PARADISE TO PARKING LOTS:
CREATION VERSUS MAINTENANCE OF A PUBLIC GOOD*

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Abstract

We offer further evidence that experiment framing significantly influences subject behavior. A public bad game strategically equivalent to the traditional public good game is designed. The public bad game is intended to simulate the decision to pollute or not pollute, a context that is likely to be more familiar to our subjects than those of previous studies. We also include survey instruments to test for the presence of a publicly interest personality type. We find that subjects are more likely to take actions, at some cost to themselves, to create benefits for the group than they are to be inactive, at some cost to themselves, to create the same benefits for the group. We also find only weak evidence of the existence of a publicly interest personality type. There is only weak correlation between subjects’ personality survey scores and their contributions to the public good.

JEL: H41 (Public Goods), C92 (Group Behavior)

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CREATION VERSUS MAINTENANCE OF A PUBLIC GOOD

I. Introduction

Contributions to a public good may take many forms. A person can contribute time, effort, or money in order to create a public good, while another person could contribute by avoiding actions that lead to the degradation or destruction of an existing public good, (i.e. forgoing a polluting action). The first instance constitutes positive actions (or the repression of negative inaction), while the second constitutes positive inaction (repression of negative action). Economic reasoning would suggest that a person willing to sacrifice self-interest to create a public good would also sacrifice self-interest to avoid destroying that same public good.

Evidence suggests, however, that people do not see the two actions as strategically similar. That people will subordinate their private interests and take positive action to advance the interest of the group is well documented, both by real world actions (contributions to charitable causes) and by their actions in laboratory experiments (see Davis & Holt, 1995, and Ledyard, 1995). Andreoni (1995) and Sonneman, Schram, and Offerman (1998), however, show that a subject’s perception of the best course of action in a voluntary contribution mechanism game (VCM) is influenced by the way in which the problem is framed.¹

For this study, we adopt Andreoni’s format of strategically-equivalent positively-framed and negatively-framed VCMs. The subjects in our study are affected by the same positive and negative externalities. However, our negatively-framed VCM, which we call the Public Bad

¹ Kahneman and Tversky (1979); Elliott, Hayward, and Canon (1998); and Johnson, et. al. (1993) offer additional evidence of the impact of framing.
game, similar in nature to Sonnemans, Schram, and Offerman’s (1998), is designed to simulate the decision to pollute or not pollute, a context that should be more familiar to subjects than the cartel context of Anderoni’s study. In this game, subjects degrade an existing public good by “contributing” to the common pool.

Our subjects also complete a 48-question opinion survey designed to measure subjects’ attitudes regarding interpersonal trust and human nature. The survey was comprised of the Machiavellianism Scale – Mach IV (Christie and Geis, 1970) and the Trustworthiness and Altruism subscales of Wrightman’s (1964, 1974) Philosophies of Human Nature Scale. We include these instruments to test for the presence of a publicly interest personality type. We hypothesize those subjects with a more Machiavellian, less trusting, and/or less altruistic nature would be less inclined to subordinate their private interests in favor of the public interest and therefore be more inclined to free-ride on the public good.

Our results are largely consistent with Anderoni’s (1995) and Sonnemans, Schram, and Offerman’s (1998). We find that subjects are more likely to contribute to the creation of a new public good than contribute to the maintenance of an existing public good. Subjects are more willing to take actions, at some cost to themselves, to create benefits for the group than they are to be inactive, at some cost to themselves, to create benefits for the group. We also find only weak evidence of the existence of a publicly interest personality type. There is only weak correlation between subjects’ personality survey scores and their contributions to the public good.
II. Previous Studies

Andreoni’s (1995) positively-framed voluntary contribution mechanism game (VCM) is a standard public good game. In the public good game, investing in the public good creates positive externalities for other members of the group. Andreoni noted that in the standard public good game, the opportunity cost of investing in the private good was the lower return to others from the public good. To create his negatively framed VCM, this aspect is made explicit by having investment in the private good create negative externalities for other members of the group at the same time eliminating the positive externalities from investment in the public good.

Andreoni found a significant difference in subjects’ behavior between the strategically-equivalent positively-framed and negatively-framed VCMs. He reports that cooperation in the public good game was approximately twice that in the negatively framed game, indicating, “…that the warm-glow of creating a positive externality appears to be stronger than the cold-prickle of creating a negative externality” (1995; p. 2).

Andreoni’s negatively framed VCM structure roughly models the decision to participate in or cheat on a cartel agreement. While his study addresses an interesting question, the context of Andreoni’s negatively framed VCM is one that would be largely alien to a typical experiment subject. Few college-aged students would have had much experience with cartels and the decisions they made may have been influenced by their inability to relate the experiment to their real-world experiences. Our negatively-framed VCM simulates the decision to pollute or not pollute, a context that should be more familiar to subjects than the cartel context.

Sonnemans, Schram, and Offerman (1998) address the framing question in a manner similar to that adopted in this paper. They create strategically-equivalent games framed as either the provision of a public good or the prevention of a public bad. Their games differ from ours in
three important ways. First, they use a step-level environment; the public good (bad) is provided (prevented) only if the sum of individual contributions exceeds (does not exceed) some level. Second, their subjects either contribute all or nothing, while in ours contributions may vary. Finally, in their Public Bad game, taking action to prevent the public bad unrealistically imposes no direct cost on the subject. In our Public Bad game, this course of action does impose a direct cost; an individual who refrains from littering must herself bear the cost of disposing of the item.

