Voice Matters in a Dictator Game

Abstract

We examine the following dictator game in the laboratory: The recipient has an opportunity to state a payoff-irrelevant request for the dictator's offer before the dictator dictates his/her offer. Our hypothesis that the dictator's offer is independent of the recipient's request is rejected: if the request is less than 50% of the pie, the dictator's offer increases as the recipient's request increases; on the other hand, if the request goes beyond 50% of the pie, the offer decreases as the request increases. We also conduct a clustering analysis to classify dictators' behaviour into some notable patterns. (*JEL* C72, C91, D64)

Communication by voice is one of the most fundamental forms of activities in human society. It affects the fate of human beings just like economic and political activities do; indeed, it is often an economic as well as a political activity as exemplified by labor-management negotiation, customer complaints, political debates, and so forth.[1]

Game theory has studied the role of communication in strategic settings. It has been shown that communication serves as coordination device. A flip side of this observation is, as claimed by Crawford and Sobel (1982), that a coordination aspect is needed to make communication valid.[2] According to this view, a seemingly conflicting situation would also contain some coordination aspect. Consider a student making an effort after, rather than before, an examination to obtain a higher grade. We know from

---

[1] Hirschman (1970) pointed out the importance of communication, or voice, in economic settings. He examined and emphasized the effects that the voice of customers and employees has on the quality of products and services which are deteriorated by the negligence of a firm manager. Hirschman discussed a wide range of phenomena from a mere complaint of a customer to a legal action taken by an insider. His argument, however, does not give us clear answers to some question concerning the mechanism through which and the extent to which cheap-talk affects others' behavior.

[2] Crawford and Sobel (1982) examined a strategic aspect of cheap-talk as information transmitting device in the Sender-Receiver game. Kim and Sobel (1995), Matsui (1991) and Warneryd (1991) studied the evolutionary mechanism in which cheap-talk comes to have this function. Dickhaut et al. (1995) and Kawagoe and Takizawa (1999) showed that cheap-talk can convey one’s private information and facilitate coordination in the Sender-Receiver Game experiment only if both players’ interests are sufficiently aligned. Also, see Blume et al.(1998) for an experimental study on the evolution of the meaning of cheap-talk. See surveys by Crawford (1998) and Camerer (2003) for detail.

our experiences and observations that these requests are sometimes effective, or at least some students think them effective, despite that professors are often reluctant to conform with the request for various reasons. Indeed, even in these cases, we can still think that they have a common interest to some extent since the pecuniary payoff is not all that matter. A professor sometimes responds to the request of a student for some reason.

If we follow the principle of revealed preferences, it seems obvious that communication matters only when there is a coordination aspect. But is it really obvious? Let us go back to the student's request story. It is true that the professor gave an extra credit because it was better for him/her for some reason. However, it may well be the case that the professor would be happier if the student did not come for the request in the first place. In the sense that mere speaking lowers the payoff of the professor, communication is *not* payoff-irrelevant in a narrow sense. The request of the student increases his payoff at the expense of the professor.

It is the purpose of the present paper to study the effects of communication in an environment free of coordination aspects as much as possible by conducting a laboratory experiment.

To this aim, we consider a dictator game with a "voice" option in the laboratory. In the dictator game, the dictator dictates how to divide a pie, and the recipient simply receives his/her share, i.e., unlike in an ultimatum game, he/she does not have an option to reject this division. In our experiment, the recipient has an opportunity to state a payoff-irrelevant request for the minimum offer that he/she is willing to receive before the dictator dictates his/her offer.

We have several reasons for examining this game. First, in this game, unlike in, say, an ultimatum game, he/she cannot take any action after his/her request. If the underlying game is an ultimatum game, that is, the recipient has an option to reject the dictator's offer, his/her request may work as a threat. Second, every subgame beginning with the dictator's move is different only in the recipient's request; hence any difference in dictator's play must be caused by the difference in recipient's voice.[3] Finally, this game is a strictly competitive game. Therefore, an environment free of coordination aspects can be realized in a laboratory at least in pecuniary payoffs.

In this game, it is predicted not only by the standard game theory, but by the behavioral game theory such as the theory of other-regarding preferences, that the dictator's offer is independent of the recipient's request.[4] Some findings based on our data are as follows: the independence hypothesis is rejected; as the recipient's request increases, the dictator's offer increases when the requests are less than 50% of the pie;

---

[3] The results in Fehr and Rockenbach (2003) seemed to imply an effect of communication. They conducted the following trust game experiments; the investor states a desired back transfer in the same time he transfers money to the trustee. Similar to ours, every subgame beginning with the trustee is a dictator game. However, trustee's back transfer depends on not only investor's request but also the amount of his transfer. Thus, we are not sure how and the extent to which their communication affects trustee's back transfer.

[4] See, e.g., Fehr and Schmidt (1999) and Bolton and Ockenfels(2001) for "outcome-based" models, and Rabin(1993) and Dufwenberg and Kirchsteiger (1998) for "intention-based" models.

on the other hand, when the request goes beyond 50% of the pie, the offer decreases as the request increases. That is, “communication”, or “voice” matters without coordination aspects.

We also conduct a clustering analysis to find notable different tendencies among dictators’ behavior. In our experimental setting, we adopted the strategy method: a subject who is selected by lottery to be a dictator is asked to determine a strategy, or a contingent plan, which prescribes the share to be given to the recipient for each possible request. This method enables us to study an individual behavior pattern of each subject as opposed to the aggregate pattern. We obtain the following three patterns of dictators’ behavior:

(i) [*other-disregarding*] 9 out of 39 subjects belong to this cluster. The representative pattern of this cluster is to give no share to the recipient, which corresponds to a Nash equilibrium of the dictator game with a voice option;

(ii) [*punishing the greedy*] 16 out of 39 subjects belong to this cluster. The representative pattern of this cluster is to comply with the request up to 50% and decrease the share to be given as the request increases beyond 50%; and

(iii) [*the lenient*] 14 out of 39 subjects belong to this cluster. The representative pattern of this cluster is to comply with the request up to 50% and keep 50% beyond it.

Thus, voice matters in the dictator game against those who fall in (ii) and (iii).

The rest of the paper is organized as follows. The next section explains the structure of the game with a voice option, game theoretic predictions for it and our independence hypothesis formally. Section II explains our experimental procedures. Section III states and studies our experimental results. Section IV provides some concluding remarks. Appendix contains instructions, recording sheets, and raw data.

I. Design

We examine a dictator game with a "voice" option in the laboratory. In the dictator game, the dictator dictates how to divide a pie, and the recipient simply receives his/her share, i.e., unlike in an ultimatum game, he/she does not have an option to reject this division (see Figure 1). The size of a pie is 1,000 yen in our experiment. In the dictator game with a "voice" option, the recipient can either tell the minimum offer that he/she is willing to receive (MO) to the dictator or simply choose "not to tell," denoted by ϕ, before the dictator dictates his/her offer (see figure 2.). MO has to be between 0 and 1,000 yen with gradations of 100 yen. A typical element of the dictator's offer is denoted by x, while MO is denoted by y. The dictator can condition his offer on MO. If the actual offer of the dictator is x, then the dictator receives (1,000-x) yen, and the recipient x yen as their rewards, respectively.

Figures 1 and 2 are here.

Denote by $p_x(y)$ the probability that the dictator chooses *x* in response to $y \in Y \equiv \{\phi, 0, 100, \ldots, 1{,}000\}$. Then, $P(y) = (p_0(y), \ldots, p_{1,000}(y))$ gives a conditional probability distribution of the dictators' choice in response to *y*. Let $P = (P(y))_{y \in Y}$ be a tuple of such conditional distributions.

Our main interest is to see whether or not voice matters in the dictator game, and if it does, how. For this purpose, we first test the following null hypothesis that conditional distributions $P(\phi)$ and $P(y)$'s are identical. We call this hypothesis the Independence Hypothesis (IH):

(IH) $P(\phi) = P(0) = P(100) = \ldots = P(1000)$.

Next, we consider some game theoretic predictions of our dictator game with a voice option. First, *P* with $P(y) = (1, 0, \ldots, 0)$ for all $y \in Y$ is the unique Nash equilibrium. In this equilibrium, the dictator keeps the whole pie regardless of the request of the recipient. However, several experimental researches found that the dictator often deviates from the equilibrium and makes a "fair" offer to the recipient in the laboratory (for example, Kahneman, Knetsch and Thaler (1986), Forsythe, Horowitz, Savin and Sefton (1994), Andreoni and Miller (2000) and others).

Several theoretical attempts have been made based on other-regarding preferences to explain such deviations.[5] We categorize these theories of other-regarding preferences into the following two: One is the consequentialistic, or the outcome-based, model

[5] See more details in the survey of Fehr and Schmidt (2000) and Camerer (2003).

according to which players, who care about other players' payoffs, pay attention to a realized outcome only. Even though a player's interest lies only in the realized outcome, this model can explain both altruistic behavior and spite behavior (Bolton and Ockenfels (2001), Fehr and Schmidt (1999)). The other is the reciprocal, or the intention-based, model according to which players pay attention not only to the realized outcome but also to opponents' intention behind the process inducing that outcome. This model can explain both positive and negative reciprocity (Rabin (1993), Dufwenberg and Kirchsteinger (1998)).

In our dictator game with a voice option, every subgame beginning with the recipient's move is identical, so the outcome-based model as well as Nash equilibrium supports the Independence Hypothesis. In other words, voice does not affect the choice of the dictator's offer in our game. Of course, the shape of the dictator's choice distributions, $P(y)$, themselves depends on the parameters of the dictator's utility function.

Furthermore, the intention-based model also supports the Independence Hypothesis. The positive reciprocity that returns kindness for kind behavior and the negative reciprocity that returns unkindness for unkind behavior are key features of the intention-based model. Such reciprocal behavior cannot be an equilibrium in the dictator game with a voice option. Since the dictator game with a voice option is a zero-sum game, the dictator thinks that the recipient's behavior is "kind" only if he makes an "unkind" offer to the recipient; on the other hand, the dictator thinks that the recipient's behavior is "unkind" only if he makes a "kind" offer to the recipient. In fact, a fairness equilibrium in the sense of Rabin (1993) and Dufwenberg and Kirchsteiger (1998) predicts that $P(y) = (1,0,\dots,0)$ for all *y*.

