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Contributions in Linear Public Goods Experiments: Two Different Motivations

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This Paper attempts to investigate why subjects contribute to the public good in linear public goods game, using an exploratory experiment. Our main finding is that 86.5 percent of total contributions in public goods experiments using a strangers design is due to two different motivations: one is conditional cooperation to achieve the socially optimal outcome, and the other is the desire to lead the other group member to contribute all of his/her endowment in the following periods by teaching him/her about the socially optimal outcome, and to increase the number of cooperators among the participants. JEL (C72; C91; C92; H41)

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In numerous previous studies, contributions in linear public goods experiments tended to decline toward a Nash equilibrium over time, but did not disappear even after as many as 60 periods (for a survey, see Laury and Holt, 2008). Some previous experimental studies have argued that the contributions might possibly be explained by confusion or errors (see, e.g., Andreoni, 1995; Palfrey and Prisbrey, 1997; Goeree, Holt and Laury, 2002; Houser and Kurzban, 2002), other-regarding preferences (see, e.g., Andreoni, 1995; Palfrey and Prisbrey, 1997; Goeree, Holt and Laury, 2002; Houser and Kurzban, 2002), conditional cooperation (see, e.g., Croson, 2007; Fischbacher and Gächter, 2010), and so on. Although numerous experiments on linear public goods have been conducted to date, previous studies have not yet found common evidence on the motivations for these contributions. In other words, the reason why subjects contribute to the public good has not been fully understood yet. Therefore, in order to accurately recognize the motivation for contributions, we conducted an exploratory linear public goods experiment with the following four features.

(i) We asked the subjects to estimate the other group member's contribution to enable us to understand a subject's mind processing. This method of eliciting beliefs is similar to the one used by Croson (2007) and Fischbacher and Gächter (2010).

(ii) In each period (not after the experiment), the subjects described the reason for their decisions on their record sheets because we wanted to understand their motivations directly and in real time. This method was used by Cason, Saijo, and Yamato (2002), and Cason et al. (2004).

(iii) Each group consisted of two subjects because we wanted to study the motivation of the subjects in a simple environment in which the subjects could easily estimate the other group member's contribution.

(iv) We provided the subjects with a payoff table with complete payoff information to enable them to easily confirm all strategies and payoffs. As we will explain later, Yamakawa et al. (2009) conducted a linear public goods experiment using a payoff table identical to our payoff table, and they observed that any resulting confusion occurred for just 2 percent of all contributions. Therefore, we are certain that we could prevent the subjects from making mistakes when calculating their payoffs.

The above four features of the experiment allowed us to analyze the motivation for contributions while minimizing confusion or errors.

We conducted two linear public goods experiments with the above-mentioned four features. For the first experiment, the subjects played the linear public goods game for 15 periods using a strangers design. We observe that 86.5 percent of contributions is the results of two types of behaviors. One is to contribute his/her entire endowment when he/she estimates that the other group member's contribution is full. The other is to contribute his/her entire endowment when he/she estimates that the other group member's contribution is zero. We analyze the motivation of these two behaviors using the subjects' descriptions in each period on their record sheets. Then, we can interpret that the former behavior is conditional cooperation to achieve the socially optimal outcome, and the latter behavior is unconditional cooperation to lead the other group member to contribute his/her entire endowment in subsequent periods by teaching him/her about the socially optimal outcome, and to increase the number of cooperators out of all the participants. For the second experiment, we conducted a linear public

goods experiment that consists of one period (a so-called single-shot game). The purpose of the second experiment is to verify our interpretation for unconditional cooperation in the first experiment because unconditional cooperation observed in the first experiment could also be interpreted as warm-glow or altruism. If our interpretation is correct, unconditional cooperation should not be observed in the single-shot game, because the subjects cannot change other subjects' behavior in just one period. On the other hand, if the motivation for unconditional cooperation is altruism or warm-glow, it should be observed in the single-shot game because the theoretical model of altruism or warm-glow is not influenced by repetition. The results of the second experiment show that our interpretation is reasonable.

From the first experiment and the second experiment, We conclude that 86.5 percent of cooperation to the public good in a strangers design is attributed to two different motives: one is conditional cooperation to achieve the socially optimal outcome, and the other is the desire to lead the other group member to contribute all of his/her endowment in the following periods by teaching him/her about the socially optimal outcome, and to increase the number of cooperators among the participants.

The current study proceeds as follows. Section I presents the theoretical model for the voluntary contribution mechanism. Section II presents the experimental design, the results, and discussion for study 1. Section III presents our hypothesis based on the findings of the first experiment, our experimental design, and the results of study 2. Section IV discusses the experimental results for studies 1 and 2, and in section V, we draw conclusions on our experimental results.

I. Voluntary Contribution Mechanism

There are two subjects, and subject i has w_i points of initial endowment. Each subject faces the decision of splitting her endowment between her own consumption of the private good (x_i) and her contribution (y_i). The level of the public good that each subject receives from the contribution is $y = w_y + \sum_{j=1}^{2} y_j$, where w_y is the initial level of the public good. Therefore, each subject's decision problem is to maximize her payoff $\pi_i(x_i, y)$ subject to the constraint $x_i + y_i = w_i$. The marginal per capita return is set to 0.7. We assume that all subjects have the following same linear payoff function:

(1) $$\pi_i = 100(x_i + 0.7y).$$

We set $w_i = 24$, $w_y = 3$. Taken together, the game payoff for each subject is given by

(2) $$\pi_i = 100\{24 - y_i + 0.7(3 + \sum_{j=1}^{2} y_j)\}.$$

From (2), it is obvious that a rational and selfish individual has an incentive to contribute nothing, whereas full contributions are socially optimal.

II. Study 1: The Exploratory Experiment

In this section, we explain study 1. We conducted the experiment in October 2010 at the Economics Department Computer Laboratory of Osaka University in Japan. Our subjects were 20 university students from various disciplines. All subjects were recruited from Osaka University through the Internet.

A. Design and Procedures

Twenty subjects participated in the experiment. At the beginning of the experiment, the subjects were randomly assigned to their booth in the laboratory and were given identification numbers. The booths separated the subjects visually and ensured that every individual made his or her decision anonymously and independently. The subjects were provided with a record sheet, a payoff table for practice, a payoff table for the actual task, the instructions, and a summary sheet of the experimental procedures.[1] After instructions, we gave the subjects five minutes to ask questions about the instructions. Then, we tested the subjects to confirm that they understood the rules and how to calculate their payoff using the practice payoff table. After the control questions, we corrected the subjects' tests, and then the correct answers were publicly explained. Our subjects answered 11 control questions, and the number of mean correct answers was 10.65 (standard deviation 0.6). We gave the subjects another five minutes to ask us about the instructions and to examine the payoff table for the actual task. On the basis of these procedures and the subjects' test scores, we are certain that all subjects completely understood the rules of the game and were able to readily calculate their payoffs.

Next, we formed ten pairs from the 20 subjects, and these pairs played the linear public goods game for 15 periods. The pairings were anonymous and randomly re-matched at the beginning of each period (i.e., the strangers design). In each period, each subject was endowed with 24 points. Then, on the computer screen and for the current period, each subject had to decide on how many of the 24 points to contribute to the public good and had to determine their beliefs about

[1] Since we wanted to prevent the bias of practice experience, we provided the subjects with two payoff tables for practice and actual task.

the contributions of their partner. All members simultaneously made these decisions. Then, the subjects were asked to write their contributions and beliefs in the current period on their record sheet. In addition, the subjects were asked to write the reasons why they chose these contributions and beliefs on their record sheets[2]. Next, the results of the current periods; the subjects' own payoff and the actual contribution of the partner, appeared on the computer screen. Then, the subjects wrote these results of the current period on their record sheets.

After the experiment, one of the subjects selected an integer from one to fifteen by lottery from a box. We paid additional money 500 yen (roughly $6) to the subjects who correctly estimated their partner's contribution in the period selected by lottery.[3] Thus, the subjects' total earnings depended on the payoff from the public goods game and this additional money. After the lottery, all subjects answered the postexperiment questionnaire.

The experiment was computerized using the software z-Tree (Fischbacher, 2007). The experiment required approximately 130 minutes to complete. The mean earnings per subject were 2140 yen (roughly $26). Average per-hour earnings exceeded the average hourly wage of a typical student job in the location of Osaka University.

B. Results

In this subsection, we first analyze the average contribution across the periods. Then, we analyze the distribution of the pairs: belief and contribution.