II. Experimental Design

The positively-framed treatment is the standard public good experiment. Subjects are randomly assigned to groups of five. Each subject is given an endowment of 100 tokens at the start of each decision round. Tokens may be either held or deposited into the group’s pool, thereby creating the public good. Tokens held have a value of $0.01. Tokens deposited into the group pool have a value of $0.02. The tokens in the group pool at the end of each decision round are divided equally among the group members. A subject’s earnings for each decision round is given by:

$$\Pi_i = \text{TH}_i \times 0.01 + 1/5 \times (\sum \text{TD}_i \times 0.02)$$

Where $\Pi_i =$ subject i’s earnings, $\text{TH}_i =$ tokens held by subject i, and $\sum \text{TD}_i =$ tokens deposited into the group pool by all members (i = 1, 5) in the group.

The Public Bad treatment was designed to be the mirror image of the Public Good treatment. In this treatment, the public good already exists; the group pool begins each decision round with 500 tokens, each with a value of $0.02. Subjects begin each decision round with 100 “anti-tokens”. Anti-tokens held have a value of -$0.01; while each anti-token deposited into the group pool cancels out one token, or in other words, has a value of -$0.02. Tokens remaining in
the group pool at the end of each decision round are divided equally among the group members.
A subject’s earnings for each decision round is given by:

\[ \Pi_i = (ATH_i \times -.01) + \frac{1}{5} \times (500 - \sum ATD_i) \times .02 \]

Where \( \Pi_i \) = subject i’s earnings, \( ATH_i \) = anti-tokens held by subject i, and \( \sum ATD_i \) = anti-tokens deposited into the group pool by all members (\( i = 1, 5 \)) in the group. Finally, to preserve incentives and equate the earnings potential of the two games, subjects in the Public Bad treatment are paid $10 at the beginning of the session but are told they may possibly lose some or all of this money in the later part of the experiment.

Though the two treatments are framed differently, they are strategically-equivalent, mirror images. In the Public Good experiment, the optimal strategy for the individual is to hold all of her tokens, letting others contribute to the group pool. For the Public Bad treatment, the optimal strategy is for the individual to deposit all of her anti-tokens into the group pool, letting others maintain the pool by withholding theirs. In the Public Good treatment the optimal strategy for the group is for all members to contribute their tokens to the group pool; in the Public Bad treatment the optimal group strategy is to withhold all their anti-tokens.

Twenty subjects are recruited to a common room for each session. Subjects first completed a 48-question opinion survey designed to measure subjects’ attitudes regarding interpersonal trust and human nature. (The survey and results are discussed in greater detail in Section V.) Subjects were given 20 minutes to complete the survey. In the Public Good treatment, subjects received no payment for this task. In the Public Bad treatment, subjects were told that their $10 initial earnings were in payment for completing this task. In addition to equating the earnings potential of subjects across treatments, we wanted to minimize the “house money” effect. We wanted the subjects to realize that it is their money, since each decision period it is possible, through poor decision making,
to actually lose some of the money.

Copies of both sets of instructions and the survey are attached in the Appendix.

III. Data Results: Public Good vs. Public Bad

A total of 160 students participated in the experiment: 85 subjects (17 teams) in the Public Good treatment, 75 subjects (15 teams) in the Public Bad treatment. The subjects were drawn from the student population of St. Cloud State University and were recruited from economics, geography, sociology, and business classes and by word of mouth. All students but one were undergraduates. Students were paid a $3 appearance fee and earned, on average, an additional $15.24 in the Public Good treatment and $13.76 in the Public Bad treatment.

Table 1 reports the average contribution rate by group in each decision round. For the Public Good treatment teams, the figure is the percentage of tokens contributed to the creation of the public good. For the Public Bad treatment teams, the figure is the percentage of anti-tokens held (i.e. not deposited into the group pool and thereby not degrading the existing public good). While there is considerable variation across groups, it should be noted that the average contribution rate for all Public Good groups is consistently higher than that for Public Bad groups. The average contribution rate for Public Good teams begins at 63 percent and decays to 30 percent by decision period 10. For the Public Bad groups, the average contribution rate begins at 43 percent and decays to 27 percent. The overall contribution rate for Public Good groups is 40 percent higher than the overall rate for Public Bad groups (52.4 percent versus 37.6 percent).

The significance of the difference in contribution rates is examined using a Mann-Whitney rank-sum test. We calculate the mean contribution for all 160 subjects and then rank
the subjects by these means. The null hypothesis is that there is no difference between treatments in the sum of the ranks. The test statistic has a value of $z = 3.57$, $p$-value $< 0.001$. This is further evidence to support Andreoni’s conclusion that, “… the positive frame significantly increases the amount of the endowment contributed to the public good”(1995, p. 8).

Unlike Andreoni (1995) we find no evidence that framing affects subject’s propensity to free ride. Table 2 reports the percent of subjects who adopted the free riding strategy for each decision period of the game. Overall, subjects in the Public Bad treatment were less inclined, though not significantly so, to free ride than were subjects in the Public Good treatment. The Mann-Whitney rank-sum test yields a $Z = 0.83$, $p$-value $< 0.80$.