In summary, both Nash equilibrium and the intention-based model predict $P(y) = (1,0,\dots,0)$ for all *y*. In the outcome-based model, the dictator's choice distribution, $P(y)$, can be affected by the parameters of utility functions. However, voice has no effect on equilibrium plays in our dictator game, either.

II. Experiment

Our experiment was conducted at the University of Tokyo, Komaba Campus, on October 23, 2003. Subjects were undergraduate students in the class of "Corporate Economics" in the Department of Liberal Arts. Most of the students were sophomore, took microeconomics in the previous semester, and would become economics major. They were supposed to learn game theoretic concepts like subgame perfection in this class, though they had not learned either subgame perfection or backward induction at the time of experiment. They hadn't participated in any formal experiment in economics prior to this one. 80 out of 390 students were selected at random.

In the beginning of the experiment, each subject was distributed an envelope that contains all the experimental materials such as instructions, a recording sheet, a practice problem, and an identification number card. The subjects to whom an even number is given as an identification number were dictators, and the others were recipients.[6] The

[6] Of course, we did not use terms ``Dictator'' and ``Recipient'' in the actual experiment at all. Instead, we use ``Player B'' as a dictator and ``Player A'' as a recipient.

identification numbers were also used to determine pairs in the actual experiment. The identity of the opponent in a pair was informed neither publicly nor privately, and subjects were assigned their seats at random so that we keep subjects' identities as anonymous as we can.

To remove any experimenter's effect, we used volunteers other than the researchers as instructors in this experiment. [7] One of the instructors read aloud the instructions of the experiment. Written instructions were also distributed to each subject. Before the actual experiment, subjects were told to solve practice problems to confirm their understandings of our dictator game and the instructions of the experiment.

In the actual experiment, we followed the strategy method.[8] That is, a dictator and a recipient made decisions simultaneously as follows. The recipient chose between "to tell MO" and "not to tell." If he/she decided "to tell MO," the amount of MO, y, was chosen as well. The dictator dictated his/her offer, *x*, for each possible choice of the recipient before he/she knew the actual choice made by his/her opponent. These decisions were made once and for all. The experiment was conducted manually. Session

---

[7] As is well known, Hoffman, McCabe, Shachat and Smith (1994) developed a double blind method to keep anonymity among subjects as well as between experimenters and subjects, and it become standard method to conduct bargaining experiment such as the ultimatum game, the dictator game, trust game etc. Unlike their experimental design, we employed the one room experiment that all subjects were in the same room. Our design is reflected by a confounding effect of double blind method reported by Frohlich, Oppenheimer, and Moore (2001). They pointed out that double blind experiments might endanger doubts in subjects regarding the existence of pairings and the disposition of any money they share.

[8] See more details of strategy method in Selten (1967).

time was about one and half hours and twenty minutes was spent for instruction and practice. The average reward was about 1,000 yen and the participation fee, 500 yen, is included. The reward was paid in cash privately to each subject about one hour after the experiment.

III. Results

We use 39 pairs of data for our analysis because one of them was incompletely written. To see how the dictators responded to the voice of the recipients, the relative frequency table is given in Table 1.[9]

Table 1 is here.

The column is the recipient's choice, $y \in Y$, and the raw is the amount of the offer made by the dictator, *x*. Each column can be regarded as a sample population density for each *y*. There are 39 data for each *y* because the dictators made their decisions against all *y*'s under the strategy method. It seems that each sample population density is different for each *y*. As representative cases, let us focus on the cases of $y = \phi$ and $y = 500$. In each case, the amount of offer made by a dictator, *x*, is distributed between $x = 0$ and $x = 500$. While *x* is concentrated near $x = 0$ for $y = \phi$, *x* is distributed around $x = 500$ for $y = 500$. Furthermore, over 50% of the offers satisfy $x = y$ for *y* between 0 and 500. That is, almost a half of the offers made by the dictators are equal to MO if MO is less than or equal to a half of the pie. If MO exceeds 50% of the

---

[9] See also Figure 3 that describes the relative frequency of *x* for each *y*.

pie, this tendency disappears; the amount of the offer made by a dictator decreases as MO increases. The greater MO is, the larger the variance of the distribution becomes.

Figure 4 is here.

To see more details of the distributions of x, a box plot is shown in figure 4. In this box plot, the vertical-axis is the amount of x and the horizontal-axis is y. The top line of the box corresponds to the third quartile (75% percentile), the bottom line of the box to the first quartile (25% percentile), the line within the box to the median. Since there are cases that the third quartile is equal to the median, we also put a dark mark on the line of the median. The line segments associated with the top and the bottom of the box shows the maximum and the minimum values, respectively. The mode is shown as a triangle. Next, let us confirm our general findings mentioned above using this box plot.

At $y = \phi$, one can see that the distribution of x is concentrated on 0 since the median and the mode is at $x = 0$. On the other hand, at $y = 500$, the distribution centers around 500 since the mode is $x = 500$ and the median is also close to it (400). We can also see that the median monotonically increases between $y = 0$ and 500 and decreases between $y = 600$ and 1000. Furthermore, note that the third quartile, the median, and the mode are all equal to y between y=0 and 400. On the other hand, the distribution tends to decline toward the mode, x =0, when y is greater than 500.

Now, we use the Friedman two-way analysis of variance by ranks to test the null hypothesis that the twelve responses to the voice have been drawn from the distributions with the same median.[10] To do it, we first transform each individual's data into ranks, i.e., we rank each response from the first to the twelfth.[11] Let M_j be the median of the responses to the voice *j* (*j*=ϕ, 0, 100, …,1000). Then the null hypothesis is written as:

$$H_0: \quad M_\phi = M_0 = M_{100} = \cdots = M_{1000}$$

and the alternative hypothesis is:

$$H_1: \quad M_u \neq M_v \quad \textit{for some } u \textit{ and } v.$$

The Friedman's value after adjusting ties approximately follows a χ^2 distribution for the present data set with $df = 11$. The value we obtained is

$$F_r = 114.04,$$

which exceeds the critical value 31.26 for the significance level of 1%. Thus, we reject the null hypothesis. In other words, voice matters in the present game.

Since we obtain the significant result, we proceed to the multiple comparisons. The absolute differences of the sums of the ranks for the pairs of *y*'s in *Y* are shown in Table 3.[12] Three notable tendencies are the following:

---

[10] See Siegel and Castellan (1988) for the Friedman two-way analysis.

[11] If there is a tie, give them an average rank. For example, the data (0,0, …,0) is transformed into (6.5, 6.5, …, 6.5), and (5, 10, 5, 2, 2, …,2) to (2.5, 1, 2.5, 8, 8, …, 8).

[12] Each absolute difference follows a normal distribution with a proper variance. The critical value is the abscissa value from the unit normal distribution above which lies 0.05/(11*12) percent of the distribution. Note that in the present context, the Friedman analysis of variance is more suitable than the standard analysis of variance for a randomised block design with one treatment variable experiment since we do not presuppose that samples are from the normal distribution. It should be noted here that the standard analysis of variance induced the wider range of pairs that lead to significant differences.

(1) the response (offer) to a “modest” request is significantly below that to a request for a relatively “fair” division;

(2) the response to “not-to-tell” is significantly below that to a request for a relatively “fair” division; and

(3) the response to an “aggressive” request is significantly below that to a request for a relatively “fair” division.

Combining this test with the earlier observations of the present section, we may conclude that a dictator tends to give more to a recipient if the request is a “fair” one than otherwise.

Table 3 is here.

So far we have paid attention to the aggregate behavior of the subjects. From now on, we would like to see the individual behavior. In doing so, we will classify the subjects’ behavior into some prominent patterns, or clusters. Since there is no theory, to the best of our knowledge, to give us clear understandings of our results, such a clustering analysis may help us to develop the basis of our future modelling of the subjects’ behavior.

Note that, according to Figure 3, the first quartile is 0 for any y and that at least 25% of the offers are 0 for each y even though the mode is equal to MO in the case of $0 \leq y \leq 500$. So one can deduce from these aggregated data that there are at least 25% of subjects who offer 0 in the case of $0 \leq y \leq 500$. On the other hand, the variances of the distributions are still large though the mode is 0 and the distribution tends to biased toward 0 in the case of $600 \leq y \leq 1000$. According to Table 1, about 25% of offers are around x = 500 for any y between 600 and 1000. Therefore, one can deduce from these aggregated data that there are 25% of the subjects who offer about 500 if $600 \le y \le 1000$ holds.

To confirm these observations, we differentiate some behavior patterns by a hierarchical cluster analysis of Ward's method.[13] We use SAS to conduct this analysis. The dendrogram representing a clustering process is shown in Figure 5.[14] When R-square is 0.6, we find three clusters which have notable features and refer to the representative behavior patterns in these three clusters as *other-disregarding*, *punishing the greedy*, and *the lenient*, respectively. We show the dictators' behavior in each cluster by using the box plots.

Figure 6 is here.

The first cluster (other-disregarding): Nine subjects, or 23% of the whole subjects, belong to this cluster. The box plot of dictators' choices for each y is shown in Figure 6. The subjects' behavior, choosing 0 for any y, are consistent with the unique Nash equilibrium. Thus, the reason that the first quartile is always 0 in the aggregated data is that subjects who belong to this cluster always choose 0.

---

[13] In a hierarchical cluster analysis, each individual data with multiple attributes is regarded as a point in a multidimensional space, then data showing similarity according to an appropriate distance measure are combined each other. A cluster is composed by applying above process repeatedly. In Ward's method, at each step, the marginal increment in the within-cluster sum of squares is minimized over all partitions obtainable by merging two clusters from the previous step. See more details of Ward's method in Anderberg (1973).

Figure 7 is here.

The second cluster (punishing the greedy): Sixteen subjects, or 41% of the whole subjects, belong to this cluster. The box plot for dictators' choices for each y is shown in Figure 7. Comparing Figures 3 and 7, one may realize that the median and the mode in this cluster are almost the same as those in the aggregated data. The representative dictator in this cluster offers $x = y$, i.e., the offer is equal to the request, if $0 \le y \le 500$. We do not identify any representative feature for $y = \phi$ since a large variance of offers is observed for this case. There seem to be two subclusters in this cluster for $600 \le y \le 1000$, though we do not conduct a formal clustering analysis to find them. In one subcluster, the dictator always offers $x = 0$, while in the other, the dictator gradually decreases the amount of offer as the request increases. In fact, there exist two modes at $y = 600$ and 700. If y is greater than 700, the mode is $x = 0$ only, but the median tends to decrease relatively slowly. Anyway, a decreasing tendencies of offers beyond y=500 are the representative behavior in this cluster.

