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Isolating and identifying motivations: A voluntary contribution mechanism experiment with interior Nash equilibria

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Abstract: A prominent finding in public good provision experiments is that contribution exceeds a noncooperative equilibrium. There are at least three possible motivations behind this overcontribution: decision errors, cooperation, and altruism. The aim of this study is to isolate and identify these motivations. The following paragraphs describe our main strategies for building our experimental model.

First, in order to discriminate cooperation from altruism, we employ a nonlinear payoff function. If we had used linear payoff functions, as done in most previous studies, such discrimination would be impossible since both cooperative and altruistic motivations appear as full investments. Using a nonlinear payoff function creates *one-to-one correspondence* between investments and motivations and permits us to differentiate the two motivations.

Second, in order to minimize possible decision errors, we prepare a payoff table that is comparable to the standard payoff table from previous studies. The latter is a payoff table *in the nonstrategic form*, or the "*N* table," whereas the former is a payoff table *in the strategic form*, or the "*S* table." The most important difference between the two payoff tables is the degree to which subjects can see the interdependence of strategies. In the case of the *N* table, it is obscure; however, in the *S* table, subjects can see it clearly because it is a matrix payoff table.

Third, we examine how providing information regarding the *other's* payoff structure to each subject affects his/her decision. Under the complete information condition, each subject knows that the other has the same payoff table as his/her own. Under the incomplete information condition, both subjects are unaware of this fact.

Since there are two payoff table conditions and two information conditions, we have four distinct treatments. We summarize the main results as follows. First, when the *S* table was used, the average individual contributions were not statistically different from the average Nash equilibrium level. On the other hand, when the *N* table was used, they were significantly greater than the average Nash equilibrium level. This result supports that the understanding of strategic interdependence is crucial for achieving the Nash equilibrium contribution.

Second, although the frequencies of Nash motivation were approximately 90% under the *S* table condition, they were approximately 70% under the *N* table condition. When subjects knew the other's payoff information, some of them showed cooperative motivation represented by the symmetric Pareto efficient contribution. Altruistic motivation that corresponded to contributing everything was rare under both conditions.

These results suggest that the cooperative and altruistic outcomes commonly observed over the past 20 years may be artifacts of the frame of the experimental environment.

Keywords: *Motivations, decision errors, cooperation, altruism, voluntary contribution mechanism*

1. INTRODUCTION

Why people contribute to a public good even when they have economic incentives not to do so is one of the most difficult and interesting questions for economists. The last few decades have yielded a considerable number of experimental studies on the voluntary provision of a public good. When a payoff function is linear, as with most of these studies, no contribution is the dominant strategy. On the other hand, experimental results have demonstrated that subjects consistently contribute more than what is predicted by the dominant strategy and complete free riding is rare, though the average contribution gradually decays over time (see Ledyard, 1995, for a survey).

This overcontribution has led to two explanations (Andreoni, 1995). One is social preferences: subjects understand the payoff structure of the game, but still prefer to contribute rather than maximize their own payoffs. The other is decision errors: subjects do not understand the payoff structure and therefore, fail to choose the dominant strategy that would maximize their payoffs.

Beginning with Andreoni (1995), numerous attempts have been made to isolate the two explanations mentioned above. A generally accepted conclusion has been that both factors are responsible for overcontribution in linear public good experiments. Andreoni found that approximately half of overcontribution comes from social preferences and the other half from decision errors. Several other studies have also confirmed that both of these factors play leading roles in generating overcontribution (Palfrey and Prisbrey, 1997; Brandts and Schram, 2001; Goeree et al., 2002; Houser and Kurzban, 2002; Ferraro and Vossler, 2008).

However, Figure 1 indicates that the use of linear payoff functions does not allow the isolation of several motivations, since complete free riding coincides with selfish motivation, and cooperative motivation coincides with altruistic motivation. The former phenotype contribution level is zero, and the latter is all, that is, one outcome has multiple motivations.

