

When are Women More Generous than Men?*

James C. Cox
Department of Economics
University of Arizona

Cary A. Deck
Department of Economics
University of Arkansas

September 2002

Previous research on gender differences in behavior has led to seemingly contradictory findings. While some authors report that women are more generous than men, others report the opposite relative patterns of behavior. From data generated by 202 subject pairs, we find that women are more sensitive than men to the costs of generous actions when deciding whether or not to be generous. The factors that affect the level of generosity observed in our experiments are reciprocal motivation, the level of money payoffs, and the level of social distance in the experimental protocol. The relatively greater sensitivity of women to the costs of generous behavior can explain some of the apparent inconsistencies of previously-reported findings.

JEL Classifications: C7, C91, J16

Key Words: Experiments, Gender, Generosity, Motives

* We are grateful for research support from the Decision Risk and Management Science Program of the National Science Foundation (grant number SES9818561) and from the Walton College of Business. Helpful comments and suggestions were provided by William Nelson.

When are Women More Generous than Men?

1. Introduction

Several studies have found the not too surprising result that men and women behave differently; however, contradictory evidence exists as to the magnitude and direction of these gender differences. For example, in an experiment on voluntary contributions to a public good, Brown-Kruse and Hummels (1993) find that men are more generous while Nowell and Tinker (1994) conclude the opposite. Cadsby and Maynes (1998) draw the third conclusion from a series of public good experiments: men and women are equally generous.

This paper compares behavior across genders in a basic economic choice, an allocation decision. In some cases the allocation decision stands alone, as in a dictator game, but in others the final allocation decision is preceded by another person's earlier action, as in ultimatum or trust games. As the literature on reciprocity demonstrates, the differences between these two contexts can greatly alter behavior (Cox 2002b and Cox and Deck 2002). Additionally, varying the social distance involved in the experimental protocol can cause economic agents to choose differently from the same set of monetary outcomes (Hoffman, McCabe, Shachat, and Smith, 1994; Cox and Deck, 2002). Such behavioral effects are consistent with an economic model that views decisions as not being based solely on monetary outcomes. Specifically, the opportunity to act reciprocally may increase the subjective payoff of a jointly beneficial outcome. Similarly, a low social distance can increase the cost of selfish behavior. The cost of generous behavior is also a function of the explicit monetary stakes involved in the allocation decision. Therefore, allocation decisions provide a simple yet rich

environment in which to examine behavioral differences in generosity between males and females.

Some researchers have examined the effects of gender in allocation games. In ultimatum games, Eckel and Grossman (2001) and Solnick (2001) find that males and females make identical offers but Eckel and Grossman find that women are more willing to accept unfair offers while Solnick finds no second mover gender difference. In dictator games Bolton and Katoc (1995) find no gender differences while Eckel and Grossman (1998) report that women are more generous than men in a high social distance environment. Also, under a high social distance protocol, Cox (2002a) reports that men act reciprocally while women do not in the investment game. However, Croson and Buchan (1999) and Chaudhuri and Gangadharan (2002) find that women are more likely to behave generously in an investment game. In another study, Andreoni and Vesterlund (2001) demonstrate that the relative price of generosity interacts with gender. In their study of dictator games, male proposers are more sensitive to the price of allocating money to their counterparts than women are.

This study seeks to reconcile these previously reported disparate findings by systematically comparing actions taken in an allocation decision across several contexts with varied costs of generosity. The next section describes the experiments used to compare the behavior of men and women. The results of the experiments are then presented and a separate section contains a discussion of the implications of the findings.

2. Experimental Design

Groups of between 12 and 20 subjects were recruited for a one hour experiment. Once all the subjects were signed-in, each subject was paid a \$5 show-up fee and then

allowed to enter the laboratory and sit at any computer with the experiment's program running. There were inactive terminals between subjects and each terminal had privacy dividers on three sides. The subjects read computerized directions describing how decisions would be made in the extensive form game and how the dollar payoffs would be determined.¹ After completing the directions, the subjects answered a quiz that was checked by an experimenter.² A subject was randomly assigned one role and played one game, one time.

To identify an action as being generous, we first provide a definition. Throughout this paper, "generosity" or "generous behavior" refers to not following one's material self-interest and, instead, selecting an action that results in a lower monetary payoff for oneself and an increased monetary payoff for someone else. Hence, in the context of dictator games the generous action is allocating more than the minimum amount to the other person. In voluntary contributions mechanism experiments, generosity is contributing towards the public good. In many experiments involving generosity there are various types of costs of generous or ungenerous behavior.

2.1 Economic and Social Costs of Generous Behavior

Generous behavior in many contexts has an economic cost. For example in a dictator game, the amount of money that the dictator allocates to the paired subject is the economic cost of generosity. In our *binary* dictator games the economic cost of the generous action, giving the other subject 37.5% of the total payoff, is varied by changing

¹ Potentially charged terms such as game, play, and generosity were not used with the subjects. For example, the game was referred to as a decision tree and players were referred to as decision makers. Also, decisions were made by mouse clicks on unnamed branches.