Where we did find a significant difference in behavior is in the subjects’ propensity to contribute everything to the public good. Table 2 also reports the percent of subjects donating all to the public good. In every decision period, subjects in the Public Good treatment were substantially more likely to donate all than subjects in the Public Bad treatment. The Mann-Whitney rank-sum test yields a $Z = 3.79$, $p$-value $< 0.001$.

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2 Using only data from the first decision period, which guarantees independence of the observations, the test statistics has a value of $z = 3.75$, $p$-value $< 0.001$.
3 The difference in behavior does not appear to be a factor of the framing. In post-experiment testing, there was little difference in the percent of subjects answering correctly questions designed to test subjects’ understanding of the incentives. In both treatments, approximately 15 percent answered both questions correctly. This is quite low compared to Andreoni’s (1995) subjects. One important factor, which might explain the difference, is Andreoni’s subjects were recruited from intermediate economics courses as opposed to the more general recruiting done for this study. Andreoni’s subjects are, therefore, likely to have a better grasp of economics than this study’s subjects.
To further test the differences in contribution rates, we model the convergence process of the contribution path and the impact framing has on this process.\textsuperscript{4} The model’s estimating equation is as follows:

\[
y_{it} = \beta_{1i}D_i(1/t) + \beta_{2j}((t-1)/t) + u
\]  

(1)

The subscripts i, t, and j denote the group, decision period, and treatment, respectively. The dependent variable \(y_{it}\) is the contribution rate of group i at decision period t. \(D_i\) is a dummy variable that takes a value of 1 for group i, 0 otherwise. \(\beta_{1i}\) is the convergence process origin for team i, while \(\beta_{2j}\) is the asymptotic convergence point for treatment j. A common convergence point is imposed for all groups in the same treatment.

Starting values (not reported) are highly variable across groups, but are slightly higher on average for Public Good groups than for Public Bad groups. Our analysis focuses on the convergence points - the contribution rates the treatments converge to – shown in Table 3. Model 1 reports the results assuming that the two treatments have different convergence points. For the Public Bad treatment, the asymptotic contributions rate is 34.8 percent; for the Public Good treatment the asymptotic contribution rate is approximately one-third higher, 46.2 percent. Model 2 imposes a common convergence point. A log-likelihood test of the null hypothesis of no difference in convergence points gives a test statistic at \(\chi^2(1) = 4.26, p\text{-value} < 0.04\). This further supports the conclusion that a positive frame significantly increases contributions to a public good.

The results of these experiments provide additional evidence that the framing of an experiment can have a significant impact on subjects’ behavior. The differences in contribution rates and number of free-riders indicate that a positively framed experiment, such as the Public

\textsuperscript{4} This model of convergence was first suggested by Ashenfelter et. al. (1992) and was employed by Noussair, Plott, and Riezman (1995).
Good experiment, will generate higher overall contribution rates and fewer free-riders than a strategically-equivalent, negatively framed experiment, such as the Public Bad experiment.

IV. Survey Results

The 48 question survey was comprised of Christie and Geis’ (1970) Machiavellianism Scale – Mach IV (M) and the Trustworthiness, positive and negative, (PT and NT, respectively) and Altruism, positive and negative, (PA and NA, respectively) subscales of Wrightsman’s Philosophies of Human Nature Scale (1964, 1974).\footnote{M scale – questions 1 – 20; PT scale – questions 21 – 27; NT scale – questions 28 – 34; PA scale – questions 35 – 41; and NA scale – questions 42 – 48.} Robinson, et. al. (1990) provides an overview of the two scales and provides a brief discussion of their reliability and validity.

The M scale measures a subject’s beliefs about the ability to manipulate other people to achieve the subject’s goal. The T and A scales measure a subject’s expectations about other peoples’ morality, honesty, and reliability (T scale) and other peoples’ unselfishness, and concern for others (A scale). Items are scored on a +3 (agree strongly) to –3 (disagree strongly) Likert format. For all five scales, responses were rescaled so higher scores indicated subjects with a less Machiavellian nature, a more trusting nature, and a more altruistic nature. In Table 4 we report summary statistics for the five scales for all subjects and by treatment. Means tests (unreported) indicated no significant difference in scores between the two treatments. The correlation coefficients reported in Table 5 suggest that the various personality aspects measured by the different scales are strongly correlated with one another. All of the correlation coefficients are positively and significantly correlated (at greater than 0.05 level) with the exception of PT and NT (p-value = 0.07); i.e. subjects who were less Machiavellian were more trusting and more altruistic, etc.
Within the context of a variable contribution mechanism game, we hypothesize that subjects with a more Machiavellian nature, a less trusting nature, and/or a less altruistic nature would be more inclined to free-ride on contributions for the public good; i.e. there should be a positive relationship between subjects’ contributions to the public good and their scores for the five scales. To test these hypotheses we calculated correlation coefficients between subjects’ different scale scores and their first decision period contribution to the public good and their average contribution to the public good for all decision periods (see Table 6). Consistent with our hypothesis, there is a positive correlation between survey scale scores and first decision period contributions, with the exception of the NT scale, but in no case was the correlation significant. For average contributions for all periods, only the M scale is both positively correlated with contribution level, as predicted, and significant. Three of the remaining four scales have the wrong sign and all are insignificant.