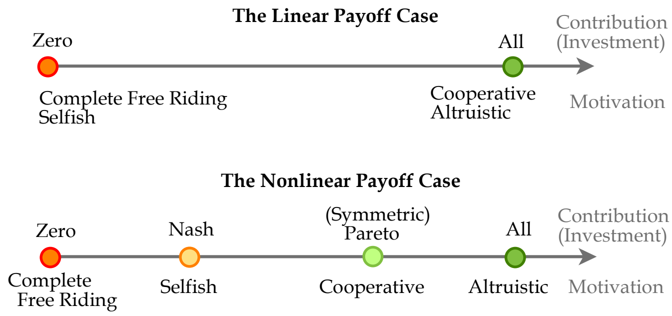

Figure 1. Contributions and motivations in linear and nonlinear payoff functions.

In order to isolate these motivations, we need to use a nonlinear payoff function (e.g., Cobb-Douglas or quasi-linear). With nonlinear preferences, complete free riding is no longer the selfish strategy. Instead, nonzero contribution to the public good for each subject becomes a Nash equilibrium. Similarly, symmetric Pareto efficient contribution represents cooperative motivation when all subjects have the same payoff function. Furthermore, contributing one's entire endowment to the public good corresponds to altruistic motivation.

However, in the case of nonlinear public good experiments, the question regarding which motivation is important is still unsettled. A large number of studies have uniformly shown that when an interior Nash equilibrium is below the midpoint of the total endowment, as in the case of boundary equilibrium, the average contribution significantly exceeds the interior Nash equilibrium level (see Laury and Holt, 2008, for a survey). Decision errors would be canceled out in this setting because such errors appear in two different directions (above and below the equilibrium). Therefore, social preferences seem to be the source of this overprovision.

However, the types of motivations that contribute to the deviation from the standard theory are not evident in previous works. This is partially owing to experiments that do not identify the experimental environment where the theoretical prediction prevails.

Therefore, here, we attempt to minimize possible decision errors and make the experimental model follow the assumptions of the standard theory in the simplest manner possible. The following paragraphs describe the strategies adopted by us for building our experimental model.

First, we set the number of subjects at two. Most previous experiments on the provision of a public good have used at least three subjects per group. Owing to the fewer participants in the two-subject design, misunderstanding on the payoff structure can be reduced and each subject is allowed to consider only one opponent's behavior.

Second, in order to discriminate contributions owing to decision errors, we use two types of payoff tables that are mathematically equivalent. One is a payoff table *in the nonstrategic form*, or the "*N* table," and the other is a payoff table *in the strategic form*, or the "*S* table." In the voluntary contribution mechanism, each subject i receives the payoff from the consumption of i's private good and the payoff from the level of the public good. Then, the payoff expression is the sum of these two payoffs, which is displayed as the *N* table. This is the type of table that was given to subjects in most of the previous experiments. The *S* table, on the other hand, shows subject i's payoff expressed by a matrix specifying the interdependence of i's own contribution and the other's contribution to the public good.

There are two major differences between these two tables. The first difference is that the *N* table allows subjects to clearly understand the economic framework wherein every player jointly produces a public good by their contributions; however, the *S* table does not do so. The second difference is the degree to which subjects can see the interdependence of strategies. In the case of the *N* table, it is obscure, whereas in the *S* table it is obvious because it is a matrix payoff table.

Third, we examine how information regarding the *other's* payoff structure given to each subject, in addition to the payoff table control, affects his/her decision. Under the complete information condition, each subject knows that the other's payoff table is the same as their own table. Under the incomplete information condition, both subjects are unaware of this fact. We call this the *information control*.