² The directions and the quiz are contained in the appendix.

the dollar amount of the total payoff. A similar economic cost treatment is also introduced in the “reciprocity game,” a truncated form of the investment game.

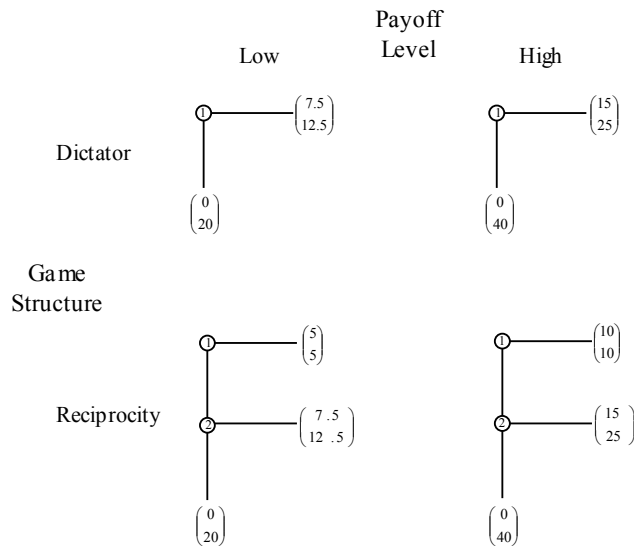
Economic costs are not the only costs that can be involved in deciding whether or not to act generously. Generous behavior can involve social benefits and ungenerous behavior can involve social costs, even in one shot games. For example, a person reacting to the kind action of another person may incur a social cost for acting ungenerously when he or she had the opportunity to repay the kind action. We vary the social cost of the ungenerous action by including or excluding the possibility that the decision-maker is responding to a kind action by another person, that is we vary the game structure. Another potential social cost pertains to external parties. Specifically, an individual may be concerned about how he or she is perceived by others who witness the decision. If this is true, then ungenerous behavior is more costly if it is observable. To vary this social cost we employ payoff procedures with differing levels of social distance.

2.2 Game Structure: Dictator vs Reciprocity

In some settings a person may wish to be generous because of reciprocal motives. Specifically, a previous action by another party that is kind or helpful may trigger a social norm making the decision-maker feel obligated to respond in a generous manner. If such a norm is activated in the experimental environment, then ungenerous behavior becomes more costly and hence should be observed less frequently. Generous behavior could still be observed in the absence of such reciprocal motivations if the decision-maker has altruistic other-regarding preferences. To explore the increased level of generosity from reciprocity, two different extensive form games are included in this study. The games are shown in Figure 1. The number at a node indicates which player makes a decision at that

point in the game. The top number at an outcome is player 1's dollar payoff and the second number is player 2's dollar payoff. In the dictator games, shown in the top part of Figure 1, the decision-maker chooses between keeping all the money and keeping only 62.5% of the money while allocating the remaining 37.5% to the other player. In the dictator game, generous behavior cannot be attributed to reciprocal motives because the other player has not taken (and cannot take) an action that benefits the decision-maker. In the reciprocity game, shown in the bottom part of Figure 1, a decision-maker at node ② faces the same allocation decisions as in the dictator game at node ① if and only if the other player has *not* previously opted for an equal split of a smaller pie. This second game, where reciprocity could motivate behavior, has been studied by McCabe and Smith, (2000) and Cox and Deck (2002). Because the only difference between the

Figure 1: Extensive Form Games Involving Cooperation



① denotes the first mover's decision node and
 ② denotes the second mover's decision node.

reciprocity and dictator games for subjects choosing between the generous action ((7.5, 12.5) or (15, 25)) and the ungenerous action ((0, 20) or (0, 40)) is the presence or absence of the prior, trusting move by the paired subject, the difference between response rates in the two games provides a test for the significance of positive reciprocity as a motive for behavior in the reciprocity game (Cox and Deck, 2002).

2.3 Payoff Level: Low vs High

The explicit component of the cost of generosity is the amount of money that an agent has to forego by choosing a generous action. As shown in Figure 1, the high payoff level has a direct cost of \$15.00 for generosity while the cost in the low payoff level is \$7.50. Because a higher payoff level generates a greater cost, one should expect (weakly) less generous behavior in such an environment.

2.4 Social Distance: Low vs High

In our terminology, social distance refers to the degree of social separation between the decision-maker and other parties including the other player, the other subjects in the experiment, and the experimenters. Potential costs of not being generous include the decision-maker's belief about the perception that others have of him or her, how the decision-maker's interactions with people who have observed the decision are affected, and any emotional response such as shame or embarrassment felt by the decision-maker. The less social distance between the decision-maker and others, the greater the possible cost associated with non-generosity.