Table 6 also reports the correlation coefficients by treatment. The survey scales are consistently poorly correlated with either initial contributions or average contributions for subjects in the Public Good sessions and in eight of the ten cases the correlations coefficients have the wrong sign. For the Public Bad sessions, the survey scores are positively correlated with contributions, as hypothesized but are only significant for the M scale. The Machiavellianism scale appears to be a good predictor of how a subject is likely to behave in a Public Bad environment. Subjects who believe strongly that they can manipulate others to achieve their own goal are also more inclined to free ride.
V. Discussion

What explains the differences in behavior across these two, strategically-equivalent games? A number of different theories are consistent with the observed behavior. Omission bias offers some partial explanation (see Samuelson and Zeckhauser, 1988; Baron and Ritov, 1994; Schweitzer, 1994; and Ritov and Baron; 1995). The omission bias reflects a preference for inaction that results in a worse outcome rather than action that results in the same worse outcome. For example, subjects have revealed a preference for withholding vaccination for a child because the vaccination may itself cause the child’s death, even if the risk of death from the prevented disease is even greater (Ritov and Baron, 1990). Andreoni’s (1995) warm glow/cold prickle theory is a mirror image of the omission bias, a commission bias; a preference for action that results in a beneficial outcome rather than inaction that results in the same beneficial outcome. Subjects are more willing to act if it results in gains to others than to remain passive and create the same gains.

Confounding this explanation is that the omission bias theory does not incorporate the group interest/private interest conflict inherent in the Public Good and Public Bad games. The omission bias addresses the issue of passively or actively causing harm to others, but the decision made had no direct repercussions for the decision maker. In the Public Good and Public Bad games, this conflict would mitigate any effect of a commission bias. Never the less, if subjects held such a bias, this would serve to offset somewhat a bias towards self-interest.

A second, and complementary, explanation is offered by the assumption of diminishing marginal utility of money. While the two games were designed to be strategically-equivalent with equal earnings potential, subjects may have focused on the implications of the independent individual decisions. In that case, diminishing marginal utility would explain the higher levels of
free riding in the Public Bad treatments. Table 7 compares the expected earnings for both the contribute all and the complete free-riding strategies in the two treatments conditional on expectations of other’s strategy choices. While the earnings differential is a constant $0.60 in every case, the marginal value of the gain from free riding is greater in the Public Bad treatment than in the Public Good treatment.

Finally, as indicated in Table 7, subjects would only lose money if they adopt a contribute strategy when others adopt a free-riding strategy. Therefore, if a subject assumes that others are more inclined to adopt a free-riding strategy and if a loss is weighted more heavily than an equal gain (Kahneman and Tversky’s; 1979), then greater free-riding should be observed in the Public Bad treatment than in the Public Good treatment. Other things equal, loss-averse subjects are more likely to free-ride in the Public Bad game than in the Public Good game.

VI. Conclusion

The results of this experiment offer further evidence that differences in the framing of an experiment can result in behavioral response differences. This study reports significantly higher contribution rates in the positively-framed VCM game than in the negatively-framed game. This result is consistent with those reported by Andreoni (1995) and Sonnemans, Schram, and Offerman’s (1998). Furthermore, subjects in the positively-framed VCM are significantly more likely to contribute everything to the public good than are subjects in the negatively-framed game. We also include survey instruments to test for the presence of a publicly interest personality type. We find only weak evidence of such a personality type. Subjects who, as indicated by their survey answers, have a less Machiavellian, more trusting, and/or more
altruistic nature are no more inclined to subordinate their private interests in favor of the public interest than their less public interested counterparts.

The observed inconsistency in behavior across treatments is consistent with observed aspects of U.S. society. On-the-one-hand, society shows a willingness to contribute, via its tax dollars, to public goods. The federal government has created an extensive system of public lands (i.e. the National Park System contains in excess of 130 million acres of parkland, the National Wildlife Refuge comprising 91 million acres, and the National Forests which have increased from 1.2 million acres in 1891 to 187 million acres in 1992; Zinser, 1995). 6

On the other hand, society exhibits behavior consistent with an unwillingness to contribute to the maintenance of existing public goods. In a poll conducted by Yankelovich Partners, Inc. for Keep America Beautiful Inc. “[F]orty-eight percent of American admit to having littered at one time or another in the past 10 years” (kab.org/release2.htm). The report also notes that of youths age 8 – 15 polled, 30 percent indicated they were unconcerned by litter and one-third “…either litter themselves or don’t care if others do.” The Bureau of Economic Analysis (http://www.bea.doc.gov/bea/dn/gap_hist.xls) reports that between 1967 and 2000, retail sales of relatively fuel inefficient light trucks, vans, and sport utility vehicles has increased six fold (from 1.2 million units in 1967 to 7.5 million units in 2000. By comparison, retail sales of automobiles have barely changed (from 8.3 million units in 1967 to 8.9 million units in 2000). 7

6 In addition to federal public land, the state and local governments also maintain systems of public lands. For example, Minnesota operates 70 state parks totaling over 240,000 acres (www.dnr.state.mn.us/parks_and_recreation/state_parks/parksataglance/.html).