2. THE VOLUNTARY CONTRIBUTION MECHANISM

There are two subjects, a and b, and subject i (= a, b) has w_i units of the endowment of a private good. Each subject faces the decision of splitting w_i between his/her own consumption of the private good (x_i) and investment (y_i) in the public good (y). From the investment, each subject enjoys $y = y_a + y_b$. In other words, the level of the public good is the sum of the investments of two subjects. Therefore, the subjects' decision problem is to maximize their own payoffs, $u_i(x_i, y)$, subject to $x_i + y_i = w_i$. We use a quasi-linear function to transform contributions and the consumption of the private good into each subject's payoff, and all subjects have the same payoff function. We specify the payoff function as follows:

$$u_i(x_i, y) = \alpha\left(x_i + \beta y - \beta y^2 / \gamma\right), \qquad (1)$$

where $(w_a, w_b) = (24, 24)$, $\alpha = 220$, $\beta = 7/6$, and $\gamma = 112$. With these parameters, the Nash equilibrium investment level is $\hat{y} = \hat{y}_a + \hat{y}_b = 8$. Subjects can choose only integer investment numbers between 0 and 24; there are nine Nash equilibrium investment pairs, $(y_a, y_b) = (0, 8), (1, 7), (2, 6), \ldots, (8, 0)$. The interior Pareto efficient level of the public good, which is 32, is also determined uniquely by the Samuelson and the feasibility conditions. Apparently, the Nash equilibrium level of the public good is less than the Pareto efficient level. The proportion of the Nash equilibrium investment to the total endowment is 8/48 (16.7%) and the proportion of the interior Pareto efficient investment to the total endowment is 32/48 (67.7%).

3. EXPERIMENTAL DESIGN

Our experiment has two parameters of control: (i) the payoff table control (the *S* table [*S*] vs. the *N* table [*N*]), and (ii) the information control (complete information [*C*] vs. incomplete information [*I*]). Thus, there are four condition pairs. Using each initial, we hereinafter refer to each of the treatments as *SC*, *SI*, *NC*, and *NI*. For example, *SC* denotes the treatment with the *S* table and complete information.

First, let us describe the payoff table control. We employ Table 1, which is the *N* table, as well as the *S* table after deleting the tag and highlighting from Table 2. Since the payoff function is quasi-linear, it can be written as $u_i(x_i, y) = u_i(w_i - y_i, y) = \varphi(y) + \alpha(w_i - y_i)$, where $\varphi(y)$ is the quasi-linear part of the payoff function. In Table 1, the left 1 × 49 table shows the $\varphi(y)$ part, and the middle saving box shows the $\alpha(w_i - y_i)$ part. Alternatively, the payoff function can be written as $u_i(w_i - y_i, y) = v_i(y_i, y_j)$ and the *S* table expresses the payoff matrix of $v_i(y_i, y_j)$. Since it is easy to construct the *S* table out of the *N* table, let us recover the *N* table out of the *S* table. As an example, consider $v_1(4, 5) = 6524$. Let us raise player 1's investment by one unit, while keeping the level of the public good at 9. Then $v_1(5, 4) = 6304$. Therefore, the value of one unit of the private good is 220 = 6524 – 6304, and the saving value is 4400 = (24 – 4) × 220. Hence, the public good value at 9 is 2124 = 6524 – 4400, which is the value of the public good at 9 in Table 1. It is important to note that the above procedure implicitly assumes that the target function is quasi-linear, and there is one private good and one public good. In other words, $u_i(w_i - y_i, y)$ cannot be recovered from $v_i(y_i, y_j)$ without having this economic structure. Therefore, the mathematical equivalence is valid under the knowledge of the structure. One of the sufficient conditions guaranteeing the interchangeability between the two payoff tables to secure their mathematical equivalence is that the payoff function is quasi-linear.

Table 1. The payoff table in the nonstrategic form (the *N* table).