Figure 8 is here.

The third cluster (the lenient): Fourteen subjects, or 36% of the whole subjects, belong to this cluster. The box plot of dictators' choices for each y is shown in Figure 8. First, the median and the mode coincide with those in aggregated data for $y = \phi$ and $0 \le y \le 500$. As in the second cluster, the representative behavior in this cluster is that x=y holds, i.e., the dictator offers the same amount as MO, if $0 \le y \le 500$. We cannot

---

[14] Other SAS outputs are in Appendix B.

identify any representative feature in the case of $y = \phi$ since a large variance of offers is observed in this case. On the other hand, the median and the mode of dictators' offers in the case of $600 \le y \le 1000$ are almost equal to 500 and the variance of the distribution is rather small. It means that the representative dictator offers *x* = 500 regardless of MO if it exceeds 500.[15] The reason that the offer of *x* = 500 does not disappear in the aggregated data even though the distribution tends to be biased toward *x* = 0 in the case of $600 \le y \le 1000$ is that the subjects in this cluster always choose *x* = 500 regardless of MO.

In summary, we have identified three behavior patterns through the clustering analysis of Ward's method. The game theoretic player offers *x* = 0 regardless of MO. The lenient complies with the request if it is below 500 and keeps the amount *x* = 500, otherwise. The punishing the greedy complies with the request up to the equal allocation and decreases the offer *x* as the request y increases beyond it. The patterns that reject the Independence Hypothesis are the last two, which comprise of 77% of the whole subjects. In both patterns, the representative behavior is to comply with the recipient's request if $0 \le y \le 500$.[16]

Figure 9 is here.

---

[15] One may think that 500 yen or a half of the pie is reserved in subject's mental accounting to help the other players as suggested by a fixed total sacrifice theory reported in the Selten and Ockenfels (1998)'s solidarity game experiment.

Finally, the relative frequency of recipients' choices is shown in Figure 9. At a glance, the distribution is centered around y = 500. Thus, most of the recipients correctly chose MO that maximizes their payoffs based on the expectation of dictators' behavior mentioned above.

IV. Conclusions

In this article, to examine an effect of communication in conflicting situations, we studied a dictator game with a voice option. In our experimental results, the voice of the recipient can have significant effect on determining the allocation of the pie even though the recipient has no control power on the allocation. Further, the amount of offers made by dictators is increasing with respect to MO when MO lies between 0 and 500 yen. On the other hand, the amount of offer tends to decrease relatively slowly beyond 500 yen.

In our experiment, we follow the strategy method. In the strategy method, dictators forced to specify their actions for every possible y before they observe real choices of recipients. By that method, we could obtain dictators' reactions for each value of y. If we don't follow the strategy method but the sequential method, that is, when dictators choose their offers after they observe MO stated by recipients, there is

[16] We can also observe three clusters which have the same features as above by using others hierarchical clustering methods (e.g. the centroid method, UPGMA (unweighted pair-group method using arithmetic average), and the within-group average method).

no guarantee that subjects behave same way in our experiment that employs the strategy method[17].

It is well known that in a dictator game, subjects react dramatically to slight changes in experimental designs. For example, Hoffman, McCabe, Shachat and Smith (1994), employing double blind method to keep anonymity among subjects as well as between experimenters and subjects, found that subjects offer the amount that is closer to the Nash equilibrium than those of previous experiments reported. Hoffman et al. (1994) also introduced endowment effect by which they assigned the right to be the dictator to the winners for simple intellectual tasks. Such arrangements also induced selfish behavior in their experiment. Bohnet and Frey (1999) considered the environment in which the dictator can see the identity of the recipient but the recipient cannot. When the dictator hears the recipient's personal information in such an environment, they reported that the dictator behaves more altruistically.[18] One can ask us whether our results may change by introducing these experimental designs.

If we can regard our y = "not to tell" case as ordinary dictator games, we have more altruistic behavior in the case of y = "to tell," especially y = 500 than those in ordinal dictator games. As Nagel (1970) said, if altruism is based on the cognition of the existence of others, communication may contribute to inform the dictator of the

---

[17] Brandts and Charness (2000) reported the differences of subjects behaviors between hot (sequential method) and cold (strategy method) experiments.

[18] See Camerer (2003) for others examples of dictator games experiments.

existence of the recipient. Of course, it is necessary to examine that our y = “not to tell” case can really be regarded as ordinary dictator games.

As we see in the previous section, our experimental results can be explained neither by the standard game theory nor by the behavioral game theory. Indeed, neither the “outcome-based model” that players only care about the pecuniary outcome of the game nor the “intention-based model” that incorporates players’ reciprocal intentions explains our results. In these models, players’ preferences or motivations are based solely on the outcomes of the game and available strategies. But, as Gintis (2000) stressed, we cannot separate subjects’ preferences and motivations from their social experiences that are obtained before they enter the laboratory. Following this view, we must note that it might be dangerous for us to explain our experimental results solely by the structure of the game.

A reasonable explanation might be that the subjects apply their past experiences to the present experimental task. They search similar social situations applicable to the present experimental task that they face. Then they apply appropriate behavioral norms, which have been suitable for their past experiences, to the current situation. In this way, subjects choose their strategy choices. We learn some norms or behavioral principles from various social experiences. For example, consider the following commandment in the bible or the golden law of morality, “just as you want men to do to you, you also do to them likewise[19].” Such a behavioral norm is different from a strategy in the sense of game theory since this norm does not address to a specific person but to anonymous,

[19] New Testament, King James Version, The Gospel According to Luke, 6.31.

and what is good to do depends on others' wants. But it is possible that subjects use such a behavioral norm in the experiment. Constructing a theory based on these ideas is an important topic for future research.

References

1. Anderberg, M. R. *Cluster Analysis for Applications* (Academic Press, New York, 1973).

2. Andreoni, J. & Miller, J. H. Giving According to GARP: An Experimental Study of Rationality and Altruism. *Econometrica* **70**, 737-53, (2002).

3. Bem, D. J. An Experiment Analysis of Self-Persuation. *Journal of Experimental Social Psychology* **1**, 199-218, (1965).

4. Bem, D. J. Self-Perception: An Alternative Interpretation of Cognitive Dissonanc Phenomena. *Psychological Review* **74**, 183-200, (1967).

5. Blume, A., DeJong, D. V., Kim, Y.-G. & Sprinkle, G. B. Experimental Evidence on the Evolution of Meaning of Messages in Sender-Receiver Games. *American Economic Review* **88**, 1323-40, (1998).

6. Bohnet, I. & Frey, B. S. Social Distance and Other-Regarding Behavior in Dictator Games: Comment. *American Economic Review* **89** (1), 335-39, (1999).

7. Bolton, G. E. & Ockenfels, A. ERC: A Theory of Equity, Reciprocity, and Competition. *American Economic Review* **90**, 166-93, (2000).

8. Brandts, J. & Charness, G. Hot vs. Cold: Sequential Responses and Preference Stability in Experimental Games. *Experimental Economics* **2**, 227-38, (2000).

9. Camerer, C. F. *Behavioral Game Theory - Experiments in Strategic Interaction* (Princeton University Press, New Jersey, 2003)

10. Crawford, V. A Survey of Experiments on Communication via Cheap Talk. *Journal of Economic Theory* **78**, 286-98, (1998).

11. Crawford, V. P. & Sobel, J. Strategic Information Transmission *Econometrica* **50**, 1431-51, (1982).

12. Dickhaut, J. W., McCabe, K. A. & Mukherji, A. An Experimental Study of Strategic Information Transmission. *Economic Theory* **6**, 389-403, (1995).

13. Dufwenberg, M. & Kirchsteiger, G. A Theory of Sequential Reciprocity. Tilburg Center for Economic Research Discussion Paper 9837, (1998).

14. Farrell, J. Cheap Talk, Coordination, and Entry. *Rand Journal of Economics*, **18**, 34-39, (1987).

15. Fehr, E. & Rockenbach, B. Detrimental Effects of Sanctions on Human Altruism. Nature **422**, 137-140, (2003).

16. Fehr, E. & Schmidt, K. M. A Theory of Fairness, Competition and Cooperation. *Quarterly Journal of Economics* **114**, 817-68, (1999).

17. Forsythe, R., Horowitz, J. E., Savin, N.E., & Sefton, M. Fairness in Simple Bargaining Experiments. *Games and Economic Behavior* **6**, 347-69, (1994).

18. Frohlich, N., Oppenheimer, J., & Moore, J.B. Some Doubts about Measuring Self-interest using Dictator Experiments: The Cost of Anonymity. *Journal of Economic Behavior & Organization* **46**, 271-290, (2001).

19. Gintis, H. *Game Theory Evolving: A Problem-Centered Introduction to Modeling Strategic Interaction* (Princeton University Press, New Jersey, 2000).

20. Hirschman, A. O. *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States* (Harvard University Press, Cambridge, Massachusetts, 1970).

21. Hoffman, E., McCabe, K., Shachat, K., & Smith, V. L. Preferences, Property Rights and Anonymity in Bargaining Games. *Games and Economic Behavior* **7**, 346-80, (1994).

22. Kahneman, D., Knetsch, J. L., & Thaler, R. Fairness as a Constraint on Profit Seeking: Entitlements in the Market. *American Economic Review* **76**, 728-41, (1986).

23. Kawagoe, T. & Takizawa, H. Instability of Babbling Equilibirum in Cheap Talk Games: An Experiment. mimeo, (1999).

24. Kim, Y.-G. & Sobel, J. An Evolutionary Approach to Pre-play Communication, *Econometrica* **63**, 1181-93, (1995).

25. Matsui, A. Cheap-Talk and Cooperation in a Society. *Journal of Economic Theory* **54**, 245-58, (1991).

26. Nagel, T. *The Possibility of Altruism*, (Clarendon Press, Oxford, 1970).

27. Rabin, M. Incorporating Fairness into Game Theory and Economics. *American Economic Review* **83**, 1281-1302, (1993).