7 The fuel economy statistics for 2002 model vehicles released by the Environmental Protection Agency reported an average fuel economy of 23.9 mpg for the 491 cars. By comparison, the 374 models of pickup trucks, sport utility vehicles, and vans averaged 17.9 mpg (New York Times, October 10, 2001, p. A13).
The reported findings have implications for anti-littering campaigns such as Keep America Beautiful and other public good preservation movements. Appeals emphasizing the destructive nature of certain actions would, on the basis of evidence reported here, be less efficient than appeals emphasizing positive actions that imply the creation of new or the improvement of existing public goods. Rather than “Don’t be a Litterbug!”, a more effective slogan might be “Help Create a Cleaner Environment!”. Emphasize the positive act of creating rather than the negative act of not destroying.
<table>
<thead>
<tr>
<th>Decision Periods</th>
<th>Public Good Average</th>
<th>Public Bad Average</th>
<th>Difference</th>
<th>Mann-Whitney Statistic</th>
<th>p-value</th>
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<td>43.4%</td>
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<td>45.2%</td>
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<td>4</td>
<td>62.4%</td>
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<td>5</td>
<td>55.8%</td>
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<td>17.5%</td>
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<td>8</td>
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<td>33.0%</td>
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<td>9</td>
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<td>10</td>
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<td>27.0%</td>
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<tr>
<td>All</td>
<td>52.4%</td>
<td>37.6%</td>
<td>14.8%</td>
<td>3.57</td>
<td>&lt;0.001</td>
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Table 2: Percent of Subjects Contributing All or Nothing
To the Public Good Per Decision Period

<table>
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<tr>
<th></th>
<th>Percent of Subjects Contributing Nothing</th>
<th>Percent of Subjects Contributing All</th>
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<tr>
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<td>Decision Period</td>
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<td>Public Good</td>
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<td>Public Bad</td>
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<td>Decision Period</td>
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<tr>
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<td>Public Bad</td>
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Table 3: Convergence Points For Contributions To The Team
(Standard errors in parentheses)
Note: Estimated Starting Points for Each Team are suppressed

<table>
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<tr>
<th></th>
<th>Public Good Teams</th>
<th>Public Bad Teams</th>
</tr>
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<tr>
<td><strong>Model 1</strong></td>
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<tr>
<td><strong>Convergence point</strong></td>
<td>46.19</td>
<td>34.85</td>
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<tr>
<td><em>(Standard Error)</em></td>
<td>(2.46)</td>
<td>(1.77)</td>
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<tr>
<td><strong>N</strong></td>
<td>320</td>
<td></td>
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<tr>
<td><strong>Log Likelihood</strong></td>
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<tr>
<td><strong>Model 2</strong></td>
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<tr>
<td><strong>Convergence point</strong></td>
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<tr>
<td><em>(Standard Error)</em></td>
<td>(1.42)</td>
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<tr>
<td><strong>N</strong></td>
<td>320</td>
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<tr>
<td><strong>Log Likelihood</strong></td>
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<tr>
<td><strong>Likelihood Ratio Test</strong></td>
<td>4.26</td>
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<td><em>(vs. Model 1)</em></td>
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</tr>
<tr>
<td><strong>p-value</strong></td>
<td>&lt; 0.04</td>
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Table 4: Summary Statistics –Opinions and Preferences Survey

<table>
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<tr>
<th>Survey Subscales</th>
<th>Mean (Std. Dev.)</th>
<th>All Subjects</th>
<th>Public Good Subjects</th>
<th>Public Bad Subjects</th>
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<tbody>
<tr>
<td>Machiavellianism (M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.41 (10.77)</td>
<td>9.33 (10.98)</td>
<td>9.51 (10.59)</td>
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<td>Trustworthiness – Positive (PT)</td>
<td>3.08 (6.43)</td>
<td>2.88 (6.12)</td>
<td>3.29 (6.80)</td>
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</tr>
<tr>
<td>Trustworthiness – Negative (NT)</td>
<td>-6.41 (6.51)</td>
<td>-6.33 (5.87)</td>
<td>-6.49 (7.20)</td>
<td></td>
</tr>
<tr>
<td>Altruism – Positive (PA)</td>
<td>3.00 (6.50)</td>
<td>2.68 (6.09)</td>
<td>3.36 (6.96)</td>
<td></td>
</tr>
<tr>
<td>Altruism – Negative (NA)</td>
<td>-3.92 (7.89)</td>
<td>-3.34 (7.42)</td>
<td>-4.59 (8.39)</td>
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</tr>
</tbody>
</table>
Table 5: Survey Scales’ Correlation Coefficients

<table>
<thead>
<tr>
<th>Scale</th>
<th>M</th>
<th>PT</th>
<th>NT</th>
<th>PA</th>
<th>NA</th>
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<tr>
<td></td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>PT</td>
<td>0.398</td>
<td>5.27</td>
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<tr>
<td></td>
<td>(0.00)</td>
<td></td>
<td>(0.00)</td>
<td></td>
<td></td>
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<tr>
<td>NT</td>
<td>0.379</td>
<td>4.98</td>
<td>0.135</td>
<td>1</td>
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<td></td>
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<td>(0.07)</td>
<td>(0.01)</td>
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<td></td>
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<td>PA</td>
<td>0.324</td>
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<td>0.598</td>
<td>0.175</td>
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<td>(0.00)</td>
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<td>(0.03)</td>
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<td>NA</td>
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<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.00)</td>
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Correlation Coefficient