Payoff from Investment

Total Amount of Investment	0	1	2	3	4	5	6	7	8	9
Your Payoff	0	254	504	749	990	1226	1458	1684	1907	2124

Total Amount of Investment	10	11	12	13	14	15	16	17	18	19
Your Payoff	2338	2546	2750	2949	3144	3334	3520	3701	3878	4049

Total Amount of Investment	20	21	22	23	24	25	26	27	28	29
Your Payoff	4217	4379	4538	4691	4840	4984	5124	5259	5390	5516

Total Amount of Investment	30	31	32	33	34	35	36	37	38	39
Your Payoff	5638	5754	5867	5974	6078	6176	6270	6359	6444	6524

Total Amount of Investment	40	41	42	43	44	45	46	47	48
Your Payoff	6600	6671	6738	6799	6857	6909	6958	7001	7040

\+ Payoff from Saving: (24 - Your Investment Number) × 220 = Your Payoff

Table 2. The payoff table in the strategic form (the *S* table).

Your Investment Number (columns); The Other's Investment Number (rows)

Your Payoff	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	5280	5314	5344	5369	5390	5406	5418	5424	5427	5424	5418	5406	5390	5369	5344	5314	5280	5241	5198	5149	5097	5039	4978	4911	4840
1	5534	5564	5589	5610	5626	5638	5644	5647	5644	5638	5626	5610	5589	5564	5534	5500	5461	5418	5369	5317	5259	5198	5131	5060	4984
2	5784	5809	5830	5846	5858	5864	5867	5864	5858	5846	5830	5809	5784	5754	5720	5681	5638	5589	5537	5479	5418	5351	5280	5204	5124
3	6029	6050	6066	6078	6084	6087	6084	6078	6066	6050	6029	6004	5974	5940	5901	5858	5809	5757	5699	5638	5571	5500	5424	5344	5259
4	6270	6286	6298	6304	6307	6304	6298	6286	6270	6249	6224	6194	6160	6121	6078	6029	5977	5919	5858	5791	5720	5644	5564	5479	5390
5	6506	6518	6524	6527	6524	6518	6506	6490	6469	6444	6414	6380	6341	6298	6249	6197	6139	6078	6011	5940	5864	5784	5699	5610	5516
6	6738	6744	6747	6744	6738	6726	6710	6689	6664	6634	6600	6561	6518	6469	6417	6359	6298	6231	6160	6084	6004	5919	5830	5736	5638
7	6964	6967	6964	6958	6946	6930	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6380	6304	6224	6139	6050	5956	5858	5754
8	7187	7184	7178	7166	7150	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6524	6444	6359	6270	6176	6078	5974	5867
9	7404	7398	7386	7370	7349	7324	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6664	6579	6490	6396	6298	6194	6087	5974
10	7618	7606	7590	7569	7544	7514	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6799	6710	6616	6518	6414	6307	6194	6078
11	7826	7810	7789	7764	7734	7700	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6930	6836	6738	6634	6527	6414	6298	6176
12	8030	8009	7984	7954	7920	7881	7838	7789	7737	7679	7618	7551	7480	7404	7324	7239	7150	7056	6958	6854	6747	6634	6518	6396	6270
13	8229	8204	8174	8140	8101	8058	8009	7957	7899	7838	7771	7700	7624	7544	7459	7370	7276	7178	7074	6967	6854	6738	6616	6490	6359
14	8424	8394	8360	8321	8278	8229	8177	8119	8058	7991	7920	7844	7764	7679	7590	7496	7398	7294	7187	7074	6958	6836	6710	6579	6444
15	8614	8580	8541	8498	8449	8397	8339	8278	8211	8140	8064	7984	7899	7810	7716	7618	7514	7407	7294	7178	7056	6930	6799	6664	6524
16	8800	8761	8718	8669	8617	8559	8498	8431	8360	8284	8204	8119	8030	7936	7838	7734	7627	7514	7398	7276	7150	7019	6884	6744	6600
17	8981	8938	8889	8837	8779	8718	8651	8580	8504	8424	8339	8250	8156	8058	7954	7847	7734	7618	7496	7370	7239	7104	6964	6820	6671
18	9158	9109	9057	8999	8938	8871	8800	8724	8644	8559	8470	8376	8278	8174	8067	7954	7838	7716	7590	7459	7324	7184	7040	6891	6738
19	9329	9277	9219	9158	9091	9020	8944	8864	8779	8690	8596	8498	8394	8287	8174	8058	7936	7810	7679	7544	7404	7260	7111	6958	6799
20	9497	9439	9378	9311	9240	9164	9084	8999	8910	8816	8718	8614	8507	8394	8278	8156	8030	7899	7764	7624	7480	7331	7178	7019	6857
21	9659	9598	9531	9460	9384	9304	9219	9130	9036	8938	8834	8727	8614	8498	8376	8250	8119	7984	7844	7700	7551	7398	7239	7077	6909
22	9818	9751	9680	9604	9524	9439	9350	9256	9158	9054	8947	8834	8718	8596	8470	8339	8204	8064	7920	7771	7618	7459	7297	7129	6958
23	9971	9900	9824	9744	9659	9570	9476	9378	9274	9167	9054	8938	8816	8690	8559	8424	8284	8140	7991	7838	7679	7517	7349	7178	7001
24	10120	10044	9964	9879	9790	9696	9598	9494	9387	9274	9158	9036	8910	8779	8644	8504	8360	8211	8058	7899	7737	7569	7398	7221	7040