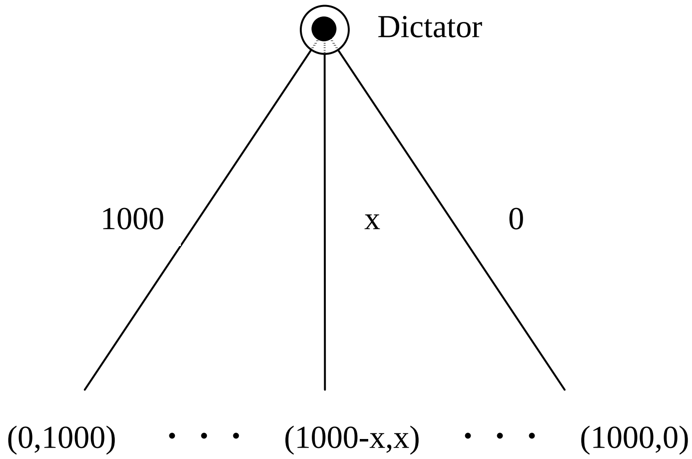
28. Selten, R. Die Strategiemethode zur Erforschung eingeschrnkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes. *Sauerman, H. ed., Beitrage zue Experimentellen Wirtschaftsforschung*, (Mohr, Tubingen, 1967), 136-168.

29. Selten, R. and Ockenfels, A. An Experimental Solidarity Game. *Journal of Economic Behavior and Organization* **34**, 517-539, (1998).

30. Siegel, S. & Castellan, N. J., Jr. *Nonparametric Statistics for the Behavioral Sciences*, second edition, (McGraw-Hill International Editions, New York, 1988).

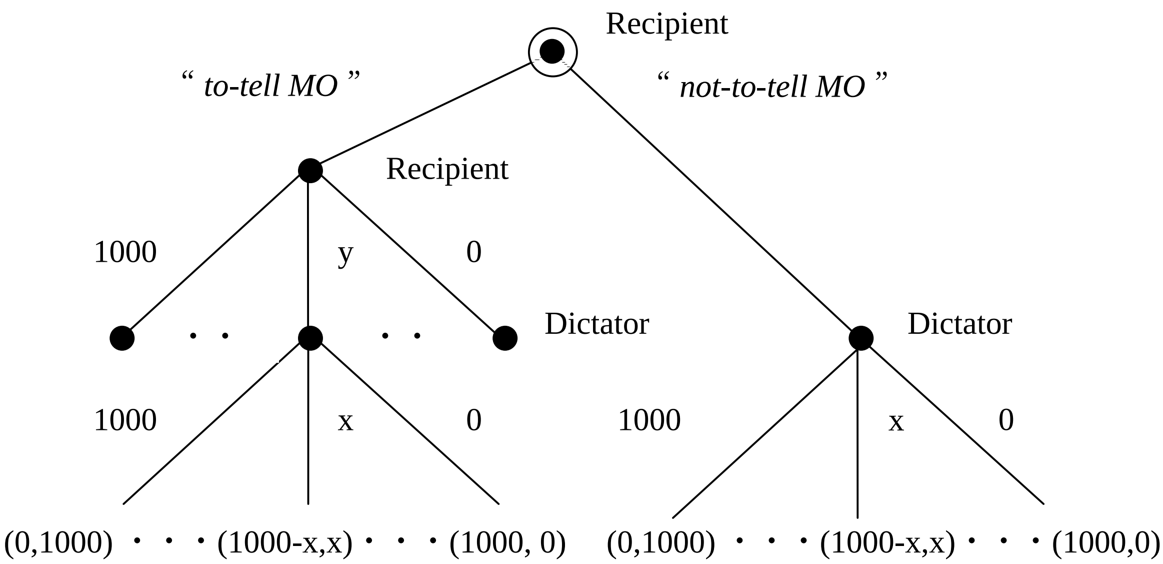
31. Warneryd, K. Evolutionary Stability in Unanimity Games with Cheap Talk. *Economics Letters* **36**, 375-78, (1991).

Figure 1: Dictator game



The left hand side (*resp.* right hand side) of parentheses represents the dictator's payoff (*resp*. the recipient's payoff).

Figure 2: Dictator game with a "voice" option



The left hand side (*resp.* right hand side) of parentheses represents the dictator's payoff (resp. the recipient's payoff).

Table 1: Relative frequency of x for each y												%
x \ y	not-to-tell	0	100	200	300	400	500	600	700	800	900	1000
0	69.2	82.1	28.2	25.6	25.6	25.6	25.6	33.3	38.5	41.0	41.0	64.1
100	5.1	7.7	69.2	7.7	2.6	0	2.6	5.1	2.6	0	15.4	5.1
200	2.6	7.7	0	59.0	5.1	5.1	5.1	5.1	5.1	15.4	5.1	2.6
300	2.6	0	2.6	2.6	64.1	12.8	10.3	15.4	20.5	10.3	5.1	2.6
400	7.7	2.6	0	2.6	0	51.3	10.3	12.8	10.3	7.7	7.7	2.6
500	10.3	0	0	2.6	2.6	5.1	46.2	23.1	17.9	17.9	20.5	15.4
600	0	0	0	0	0	0	0	5.1	2.6	2.6	0	0
700	0	0	0	0	0	0	0	0	2.6	2.6	2.6	2.6
800	0	0	0	0	0	0	0	0	0	2.6	0	0
900	0	0	0	0	0	0	0	0	0	0	2.6	2.6
1000	2.6	0	0	0	0	0	0	0	0	0	0	2.6
sum	100	100	100	100	100	100	100	100	100	100	100	100

The percentage terms are rounded off to one decimal places.

Figure 3: Relative frequency of x for each y

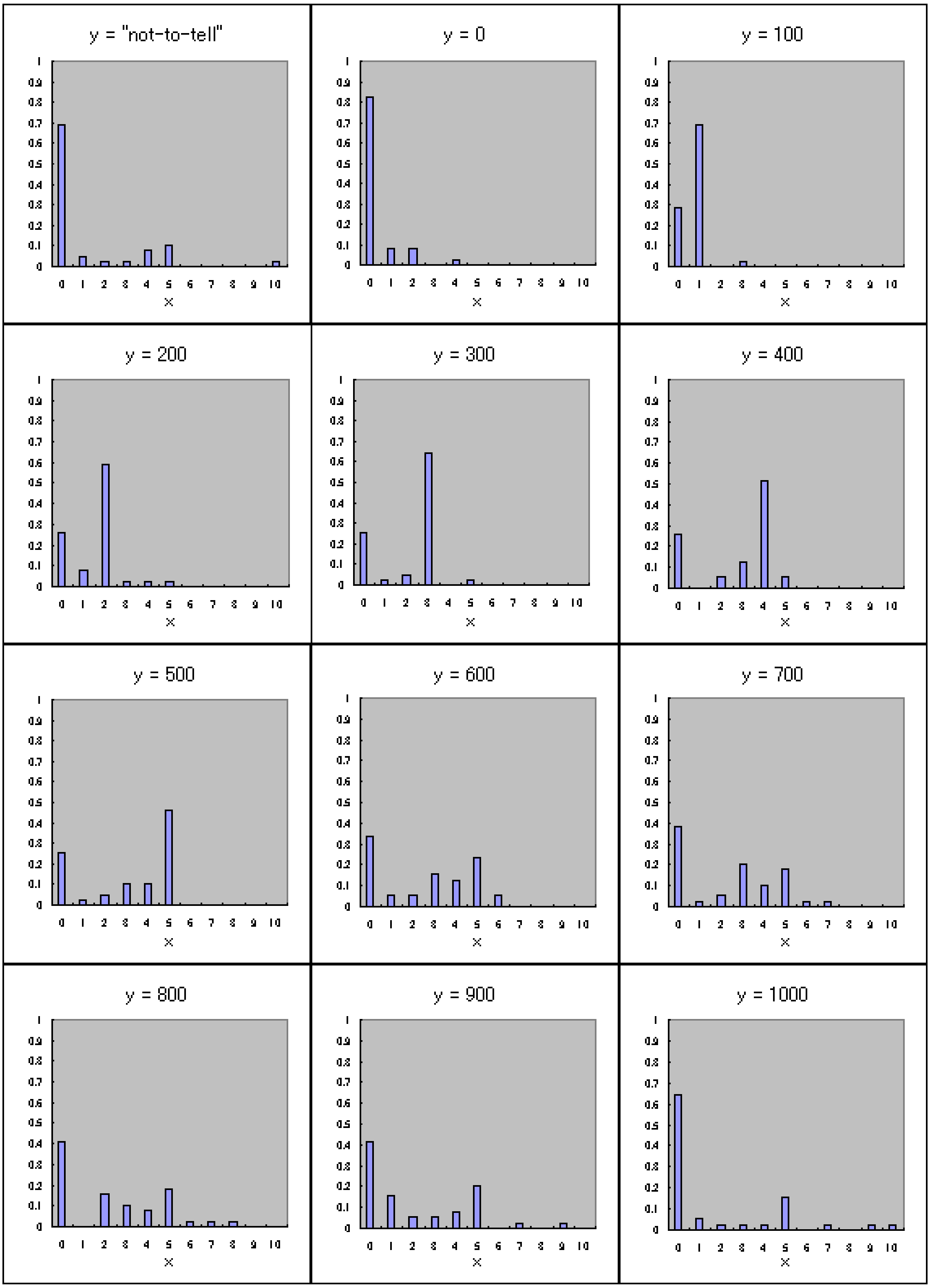


Table 2: Descriptive statistics of x

y	not-to-tell	0	100	200	300	400	500	600	700	800	900	1000
minimum value	0	0	0	0	0	0	0	0	0	0	0	0
the first quartile	0	0	0	0	0	0	0	0	0	0	0	0
median	0	0	100	200	300	400	400	300	300	200	100	0
the third quatile	200	0	100	200	300	400	500	500	400	500	500	400
maximum value	1000	400	300	500	500	500	500	600	700	800	900	1000
mode	0	0	100	200	300	400	500	0	0	0	0	0