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[2] In this method, there are no biases for their decisions because it is free description. And, this method allows for the gathering of real-time data.

[3] We used the quadratic scoring rules which are known to be incentive compatible. These rules have successfully been used in a number of experiments (see, e.g., Offerman, 1997; Nyarko and Schotter, 2002; Kosfeld, Okada and Riedl, 2009).

The average contribution to the public good is shown in Figure 1. The average contribution begins at 41 percent (9.9 points) of the endowments and declines over time (Spearman rank correlation test, $\rho = -0.61$, $p < 0.05$). However, contributions persist. This observation is consistent with previous observations in linear public goods experiments (for a survey, see Holt and Laury, 2008).

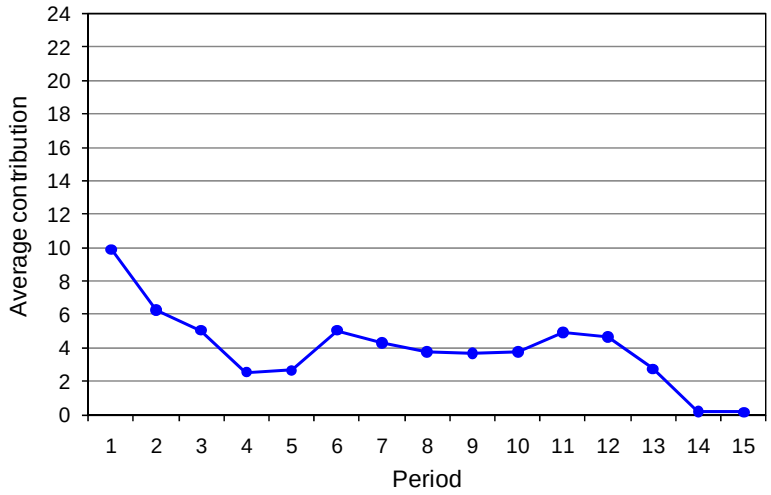

FIGURE 1. AVERAGE CONTRIBUTIONS OVER TIME IN STUDY 1

Figure 2 shows the distribution of pairs (x, y) over all 15 periods, where x is the belief about a partner's contributions and y is one's own contributions. There are data on 300 choices because 20 subjects played the game for 15 periods. The mode is at (0, 0). The pair (0, 0) is a theoretical prediction, and account for 64.0 percent of all the data. The second highest number is at (0, 24), which account for 8.3 percent of all the data. The third highest numbers are at (0, 1) and (24, 24), which account for 6.0 percent, respectively. Note that the socially optimal contribution (i.e., 24) is divided almost entirely into two categories: (0, 24) and

(24, 24).[4] We interpret this result as the first piece of evidence that there are two different motivations for the socially optimal contribution.

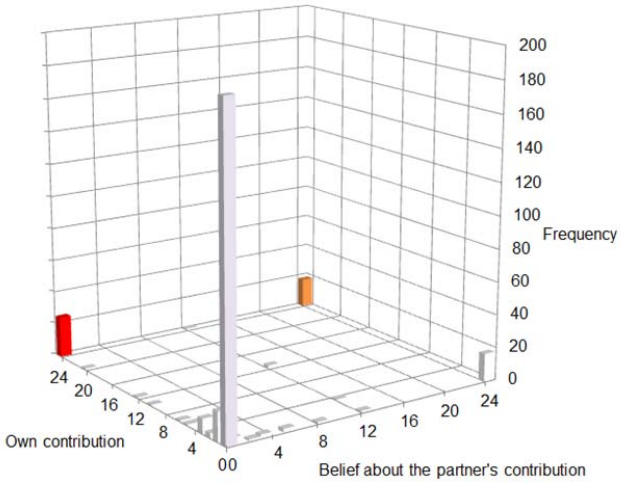

FIGURE 2. DISTRIBUTION OF PAIRS: BELIEF AND OWN CONTRIBUTIONS OVER ALL PERIODS IN STUDY 1

In Figure 3, the solid line represents the total contributions in each period, the dashed line represents the sum of contributions due to (0, 24) and (24, 24) in each period, and the dashed-dotted line represents the sum of contributions attributable to (0, 24). As can be seen from Figure 3, the solid line and the dashed line are almost the same. In fact, the aggregated contributions across all periods show that 86.5 percent of the total contributions are attributable to (0, 24) and (24, 24). This evidence shows that contributions to the public good are mainly the result of the choices of (0, 24) and (24, 24).

[4] (12, 24) was observed once in study 1.

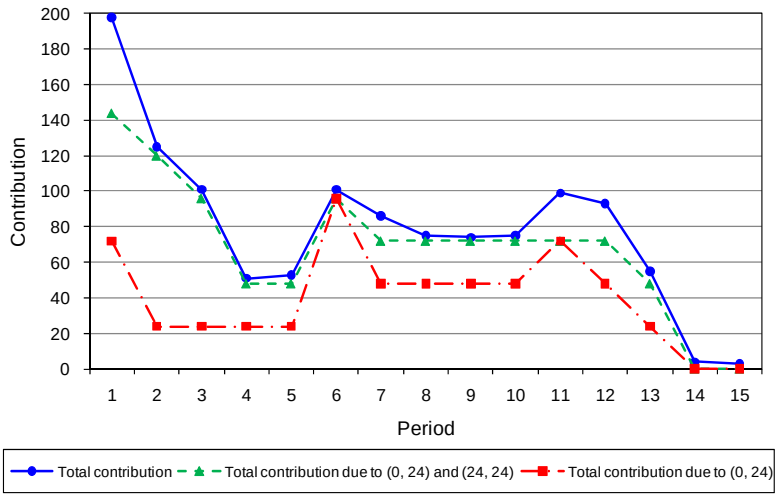

FIGURE 3. TOTAL CONTRIBUTION, THE SUM OF CONTRIBUTIONS DUE TO (0, 24), AND THE SUM OF CONTRIBUTIONS DUE TO (0, 24) AND (24, 24) IN EACH PERIOD IN STUDY 1

C. Interpretation

Here we investigate why the subjects contribute all of their endowment to the public goods. Our original motivation for asking subjects to describe the reason for their decisions in each period was to obtain direct insight into their mind processing.[5] Therefore, we discuss about the motivation for the socially optimal contribution using the descriptions in each period on their record sheets. As noted above, there are two different choices of the socially optimal contribution (i.e., (0, 24) and (24, 24)).

First, we investigate the motivation of (24, 24). In our subjects' descriptions on their record sheets, the most popular reason for the socially optimal contribution

[5] To use subjects' description for analysis have been done in a few experiments (see, e.g., Cooper and Kagel, 2005).

and beliefs are “The sum of the group’s payoff will be maximized if each group member contributes all of their endowments” and “I’m sure that my partner has the same idea as mine,” respectively. From these descriptions, in the subjects’ mind, they contribute 24 because they are sure that their partner will also contribute 24. Thus, we can interpret that (24, 24) is due to conditional cooperation to achieve the socially optimal outcome. A number of studies show that contribution is motivated by conditional cooperation.[6]

Next, we investigate the motivation of (0, 24), which is unconditional cooperation. Six out of 20 subjects chose (0, 24) at least once throughout the 15 periods.[7] In their descriptions on the record sheets, the most popular reason is “The higher payoff is achieved if each group member contributes 24.” Some subjects described “I want to inform other subjects that the payoff will be maximized if each group member contributes 24. And I want to lead other subjects to increase their contribution.” Moreover, the subject who chose (0, 24) continuously from period 1 to 12 chose (0, 0) in period 13, and described on his record sheet “Other subjects have already fixed their own strategy; therefore, I need not lead other subjects to contribute 24 by contributing 24.” Note that we did not employ a partners design and all subjects understood this.[8] We used a strangers design and the subjects were randomly re-matched with other subjects in each period; thus, the subjects possibly changed in the laboratory from being a non-cooperator to a cooperator throughout the 15 periods by the teaching that the payoff will be maximized if each group member contributes 24. Therefore, from the subjects’ descriptions and the features of the strangers design, we can interpret that the subjects who chose (0, 24) want to lead the other group member to contribute 24 in subsequent periods by teaching him/her about the socially

6 Chaudhuri (2011) presents an excellent survey of conditional cooperation.

7 One subject chose (0, 24) 12 consecutive times, one subject chose it six continuous times, one subject chose it three times, one subject chose it two times, and two subjects chose it one time.