Z-statistic

(p-value)
Table 6: Correlation Coefficients – Survey Scales and Contributions to Public Good

<table>
<thead>
<tr>
<th>Survey Scales</th>
<th>Contribution First Decision Period</th>
<th>Average Contribution All Periods</th>
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</thead>
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<tr>
<td></td>
<td>Correlation Coefficient Z-statistic</td>
<td>(p-value)</td>
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<tr>
<td></td>
<td>All</td>
<td>Public Good</td>
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<tr>
<td>Machiavellianism (M)</td>
<td>0.088</td>
<td>-0.090</td>
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<tr>
<td></td>
<td>(0.27)</td>
<td>(0.41)</td>
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<tr>
<td>Trustworthiness – Positive (PT)</td>
<td>0.015</td>
<td>-0.054</td>
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<tr>
<td></td>
<td>(0.86)</td>
<td>(0.62)</td>
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<tr>
<td>Trustworthiness – Negative (NT)</td>
<td>-0.039</td>
<td>-0.092</td>
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<tr>
<td></td>
<td>(0.62)</td>
<td>(0.41)</td>
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<tr>
<td>Altruism – Positive (PA)</td>
<td>0.015</td>
<td>-0.016</td>
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<tr>
<td></td>
<td>(0.85)</td>
<td>(0.89)</td>
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<tr>
<td>Altruism – Negative (NA)</td>
<td>0.049</td>
<td>-0.041</td>
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<tr>
<td></td>
<td>(0.54)</td>
<td>(0.71)</td>
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</table>
Table 7: Expected Earnings by Treatment, Own Action, and Expectations About Other’s Actions

<table>
<thead>
<tr>
<th>Public Good</th>
<th>Expectations about Other’s Actions</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Own Action</td>
<td>Contribute</td>
<td>Free-Ride</td>
</tr>
<tr>
<td>Contribute</td>
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<td>$0.40</td>
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<td>Free-Ride</td>
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<td>$1.00</td>
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<td>Contribute</td>
<td>$1.00</td>
<td>-$0.60</td>
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<tr>
<td>Free-Ride</td>
<td>$1.60</td>
<td>$0.00</td>
<td></td>
</tr>
</tbody>
</table>
References


Appendix

Opinions and Preferences Survey

(For those participating in the public bad sessions the following addition/changes were made.)

You are asked to participate in a study of economic decision-making. The study will take approximately one hour to complete. The study is comprised of two parts to be described at the appropriate time. You will be paid $10 for completing Part 1. Your earnings for Parts 2 and your total earnings for the study will be determined by the decisions you and the other Players make in each part. Please note that in Part 2 of the study you may lose money. If you should do so, your losses will be deducted from your earnings from Part 1. You are free to make as much money as you can. How your compensation for Part 2 and your total compensation will be determined is explained below. You will be paid in cash in private at the end of the session.

Instructions

Listed below are a number of statements. Each represents a commonly held opinion and there are no right or wrong answers. You will probably disagree with some items and agree with others. We are interested in the extent to which you agree or disagree with such matters of opinion.

Read each statement carefully. Decide if you agree or disagree and the strength of your opinion. Then circle the appropriate number. The numbers and their meanings are indicated below.

If you agree strongly, circle +3
If you agree somewhat, circle +2
If you agree slightly, circle +1
If you disagree slightly, circle -1
If you disagree somewhat, circle -2
If you disagree strongly, circle -3

Give your opinion on every statement.

If you find that the numbers to be used in answering do not adequately indicate your own opinion, use the one that is closest to the way you feel.

1. Never tell anyone the real reason you did something unless it is useful to do so.
   +3   +2   +1   -1   -2   -3

2. The best way to handle people is to tell them what they want to hear.
   +3   +2   +1   -1   -2   -3

3. One should take action only when sure it is morally right.
   +3   +2   +1   -1   -2   -3

4. Most people are basically good and kind.
   +3   +2   +1   -1   -2   -3

5. It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.
   +3   +2   +1   -1   -2   -3

6. Honest is the best policy in all cases.
   +3   +2   +1   -1   -2   -3
7. There is no excuse for lying to someone else.
   +3 +2 +1 -1 -2 -3

8. Generally speaking, men won’t work hard unless they’re forced to do so.
   +3 +2 +1 -1 -2 -3

9. All in all, it is better to be humble and honest than to be important and dishonest.
   +3 +2 +1 -1 -2 -3

10. When you ask someone to do something for you, it is best to give the real reasons for wanting it rather than giving reason which carry more weight.
    +3 +2 +1 -1 -2 -3

11. Most people who get ahead in the world lead clean, moral lives.
    +3 +2 +1 -1 -2 -3

12. Anyone who completely trusts anyone else is asking for trouble.
    +3 +2 +1 -1 -2 -3

13. The biggest difference between most criminals and other people is that the criminals are stupid enough to get caught.
    +3 +2 +1 -1 -2 -3