Figure 4: A box plot of dictators' choices for each y

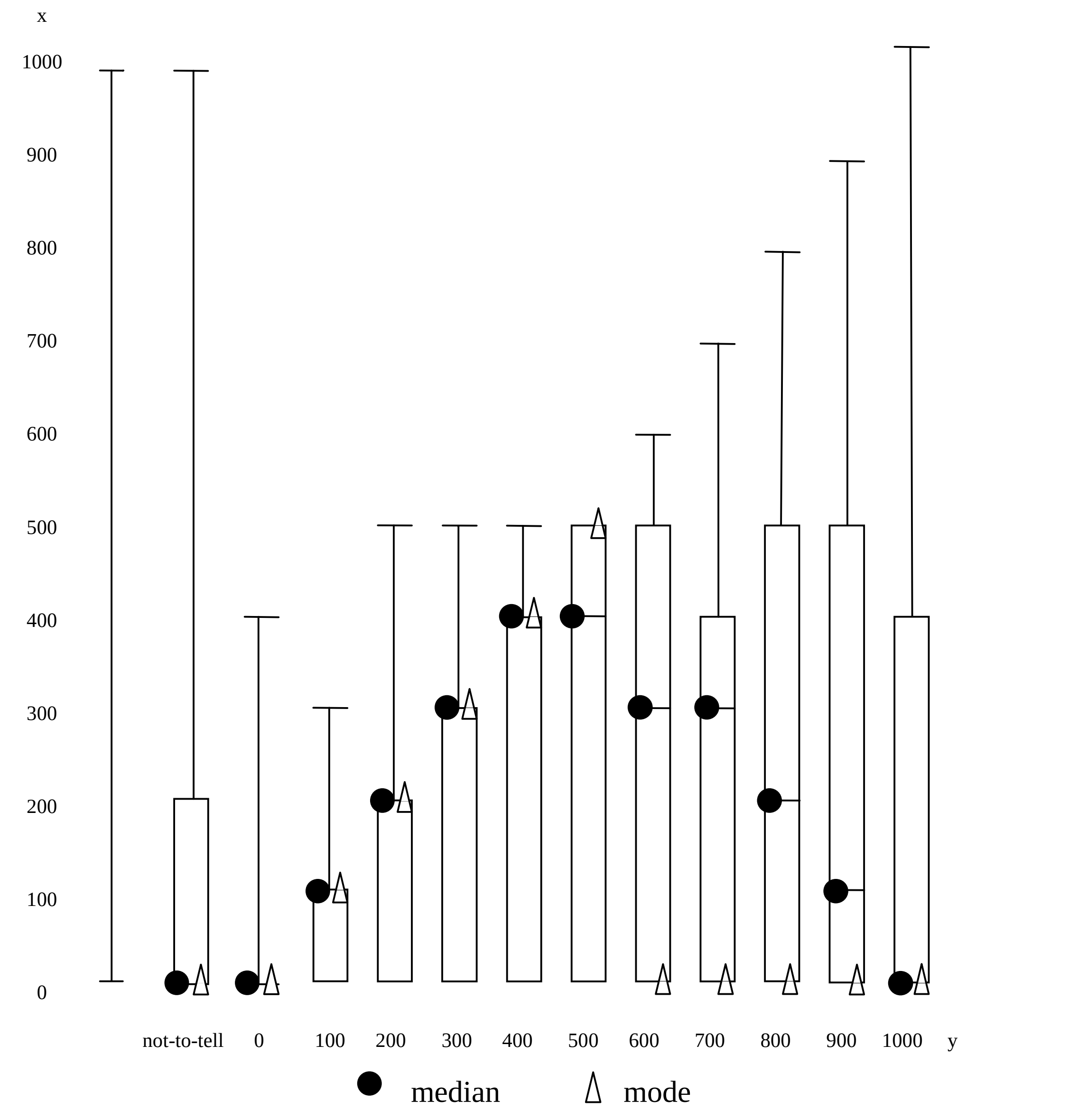


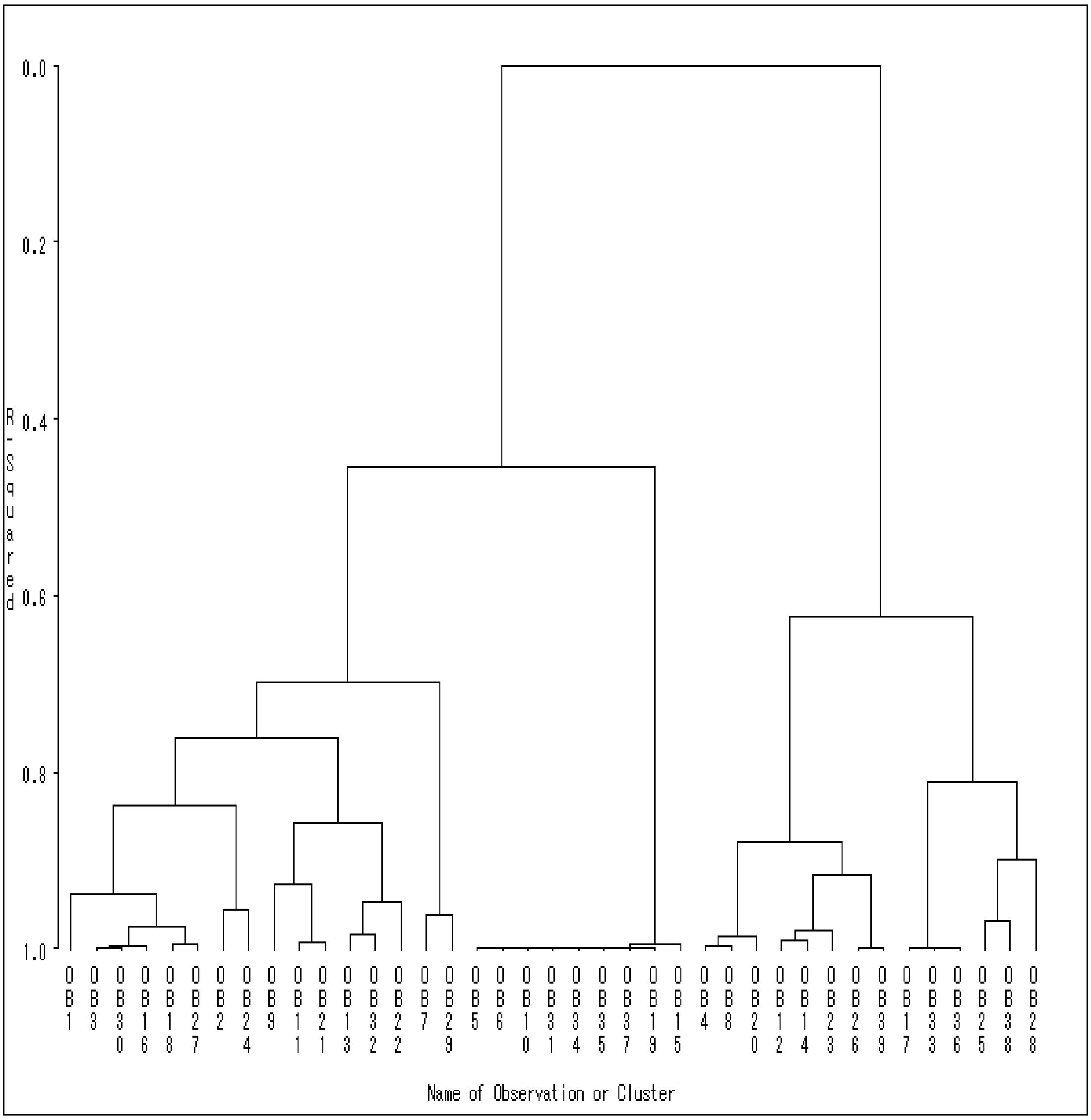
Table 3: Multiple comparison

not-to-tell											
47.5	0										
4	43.5	1									
44	91.5*	48	2								
85.5	133**	89.5*	41.5	3							
125**	172.5**	129**	81	39.5	4						
151.5**	199**	155.5**	107.5**	66	26.5	5					
123.5**	171**	127.5**	79.5	38	1.5	28	6				
100.5**	148**	104.5**	56.5	15	24.5	51	23	7			
91*	138.5**	95*	47	5.5	34	60.5	32.5	9.5	8		
76	123.5**	80	32	9.5	49	75.5	47.5	24.5	15	9	
34.5	82	38.5	9.5	51	90.5*	117**	89	66	56.5	41.5	10

** 1% $\geq z_{0.01/132}\sqrt{2}\sigma = 100.3$

* 5% $\geq z_{0.05/132}\sqrt{2}\sigma = 89.2$

Figure 5: Cluster analysis using the Ward's method[20]



[20] See Appendix A for row data of each observation number (OB). Each observation number corresponds to each subject's number of dictator in Appendix A.

Table 4: Descriptive statistics of x (the first cluster)												
y	not-to-tell	0	100	200	300	400	500	600	700	800	900	1000
minimum value	0	0	0	0	0	0	0	0	0	0	0	0
the first quartile	0	0	0	0	0	0	0	0	0	0	0	0
median	0	0	0	0	0	0	0	0	0	0	0	0
the third quatile	0	0	0	0	0	0	0	0	0	0	0	0
maximum value	0	100	100	100	0	0	0	0	0	0	0	0

.