In all of our laboratory sessions subjects were anonymously matched and never learned the identity of their counterparts. However, in the low social distance environment, subjects were called by name and handed their earnings by the

experimenter. Also, subjects in treatments with low social distance entered their names in their computers prior to making decisions. In contrast, all personal identification of the decision-makers was eliminated in the high social distance treatments. Under the high social distance protocol, subjects drew sealed envelopes containing keys labeled with an alphanumeric code. Instead of entering their names in the computer, subjects entered this private identification code. At the conclusion of a high social distance session, subjects were escorted to a separate room where they could use their keys to open locked mailboxes that contained sealed envelopes with their earnings. The experimenters were not present when the subjects opened their key envelopes, entered their names, or retrieved their payoffs. This process was explained to the subjects via a handout that was read aloud to assure all subjects that no one would ever know the personal decision of any subject. The social distance was also increased by always having more than twelve subjects participate in each high social distance session, thus making it a less than 10% chance that any two subjects would be anonymously paired. The low social distance sessions always involved exactly twelve subjects.

2.5 Experimental Treatments

The experimental design includes five treatments that vary the economic and social costs of generosity. To identify a treatment we use R or D, the first letter from the name of the reciprocity or dictator game, a \$ superscript for high stakes payoffs or a \$ subscript for low stakes payoffs, and an S superscript for high social distance procedures or an S subscript for low social distance procedures. Table 1 lists all the treatments and the numbers of subject pairs that participated in each treatment.

Table 1: Experimental Treatments

| Treatment | Game Structure | Monetary Payoff | Social Distance | Number of Subject Pairs |
|-----------|----------------|-----------------|-----------------|-------------------------|
| R_S^D | Reciprocity | Low | High | 51 |
| D_S^D | Dictator | Low | High | 37 |
| R_D^S | Reciprocity | High | Low | 42 |
| D_D^S | Dictator | High | Low | 24 |
| R^{SD} | Reciprocity | High | High | 48 |

2.6 Collecting Gender Data

In order to determine if gender influences the decision to be generous, one must be able to identify the sex of the decision-maker. In the low social distance protocol, gender data collection is trivial because payoffs are made face to face. However, under the high social distance protocol the experimenter only knows the alphanumeric code associated with a decision. Collection of gender data in this environment required supplementary procedures. After collecting their payoffs subjects deposited their keys into one of two appropriately labeled milk jugs positioned on opposite sides of the hallway. One milk jug was labeled “Men’s Keys” and the other was labeled “Women’s Keys.” The experimenters watched from a distance to ensure that subjects dropped their coded keys in the appropriate containers. This viewing distance was sufficiently great so that the experimenters could not observe the key codes but could make sure the subjects approached the right containers. Subjects in both social distance environments were *not* informed prior to making their decisions that gender data would be recorded.

3. Experimental Results

The data on generosity consist of 128 choices between keeping all the money and allocating 37.5% of it to the other player.³ The raw data are presented in Table 2, which also reports significance tests for equality of generous responses across genders at the various economic and social cost levels.

Table 2: Across - Gender Comparisons of Generous Behavior

| Treatment | Females | Males | p-value | |
|--|---------|-------|-----------------------------|-------------------------------|
| | | | Ha: Males are More Generous | Ha: Females are More Generous |
| R_s^s | 5/10 | 4/16 | 0.934 | 0.096* |
| D_s^s | 7/15 | 8/22 | 0.735 | 0.265 |
| R_s^s | 6/9 | 6/12 | 0.778 | 0.222 |
| D_s^s | 3/14 | 5/10 | 0.071* | 0.929 |
| R^{ss} | 1/7 | 5/12 | 0.081* | 0.919 |
| p-values are reported for a test of equal proportions against a one sided alternative hypothesis. * indicates significance at the 10% level. | | | | |

Table 2 reports hypothesis tests against both one sided alternatives to demonstrate how different conclusions could be drawn depending on what comparison one makes. Results in Cox (2002a) and Brown-Kruse and Hummels (1993) suggest that the appropriate alternative hypothesis is that men are more generous than women. We find support for this hypothesis in two of our treatments, D_s^s and R^{ss} . However, the work of Nowell and Tinker (1994), Eckel and Grossman (1998), Croson and Buchan (1999), and Chaudhuri and Gagadharan (2002) suggest the one sided alternative should run in the

³ Some of these data, aggregated across gender, were previously reported in Cox and Deck (2002). A total of 74 first movers in reciprocity games chose an equal split of a smaller amount of money rather than trusting the other player to act generously. These data are not included in the present paper.

other direction. Our data support the hypothesis that women are more generous than men in the R_s^S treatment

To explore this complex and seemingly contradictory pattern of relative generosity by men and women, our analysis turns to the impact of varying the cost of generosity. Table 3 reports the results of within-gender pair-wise tests of the null hypothesis that varying the cost of generosity has no impact upon behavior versus the two-sided alternative that the costs do affect behavior.