8 In the control questions, all subjects corrected the question for which the matching design was not a partners design.

optimal outcome, and want to increase the number of cooperators out of all the participants.[9]

Note that our interpretation is based on the subjects' descriptions on their record sheets, and (0, 24) could also be interpreted as altruism or warm-glow. Therefore, we conducted an additional experiment to verify our interpretation.

III. Study 2: The Additional Experiment to Verify Our Interpretation of Study 1

In study 2, the subjects played a linear public goods game consisting of only one period (a so-called single-shot game). The other settings and procedures were the same as in study 1. We conducted this experiment in December 2010 at the same location as in study 1. In addition, the experimenter was the same person as in study 1. Our subjects were 44 university students from various disciplines. All subjects were recruited from Osaka University through the Internet. The experiment required approximately 70 minutes to complete. The mean earnings per subject were 1550 yen (roughly $19).[10] Average per-hour earnings exceeded the average hourly wage of a typical student job in the location of Osaka University.

A. The Aim of This Study and Our Hypothesis

[9] Based on their descriptions on the record sheet, it is not clear whether the subjects who chose (0, 24) intended to improve the sum of the payoffs in the laboratory or intended to improve their own payoffs in the future by spreading cooperative behavior.

[10] The average hourly wage was not significantly different between study 1 and study 2 (*t*-test, $p > 0.1$).

The purpose of study 2 is to verify our interpretation of (0, 24). As mentioned above, we found that (0, 24) is due to the desire to lead the other group member to contribute his/her entire endowment in subsequent periods by teaching him/her about the socially optimal outcome, and to increase the number of cooperators among the participants. With such a motivation, (0, 24) should not be observed in the single-shot game, because the subjects cannot change other subjects' behavior in just one period. On the other hand, if the motivation of (0, 24) is altruism or warm-glow, (0, 24) should be observed in the single-shot game because the theoretical model of altruism or warm-glow is not influenced by repetition (see, for instance, Andreoni, 1989, 1990).

B. Results

Figure 4 shows the distribution of pairs (x, y), where x is belief about a partner's contributions and y is one's own contributions. Since 44 subjects played the single-shot game, 44 data points were observed. As can be seen in Figure 4, there were no (0, 24) occurrences.[11] Thus, this result verifies our hypothesis and shows that the motivation for (0, 24) is not altruism or warm-glow.

[11] For the frequency of (0, 24), the experimental results of study 1 are significantly higher than those of study 2 (proportion test, $p < 0.05$).

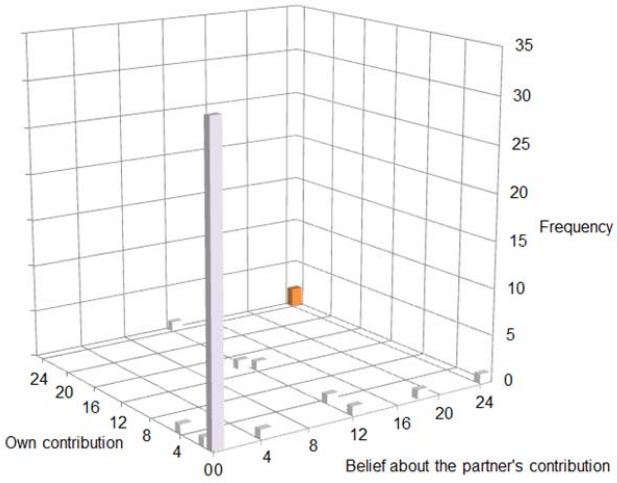

FIGURE 4. DISTRIBUTION OF PAIRS: BELIEF AND OWN CONTRIBUTIONS IN STUDY 2

IV. Discussion

In this current study, we conducted two linear public goods experiments. From the results of study 1 and study 2, we obtained three primary findings. First, there are two different motivations for the socially optimal contribution. Second, 86.5 percent of the total contributions is attributable to (0, 24) and (24, 24). Third, (24, 24) is due to conditional cooperation to achieve the socially optimal outcome and (0, 24) is due to the desire to lead the other group member to contribute his/her entire endowment in the following periods by teaching him/her about the socially optimal outcome, and to increase the number of cooperators among the

participants. Here we note whether (0, 24) can be interpreted as having other motivations.

A. Confusion or Errors

Several previous papers pointed out that contributions may be partially explained by confusion or errors (see, e.g., Andreoni, 1995; Palfrey and Prisbrey, 1997; Goeree, Holt and Laury, 2002; Houser and Kurzban, 2002). Our experiment removed to the greatest extent possible the notion of confusion or errors as follows. First, we provided the subjects with a payoff table with complete payoff information. Yamakawa et al. (2009) conducted a linear public goods experiment using a payoff table that was the same as our payoff table and observed that confusion occurred during only 2.0 percent of all contributions. Second, we gave the subjects enough time to confirm the instructions and examine the payoff table. From these procedures, the subjects correctly answered on average 10.65 out of 11 control questions. Therefore, we succeeded in removing confusion or errors. Thus, the interpretation that (0, 24) is due to confusion or errors is not reasonable.

B. Indirect Reciprocity

According to Nowak (2006), in the standard framework of indirect reciprocity, there are randomly chosen pairwise encounters in which the same two individuals need not meet again. Helping someone establishes a good reputation, which is rewarded by others, and developing a good reputation leads to cooperative

behavior.[12] Our experiments were conducted anonymously, and since historical choices were not disclosed to other subjects, no opportunity existed for the subjects to develop a reputation. Thus, the interpretation that (0, 24) is due to indirect reciprocity is not reasonable.[13]

C. Moral, Ethics, and Culture

Here we explain whether unconditional cooperation (0, 24) is due to Japanese culture's uniqueness, morality, and ethics. Kocher et al. (2008) conducted a public goods experiment by eliciting beliefs in North Carolina (USA), Tyrol (Austria), and Tokyo (Japan), and observed unconditional cooperation across the countries. Fischbacher and Gächter (2010) also conducted the public goods experiment in Zurich (Switzerland) and observed unconditional cooperation. From these results, we can say that unconditional cooperation is not a uniquely Japanese behavior. Hence, the interpretation that (0, 24) is due to the Japanese culture's uniqueness, morality, and ethics is not reasonable.

V. Conclusion

Our main finding is that 86.5 percent of the total contributions in linear public goods experiments using a strangers design is due to two different motivations. One is conditional cooperation to achieve the socially optimal outcome and the

[12] See Nowak and Sigmund (2005) for a detailed description of the mechanism of indirect reciprocity.

[13] Nowak and Sigmund (2005) also mentioned "upstream" indirect reciprocity, which does not require reputation to build cooperation. They argued that subject B, who just received help from A, goes on to help C because a person who has received help may be motivated to help in turn. However, the motive of upstream indirect reciprocity is not yet fully understood.

other is the desire to lead the other group member to contribute all of his/her endowment in subsequent periods by teaching him/her about the socially optimal outcome and to increase the number of cooperators among the participants. Our finding is of some help in solving the puzzle why the subjects contribute to the public goods. Moreover, we show that the combination of an exploratory experimental study and a hypothesis verification study is an effective method in finding new evidence.

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APPENDICES FOR

"CONTRIBUTIONS IN LINEAR PUBLIC GOODS EXPERIMENTS: TWO DIFFERENT MOTIVATIONS"

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This supplementary material has two sections. Appendix A provides all descriptions on the record sheet for all subjects' belief and contribution. Appendix B contains the instructions, payoff table for the actual task, payoff table for practice and control questions.

APPENDIX A: The Reasons for the Belief and the Contribution

Here, we provide all descriptions on the record sheet for all subjects, alongside the subjects' choices about belief and contribution. In the Appendix table, ID: Subject's ID, P: Period, B: Belief, and C: Contribution. This is a translation of the original Japanese version.