Figure 6: A box plot of dictators' choices for each y (the first cluster)

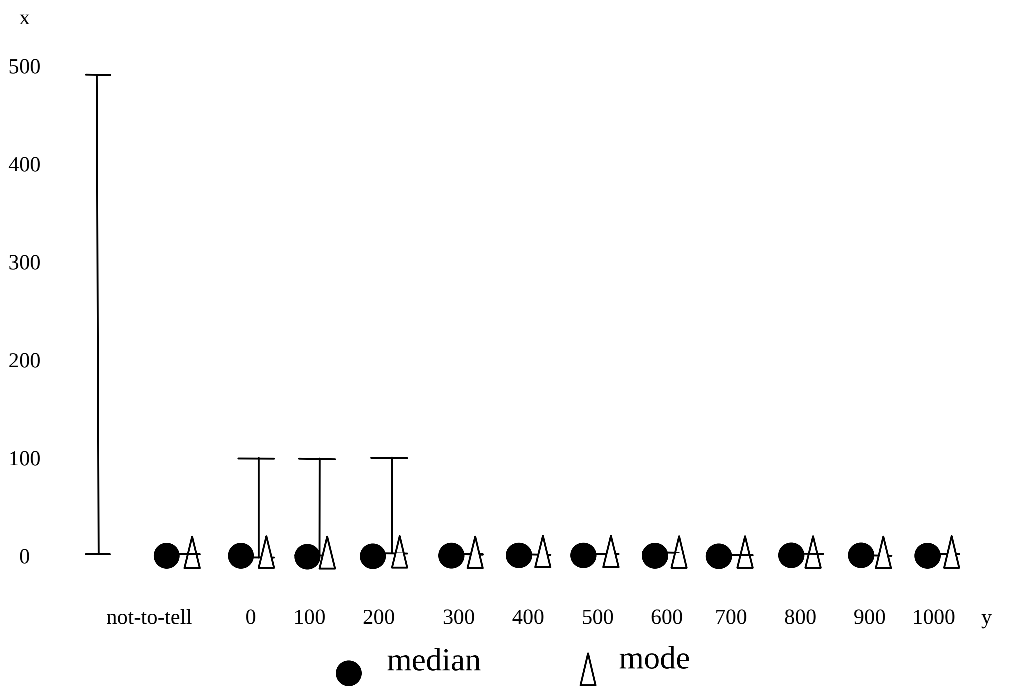


Table 5: Descriptive statistics of x (the second cluster)

y	not-to-tell	0	100	200	300	400	500	600	700	800	900	1000
minimum value	0	0	0	0	0	0	0	0	0	0	0	0
the first quartile	0	0	100	200	300	300	300	50	0	0	0	0
median	0	0	100	200	300	400	500	250	250	200	100	0
the third quatile	250	0	100	200	300	400	500	350	300	200	100	0
maximum value	1000	400	100	500	500	500	500	500	400	300	300	200
mode	0	0	100	200	300	400	500	0, 300	0, 300	0	0	0

Figure 7: A box plot of dictators' choices for each y (the second cluster)

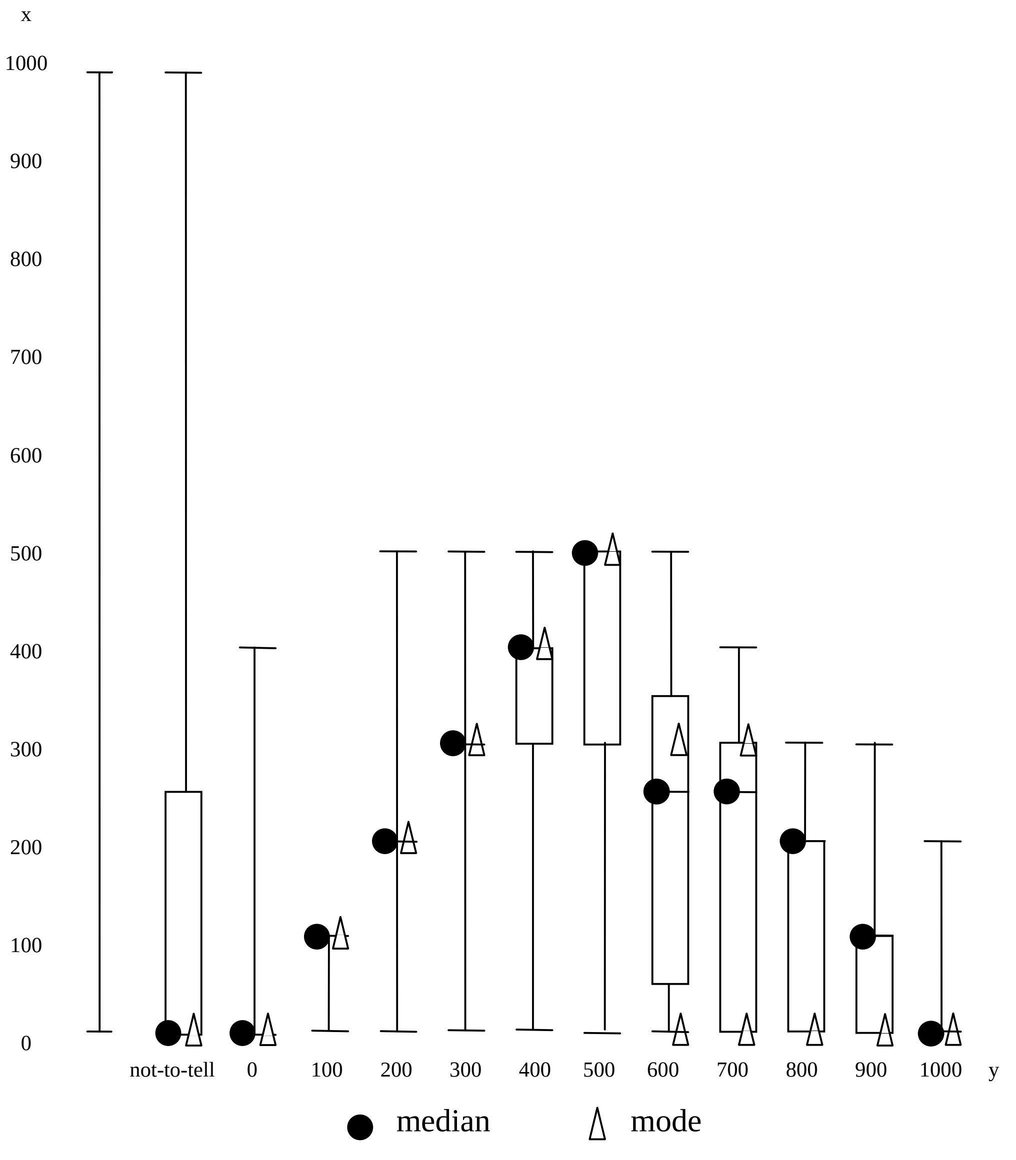


Table 6: Descriptive statistics of x (the third cluster)												
y	not-to-tell	0	100	200	300	400	500	600	700	800	900	1000
minimum value	0	0	0	100	200	200	200	300	200	300	300	0
the first quartile	0	0	100	200	300	400	400	400	400	400	400	300
median	50	0	100	200	300	400	500	500	500	500	500	500
the third quatile	400	100	100	200	300	400	500	500	500	500	500	500
maximum value	500	200	300	400	300	500	500	600	700	800	900	1000
mode	0	0	100	400	300	400	500	500	500	500	500	500

Figure 8: A box plot of dictators' choices for each y (the third cluster)