Table 3. Within Gender Treatment Effects

| Males Females | R_s^S | D_s^S | R_s^S | D_s^S | R^{SS} |
|------------------|---------|---------|---------|---------|----------|
| R_s^S | - | 0.457 | 0.172 | 0.192 | 0.350 |
| D_s^S | 0.870 | - | 0.440 | 0.467 | 0.761 |
| R_s^S | 0.462 | 0.341 | - | 0.999 | 0.682 |
| D_s^S | 0.143 | 0.153 | 0.030** | - | 0.696 |
| R^{SS} | 0.094* | 0.101 | 0.024** | 0.601 | - |

The table entries are p-values associated with testing the null hypothesis that the proportion of subjects acting generously is identical in the two treatments being compared versus the two-sided alternative. Data above the main diagonal are from male subjects while data from female subjects are presented below the diagonal. The two treatments being compared are given by the row and column entries. * indicates significance at the 10% level and ** indicates significance at the 5% level.

The first striking feature in Table 3 is that for men the decision about whether to be generous does not depend on reciprocal considerations, the level of payoffs, or the social distance. As formalized in Cox and Deck (2002), if the desire to reciprocate influences behavior then there should be a significant difference between R_s^S and D_s^S and/or between R_s^S and D_s^S . For men, this is clearly not the case as the p-values are 0.457 and 0.999, respectively. Similarly, based on the comparison of R^{SS} and R_s^S , changes in the level of monetary payoff do not significantly change the behavior of men

(p-value = 0.35). Based on a comparison of R^{SS} and R_S^S , the level of social distance is also found not to influence the behavior of men (p-value = 0.682). In fact no combination of these factors strongly influences male behavior, as evidenced by the absence of significant p-values above the diagonal in Table 3.

Unlike men, women do base the decision of whether or not to be generous on the costs associated with the decision. Women are more likely to be generous when the stakes are lower, as evidenced in Table 3 by a p-value of 0.094 from a comparison of R^{SS} and R_S^S . Also, the frequency with which women are generous is inversely related to the social distance. This conclusion is supported by a p-value of 0.024 from a comparison of R_S^S and R^{SS} . With respect to reciprocity, the evidence is mixed. In an environment with low social distance and relatively high stakes, women do reciprocate (p-value = 0.03). However, when the level of social distance and the level of payoffs are reversed, women no longer reciprocate (p-value = 0.87).

Additional econometric analysis also supports the conclusion that women are more elastic with respect to the relative costs of generosity, while the behavior of men can be described as inelastic. A probit model, given by equation (1), is estimated treating the choice between generous and selfish options as a function of the level of the monetary payoffs, the opportunity to reciprocate, and the social distance in the experimental protocol.

(1) Probability of Generous Behavior =

$$\Phi(\alpha + \beta_1HP + \beta_2NR + \beta_3HSD + \beta_4F + \beta_5HPF + \beta_6NRF + \beta_7HSDF)$$

where Φ denotes the cumulative density for the standard normal distribution.

In this specification HP and HSD are dummy variables that take on the value 1 for High Payoff and High Social Distance treatments, respectively, and 0 otherwise. NR is a dummy variable equal to one for the non-reciprocal environment of the dictator game. F is a dummy variable for gender that equals 1 for a female decision-maker and 0 for a male decision-maker. The terms HPF, NRF, and HSDF are interaction dummies that are the product of F and HP, NR, and HSD respectively. Table 4 reports the results of estimating equation (1) with the available data.

Table 4: Probit Estimation

| Parameter | Equation (1) | | | Equation (2) | | |
|-----------|--------------|----------------|---------|--------------|----------------|---------|
| | Estimate | Standard Error | p-value | Estimate | Standard Error | p-value |
| α | -0.4752 | 0.6136 | 0.4387 | -0.2822* | 0.1499 | 0.0597 |
| β_1 | 0.3856 | 0.4683 | 0.2049 | - | - | - |
| β_2 | 0.1965 | 0.3376 | 0.2803 | - | - | - |
| β_3 | -0.1211 | 0.4775 | 0.3999 | - | - | - |
| β_4 | 1.9274* | 1.0267 | 0.0605 | 1.7344** | 0.8367 | 0.0382 |
| β_5 | -1.0210 | 0.8326 | 0.1101 | -1.3776** | 0.6767 | 0.0209 |
| β_6 | -0.7979* | 0.5056 | 0.0573 | -0.6014* | 0.3763 | 0.0550 |
| β_7 | -1.7635** | 0.8230 | 0.0161 | -1.1422** | 0.6821 | 0.0470 |

The p-values reported for α and β_4 are for a null hypothesis that the coefficient is equal to zero versus the two sided alternative. For the remaining parameters the alternative hypothesis is that the value of the parameter is less than zero as the dummy has a value of one when the economic or social costs of ungenerous behavior are lower. * indicates significance at the 10% level and ** indicates significance at the 5% level.

Results from the probit estimation of equation (1) are reported in Table 4. The test results imply that men do not alter their behavior in response to any of the experimental treatments while women clearly do. Formally, the hypothesis that $\beta_1 = \beta_2 = \beta_3 = 0$ is not rejected at the 95% confidence level based on a likelihood ratio test. Taking this finding into account, equation (2) is estimated.

$$(2) \quad \text{Probability of Generous Behavior} = \Phi(\alpha + \beta_4 F + \beta_5 \text{HPF} + \beta_6 \text{NRF} + \beta_7 \text{HSDF})$$

The results of this estimation, also reported in Table 4, indicate that the behavior of female subjects conforms to the predictions of an economic model where the cost of generosity influences behavior. As the monetary cost associated with generosity increases, women are less generous: $\beta_5 < 0$. As the social cost of not reciprocating a kind action is eliminated, the rate of generous responses is reduced: $\beta_6 < 0$. As the level of social distance in the protocol is increased, the social cost of not being generous decreases and generous responses are observed less frequently: $\beta_7 < 0$.