ID	P	Reason for the Belief	Reason for the Contribution	B	C
1	1	I guess my partner will choose half the endowment because of the first period.	I think that choosing 0 earns me the highest payoff regardless of the partner's contribution.	12	0
1	2	My partner will choose the half of the half of the endowment.	The same reason as that of the first period.	5	0
1	3	Because my partner repeatedly chooses 3.	The same reason as that of the first period.	3	0
1	4	I think all subjects choose a 0 contribution.	My payoffs are maximized.	0	0
1	5	I think my payoffs are high when both group members choose 24.	I am happy if my partner chooses 24.	24	0
1	6	Because almost all subjects choose 0 or 24.	I feel bad if my contribution is 24 and my partner's contribution is 0.	0	0
1	7	I guess everybody chooses 0.	My partner also chooses 0.	0	0
1	8	I guess everybody chooses 0.	I want to choose 24. However, the possibility that my partner chooses 0 is high.	0	0
1	9	I guess everybody chooses 0.	It is difficult to choose other than 0.	0	0
1	10	I guess everybody chooses 0.	It is difficult to choose other than 0.	0	0
1	11	I think that everybody must choose 0s.	I have no choice to choose other than 0 when my partner chooses 0.	0	0
1	12	I guess nobody chooses other than 0.	It is difficult to choose other than 0.	0	0
1	13	I guess nobody chooses other than 0.	It is difficult to choose other than 0.	0	0
1	14	I guess nobody chooses other than 0 in this period.	I think my partner will choose 0, so it is difficult for me to choose other than 0.	0	0
1	15	I guess nobody chooses other than 0.	I cannot choose other than 0.	0	0
2	1	Wait and watch.	Wait and watch.	12	3
2	2	My partner's payoff is high.	My payoff is high.	0	1
2	3	My partner's payoff is high.	My payoff is high. My partner in the second period chooses 1.	0	2
2	4	There are some players for whom I estimated their contributions with difficulty.	My payoff is high.	2	0
2	5	No reason.	I chose a lower contribution other than 0, and my payoff is high.	1	1

ID	P	Reason for the Belief	Reason for the Contribution	B	C
2	6	My partner's payoff is high.	My payoff is high.	0	2
2	7	My partner's payoff is high.	I choose a number greater from 0.	1	5
2	8	My partner's payoff is high.	My payoff is high.	0	0
2	9	My partner in previous periods chose 0 frequently.	No reason.	0	1
2	10	The same reason as that of the ninth period.	The same reason as that of the ninth period.	0	1
2	11	There have been many 0 contributions.	No reason.	0	3
2	12	The same reason as that of the 11th period.	My payoff does not change even if my contribution is high, so I try to choose a high contribution.	0	20
2	13	The same reason as that of the 11th period.		0	6
2	14	I think that there are many who choose 0.	I chose a lower contribution other than 0, and my payoff is high.	0	2
2	15	The same reason as that of the 14th period.	The same reason as that of the 14th period.	0	1
3	1	I think my partner chose the number that maximizes his/her payoff.	I compare the maximum payoff with the minimum, and then I decide on my contribution.	0	3
3	2	The same reason as that of the first period. Wait and watch.	The same reason as that of the first period.	0	3
3	3	The same reason as that of the former period.	The same reason as that of the former period.	0	3
3	4	I cannot understand how my partner thinks and behaves.	The same reason as that of the former period.	0	3
3	5	I think that there are many subjects who choose their contribution to maximize their payoff.	It is not amusing that all subjects choose 0. Moreover, I try to oppose my partner's expectations.	0	3
3	6	The same reason as that of the former period.	The same reason as that of the former period.	0	3
3	7	It is surprising that a subject exists who chooses 24. However, it is difficult to estimate my partner's contribution by guessing.	I compare the maximum payoff with the minimum, and then I decide on my contribution.	0	3
3	8	From the frequency of choices, till now, I think there are many subjects who choose 0.	The same reason as that of the former period.	0	3
3	9	The same reason as that of the former period.	There are many subjects who choose 0; therefore, I can oppose my partner's expectations and increase my payoff.	0	1
3	10	The same reason as that of the former period.	The same reason as that of the former period.	0	1
3	11	The same reason as that of the former period. If my partner chooses 0, I have no other choice than to choose 0 to win from my partner.	The same reason as that of the former period.	0	1

ID	P	Reason for the Belief	Reason for the Contribution	B	C
3	12	The same reason as that of the former period.	It is peaceful that not only all the subjects choose 0 and get the additional money, but also the same payoffs. However, I do not feel as if it is fun.	0	1
3	13	The same reason as that of the former period.	The same reason as that of the former period.	0	1
3	14	The same reason as that of the former period.	The same reason as that of the former period.	0	1
3	15	The same reason as that of the former period.	Achieve my original objectives.	0	1
4	1	I examined the payoff table, and I guess the situation in which both players choose 0.	I want to observe how my partner thinks.	0	0
4	2	The same reason as that of the first period.	I want to perform irregularly.	0	1
4	3	The same reason as that of the first period.	Even though my partner estimates accurately, I do not make a loss. Thus, I maximize my expected payoff.	0	0
4	4	The same reason as that of the third period.	The same reason as that of the third period.	0	0
4	5	The same reason as that of the former period.	Changing.	0	1
4	6	The same reason as that of the former period.	I think that both players choose 0 from henceforth.	0	0
4	7	The same reason as that of the former period.	Irregular choice.	0	1
4	8	The same reason as that of the former period.	I am very surprised at the irregular choice of my partner in the seventh period. I do things steadily.	0	0
4	9	The same reason as that of the former period.	I expect that both players choose 0 again.	0	0
4	10	The same reason as that of the former period.	I try to oppose my partner's expectations.	0	1
4	11	The same reason as that of the former period.	I try to oppose my partner's expectations again.	0	1
4	12	The same reason as that of the former period.	Although I feel good about opposing my partner's expectations, I choose the contribution regularly.	0	0
4	13	The same reason as that of the former period. I think all subjects will choose 0.	I think that both players choose 0.	0	0
4	14	The same reason as that of the former period.	Spoiling the atmosphere.	0	1
4	15	The same reason as that of the former period.	I want to make my partner regret the last period.	0	1
5	1	My partner's payoff is maximized.	To maximize the sum of both players' expected payoffs. Moreover, I want to inform other subjects that the payoff will be maximized if each group member contributes 24, and leads other subjects to increase their contribution.	0	24
5	2	In this experiment, there is no choice other than 0 or 24.	Continuously, I appeal to the other subjects that there is a subject who contributes 24.	0	24
5	3			0	24
5	4			0	24