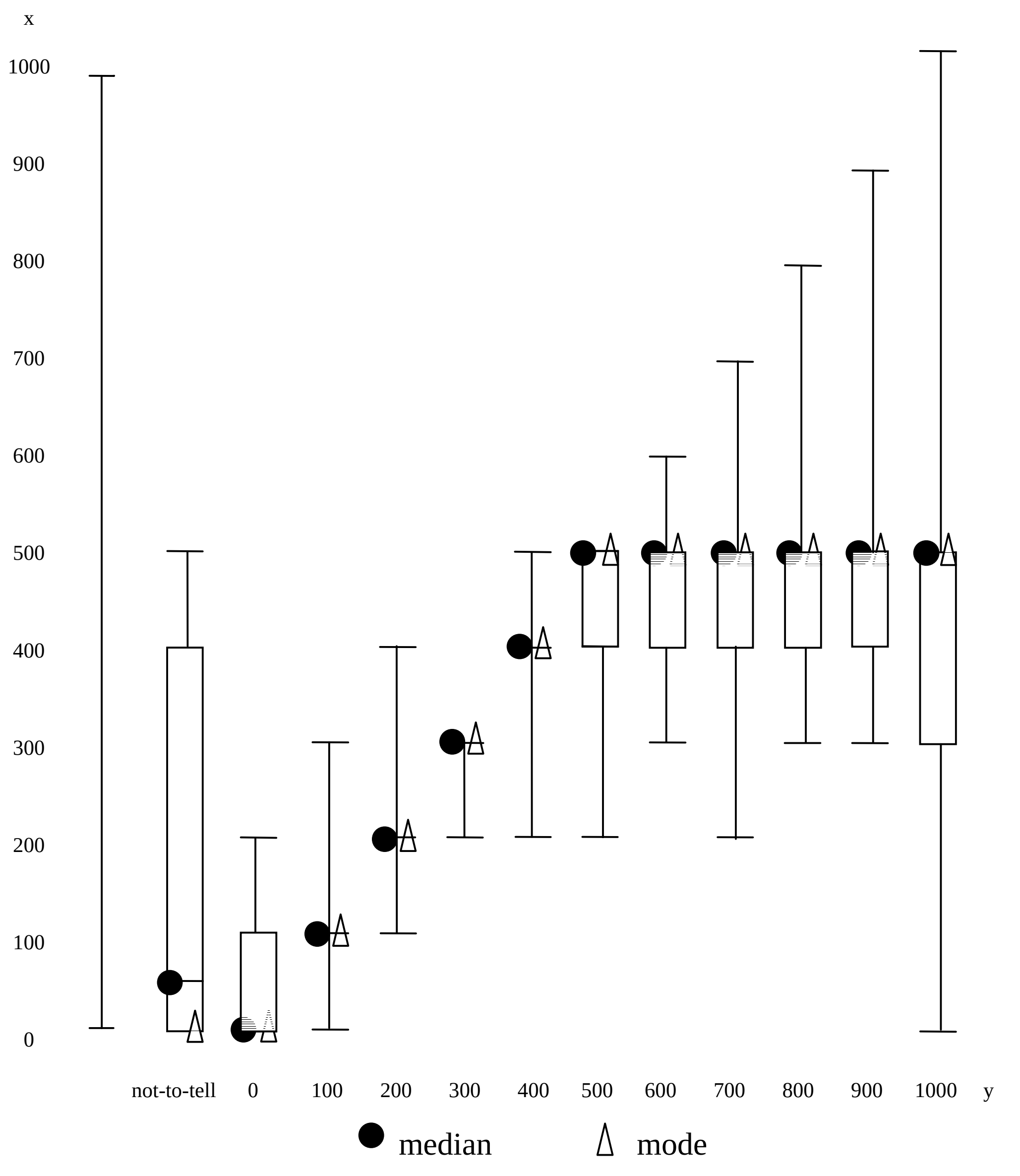


Figure 9: The distribution of relative frequency of recipients' choices

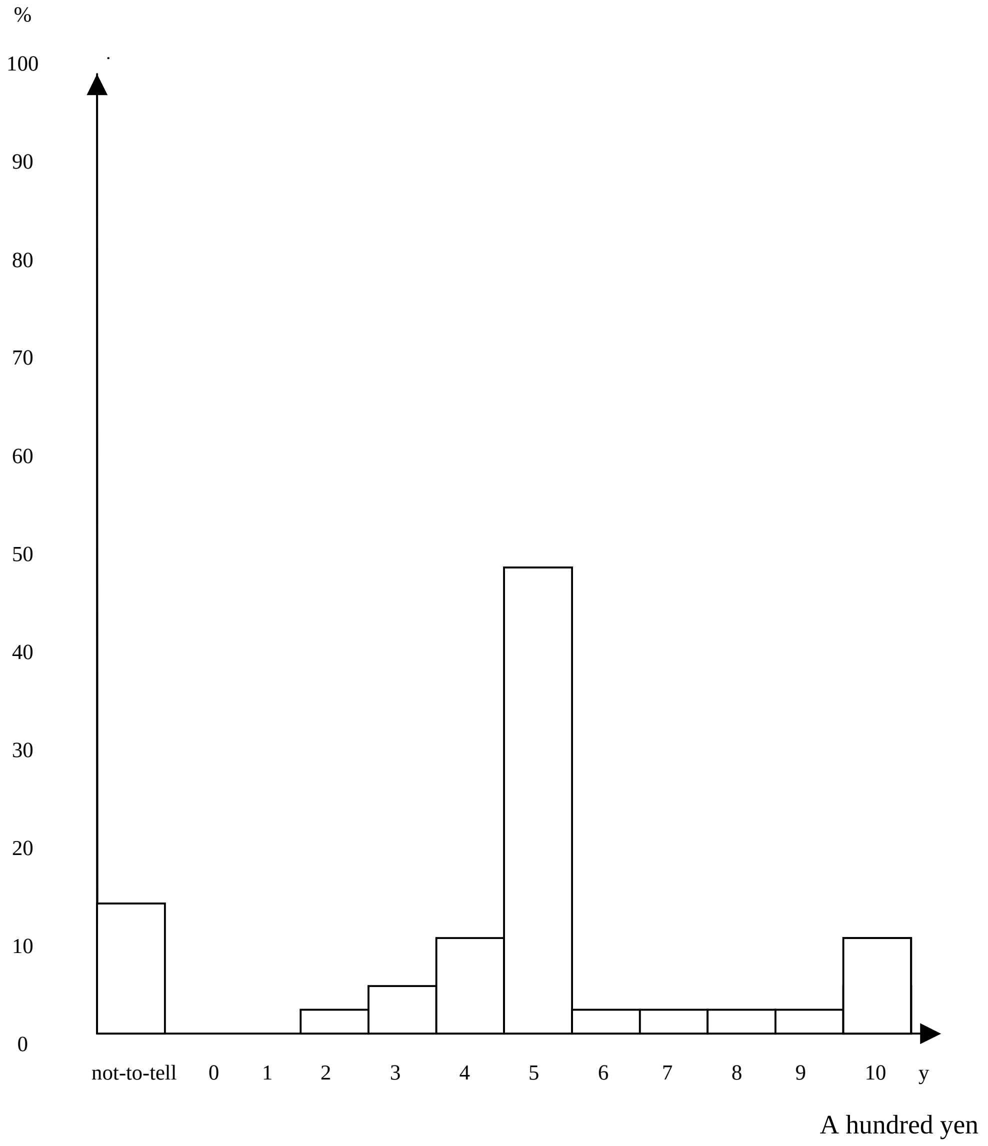


Table 7: Descriptive statistics of a recipient's acquired surplus

minimum value	0
the first quartile	0
median	300
the third quatile	500
maximum value	500

Appendix A. Raw data[21]

Recipient		Dictator												
Subject	MO	Subject	Φ	0	100	200	300	400	500	600	700	800	900	1000
R-1	500	D-1	0	0	0	500	500	500	500	300	300	300	100	0
R-2	500	D-2	400	400	100	200	300	400	400	400	400	200	200	200
R-3	not-to-tell	D-3	0	0	100	200	300	300	300	300	300	200	100	0
R-4	500	D-4	0	0	100	200	300	400	500	500	500	400	400	0
R-5	1000	D-5	0	0	0	0	0	0	0	0	0	0	0	0
R-6	400	D-6	0	0	0	0	0	0	0	0	0	0	0	0
R-7	500	D-7	1000	0	100	200	300	400	500	0	0	0	0	0
R-8	900	D-8	0	0	100	200	300	400	500	500	500	500	500	0
R-9	not-to-tell	D-9	0	0	100	200	300	400	0	100	200	300	300	0
R-10	500	D-10	0	0	0	0	0	0	0	0	0	0	0	0
R-11	200	D-11	0	0	100	200	300	400	200	0	0	0	0	0
R-12	500	D-12	0	0	100	200	300	400	400	400	400	400	400	400
R-13	500	D-13	0	0	0	0	100	300	500	200	0	0	0	0
R-14	500	D-14	100	100	100	200	300	300	300	300	300	300	300	300
R-15	300	D-15	0	100	100	100	0	0	0	0	0	0	0	0
R-16	500	D-16	100	100	100	200	300	300	400	300	300	200	100	0
R-17	not-to-tell	D-17	400	0	100	200	300	400	500	500	500	500	500	500
R-18	1000	D-18	0	0	100	200	300	400	500	400	300	200	100	0
R-19	500	D-19	0	0	100	0	0	0	0	0	0	0	0	0
R-20	1000	D-20	0	0	100	100	200	300	400	400	400	500	500	100
R-21	500	D-21	0	0	100	200	300	200	100	100	0	0	0	0
R-22	700	D-22	0	0	0	0	0	0	500	0	0	0	0	0
R-23	not-to-tell	D-23	0	0	0	100	200	200	200	300	300	400	400	500
R-24	1000	D-24	500	0	100	200	300	400	500	500	300	200	100	0
R-25	500	D-25	400	200	300	300	300	400	500	600	700	800	900	900
R-26	500	D-26	0	0	100	200	300	400	500	500	500	500	500	500
R-27	400	D-27	0	0	100	200	300	400	500	500	400	300	200	100
R-28	400	D-28	300	200	100	400	300	500	300	400	200	600	500	1000
R-29	500	D-29	500	0	100	200	300	400	500	0	0	0	0	0
R-30	500	D-30	0	0	100	200	300	400	300	300	300	200	100	0
R-31	800	D-31	0	0	0	0	0	0	0	0	0	0	0	0
R-32	not-to-tell	D-32	0	0	100	200	300	400	500	200	100	0	0	0
R-33	500	D-33	500	0	100	200	300	400	500	500	500	500	500	500
R-34	500	D-34	0	0	0	0	0	0	0	0	0	0	0	0
R-35	300	D-35	0	0	0	0	0	0	0	0	0	0	0	0
R-36	500	D-36	500	0	100	200	300	400	500	500	500	500	500	500
R-37	400	D-37	0	0	0	0	0	0	0	0	0	0	0	0
R-38	600	D-38	200	200	100	200	300	400	500	500	600	700	700	700
R-39	500	D-39	0	0	100	200	300	400	500	600	500	500	500	500

[21] Each pair consists of subjects with the same number. Note also that each subject's number does not correspond to his/her ID number in a laboratory.

Appendix B. SAS outputs

SAS

OBS	D-S	SΦ	S0	S100	S200	S300	S400	S500	S600	S700	S800	S900	S1000
1	D1	0	0	0	500	500	500	500	300	300	300	100	0
2	D2	400	400	100	200	300	400	400	400	400	200	200	200
3	D3	0	0	100	200	300	300	300	300	300	200	100	0
4	D4	0	0	100	200	300	400	500	500	500	400	400	0
5	D5	0	0	0	0	0	0	0	0	0	0	0	0
6	D6	0	0	0	0	0	0	0	0	0	0	0	0
7	D7	1000	0	100	200	300	400	500	0	0	0	0	0
8	D8	0	0	100	200	300	400	500	500	500	500	500	0
9	D9	0	0	100	200	300	400	0	100	200	300	300	0
10	D10	0	0	0	0	0	0	0	0	0	0	0	0
11	D11	0	0	100	200	300	400	200	0	0	0	0	0
12	D12	0	0	100	200	300	400	400	400	400	400	400	400
13	D13	0	0	0	0	100	300	500	200	0	0	0	0
14	D14	100	100	100	200	300	300	300	300	300	300	300	300
15	D15	0	100	100	100	0	0	0	0	0	0	0	0
16	D16	100	100	100	200	300	300	400	300	300	200	100	0
17	D17	400	0	100	200	300	400	500	500	500	500	500	500
18	D18	0	0	100	200	300	400	500	400	300	200	100	0
19	D19	0	0	100	0	0	0	0	0	0	0	0	0
20	D20	0	0	100	100	200	300	400	400	400	500	500	100
21	D21	0	0	100	200	300	200	100	100	0	0	0	0
22	D22	0	0	0	0	0	0	500	0	0	0	0	0
23	D23	0	0	0	100	200	200	200	300	300	400	400	500
24	D24	500	0	100	200	300	400	500	500	300	200	100	0
25	D25	400	200	300	300	300	400	500	600	700	800	900	900
26	D26	0	0	100	200	300	400	500	500	500	500	500	500
27	D27	0	0	100	200	300	400	500	500	400	300	200	100
28	D28	300	200	100	400	300	500	300	400	200	600	500	1000
29	D29	500	0	100	200	300	400	500	0	0	0	0	0
30	D30	0	0	100	200	300	400	300	300	300	200	100	0
31	D31	0	0	0	0	0	0	0	0	0	0	0	0
32	D32	0	0	100	200	300	400	500	200	100	0	0	0
33	D33	500	0	100	200	300	400	500	500	500	500	500	500
34	D34	0	0	0	0	0	0	0	0	0	0	0	0
35	D35	0	0	0	0	0	0	0	0	0	0	0	0
36	D36	500	0	100	200	300	400	500	500	500	500	500	500
37	D37	0	0	0	0	0	0	0	0	0	0	0	0
38	D38	200	200	100	200	300	400	500	500	600	700	700	700
39	D39	0	0	100	200	300	400	500	600	500	500	500	500