Subject's Own Best Response Curve

On the other hand, as Saijo and Nakamura (1995) had indicated, there are at least two *qualitative* differences between the two payoff tables. First, each subject can find his/her own total payoff immediately from the *S* table, but not from the *N* table. For example, assume that subject *a* invests 4 and subject *b* invests 8. Then the total investment is 12. By using the *N* table, subjects can know only their respective payoffs from the public good (2750), but they have to calculate their payoffs from their private consumption for themselves. In this case, subject *a*'s total payoff is equal to 220 × (24 – 4) + 2750 = 7150. On the other hand, with the *S* table, subject *a* can immediately know his/her own total payoff by simply looking at cell (4, 8) in the table, where each column corresponds to each subject's own investment and each row corresponds to the other's investment.

Moreover, by simply looking at the *S* table, subjects can compare a payoff in a certain cell with payoffs in the neighboring cells; however, subjects cannot do so with the *N* table. The strategic interactions between subjects are *visible* in the *S* table, but *invisible* in the *N* table.

Subsequently, we consider the information control. Under the complete information condition, each subject knows that the other's payoff table is exactly the same as his/her own. On the other hand, under the incomplete information condition, no subject knows the other's payoff table.

4. RESULTS

4.1. Average Investment Data

Figure 2 shows the average individual investment pattern for each treatment. First, we tested the hypothesis that the average individual investment would equal the average Nash equilibrium level (4) by pooling the data across rounds. Since the data was not independent, we considered the panel nature and used a random error specification, $v_{it} = e_i + \varepsilon_{it}$, where e_i was a subject-specific error and ε_{it} was an IID error.

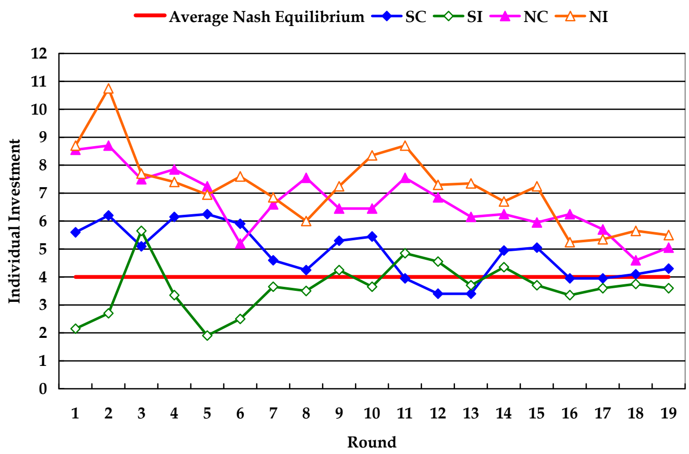

Figure 2. Average individual investment pattern for each treatment.