ID	P	Reason for the Belief	Reason for the Contribution	B	C
5	5		If each subject pursues his/her own payoff, the sum of all subjects' payoffs decreases. I want to inform the other subjects that it is better for us to share a big pie among us than a small pie.	0	24
5	6			0	24
5	7			0	24
5	8			0	24
5	9			0	24
5	10			0	24
5	11			0	24
5	12			0	24
5	13		Other subjects have already fixed their own strategy; therefore, I need not lead other subjects to contribute 24 by contributing 24.	0	0
5	14	I think that my partner has the same idea as mine.		0	0
5	15			0	0
6	1	I think the first choice will be the middle of the endowment.	I think that this experiment is a kind of prisoner's dilemma game. In this experiment, there is the noise of informing "cooperate" and "defect" because my partner is assigned randomly. In such a case, I choose 24 in the first period, and then I apply a "tit-for-tat" strategy because I do not know the optimal solution for this game.	12	24
6	2	My partner's contribution was 24 in the first period.	Tit-for-tat strategy.	24	24
6	3	I worry whether to choose 0 or 24. I choose 24 intuitively.	Tit-for-tat strategy.	24	0
6	4	Whatever my partner chooses…		0	0
6	5			0	0
6	6			0	0
6	7	Similar to the Nash equilibrium.		0	0
6	8			0	0
6	9			0	0
6	10			0	0
6	11			0	0
6	12			0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
6	13			0	0
6	14			0	0
6	15			0	0
7	1	It is the best way for my partner to choose 0 for any of my contributions to maximize my partner's payoff.	It is the best way for me to choose 0 for any of my partner's contributions to maximize own payoff.	0	0
7	2	The same reason as that of the former period.	The same reason as that of the former period.	0	0
7	3	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	4	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	5	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	6	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	7	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	8	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	9	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	10	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	11	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	12	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	13	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	14	The same reason as that of the first period.	The same reason as that of the first period.	0	0
7	15	The same reason as that of the first period.	The same reason as that of the first period.	0	0
8	1	I think that this contribution has the lowest risk.	I think that this contribution has the lowest risk.	0	0
8	2	The same as above.	The same as above.	0	0
8	3	The same as above.	The same as above.	0	0
8	4	The same as above.	The same as above.	0	0
8	5	The same as above.	The same as above.	0	0
8	6	The same as above.	The same as above.	0	0
8	7	The same as above.	The same as above.	0	0
8	8	The same as above.	The same as above.	0	0
8	9	The same as above.	The same as above.	0	0
8	10	The same as above.	The same as above.	0	0
8	11	The same as above.	The same as above.	0	0
8	12	The same as above.	The same as above.	0	0
8	13	The same as above.	The same as above.	0	0
8	14	The same as above.	The same as above.	0	0
8	15	The same as above.	The same as above.	0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
9	1	I think that my partner has the same idea as mine.	I think that the choice of 0 earns me the highest payoff regardless of my partner's contribution.	0	0
9	2	The same as above.	The same as above.	0	0
9	3	The same as above.	The same as above.	0	0
9	4	The same as above.	The same as above.	0	0
9	5	The same as above.	The same as above.	0	0
9	6	The same as above.	The same as above.	0	0
9	7	The same as above.	The same as above.	0	0
9	8	The same as above.	The same as above.	0	0
9	9	The same as above.	The same as above.	0	0
9	10	The same as above.	The same as above.	0	0
9	11	The same as above.	The same as above.	0	0
9	12	The same as above.	The same as above.	0	0
9	13	The same as above.	The same as above.	0	0
9	14	The same as above.	The same as above.	0	0
9	15	The same as above.	The same as above.	0	0
10	1	If my partner is rational, own payoff maximize, he/she expect that I will chose 0. If my partner chooses 0, he/she can get the highest payoff regardless of my contribution.	I think that the choice of 0 earns me the highest payoff regardless of my partner's contribution.	0	0
10	2	The same as above.	The same as above.	0	0
10	3	The same as above.	The same as above.	0	0
10	4	The same reason as that of the first period.	The same reason as that of the first period.	0	0
10	5	The same as above.	The same as above.	0	0
10	6	The same as above.	The same as above.	0	0
10	7	The same reason as that of the first period.	The same reason as that of the first period.	0	0
10	8	The same as above.	The same as above.	0	0
10	9	The same as above.	The same as above.	0	0
10	10	The same reason as that of the first period.	The same reason as that of the first period.	0	0
10	11	The same as above.	The same as above.	0	0
10	12	The same as above.	The same as above.	0	0
10	13	The same reason as that of the first period.	The same reason as that of the first period.	0	0
10	14	The same as above.	The same as above.	0	0
10	15	The same as above.	The same as above.	0	0
11	1	Wait and watch because this period is first.	I think that the choice of 0 earns me the highest payoff.	24	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
11	2	My payoff was low in the former period.	I think that the choice of 0 earns me the highest payoff when my partner chooses 0.	0	0
11	3	Both players' earnings will be high.	I want my partner to choose 24.	24	24
11	4	To keep the minimum payoff.	The same reason as that of the reason belief.	0	0
11	5	The same as above.	The same as above.	0	0
11	6	The same as above.	I want to realize the situation in which both players choose 24.	0	24
11	7	The same as above.	The same reason as that of the sixth period.	0	24
11	8	The same as above.	I think that my partner will not choose 24 from now on.	0	0
11	9	The same reason as that of the second period.	The same as above.	0	0
11	10	The same as above.	My partner may choose only 0.	0	0
11	11	The same as above.	I want my partner to choose 24.	0	24
11	12	My partner chooses 0 until now.	I want my partner to choose 24.	24	24
11	13	I want my partner to choose 24.	I want my partner to choose 24.	24	24
11	14	To keep the minimum payoff.	My partner doesn't change the contribution. Everybody chooses 0.	0	0
11	15	The same reason as that of the 14^{th} period.	The same as above.	0	0
12	1	My partner cannot estimate my contribution correctly in the first time. I think that my partner chooses 0 because that choice of 0 earns the partner a high payoff for any contribution of mine.	I teach my partner that there are some subjects who contribute a lot. Additionally, I want to lead other subjects to increase their contributions.	0	24
12	2	The same as above.	I think that my contribution at previous period does not affect the other partner, so I choose a safe contribution.	0	0
12	3	The same as above.	The same as above.	0	0
12	4	The same as above.	The same as above.	0	0
12	5	My partners choose only 0 till now.	There is no effect from choosing other than 0.	0	0
12	6	The same as above.	The same as above.	0	0
12	7	The same as above.	The same as above.	0	0
12	8	The same as above.	The same as above.	0	0
12	9	The same as above.	The same as above.	0	0
12	10	I guess that many subjects choose 0 safely.	I cannot expect that there is an effect of choosing high contributions at that time. I want to compensate for the loss of my payoff in the first period.	0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
12	11	The same as above.	The same as above.	0	0
12	12	The same as above.	The same as above.	0	0
12	13	The same as above.	The same as above.	0	0
12	14	The same as above.	The same as above.	0	0
12	15	The same as above.	The same as above.	0	0
13	1	The sum of the group's payoff will be maximized if each group member contributes all of their endowments.	The sum of the group's payoff will be maximized if each group member contributes all of their endowments.	24	24
13	2	The same reason as that of the first period. I knew that some subjects have the same idea as mine.	The same reason as that of the first period. I knew that some subjects have the same idea as mine.	24	24
13	3	The same reason as that of the first period. Though my partner chose 0 in the second period, it is too soon to give up on my idea.	The same reason as that of the reason belief.	24	24
13	4	I guess that there are many subjects who choose 0 because my partner's contribution was 0 continuously.	The same reason as that of the belief. Moreover, there is no disadvantage for me to choose 0 even if my partner chooses 24.	0	0
13	5	I guess that many subjects choose 0. It is better for both players to choose 0 because we can estimate a partner's contribution accurately and acquire higher earnings.	The same reason as that of the belief.	0	0
13	6	The same as above.	The same as above.	0	0
13	7	My partner chose 24 in the former period, so I wondered how many endowments to contribute. However, many subjects chose 0 till now.	If my partner will choose 0, I will also choose 0.	0	0
13	8	My partner chose 0 in the seventh period.	The same as above.	0	0
13	9	I guess that there are many subjects who choose 0.	The same as above. Moreover, the possibility that both players choose 0 is higher than the possibility that both players choose 24.	0	0
13	10	The ratio of 0 is 2/3. The ratio of 24 is 1/3. The ratio of 0 is higher than that of 24.	The same as above.	0	0
13	11	Twenty-four contributions did not continue for the second time in a row. Until now, there have been many 0 contributions.	The same as above.	0	0
13	12	The same as above.	The same as above.	0	0
13	13	Almost all of the choices are 0.	The same as above.	0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
13	14	The same reason as that in the 13th period.	The same as above.	0	0
13	15	The frequency of 0 is the highest.	The same as above.	0	0
14	1	Wait and watch. I guess that my partner think my choice is 24.	The same reason as that of the reason belief.	24	24
14	2	My estimation was correct in the first period. Hence, I want to try to choose 24 again.	The same reason as that of the reason belief.	24	24
14	3	My estimation was also correct in the second period. I am interested in the contribution in the third period.	The same reason as that of the reason belief.	24	24
14	4	I want to try to choose 24 again.	The same reason as that of the reason belief.	24	24
14	5	I guess that many subjects choose 0. I am concerned about estimating 0 or 24, and I aim to get 500 yen.	It is best for me to choose 0 when my partner chooses 0.	24	0
14	6	The same reason as that of the fifth period.	The same reason as that of the fifth period.	0	0
14	7	The same reason as that of the sixth period.	The same reason as that of the sixth period.	0	0
14	8	My partner chose 24 in the seventh period. Therefore, I worry about estimation, but I guess that my partner chose 24.	I try to get a higher payoff.	24	0
14	9	My partner will have chosen 0 by now. I want to get 500 yen.	Safety.	0	0
14	10	I guess that all subjects will have safely chosen 0 by now.	The same reason as that of the ninth period.	0	0
14	11	I guess that my partner's contribution will become other than 0 and 24. However, my estimation is 0.	The same reason as that of the ninth period.	0	0
14	12	I worried about estimating 0 or 10. However, I think this is difficult to correct when I estimate other than 0 and 24. Thus, my estimation is 0.	I am bothered by considering the advantages to choosing other contributions.	0	0
14	13	I guess that a contribution other than 0 and 24 is minor. I guess my partner's contribution will become 0.	I am bothered by considering which contribution to choose.	0	0
14	14	The same reason as that of the 13th period.	The same reason as that of the 13th period.	0	0
14	15	My estimation is also 0 in the last period.	The same as above.	0	0
15	1		I lead my partner to contribute more actively.	0	24
15	2			24	0
15	3			24	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
15	4			24	0
15	5			24	0
15	6			0	24
15	7			24	24
15	8			24	0
15	9			24	0
15	10			24	0
15	11			0	0
15	12			0	0
15	13			0	0
15	14			0	0
15	15			0	0
16	1	I'm sure that my partner has the same idea as mine.	My partner's payoff is maximized when I choose 24.	24	24
16	2	I'm sure that my partner has the same idea as mine.	My partner's payoff is maximized when I choose 24.	24	24
16	3	My partner chose 24 in the first and second periods.	My payoff is maximized when my contribution is 0 and my partner's contribution is 24.	24	0
16	4	My partner chose 24 in the first, second, and third periods.	My payoff is maximized when my contribution is 0 and my partner's contribution is 24.	24	0
16	5	I expect that my partner regards both players' payoffs.	The same reason as that of the reason belief.	24	24
16	6	From my partner's contribution in the fourth and fifth periods.	Maximizing my partner's payoff.	0	24
16	7	From my partner's contribution in the fourth, fifth, and sixth periods.	To maximize my payoff when my partner chooses 0.	0	0
16	8	Both players should choose 24 if they regard both player's payoff.	The same reason as that of the belief.	24	24
16	9	The same reason as the eighth period.	The same reason as the eighth period.	24	24
16	10	The same reason as the eighth period.	The same reason as the eighth period.	24	24
16	11	From my partner's contribution in the fourth, fifth, sixth, eighth, and 10^{th} periods.	The middle of the endowment.	0	12
16	12	From my partner's contribution in the fourth, fifth, sixth, eighth, 10^{th}, and 11^{th} periods. There are many selfish people.	The same reason as that of the belief.	0	0
16	13	The same reason as that of the 12^{th} period.	The same reason as that of the 12^{th} period.	0	0
16	14	The same reason as that of the 12^{th} period.	The same reason as that of the 12^{th} period.	0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
16	15	The same reason as that of the 12th period.	The same reason as that of the 12th period.	0	0
17	1	I guess that my partner will not choose a higher contribution.	Because my expected payoff is highest.	5	0
17	2	My partner unexpectedly chose a high contribution in the first period.	I think my result went well in the first period.	8	0
17	3	My partner chose 0 in the second period.	The same reason as the first period.	3	0
17	4	From the results in the second and third periods.	The same reason as the first period.	0	0
17	5	From the results in past periods.	The same reason as that of the first period.	0	0
17	6	From the results in past periods.	The same reason as that of the first period.	0	0
17	7	From the results in past periods.	My partner chose other than 0 in the former period. Changed my feeling.	0	5
17	8	From the results in past periods.	After all, I want a higher payoff.	0	0
17	9	From the results in past periods.	To increase my payoff as much as possible.	0	0
17	10	From the results in past periods.	The same reason as that of belief.	0	0
17	11	From the results in past periods.	I got bored with choosing 0. Changed my feeling.	0	10
17	12	From the results in past periods.	To increase my payoff.	0	0
17	13	From the results in past periods.	To increase my payoff.	0	0
17	14	From the results in past periods.	To increase my payoff.	0	0
17	15	From the results in past periods.	From the results in past periods.	0	0
18	1	I do not expect the number of endowments that my partner contributes.	The same reason as that of the belief.	12	12
18	2	Lower contribution earns more benefit.	The same reason as that of the belief.	0	0
18	3	There have been lower contributions.	The same as above.	0	0
18	4	I guess there is no change.	I think I should choose a lower contribution.	0	0
18	5	The same reason as that of the former period.	The same reason as that of the former period.	0	0
18	6	The same reason as that of the former period.	The same reason as that of the former period.	0	0
18	7	I do not want to change my estimation because my partner often chose 0 in the past periods.	The same reason as that of the former period.	0	0
18	8	I think that the change will not occur.	The same reason as that of the former period.	0	0
18	9	I hope that my estimation is consistent with the actual contribution.	The same reason as that of the former period.	0	0
18	10	The same reason as that of the former period.	I think that changing my contribution will decrease my payoff.	0	0
18	11	The possibility that my partner chooses 0 is high.	The same reason as that of the former period.	0	0