SAS

The CLUSTER Procedure
Ward's Minimum Variance Cluster Analysis

Variable	Mean	Std Dev	Skewness	Kurtosis	Bimodality
SN	125.6	230.2	2.0282	4.2906	0.6779
S0	33.3333	83.7708	2.9674	9.5706	0.7647
S100	76.9231	58.3165	0.8988	4.3937	0.2364
S200	156.4	114.2	0.3922	1.0877	0.2659
S300	217.9	139.3	-0.7073	-0.7791	0.6066
S400	279.5	176.5	-0.8216	-1.0270	0.7528
S500	315.4	212.2	-0.6130	-1.3886	0.7382

S600	259.0	217.3	-0.0391	-1.6047	0.6079
S700	238.5	219.6	0.2184	-1.3046	0.5379
S800	235.9	237.8	0.5374	-0.8343	0.5330
S900	215.4	245.5	0.8811	-0.1447	0.5716
S1000	171.8	279.0	1.5322	1.4443	0.7128

Eigenvalues of the Covariance Matrix

	Eigenvalue	Difference	Proportion	Cumulative
1	302847.637	238812.787	0.6552	0.6552
2	64034.850	14813.645	0.1385	0.7938
3	49221.205	31810.195	0.1065	0.9002
4	17411.009	5456.378	0.0377	0.9379
5	11954.631	5434.150	0.0259	0.9638
6	6520.481	2244.390	0.0141	0.9779
7	4276.091	2042.969	0.0093	0.9871
8	2233.121	517.441	0.0048	0.9920
9	1715.681	411.347	0.0037	0.9957
10	1304.333	839.480	0.0028	0.9985
11	464.854	235.521	0.0010	0.9995
12	229.333		0.0005	1.0000

Root-Mean-Square Total-Sample Standard Deviation = 196.2594

Cluster History

NCL	--Clusters	Joined--	FREQ	RMS STD	SPRSQ	RSQ	ERSQ	CCC	PSF	PST2	BSS	Tie
38	OB5	OB6	2	0	0.0000	1.00	.	.	.	.	0	T
37	CL38	OB10	3	0	0.0000	1.00	.	.	.	.	0	T
36	CL37	OB31	4	0	0.0000	1.00	.	.	.	.	0	T
35	CL36	OB34	5	0	0.0000	1.00	.	.	.	.	0	T
34	CL35	OB35	6	0	0.0000	1.00	.	.	.	.	0	T
33	OB33	OB36	2	0	0.0000	1.00	.	.	.	.	0	T
32	CL34	OB37	7	0	0.0000	1.00	.	.	.	.	0	
31	OB3	OB30	2	20.4124	0.0003	1.00	.	.	936	.	5000	T
30	OB26	OB39	2	20.4124	0.0003	.999	.	.	545	.	5000	
29	OB17	CL33	3	16.6667	0.0004	.999	.	.	376	.	6666.7	
28	CL32	OB19	8	10.2062	0.0005	.999	.	.	281	.	8750	
27	OB4	OB8	2	28.8675	0.0006	.998	.	.	228	.	10000	
26	CL31	OB16	3	33.3333	0.0012	.997	.	.	159	4.3	21667	
25	CL28	OB15	9	18.6339	0.0014	.995	.	.	125	19.7	24583	
24	OB18	OB27	2	45.6435	0.0014	.994	.	.	107	.	25000	
23	OB11	OB21	2	50.0000	0.0017	.992	.	.	92.7	.	30000	
22	OB12	OB14	2	61.2372	0.0026	.990	.	.	77.5	.	45000	
21	CL27	OB20	3	50.0000	0.0028	.987	.	.	67.3	5.0	50000	
20	OB13	OB32	2	67.7003	0.0031	.984	.	.	60.3	.	55000	
19	CL22	OB23	3	70.7107	0.0043	.979	.	.	52.8	1.7	75000	
18	CL26	CL24	5	52.4404	0.0046	.975	.	.	47.9	4.7	80333	
17	OB25	OB38	2	91.2871	0.0057	.969	.	.	43.2	.	100000	
16	OB7	OB29	2	102.1	0.0071	.962	.	.	38.8	.	125000	T
15	OB2	OB24	2	102.1	0.0071	.955	.	.	36.3	.	125000	
14	CL20	OB22	3	91.2871	0.0083	.947	.	.	34.1	2.6	145000	
13	OB1	CL18	6	68.7184	0.0086	.938	.	.	32.8	4.6	151333	
12	OB9	CL23	3	91.2871	0.0097	.928	.	.	31.8	5.7	170000	
11	CL19	CL30	5	83.6660	0.0120	.916	.	.	30.7	5.1	211000	
10	CL17	OB28	3	130.2	0.0175	.899	.	.	28.6	3.1	306667	
9	CL21	CL11	8	94.1756	0.0199	.879	.	.	27.2	5.3	349000	
8	CL12	CL14	6	113.2	0.0210	.858	.	.	26.8	3.7	368333	

7	CL13	CL15	8	96.2852	0.0211	.837	.804	1.83	27.4	5.4	370417
6	CL29	CL10	6	120.2	0.0258	.811	.777	1.72	28.3	4.4	453333
5	CL7	CL8	14	124.8	0.0503	.761	.743	0.80	27.0	6.9	884345
4	CL5	CL16	16	142.3	0.0621	.699	.697	0.07	27.1	6.0	1.09E6

SAS

The CLUSTER Procedure
Ward's Minimum Variance Cluster Analysis

Cluster History

NCL	--Clusters Joined--		FREQ	RMS STD	SPRSQ	RSQ	ERSQ	CCC	PSF	PST2	BSS	Tie
3	CL9	CL6	14	136.7	0.0742	.625	.630	-.15	29.9	9.7	1.3E6	
2	CL4	CL25	25	152.3	0.1709	.454	.509	-1.1	30.7	18.8	3E6	
1	CL2	CL3	39	196.3	0.4537	.000	.000	0.00	.	30.7	7.97E6	

Appendix C. The instructions

The decision problem in the experiment you participate is very simple. If you carefully read and follow the instructions, the amounts of money you will earn in the experiment are directly paid in cash after the experiment is over.

Cautions

Do not talk to anyone and any eye contact is forbidden. If you do such things, we will demand you exit from the experiment. If you have a question, please raise your hand quietly. The instructors respond appropriately. Do not exit from this room during the experiment. Turn off your beep phone.

The player whose identification number is odds is called player A and the other, that is, the player whose identification number is even, is called player B.

Check the contents in your envelope

Your will find the following materials in your envelope. Please check whether or not you have all of these in your envelope. If you don’t have any of them, please let us know by raising your hand quietly.

(1) The instructions (this copy)

(2) A recording sheet

(3) Practice problems and an answer sheet

General instructions

Each pair is consisted with two players, player A and B, and the membership in your pair has been determined by us before the experiment. 1,000 yen is allotted to each pair as a total reward for both players. Each player in the pair decides how to share that money according to the following rules. First player B is given 1,000 yen from the instructors. Player A can ask player B at least how much he/she is willing to receive. The amount player A asks is called the minimum offer that he/she is willing to receive. Then player B decides the amounts, x, he/she is willing to give to player A. This is the end of experiment and player A receives x and player B 1000-x yen respectively as their rewards.

Every subject participates in the experiment in the same room (Room 742). Don't exit from the room during the experiment. Next we will tell you more details of experimental procedures.

Experimental procedures

0. First of all, we would like you to solve practice problems. These are easy test to confirm your understanding of the game you will play. The time for solving them is three minutes. After that, the instructors will gather your answer sheet.

1. Please confirm the identification numbers for you and your opponent printed on the top of your recording sheet.

2. Player A and B do the following tasks simultaneously within four minutes when the experiment starts.

   Player A: Mark “to tell” in the first column if you would like to tell player B the minimum offer that you are willing to receive and mark “not to tell” if you would not. Then mark one of any 100s from 0 to 1,000 yen in the second column when you have marked “to tell” in the first column.

   Player B: Mark any one of 100s from 0 to 1,000 yen for all possible amounts that player A can choose.

3. Please put all the experimental materials but the identification number into your envelope of A4 size after your decision-making is done.

4. The instructors gather your envelope of A4 size from you. This is the end of the experiment.

<u>Your reward</u>

After your decision-making is done, the instructors determine the outcome of the game for each pair. Please note the following things.

(1) The amounts you earned in the experiment do not affect your grade in this class.

(2) Practice problems are used to confirm your understandings of the rule of game you play. The score does not affect your grade in this class. But you will not be paid if you leave any of questions unanswered.

(3) You will also not be paid if you do not write your recording sheet properly as the instructions explain. For example, marking twice in the same column, no marking, etc. Of course, your grade is not affected by such mistakes. Note also that you will receive as much reward as you can if your opponent does not write recording sheet properly.

(4) The name of your opponent is never informed to you, even after the experiment.

Appendix D. Recording Sheet

Recording Sheet A

(You)

Player A's identification number ______________________ Player B's identification number ______________________

Your pair (player B) decides how to share 1,000 yen between you and himself/herself.
You can tell player B the minimum offer that you are willing to receive.
Decide whether or not you tell player B the minimum offer that you are willing to receive.
(Mark **one** of the following alternatives.)

---

to tell	not to tell

<2>
Decide the amount of the minimum offer that you are willing to receive **when you have marked "to tell" in the first column.**
(Mark **one** of the following amounts.)

(a hundred yen)

0	1	2	3	4	5

6	7	8	9	10

warning) You will not paid if you mark more than one.

Recording Sheet B

(You)

Player B's identification number ________ Player A's identification number ________

You are given 1,000 yen from the instructors.
Decide the amount that you are willing to give to your pair (player A) for all possible his/her requests.
(Mark one of the amounts for each case.)
If you decide to give **y** yen to him/her, then you receive (**1000-y**) yen and player A receives **y** yen.

cutoff line

<**1**>Mark one of the following amounts that you are willing to give player A, when he/she chooses “not to tell”

(a hundred yen)

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

warning) You will not paid if you mark more than one.

cutoff line

<**2**>Mark one of the following amounts that you are willing to give player A, when he/she chooses 100 yen.

(a hundred yen)

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

warning) You will not paid if you mark more than one.

●
●
●

cutoff line

<**9**>Mark one of the following amounts that you are willing to give player A, when he/she chooses 900 yen.

(a hundred yen)

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

warning) You will not paid if you mark more than one.

cutoff line

<**10**>Mark one of the following amounts that you are willing to give player A, when he/she chooses 1,000 yen.

(a hundred yen)

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

warning) You will not paid if you mark more than one.

cutoff line