As male subjects do not react to the cost of generosity, their behavior is more consistent with a model of behavior based solely on money payoffs, while women do tend to incorporate the cost of generosity into their decisions. Based upon these findings, it is not appropriate to talk about which gender is more generous without also specifying the cost of generosity. Hence, the positive and significant value of β_4 should not be interpreted as indicating that women are generally more generous than men. In contexts where generosity is relatively costly men appear to be more generous while in low cost contexts women appear to be more generous. These different reaction functions can be characterized as gender-specific elasticities of generosity. The value of β_4 should be interpreted as stating that when generosity is less costly ($HP=NR=HSD=0$) women tend to choose the generous response more frequently.

4. Discussion

This study finds that women are more responsive to the economic and social costs of generous behavior. This finding explicates how diametrically opposed conclusions about male and female generosity can be drawn from a set of data that is internally consistent. Similar conclusions about the greater responsiveness of women to the

decision context have been drawn by Cadsby and Maynes (1998) in the context of public goods games and Eckel and Grossman (1996) in the context of punishment games. However, Andreoni and Vesterlund (2001) found that men are more sensitive to the price of altruism when attention is restricted to a high social distance protocol where reciprocal motives are absent.

At first, the results of Andreoni and Vesterlund (2001) appear at odds with our findings but upon closer inspection these findings are actually consistent. In that study, subjects allocated tokens between themselves and a counterpart. The exchange rate at which the tokens could be redeemed for cash was role specific. By varying these exchange rates and the number of tokens, Andreoni and Vesterlund observed decisions across eight distinct budget constraints. Budget #5 corresponds to the standard dictator game of dividing \$10 and for this game they find no gender difference. This treatment is similar to our D_5^S treatment where we also found no significant gender difference. Their budget #4 corresponds to a standard dictator game involving less money, \$6. With this parameterization they report that women are more generous than men, as would be predicted by our results since the payoff level is decreased while holding the social distance and the (absence of) reciprocal motivation constant.

The observed greater responsiveness by women to various economic considerations could explain why previous studies have drawn different conclusions about whether men or women are more generous. For example, if the subset of data reported in this study in which low social distance and high payoff levels is considered, women would be found to reciprocate while men would be found not to reciprocate. If, instead, attention were restricted to the subset of data drawn from the low payoff and high

social distance environment, then neither sex would be found to reciprocate. To ascertain if this finding does reconcile the seemingly incompatible conclusions in previous studies, we examine the relationship between the experimental designs and results of those studies most similar to our own.

The dictator games of Bolton and Katoc (1995) involved \$10 and employed single blind payoff procedures. Hence, using our labeling of treatments, their design would be considered D_{SS} . While we do not address this treatment directly, we would expect to see a higher rate of female generosity relative to either our $D_S^{\$}$ or our D_S^S treatments. Given our results, it would *not* be surprising to observe the absence of a gender effect in D_{SS} , which is what they reported. Chaudhuri and Gangadharan (2002) studied the investment game using low stakes and a single blind payoff procedure, an R_{SS} treatment. Based on our results, each of these factors should increase the relative generosity of female subjects. Given that we found women to be more generous than men in the $R_S^{\$}$ treatment, our results can explain their finding that women were more generous than men.

While our results can explain some of the variation in previously reported results, our findings appear to be at odds with the quite similar study of Cox (2002a). In the investment game experiments reported in that study, the first mover decided how much of his or her \$10 endowment to pass to the second mover, who was also endowed with \$10. Any amount sent by the first mover was tripled and then the second mover had an opportunity to return any portion of this tripled amount. The dictator experiments in that study had second movers making the same allocation decisions without the preceding decision of the first mover. Therefore reciprocity could be measured by differences in

behavior between the two games, just as in our study. Our reciprocity game is a simplification of the investment game where mover one can send all or nothing and mover two can respond with only one of two predetermined allocations. While the general results of Cox (2002a) indicate that men reciprocate and women do not in a high social distance environment, this may not be the appropriate comparison to make with our reciprocity and dictator games. Instead, one could compare behavior in our games with behavior in Cox (2002a) for subjects who were allowed to allocate a total amount of \$40, as in our R^{SS} treatment.

