavior by

a confederate induces ethical behavior from other participants if the participants understand that the confederate belongs to a different social group than themselves. Gino et al. (2009) explains the reason for this result as follows. "When people observe someone behaving dishonestly (e.g., when they read about a new corruption scheme), the saliency of this act increases, making them pay attention to honesty and to their own standards of honesty, and, as a consequence, decreasing their tendency to engage in dishonest acts." The same should be true of social norms related to fairness or generosity, which is an interesting question for future research.

# Acknowledgments

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# Appendix

# A    Example of an Instruction

The following instructions were provided to the dictators in the GD treatment at Hiroshima City University.[9]

# How to make decisions

You will belong to a group that consists of three people. Your group members are others in this room, and they will change every round. You also have a paired group (which consists of three people) that is anonymous and that consists of people sitting in a room at Yamagata University (see the photograph on the front page). *Your paired group will change every round.*

This experiment consists of a number of rounds. In each round, you should do the following.

- The experimenter will give you JPY 800. That is, the experimenter will give your group JPY 2400 in total.

- You decide whether to give some money to people in your paired group. *The amount of money given must be the same from each group member.* To determine the amount given, you can talk to your group members through the

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[9]The instructions were originally written in Japanese.

online chat. You can give between JPY 0 and JPY 800 in increments of JPY 1.

The procedure for the online chat will be explained later.

Your paired group will be waiting while you discuss your decision.

- If all members of your group decide to give JPY $x$, your group gives JPY $3x$ to your paired group, and each member of your paired group receives JPY $x$.

- Enter the agreed-upon amount of money to give into your computer console.

- If the amount entered coincides with the amounts given by the other members, a confirmation screen is printed on your console. Press the "OK" button. If the amount entered does not coincide with those of the other members, you can correct the value twice if necessary.

  If your group does not come to an agreement, the payoffs to all members and to your paired group for the round will be zero.

- If all members of your group decide to give JPY $x$, the payoff to each member of your paired group is JPY $x$ and your payoff is JPY $(800 - x)$ for the round.

Your total payoff for this experiment is the sum of the payoffs for all rounds.

# Procedure for the online chat

You will discuss the amount of money to give through an online chat. The chat lasts for 5 minutes. At the end of the chat, you will have agreed on how much to give to your paired group.

- You may not ask other members for their private information, such as name, faculty, university major, gender, or age.

- You may not input your private information, such as your name, faculty, university major, gender, or age.

- You may not reveal your choices from the previous rounds.

- When your group comes to an agreement, input the amount agreed upon by you and your group members during the online chat.