ID	P	Reason for the Belief	Reason for the Contribution	B	C
18	12	The same reason as that of the former period.	The same reason as that of the former period.	0	0
18	13	The possibility that my partner chooses 0 is high.	I think that increasing my contribution will decrease my payoff.	0	0
18	14	The same reason as that of the former period.	The same reason as that of the former period.	0	0
18	15	The same reason as that of the former period.	The same reason as that of the former period. I do not want to change my contribution.	0	0
19	1	Because there is a bias of the succession in the practice phase.	Opportunistic behavior.	24	0
19	2	The same as above.	The same as above.	24	0
19	3	The same as above.	The same as above.	24	0
19	4	To end the bias of the succession in practice phase.	Opportunistic behavior.	0	0
19	5	The same as above.	The same as above.	0	0
19	6	The same as above.	The same as above.	0	0
19	7	To end the bias of the succession in practice phase.	The same as above.	0	0
19	8	The same as above.	The same as above.	0	0
19	9	The same as above.	The same as above.	0	0
19	10	The realization of prisoner’s dilemma.	Opportunistic behavior.	0	0
19	11	The same as above.	The same as above.	0	0
19	12	The same as above.	The same as above.	0	0
19	13	The realization of prisoner’s dilemma.	Opportunistic behavior.	0	0
19	14	The same as above.	The same as above.	0	0
19	15	The same as above.	The same as above.	0	0
20	1	Wait and watch. I think my partner chooses the middle of the endowment.	The middle of the endowment.	12	12
20	2	I guess my next partner will choose 0 because my partner chose 0 in the former period.	To maximize my payoffs when my partner chooses 0.	0	0
20	3	The same reason as that of the second period.	The same reason as that of the second period.	0	0
20	4	The same reason as that of the former period.	The same reason as that of the former period.	0	0
20	5	The same reason as that of the former period.	The same reason as that of the former period.	0	0
20	6	The same reason as that of the former period.	The same reason as that of the former period.	0	0
20	7	The same reason as that of the former period.	The same reason as that of the former period.	0	0
20	8	I guess my partner chooses 0 as before.	I hope that all subjects continue to choose 24.	0	24
20	9	The same reason as that of the second period.	The same reason as that of the second period.	0	24
20	10	The same reason as that of the former period.	The same reason as that of the former period.	0	24
20	11	The same reason as that of the former period.	The same reason as that of the former period.	0	24

ID	P	Reason for the Belief	Reason for the Contribution	B	C
20	12	The same reason as that of the former period.	The same reason as that of the former period.	0	24
20	13	The same reason as that of the former period.	The same reason as that of the former period.	0	24
20	14	The same reason as that of the former period.	Because the trend of contributions did not change, to maximize my payoffs when my partner chooses 0.	0	0
20	15	The same reason as that of the former period.	The same reason as that of the former period.	0	0

APPENDIX B: Instructions, a Payoff Table for Actual Task and Practice and Control Questions

This is a translation of the original Japanese version. We present the instructions for the linear public goods game for 15 periods here.

Instructions

From now, we will explain this experiment using the provided documents. Please refer to the documents as needed. The provided documents are "Instructions," "Payoff Table (for practice)," "Payoff Table (for actual task)," "Record Sheet," and "Summary Sheet of Experimental Procedures." Each subject has received the same documents. "Payoff Table (for practice)" will be used to learn how to read the payoff table in these instructions and control questions. "Payoff Table (for actual task)" will be used in the actual task. In this experiment, please note that talking is prohibited except asking questions to the experimenter. If you cannot follow the experimenter's instructions, you will be asked to leave this experiment. If you have any questions, please raise your hand quietly.

1. Explanation of Experiment

In this experiment, at the beginning of each period, the experimenter will choose your partner randomly from all subjects except you. Then, you and your partner form a two-member group and participate jointly in the investment game. At the beginning of each period, you and your group member are endowed with 24 units of money respectively. This money is not real money. But please imagine that you have 24 units of money. You and your group member independently decide how many of 24 units of money to contribute to the investment. You and your group member can earn "income points" by contributing to the investment. The investment game will be repeated 15 times. Since the experimenter choose your partner randomly at each period, your group member will change at each period. Nobody will know the identities of your group member both during and after this experiment. We will later explain your earnings in Section 4.