If one restricts analysis to the subset of data in Cox (2002a) to decisions where retaining \$40 and leaving the other person with \$0 was feasible then a pattern of behavior similar to our results emerges.⁴ Based on this subset of data from that study, a Wilcoxon rank test rejects the hypotheses that either gender reciprocates at the 5% significance level. We also find that neither gender reciprocated in a high social distance context. To compare our reciprocity game to the investment game one must first map the denser action space of the investment game into the binary choice of the reciprocity game. If we define a mapping $f: X \rightarrow Y$ where $X = \{\$0, \$1, \dots, \$40\}$ and $Y = \{\$0, \$15\}$ are the set of feasible amounts a player can allocate to the other player, then for any mapping

f such that $f(a) = \begin{cases} \$0 & \text{if } a < b \\ \$15 & \text{else} \end{cases} \quad \forall b \in [\$1, \$2, \dots, \$14]$ there is no difference between

behavior in the investment game and the reciprocity game for either gender at the 95% confidence level. In other words, if one assumes that people who kept \$40 in the investment game would choose to keep \$40 in the reciprocity game, and that people who

⁴ These results are based on a relatively small sample size as only 13 observations in each of the games in Cox (2002a) involved decisions where keeping \$40 was feasible.

returned at least \$15 in the investment game would be generous in the reciprocity game, then the two data sets are statistically indistinguishable.

Our results are at odds with Eckel and Grossman (1998), who find that women are more generous using a D_{ξ}^S protocol while our study revealed no gender difference in that treatment. Also, we cannot explain why Croson and Buchan (1999) find that women are more generous in an investment game that can be described as fitting into our R^{SS} treatment. However, the use of a dense message space in these studies may explain this apparent inconsistency, as it does the inconsistency between the complete data set from Cox (2002a) and the data reported herein.

For experiments involving other types of decisions, such as public goods contributions, the results need not show the same absolute or relative levels of generosity by gender. However, one would expect the same pattern of comparative statics across treatments within a gender. While few gender studies have examined social distance, payoff levels, or reciprocity, there is at least one that did. Brown-Kruse and Hummels (1993) compare contributions to a public good across two levels of social distance. In one treatment, the groups are anonymously matched (corresponding to our low social distance treatment) while in a second treatment social distance is decreased as the group members interact prior to the decision task. This interaction is a deliberate attempt by the researchers to form a community relation among the decision-makers. In the first period, male behavior did not vary across treatments but females were more generous in the lower social distance community treatment, which is consistent with our findings.⁵

⁵ Subjects in Brown-Kruse and Hummels (1993) were in same sex groups and the decision task was repeated over several rounds. The first period of their experiment is the most comparable context to our one shot games.

Conclusion

This study reports the results of a series of experiments designed to determine when women are more generous than men. The results indicate that women tend to be more generous than men when 1) the social distance is low, 2) the monetary cost of generosity is low, and/or 3) there is an absence of reciprocal motivation. Furthermore, the findings indicate that women are more sensitive to the economic costs of generosity. Thus, depending on the decision context, women may appear to be more or less generous than men because men are relatively less responsive to changes in the economic and social costs of generous behavior. This finding also helps to explain why previous studies have drawn seemingly contradictory conclusions.

References

- Andreoni, J. and L. Vesterlund, 2001. Which is the Fair Sex? Gender Differences in Altruism. *Quarterly Journal of Economics* 116, 293-312.
- Bolton, G. and E. Katoc, 1995. An Experimental Test for Gender Differences in Beneficent Behavior. *Economics Letters* 48, 287-92.
- Brown-Kruse, J. and D. Hummels, 1993. Gender Effects in Laboratory Public Goods Contribution: Do Individuals Put Their Money Where Their Mouth Is? *Journal of Economic Behavior and Organization* 22, 255-67.
- Cadsby, C. and E. Maynes. 1998. Gender and Free Riding in a Threshold Public Goods Game: Experimental Evidence. *Journal of Economic Behavior and Organization* 34, 603-20.
- Chaudhuri A. and L. Gagadharan. 2002. Gender Differences in Trust and Reciprocity. Working Paper, Wellesley College.
- Cox, J. 2002a. Trust, Reciprocity, and Other-Regarding Preferences: Groups vs. Individuals and Males vs. Females, In: Rami Zwick and Amnon Rapoport (Eds.), *Advances in Experimental Business Research*. Kluwer Academic Publishers Boston, MA.
- Cox, J. 2002b. How to Identify Trust and Reciprocity. Working Paper, University of Arizona.
- Cox, J. and C. Deck. 2002. On the Nature of Reciprocal Motives. Working Paper, University of Arkansas.

- Croson, R. and N. Buchan, 1999. Gender and Culture: International Experimental Evidence from Trust Games. *American Economic Review* 89, 386-91.
- Eckel, C. and P. Grossman. 1996. The Relative Price of Fairness: Gender Differences in a Punishment Game. *Journal of Economic Behavior and Organization* 30, 143-58.
- Eckel, C. and P. Grossman, 2001. Chivalry and Solidarity in Ultimatum Games. *Economic Inquiry* 39, 171-88.
- Eckel, C. and P. Grossman. 1998. Are Women Less Selfish than Men? Evidence from Dictator Experiments. *Economic Journal* 108, 726-35.
- Hoffman, E., K. McCabe, K. Shachat, and V. Smith. 1994. Preferences, Property Rights and Anonymity in Bargaining Games. *Games and Economic Behavior* 1, 346-80.
- McCabe, K. and V. Smith. 2000. A Comparison of Naïve and Sophisticated Subject Behavior with Game Theoretic Predictions. *Proceedings of the National Academy of Sciences* 97, 3777-81.
- Nowell, C. and S. Tinker. 1994. The Influence of Gender on the Provision of a Public Good. *Journal of Economic Behavior and Organization* 25, 25-36.
- Solnick, S., 2001. Gender Differences in the Ultimatum Game. *Economic Inquiry* 39, 189-200.