The results of the panel data analysis were as follows. In both *NC* and *NI*, the Nash equilibrium hypothesis was rejected at the 1% level (t = 3.117 and t = 2.975, respectively). On the other hand, in both *SC* and *SI*, the Nash equilibrium hypothesis was not rejected at the 10% level (t = .924 and t = .617, respectively).

We also conducted round by round Wilcoxon rank-sum tests of the Nash equilibrium hypothesis. Out of a total of 19 rounds, the hypothesis was rejected in 5 rounds in *NC* and 8 rounds in *NI* at the 5% level. On the other hand, it was rejected in 1 round in *SC* and 6 rounds in *SI*. Accordingly, the Nash equilibrium hypothesis was supported more frequently under the *S* table condition.

Second, we examined the effect of each control on the average individual contribution. Using the random effects OLS regression, we compared (i) the pooled data under the *S* table condition (*SC* and *SI*) with that under the *N* table condition (*NC* and *NI*), and (ii) the pooled data under the complete information condition (*SC* and *NC*) with that under the incomplete information condition (*SI* and *NI*). As a result, the average individual contribution under the *S* table condition was significantly smaller than that under the *N* table condition at the 1% level (t = 2.967), whereas that under the complete information condition was not statistically different from that under the incomplete information condition at the 10% level (t = .074). Therefore, only the difference in the payoff tables had a significant impact on the average individual contribution, which was consistent with the results of the first regression. These results lead to the following observation:

Observation 1:

(*a*) *Under the nonstrategic table condition, the average individual investments are significantly greater than the average Nash equilibrium level.*

(*b*) *Under the strategic table condition, the average individual investments are not statistically different from the average Nash equilibrium level.*

4.2. Identifying Motivations

There are three focal investments in our experiment: investments "0–8," "16," and "24." We specify the motivation behind each investment as follows:

(i) The motivation behind investments "0–8" is called "Nash motivation," since each subject chooses an investment number between 0 and 8 in every Nash equilibrium.

(ii) The motivation behind investment "16" is called "cooperative motivation," since by investing 16, the subject aims to achieve the cooperative outcome (16, 16), which is symmetrically Pareto efficient.

(iii) The motivation behind investment "24" is called "altruistic motivation," since by investing 24, the subject aims to maximize the other's payoff.

Note that an outcome does not always accord with each subject's motivation. For example, if subject *a* chooses 16 with cooperative motivation, but subject *b* chooses 4 with Nash motivation, the outcome (16, 4) is neither the cooperative one nor the Nash one.

Let us identify subjects' motivations using Table 3 together with Figure 1. In addition to the three investments, Table 3 also lists two intermediate investments, "9–15" and "17–23." The motivations behind these are collectively called "intermediate motivations." The frequency and percentage of each motivation were as follows.

Table 3. Frequency of individual contributions by value of contribution.

Contribution	Treatment *SC*	*SI*	*NC*	*NI*
0-8	322	358	274	281
0	181	145	83	59
1-7	46	140	134	117
8	95	73	57	105
9-15	15	18	54	61
16	40	0	26	5
17-23	0	1	21	25
24	3	3	5	8
Total	380	380	380	380

In the *SC* case, "0–8" was ranked first (322, 84.7%), "16" was second (40, 10.5%), "9–15" was third (15, 3.9%), "24" was fourth (3, 0.8%), and "17–23" had no data. In other words, the Nash and cooperative motivations accounted for over 95% of motivations; and the Nash, cooperative, and intermediate (i.e., "9–15") motivations accounted for 99.1%. Furthermore, altruistic motivation was rare.