14. Most men are brave.
    +3 +2 +1 -1 -2 -3

15. It is wise to flatter important people.
    +3 +2 +1 -1 -2 -3

16. It is possible to be good in all respects.
    +3 +2 +1 -1 -2 -3

17. Barnum was wrong when he said that there’s a sucker born every minute.
    +3 +2 +1 -1 -2 -3

18. It is hard to get ahead without cutting corners here and there.
    +3 +2 +1 -1 -2 -3

19. People suffering from incurable diseases should have the choice of being put painlessly to death.
    +3 +2 +1 -1 -2 -3

20. Most men forget more easily the death of their father than the loss of their property.
    +3 +2 +1 -1 -2 -3

21. Most students will tell the instructor when he or she had made a mistake in adding up their score, even if the instructor had given them more points than they deserved.
    +3 +2 +1 -1 -2 -3

22. If you give the average person a job to do and leave him or her to do it, the person will finish successfully.
    +3 +2 +1 -1 -2 -3

23. People usually tell the truth, even when they know they would be better off lying.
    +3 +2 +1 -1 -2 -3
24. Most students do not cheat when taking an exam.
   +3  +2  +1  -1  -2  -3

25. Most people are basically honest.
   +3  +2  +1  -1  -2  -3

26. If you act in good faith with people, almost all of them will reciprocate with fairness toward you.
   +3  +2  +1  -1  -2  -3

27. Most people lead clean, decent lives.
   +3  +2  +1  -1  -2  -3

28. People claim they have ethical standards regarding honesty and morality, but few people stick to them when the chips are down.
   +3  +2  +1  -1  -2  -3

29. If you want people to do a job right, you should explain things to them in great detail and supervise them closely.
   +3  +2  +1  -1  -2  -3

30. If most people could get into a movie without paying and be sure they were not seen, they would do it.
   +3  +2  +1  -1  -2  -3

31. Most people are not really honest for a desirable reason; they’re afraid of getting caught.
   +3  +2  +1  -1  -2  -3

32. Most people would tell a lie if they could gain by it.
   +3  +2  +1  -1  -2  -3

33. Most people would cheat on their income tax, if they had a chance.
   +3  +2  +1  -1  -2  -3

34. Nowadays people commit a lot of crimes and sins that no one else ever hears about.
   +3  +2  +1  -1  -2  -3

35. Most people try to apply the Golden rule even in today’s complex society.
   +3  +2  +1  -1  -2  -3

36. Most people do not hesitate to go out of their way to help someone in trouble.
   +3  +2  +1  -1  -2  -3

37. Most people will act a “Good Samaritans” if given the opportunity.
   +3  +2  +1  -1  -2  -3

38. “Do unto others as you would have them do unto you” is a motto most people follow.
   +3  +2  +1  -1  -2  -3

39. The typical person is sincerely concerned about the problems of others.
   +3  +2  +1  -1  -2  -3

40. Most people with a fallout shelter would let their neighbors stay in it during a nuclear attack.
   +3  +2  +1  -1  -2  -3

41. Most people would stop and help a person whose car is disabled.
   +3  +2  +1  -1  -2  -3
42. The average person is conceited.
   +3 +2 +1 -1 -2 -3

43. It’s only a rare person who would risk his own life and limb to help someone else.
   +3 +2 +1 -1 -2 -3

44. It’s pathetic to see an unselfish person in today’s world because so many people take advantage of him.
   +3 +2 +1 -1 -2 -3

45. People pretend to care more about one another than they really do.
   +3 +2 +1 -1 -2 -3

46. Most people inwardly dislike putting themselves out to help other people.
   +3 +2 +1 -1 -2 -3

47. Most people exaggerate their troubles in order to get sympathy.
   +3 +2 +1 -1 -2 -3

48. People are usually out for their own good.
   +3 +2 +1 -1 -2 -3
Public Good Instructions

SUBJECTS' INSTRUCTIONS

You are asked to participate in a study of group and individual behavior. The instructions are simple and if you follow them carefully you may earn a considerable amount of money. You are free to make as much money as you can. You will be paid in cash in private at the end of the session.

This study has been designed to maintain the anonymity of each subject's decision and each subject's cash earnings. Only the proctors running the experiment will know a subject's decisions and cash earnings. To preserve this anonymity, we ask that from this point on, there be no talking among the subjects and that all subjects take precautions to maintain the confidentiality of their materials.

Before we begin, please verify that you have the following items before you on your desk.

1 Subjects' Instructions Packet
2 Consent Form
11 Decision Sheet
1 Receipt forms

Please read and then sign and date both copies of the Consent Form. Keep one copy for yourself and return the other copy to the proctors.

THE PROBLEM

You and four other people in this room have been assigned to group ____________________.

The composition of your group will not change.

In this study there will be 11 decision periods (1 practice and 10 for which your earnings will count).

At the beginning of each decision period, you and your fellow team members will each be allocated 100 tokens. Tokens have value to you. The value of a token depends on what is done with it.

If you decide to hold your tokens, you will receive $0.01 for every token you hold.