Appendix

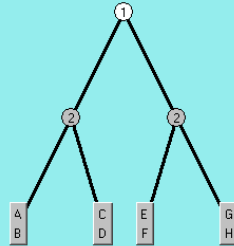
Subject Directions

Directions

Directions

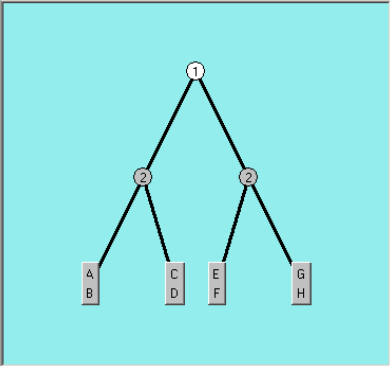
You are going to participate in an experiment like the one pictured to your right. The decision tree pictured now is similar to, but not the same as the experiment in which you will participate. In the experiment you will have to make decisions that will have a direct impact on your payoff. The way this experiment is conducted is very simple. You will be given a decision-maker number once the experiment has begun. Suppose you are decision-maker 1. You would receive a message that says "You are decision-maker 1." At certain nodes owned by you, you will have to make a decision as to which path you wish to take at that node. More instructions are coming on how to tell who owns a node and what choices you have from which to make your decision. Based on your decisions and your counterparts' decisions, one of the "ends" of the tree will be reached. These ends are the U.S. \$ payoffs that each decision-maker including yourself will receive. The top number is the U.S. \$ payoff for decision-maker 1, the bottom number is the U.S. \$ payoff for decision-maker 2. The letters in the tree pictured now are for illustration, in the real experiment the letters will be replaced with U.S. \$ amounts. Click on "Next" to continue.

Next



Directions

As you can see a new button, "Back", has appeared on your screen. At any time you can go back through the directions and review pages that you have already seen by clicking on this button. Once you have finished all the directions and decide to begin the experiment, you will not be able to come back to the directions. In the tree pictured to your right you see three circles where the "branches" of the tree meet. These circles are the nodes of the decision tree. Notice that the white circle has the number 1 in it. This indicates that decision-maker 1 owns this node, or in other words decision-maker 1 will choose what path will be chosen at that point in the tree. The two grey nodes are owned by decision-maker 2. Note that the colors are only used to point out particular nodes. It is the number that identifies the owner. Click on "Next" to continue.

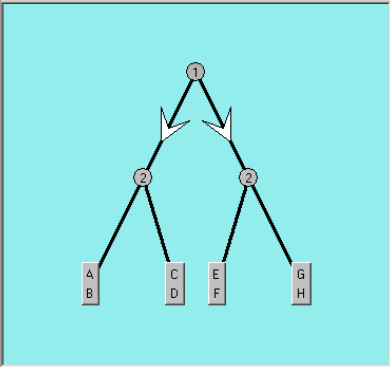


Back

Next

Directions

Now that decision-maker 1 knows that she has to make a decision, what are her choices? The arrows on the two different branches tell decision-maker 1 that she has these two possible choices. It is important to remember that just as you will not know with whom you are participating, so will other decision-makers not know your identity. Other decision makers and the experimenters will know that someone made the decisions you decide to make. But no one will ever be able to link your name or other identifying information to your decision. Click on "Next" to continue.

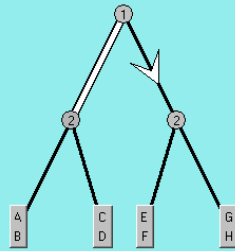


Back

Next

Directions

Again assume you are decision-maker 1. Go ahead and make a choice at your node by clicking your mouse on one of the arrows. Click on "Next" to continue.

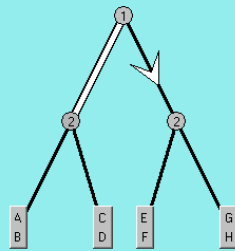


Back

Next

Directions

Notice how the branch you clicked changed appearance. This indicates to you what the computer has registered as your decision. Notice that the other branch still has an arrow on it. Try clicking the branch with an arrow on it. Once you click on the branch the appearance changes. Now that branch is your current selection and your previous selection has an arrow on it. As you can see you have not committed yourself to a decision yet. Click on "Next" to continue.