2. Reading the Payoff Table

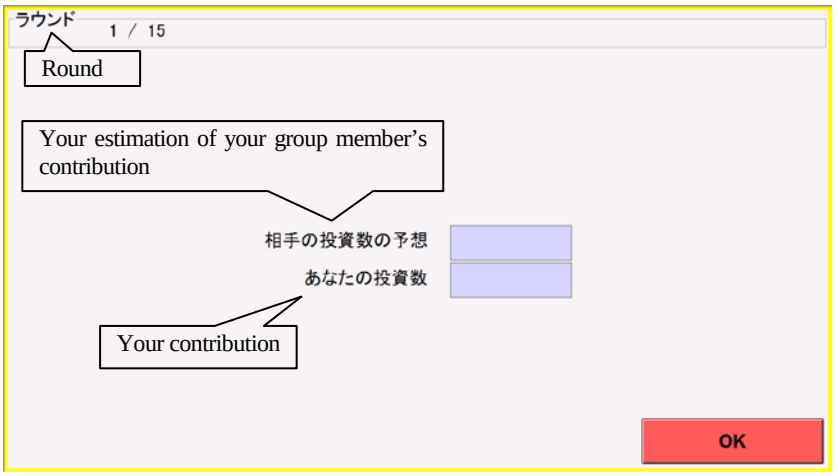
Here, we will explain how your income points are determined. We also will explain how to read "Payoff Table (for practice)." Please refer to "Payoff Table (for practice)." Your income points are determined by your contributions and your group member's contribution. The payoff table indicates your income points according to each pair of you and your group member's contribution. In the payoff table, the horizontal axis shows your contributions, and the vertical axis shows your group member's

contributions. Assume that your contribution is “5” and your group member’s contribution is “3”. In this case, your income points are “1895”, which is the intersection number between “5” and “3”. The way of reading “Payoff table (for actual task)” is same as the way of reading “Payoff table (for practice).”

3. Experimental Tasks and Procedures

Here, we will explain about the tasks and procedures in this experiment. We also will explain how to complete “Record Sheet.” Please refer to it as needed.

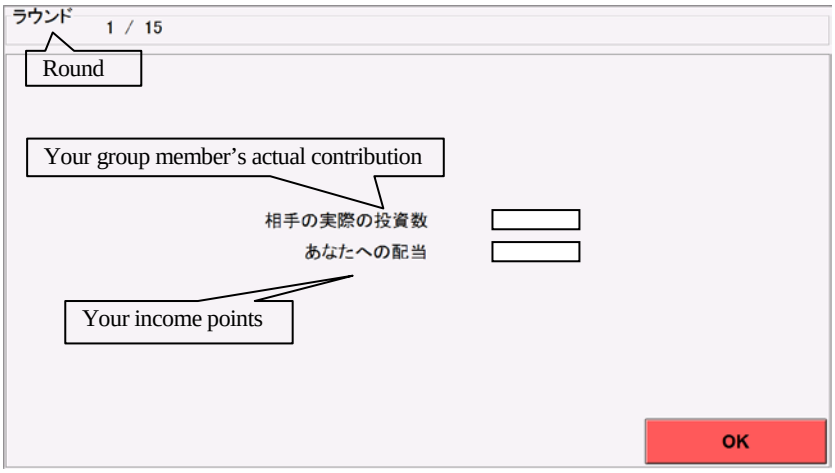
1. At the beginning of each period, the experimenter will choose your partner randomly. Please note that nobody will know the identities of your group member. Also, you and your group member are endowed with 24 units of money respectively.
2. You have to estimate your group member’s contribution between 0 and 24 using “Payoff table (for actual task).” Then, you have to enter your estimation in the space titled “Your estimation of your group member’s contribution” on your computer screen. If your estimation is correct, you will get additional money (the details will be explained in Section 4).
3. Next, you have to decide on your contribution to the investment between 0 and 24 using “Payoff table (for actual task).” Then, you have to enter your contribution in the space titled “Your contribution” on your computer screen.
4. As soon as you enter both “Your estimation of your group member’s contribution” and “Your contribution” on your computer screen, you have to press “OK” button. Please note that once you press “OK” button, you cannot cancel and re-enter your decision.



[Example of decision screen]

5. Next, you have to write down your estimation of your group member’s contribution on your “Record Sheet.” Additionally, you have to fill out the reason why you estimate such a contribution on your “Record Sheet.”

6. You also have to write down your contribution on your “Record Sheet.” Additionally, you have to fill out the reason why you choose such a contribution on your “Record Sheet.”
7. When all subjects have finished, the results will appear on your computer screen. At that point, you have to write down “Your group member’s actual contribution” and “Your income points” on your “Record Sheet.” “Your income points” are calculated according to you and your group member’s actual contributions. As soon as you write down the results, you have to press “OK” button. This completes one period of this experiment.



[Example of result screen]

8. The next period starts. Again, the experimenter will choose your partner randomly, and you and your group member are endowed with 24 units of money respectively. And then, you have to repeat the identical tasks explained above. The same task will be repeated 15 times. Please note that you cannot carry over money to the following periods, that is, each period is independent of the other periods.

4. Your Earnings

Finally, we will explain about your earnings. Your earnings depend on the sum of income points you acquired during 15 periods of this experiment and additional money based on your estimations of your group member’s contribution. We will explain the two separately.

(1) Earnings for Income Points

Your earnings for income points are determined by the following equation:

Your earnings (yen) = the sum of income points x 0.05 (yen)

(2) Additional Money for Correct Estimation

After this experiment, one of all subjects will select a number between 1 and 15 by a lottery from a box. You can get additional money 500 yen if "Your estimation of your group member's contribution" matches as "Your group member's actual contribution" at the selected number period. If you did not estimate your group member's contribution correctly, you cannot get additional money.

Combined (1) and (2), your earnings are determined by the following equation:

Your earnings (yen) = the sum of income points x 0.05 (yen) + 500 yen (if your estimation was correct)

As the above equation shows, the more income points you get, the more money you will be paid. Also, in the case that your estimation is correct, you will be paid more money. Your earnings will be available to you in cash after this experiment.

This concludes the instructions. We will give you five minutes to ask questions. After that, you will have to answer the control questions using "Payoff Table (for practice)." After all subjects' answers are corrected, we will give you another five minutes to ask questions. Then, the actual experiment will begin.

Payoff Table (for actual task)

Your contribution

The other group member's contribution / Your income points	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	2610	2580	2550	2520	2490	2460	2430	2400	2370	2340	2310	2280	2250	2220	2190	2160	2130	2100	2070	2040	2010	1980	1950	1920	1890
1	2680	2650	2620	2590	2560	2530	2500	2470	2440	2410	2380	2350	2320	2290	2260	2230	2200	2170	2140	2110	2080	2050	2020	1990	1960
2	2750	2720	2690	2660	2630	2600	2570	2540	2510	2480	2450	2420	2390	2360	2330	2300	2270	2240	2210	2180	2150	2120	2090	2060	2030
3	2820	2790	2760	2730	2700	2670	2640	2610	2580	2550	2520	2490	2460	2430	2400	2370	2340	2310	2280	2250	2220	2190	2160	2130	2100
4	2890	2860	2830	2800	2770	2740	2710	2680	2650	2620	2590	2560	2530	2500	2470	2440	2410	2380	2350	2320	2290	2260	2230	2200	2170
5	2960	2930	2900	2870	2840	2810	2780	2750	2720	2690	2660	2630	2600	2570	2540	2510	2480	2450	2420	2390	2360	2330	2300	2270	2240
6	3030	3000	2970	2940	2910	2880	2850	2820	2790	2760	2730	2700	2670	2640	2610	2580	2550	2520	2490	2460	2430	2400	2370	2340	2310
7	3100	3070	3040	3010	2980	2950	2920	2890	2860	2830	2800	2770	2740	2710	2680	2650	2620	2590	2560	2530	2500	2470	2440	2410	2380
8	3170	3140	3110	3080	3050	3020	2990	2960	2930	2900	2870	2840	2810	2780	2750	2720	2690	2660	2630	2600	2570	2540	2510	2480	2450
9	3240	3210	3180	3150	3120	3090	3060	3030	3000	2970	2940	2910	2880	2850	2820	2790	2760	2730	2700	2670	2640	2610	2580	2550	2520
10	3310	3280	3250	3220	3190	3160	3130	3100	3070	3040	3010	2980	2950	2920	2890	2860	2830	2800	2770	2740	2710	2680	2650	2620	2590
11	3380	3350	3320	3290	3260	3230	3200	3170	3140	3110	3080	3050	3020	2990	2960	2930	2900	2870	2840	2810	2780	2750	2720	2690	2660
12	3450	3420	3390	3360	3330	3300	3270	3240	3210	3180	3150	3120	3090	3060	3030	3000	2970	2940	2910	2880	2850	2820	2790	2760	2730
13	3520	3490	3460	3430	3400	3370	3340	3310	3280	3250	3220	3190	3160	3130	3100	3070	3040	3010	2980	2950	2920	2890	2860	2830	2800
14	3590	3560	3530	3500	3470	3440	3410	3380	3350	3320	3290	3260	3230	3200	3170	3140	3110	3080	3050	3020	2990	2960	2930	2900	2870
15	3660	3630	3600	3570	3540	3510	3480	3450	3420	3390	3360	3330	3300	3270	3240	3210	3180	3150	3120	3090	3060	3030	3000	2970	2940
16	3730	3700	3670	3640	3610	3580	3550	3520	3490	3460	3430	3400	3370	3340	3310	3280	3250	3220	3190	3160	3130	3100	3070	3040	3010
17	3800	3770	3740	3710	3680	3650	3620	3590	3560	3530	3500	3470	3440	3410	3380	3350	3320	3290	3260	3230	3200	3170	3140	3110	3080
18	3870	3840	3810	3780	3750	3720	3690	3660	3630	3600	3570	3540	3510	3480	3450	3420	3390	3360	3330	3300	3270	3240	3210	3180	3150
19	3940	3910	3880	3850	3820	3790	3760	3730	3700	3670	3640	3610	3580	3550	3520	3490	3460	3430	3400	3370	3340	3310	3280	3250	3220
20	4010	3980	3950	3920	3890	3860	3830	3800	3770	3740	3710	3680	3650	3620	3590	3560	3530	3500	3470	3440	3410	3380	3350	3320	3290
21	4080	4050	4020	3990	3960	3930	3900	3870	3840	3810	3780	3750	3720	3690	3660	3630	3600	3570	3540	3510	3480	3450	3420	3390	3360
22	4150	4120	4090	4060	4030	4000	3970	3940	3910	3880	3850	3820	3790	3760	3730	3700	3670	3640	3610	3580	3550	3520	3490	3460	3430
23	4220	4190	4160	4130	4100	4070	4040	4010	3980	3950	3920	3890	3860	3830	3800	3770	3740	3710	3680	3650	3620	3590	3560	3530	3500
24	4290	4260	4230	4200	4170	4140	4110	4080	4050	4020	3990	3960	3930	3900	3870	3840	3810	3780	3750	3720	3690	3660	3630	3600	3570