In the *SI* case, "0–8" was ranked first (358, 94.2%), "9–15" was second (18, 4.7%), "24" was third (3, 0.8%), "17–23" was fourth (1, 0.3%), and "16" had no data. The basic motivation in this case was Nash, and the subjects did not seem to pay any attention to the cooperative outcome, since no payoff information for the other was given.

In the *NC* case, "0–8" was ranked first (274, 72.1%), "9–15" was second (54, 14.2%), "16" was third (26, 6.8%), "17–23" was fourth (21, 5.5%), and "24" was fifth (5, 1.3%). In other words, the Nash, cooperative, and intermediate (i.e., "9–15") motivations accounted for over 93% of motivations, and altruistic motivation was rare.

In the *NI* case, "0–8" was ranked first (281, 73.9%), "9–15" was second (61, 16.1%), "17–23" was third (25, 6.6%), "24" was fourth (8, 2.1%), and "16" was fifth (5, 1.3%). In other words, the Nash, cooperative, and intermediate (i.e., "9–15") motivations accounted for over 91% of motivations, and altruistic motivation was rare.

We examined the effect of each control on the frequency of each motivation. By using the Fisher's exact test, we compared (i) the pooled data under the *S* table condition (*SC* and *SI*) with that under the *N* table condition (*NC* and *NI*); and (ii) the pooled data under the complete information condition (*SC* and *NC*) with that under the incomplete information condition (*SI* and *NI*). First, a comparison of the *S* table and *N* table conditions revealed the frequency of Nash motivation under the *S* table condition to be significantly greater than that under the *N* table condition at the 1% level (u = 8.214). The frequencies of cooperative and altruistic motivations under the *S* table condition were not statistically different from those under the *N* table condition at the 10% level (u = 1.094 and u = 1.616, respectively).

Second, a comparison of the complete and incomplete information conditions revealed the frequency of Nash motivation under the complete information condition to be significantly smaller than that under the incomplete information condition at the 1% level (u = 2.826). On the other hand, the frequency of cooperative motivation under the complete information condition was significantly greater than that under the incomplete information condition at the 1% level (u = 7.415). The frequency of altruistic motivation under the complete information condition was not statistically different from that under the incomplete information condition at the 10% level (u = .693).

If a contribution exceeds the cooperative level (16), let us identify the motivation behind it as "quasi-altruistic motivation." The ratios of quasi-altruistic motivation were 0.8%, 1.1%, 6.8%, and 8.7% in *SC*, *SI*, *NC*, and *NI*, respectively. In other words, even by expanding the notion of altruistic motivation to the extent possible, quasi-altruistic motivation was rare under the *S* table condition, and less than 9% under the *N* table condition. On the other hand, although the number of observations was small, the frequency of quasi-altruistic motivation under the *S* table condition was significantly smaller than that under the *N* table condition at the 1% level ($u = 6.668$). Summarizing the above results, we have observed the following:

Observation 2:

(*a*) *The frequency of Nash motivation under the strategic table condition is significantly greater than that under the nonstrategic table condition.*

(*b*) *The frequency of Nash motivation under the complete information condition is significantly smaller than that under the incomplete information condition.*

(*c*) *The frequency of cooperative motivation under the complete information condition is significantly greater than that under the incomplete information condition.*

5. DISCUSSION

We have confirmed the following results.

(i) Overcontribution is observed under the nonstrategic table condition, but not under the strategic table condition.

(ii) Under the strategic table condition, there is substantially less non-Nash-motivated behavior, that is, Nash-motivated behavior accounts for approximately 90 percent of all decisions. On the other hand, under the nonstrategic table condition, Nash-motivated behavior accounts for only 73 percent of all decisions.

These results suggest that the cooperative and altruistic outcomes, which seem to dominate the experimental public good literature, may be attributable to the frame of the experimental environment.

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