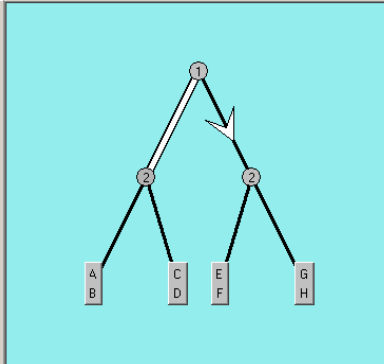


Back

Next

Directions

Now click on the "Send" button. Notice that the appearance of the selected branch remains unchanged, but the arrow is gone from the non-selected branch. Try clicking on the non-selected branch. You can't switch your decision anymore. Once you have clicked "Send" you are committed to that choice and you cannot change it. Click on "Next" to continue.

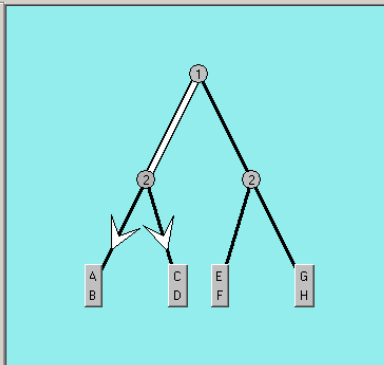


Send

Back Next

Directions

Now suppose that you are decision-maker 2. Your nodes are the two that have a "2" in the circle. One of your nodes has its choices indicated by arrows. The highlighted branch leading to this node indicates what decision maker 1 selected. Go ahead and make your decision. Remember that you can change your mind since you have not clicked the "Send" button. Once you have made your decision click on the "Send" button.

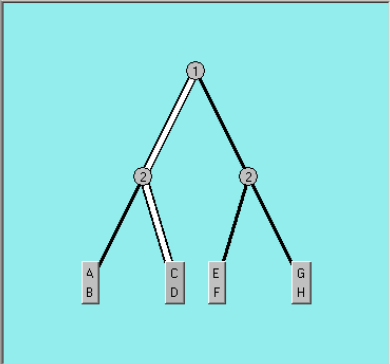


Send

Back

Directions

Now that an end of the tree has been reached we can determine the U.S. \$ payoffs for each decision-maker. The U.S. \$ payoffs are determined by starting at the first node in the tree and then following the path selected at each node that you come to in this manner. Once you reach the end of the path you can determine the U.S. \$ payoffs. You will be given a message like the one below this tree that tells you what the actual U.S. \$ payoffs are for each decision-maker. Click on "Next" to continue.



Decision maker 1's payoff is \$C and decision maker 2's payoff is \$D.

Back

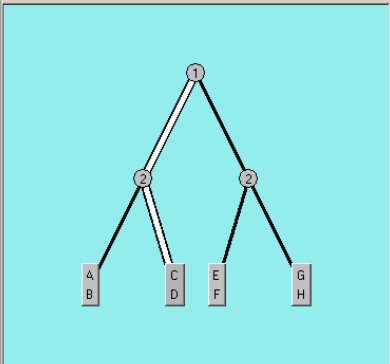
Next

Directions

Let's review the main points of the instructions.

- 1) You will be given a decision-maker number and will "own" every decision that has your decision-maker number in the circle.
- 2) When you can make a choice as indicated by arrows you need to click on the branch that you wish to choose.
- 3) Once you are sure of your decision you must hit the "Send" button. You cannot change your mind after you click on "Send".
- 4) The U.S. \$ payoffs for each decision-maker are given at the ends of the tree. Decision-maker 1's U.S. \$ payoff is the top number, decision-maker 2's U.S. \$ payoff is the bottom number.

If you wish to review the instructions please click on the "Back" button. If you understand the instructions and are ready to begin the experiment click on the "Start" button.

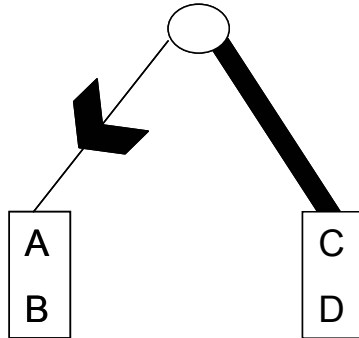


Decision maker 1's payoff is \$C and decision maker 2's payoff is \$D.

Back

Start

Comprehension Handout



If you press Send when the decision tree looks like the figure above

what is decision maker 1's payoff? _____

what is decision maker 2's payoff? _____

ADDITIONAL INSTRUCTIONS

Complete Privacy

This experiment is structured so that no one, including the experimenters and the other subjects will ever know the personal decision of anyone in the experiment. This is accomplished by a procedure in which you collect your money payoff, contained in a sealed envelope, from a coded mailbox that only you have the key for. Your privacy is guaranteed because neither your name nor your student ID number will be entered in your computer. The only identifying information that you will enter in your computer will be an identification code known only to you. The code is on your mailbox key that is in the sealed envelope that you received. You will be able to collect your money payoffs with privacy by using the key, which opens a mailbox. The key and mailbox will be labeled with the same identification code. But you will be the only person who knows your personal identification code. Please open your envelope and enter the identification code on the key **IN YOUR COMPUTER** as your subject code.