Payoff Table (for practice)

Your contribution

The other group member's contribution / Your income points	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0	1460	1500	1540	1580	1619	1659	1698	1736	1775	1812	1850	1886	1922	1957	1991	2025	2057	2089	2119	2149	2177	2204	2229	2253	2276
1	1540	1580	1620	1659	1699	1738	1776	1815	1852	1890	1926	1962	1997	2031	2065	2097	2129	2159	2189	2217	2244	2269	2293	2316	2338
2	1620	1660	1699	1739	1778	1816	1855	1892	1930	1966	2002	2037	2071	2105	2137	2169	2199	2229	2257	2284	2309	2333	2356	2378	2397
3	1700	1739	1779	1818	1856	1895	1932	1970	2006	2042	2077	2111	2145	2177	2209	2239	2269	2297	2324	2349	2373	2396	2418	2437	2455
4	1779	1819	1858	1896	1935	1972	2010	2046	2082	2117	2151	2185	2217	2249	2279	2309	2337	2364	2389	2413	2436	2458	2477	2495	2512
5	1859	1898	1936	1975	2012	2050	2086	2122	2157	2191	2225	2257	2289	2319	2349	2377	2404	2429	2453	2476	2498	2517	2535	2552	2566
6	1938	1976	2015	2052	2090	2126	2162	2197	2231	2265	2297	2329	2359	2389	2417	2444	2469	2493	2516	2538	2557	2575	2592	2606	2619
7	2016	2055	2092	2130	2166	2202	2237	2271	2305	2337	2369	2399	2429	2457	2484	2509	2533	2556	2578	2597	2615	2632	2646	2659	2670
8	2095	2132	2170	2206	2242	2277	2311	2345	2377	2409	2439	2469	2497	2524	2549	2573	2596	2618	2637	2655	2672	2686	2699	2710	2719
9	2172	2210	2246	2282	2317	2351	2385	2417	2449	2479	2509	2537	2564	2589	2613	2636	2658	2677	2695	2712	2726	2739	2750	2759	2766
10	2250	2286	2322	2357	2391	2425	2457	2489	2519	2549	2577	2604	2629	2653	2676	2698	2717	2735	2752	2766	2779	2790	2799	2806	2811
11	2326	2362	2397	2431	2465	2497	2529	2559	2589	2617	2644	2669	2693	2716	2738	2757	2775	2792	2806	2819	2830	2839	2846	2851	2854
12	2402	2437	2471	2505	2537	2569	2599	2629	2657	2684	2709	2733	2756	2778	2797	2815	2832	2846	2859	2870	2879	2886	2891	2894	2895
13	2477	2511	2545	2577	2609	2639	2669	2697	2724	2749	2773	2796	2818	2837	2855	2872	2886	2899	2910	2919	2926	2931	2934	2935	2933
14	2551	2585	2617	2649	2679	2709	2737	2764	2789	2813	2836	2858	2877	2895	2912	2926	2939	2950	2959	2966	2971	2974	2975	2973	2969
15	2625	2657	2689	2719	2749	2777	2804	2829	2853	2876	2898	2917	2935	2952	2966	2979	2990	2999	3006	3011	3014	3015	3013	3009	3003
16	2697	2729	2759	2789	2817	2844	2869	2893	2916	2938	2957	2975	2992	3006	3019	3030	3039	3046	3051	3054	3055	3053	3049	3043	3034
17	2769	2799	2829	2857	2884	2909	2933	2956	2978	2997	3015	3032	3046	3059	3070	3079	3086	3091	3094	3095	3093	3089	3083	3074	3063
18	2839	2869	2897	2924	2949	2973	2996	3018	3037	3055	3072	3086	3099	3110	3119	3126	3131	3134	3135	3133	3129	3123	3114	3103	3089
19	2909	2937	2964	2989	3013	3036	3058	3077	3095	3112	3126	3139	3150	3159	3166	3171	3174	3175	3173	3169	3163	3154	3143	3129	3113
20	2977	3004	3029	3053	3076	3098	3117	3135	3152	3166	3179	3190	3199	3206	3211	3214	3215	3213	3209	3203	3194	3183	3169	3153	3134
21	3044	3069	3093	3116	3138	3157	3175	3192	3206	3219	3230	3239	3246	3251	3254	3255	3253	3249	3243	3234	3223	3209	3193	3174	3152
22	3109	3133	3156	3178	3197	3215	3232	3246	3259	3270	3279	3286	3291	3294	3295	3293	3289	3283	3274	3263	3249	3233	3214	3192	3168
23	3173	3196	3218	3237	3255	3272	3286	3299	3310	3319	3326	3331	3334	3335	3333	3329	3323	3314	3303	3289	3273	3254	3232	3208	3180
24	3236	3258	3277	3295	3312	3326	3339	3350	3359	3366	3371	3374	3375	3373	3369	3363	3354	3343	3329	3313	3294	3272	3248	3220	3190

ID :

Control Questions

From now, we will conduct a test to confirm your understanding. You are allowed to re-read the provided documents. Follow the instructions and answer in the designated spaces. The test time is for five minutes.

I. For the following six questions, answer ○ or × in the box if the statement is true (○) or false (×).

☐ 1. The provided payoff tables for every subject are different.

☐ 2. The experiment is conducted in groups of two. The experiment consists of 15 periods, and the procedures in each period are the same. However, your group member changes randomly in each period. After this experiment, you are informed the identities of your group members.

☐ 3. At the beginning of the 1st period, you will be endowed with 24 units of experimental currency. At the beginning of the 2nd period, you are again endowed with 24 units of experimental currency. Similarly, at the beginning of each of the following periods, you are endowed with 24 units of experimental currency.

☐ 4. Your tasks in each period are to estimate your group member's contribution and to decide on your contribution. While you take on the tasks, your group member also takes on the same tasks.

☐ 5. The more income points you get, the more money you will be paid.

☐ 6. If your estimation of your group member's contribution is correct in the period selected by a lottery, you can get additional money 500 yen.

II. See "Payoff Table (for practice)." Fill in the blanks in the following five questions using "Payoff Table (for practice)."

7. If your contribution is "5" and your group member's contribution is "3," your income points is _____.
8. If your contribution is "20" and your group member's contribution is "3," your income points is _____.
9. If your contribution is "10" and your group member's contribution is "10," your income points is _____.
10. If your contribution is "3" and your group member's contribution is "20," your income points is _____.
11. If your contribution is "3" and your group member's contribution is "5," your income points is _____.