Alternatively, you could decide to deposit your tokens into your group’s pool. Tokens deposited into the group pool have positive value to members of the group. At the end of each decision period, each token in the group pool will be sold to the proctors for $0.02 per token. The proceeds from the sale of the tokens will be shared equally by every member of the group. All members of the group will share equally in the proceeds.

In each of the 10 decision periods, you may hold none, some, or all of your tokens. You deposit all, some, or none of your tokens into the group pool. The sum of the tokens held plus the tokens deposited into the group pool must equal 100.

Tokens are not carried across decision periods. At the beginning of each decision period you will receive a new 100 tokens and your group’s pool balance will return to zero.

Example: During decision period 1, you deposited 65 tokens into the group pool and the remaining four members of your group deposited a total of 200 additional tokens. You are still holding 35 tokens. For decision period 1, your earnings are determined as follows:

  + $0.35  ($0.01 x 35 tokens still held)
$1.06 \text{ (your share of proceeds from the sale of the tokens deposited in the group pool)}
\begin{align*}
&= \frac{1}{5} \times 265 \times \$0.02 \\
&= \$1.41 \text{ Earnings from decision period 1.}
\end{align*}

Example: During decision period 1, you deposited 40 tokens into the group pool and the remaining four members of your group deposited a total of 180 additional tokens. You are still holding 60 tokens. For decision period 2, your earnings are determined as follows:
\begin{align*}
+ \$0.60 \text{ ($0.01 \times 60 \text{ tokens still held})} \\
+ \$0.88 \text{ (your share of proceeds from the sale of the tokens deposited in the group pool)} \\
&= \frac{1}{5} \times 220 \times \$0.02 \\
&= \$1.48 \text{ Earnings from decision period 2.}
\end{align*}

Your total earnings for this study will equal the sum of your earnings for each of the 10 decision periods.

**CASH PAYMENTS**

At the end of the study, please collect all of your materials and place them in your folder.

A subject will be called out into the hallway where she will receive her earnings. After confirming that the amount is correct, the subject will complete and sign her earnings receipt forms. The subject may now leave.

This procedure will be repeated for the remaining subjects.

The study is then completed.
You are asked to participate in a study of group and individual behavior. The instructions are simple and if you follow them carefully you may earn a considerable amount of money. You are free to make as much money as you can. You will be paid in cash in private at the end of the session.

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2. Consent Form
3. Decision Sheet
4. Receipt forms

Please read and then sign and date both copies of the Consent Form. Keep one copy for yourself and return the other copy to the proctors.

THE PROBLEM

You and four other people in this room have been assigned to group _______________.

The composition of your group will not change.

In this study there will be 11 decision periods (1 practice and 10 for which your earnings will count).

At the beginning of each decision period, you and your fellow team members will each be allocated 100 anti-tokens. Anti-tokens have negative value to you. At the end of each decision period, your $10 earnings from Part 1 of the study will be reduced by $0.01 for every anti-token you still hold.

At the beginning of each decision period, each group will be allocated a group pool containing 500 tokens. Tokens have positive value to members of the group. At the end of each decision period, each token remaining in the group pool will be sold to the proctors for $0.02 per token. The proceeds from the sale of the tokens will be shared equally by every member of the group. All members of the group will share equally in the proceeds. Your share of these earnings will be added to your earnings from Part 1 of the study.

In each of the 10 decision periods, you may dispose of none, some, or all of your anti-tokens. You dispose of an anti-token by depositing it in the group pool. Every anti-token deposited in the group pool will eliminate one token in the group pool.

You may deposit all, some, or none of the 100 anti-tokens each period. You may not deposit more than 100 anti-tokens in the group pool during any one decision period.

Anti-tokens and tokens are not carried across decision periods. At the beginning of each decision period you will receive a new 100 anti-tokens and your group’s pool will receive a new 500 tokens.
Example: During decision period 1, you deposited 65 anti-tokens into the group pool and the remaining four members of your group deposited a total of 200 additional ant-tokens. You are still holding 35 anti-tokens, and the tokens in the group pool have been decreased by 265 to 135 tokens. For decision period 1, your earnings are determined as follows:

- $0.35  ($0.01 x 35 anti-tokens still held)
+ $0.54  (your share of proceeds from the sale of the tokens remaining in the group pool
  = 1/5*135*$0.02).
+ $0.19  Net earnings from decision period 1.

Example: During decision period 1, you deposited 40 anti-tokens into the group pool and the remaining four members of your group deposited a total of 180 additional ant-tokens. You are still holding 60 anti-tokens, and the tokens in the group pool have been decreased by 220 to 280 tokens. For decision period 2, your earnings are determined as follows:

- $0.60  ($0.01 x 60 anti-tokens still held)
+ $1.12  (your share of proceeds from the sale of the tokens remaining in the group pool
  = 1/5*280*$0.02).
+ $0.52  Net earnings from decision period 2.

Your total earnings for this study will equal:

$10 (Earnings from Part 1)

+/-  the sum of your net earnings for each of the 10 decision periods

---

**Total Earning**

---

**CASH PAYMENTS**

At the end of the study, please collect all of your materials and place them in your folder.

A subject will be called out into the hallway where she will receive her earnings. After confirming that the amount is correct, the subject will complete and sign her earnings receipt forms. The subject may now leave.

This procedure will be repeated for the remaining subjects.

The study is then completed.