Cultural values and behavior in dictator, ultimatum, trust games: an experimental study

Sun-Ki Chai[a], Dolgorsuren Dorj[b], Katerina Sherstyuk[c*]

[a]Department of Sociology, University of Hawaii at Manoa, 2424 Maile Way, Honolulu, HI 96822. Phone: (808) 956-7234, Fax: (808) 956-3707, Email: sunki@hawaii.edu

[b]Department of Economics, University of Hawaii at Manoa, 2424 Maile Way, Honolulu, HI 96822. Phone: (808) 956-8496, Fax: (808) 956-4347, Email: dolgorsu@hawaii.edu

[c]Corresponding author. Department of Economics, University of Hawaii at Manoa, 2424 Maile Way, Honolulu, HI 96822. Phone: (808) 956-7851, Fax: (808) 956-4347, Email: katyas@hawaii.edu

Abstract

We explain laboratory behavior in the dictator, ultimatum and trust games based on two cultural dimensions adopted from social and cultural anthropology: grid and group, which translate into reciprocity and altruism, respectively, in such games. Altruism and reciprocity characteristics are measured for each individual using selected items from the World Values Survey. We find that altruism and reciprocity attributes systematically affect behavior. Subjects with higher altruism scores offer more, accept lower offers and return more. Subjects with higher reciprocity scores are more willing to punish violators of norms by rejecting offers more often, dividing fewer dollars and returning fewer dollars in the ultimatum and trust games.

---

1 Introduction

Culture is a central concept broadly studied in social anthropology and sociology. It has been gaining increasing attention in economics in relation to research on discrimination in a labor market (Becker 1957), identity (Akerlof 2005, Eckel and Grossman 2005), gender (Croson and Gneezy 2009), and social preferences (Andreoni et al. 2003, Charness and Rabin 2002, Falk and Fischbacher 2006). Most of experimental economics research on culture studies inter-national or inter-ethnic differences in economic behavior (Roth et al. 1991, Buchan and Croson 1999, Fershtman and Gneezy 2001, Henrich et al. 2001, Chuah et al. 2009). In contrast, this paper focuses on universal dimensions of culture, dimensions that can be applied to all ethnicities. We define culture as a set of shared values, attitudes, goals, and practices that characterizes an institution, group or society. Even though cross-national and cross-ethnic differences exist, most human societies recognize and enforce (to different extents) universal norms such as consideration for others, mutual reciprocity, and greater reward for greater effort. Such norms alter economic activities in a way that causes individuals to not only pursue self-interest but also exhibit other-regarding preferences in decision-making.

We conceptualize culture based upon the ``grid-group'' framework for representing universal dimensions of cultural values developed in social and cultural anthropology (Douglas 1970). In grid-group theory, culture is classified along two abstract dimensions. The first is *group*, which represents the extent to which a culture emphasizes the degree of solidarity and shared identity among members of a particular group, community or society, as opposed to emphasizing the separateness of individuals. The second is *grid*, which represents the extent to which a culture embodies and enforces standardized and shared social norms and rules for achieving collective goals, as opposed to personal, self-oriented approaches to problem-solving. This grid-group framework is chosen because of its parsimony, and the fact that it is probably the best-known formalized classification of cultures in the contemporary social science literature (Douglas and Wildavsky 1982; Chai and Wildavsky 1994). Its two abstract dimensions have been shown to be accurate predictors of numerous concrete cultural predispositions (Chai et al. 2009). Finally, the grid-group framework focuses on two operationalizations of its dimensions, altruism (group) and reciprocity (grid), which have been closely investigated by economists using different approaches

(Andreoni 1995; Charness and Rabin 2002; Croson 2007). Group is closely related to altruism in abstract games, since shared identity implies that an individual's utility function will include the interests of all members of a community. Grid is closely related to reciprocity since of all social norms, this is the one that is most universally recognized as having some degree of importance across all cultures.

The objective of this paper is to study how non-pecuniary motivations or culture may affect economic choices. We measure the altruism (group) and reciprocity (grid) cultural values using an attitudinal survey drawn from items in the World Values Survey (WVS). The design of the survey is described in Chai et al. (2009). In the experiment, 220 students participated in the survey, followed by the dictator, ultimatum and trust games. We study whether altruism and reciprocity scores, derived on the basis of the survey, are good predictors of economic behavior in our laboratory experiments. In accordance with this operationalization of the grid-group cultural theory, we hypothesize that individuals with low group and low grid characteristics will act in a more self-interested manner and would not penalize others at their own cost. Individuals with high group scores will act more generously toward others, and those with high grid scores will incur costs for punishing others to enforce norms.

Our experimental results indicate that culture, as measured using this attitudinal survey, is a strong predictor of people's economic behavior. We find that individuals with higher group scores offer more and accept lower offers in the ultimatum game, and return more in the binary trust game. In contrast, individuals with higher grid scores have higher minimum acceptable amounts in the ultimatum game, thus willing to punish others. Moreover, subjects with higher grid scores divide fewer dollars in the convex version of ultimatum game and return fewer dollars in the convex trust game.

We classify people based on the juxtaposition of the two cultural attributes and find almost equal proportion of the three cultural types: altruists with high group scores and low grid scores, self-interested types with low scores in both dimensions, and reciprocators with high grid scores but high or low group scores. The behavior exhibited by these classes of individuals is consistent across various games and validates our survey instrument.

Several previous studies that incorporate a survey instrument link trusting attitudes with trusting and contributing behavior in experiments. Glaezer et al. (2000)

3

and Fehr et al. (2002) find that survey measures better reflect trustworthy behavior than trusting behavior, and direct questions about past behavior are good predictors of trusting action in the lab. Gachter et al. (2004) find that out of several measures of trust attitudes, the General Social Survey (*GSS*) *trust* question poorly reflects trust attitudes in relation with cooperative behavior. However, the *trust strangers* and the *GSS fair* and *GSS help* questions were accurate in predicting trust and contributing behavior. Anderson et al. (2004) find significant correlation between the *trust* question and contributions in the public good experiment. Chuah et al. (2009) relate WVS question responses across UK and Malaysian subjects in the ultimatum game and suggest that the higher offers of Malaysian subjects may reflect their attitudes towards individual freedom and civic-mindedness. Higher offers in both subject groups were due to whether a person has materialist and work-leisure values and be non-religious. The studies above consider the relationship between one particular attitude (e.g. trust or civic-mindedness) and experimental behavior. None of the studies attempt to connect general cultural typologies through the survey with social preferences and behavior.

Other experimental studies use choice-based instruments to measure social value orientations. Offerman et al. (1996), Sonnemans et al. (1998) and van Dijk et al. (2002) use the ring-test developed by Liebrand (1984) to classify subjects as individualistic (only concerned about their own payoff), cooperative (concerned about the sum of own and other's payoff), altruistic (only concerned about the other's payoff), competitive (concerned about the difference between own and other's payoff) or aggressive (only concerned in minimizing the earnings of the other). However, the ring test provides only altruism scores, while our instrument has an advantage of measuring reciprocal attitudes in addition to altruism. In the context of the voluntary contribution mechanism for the provision of public goods, Fischbacher et al. (2001) and Gachter et al. (2003) classify people into conditional cooperator (reciprocal type) and free-rider (self-interested). Using a linear conditional-contribution profile in a public good environment, Kurzban and Houzer (2005) classify subjects into free riders, cooperators and reciprocal types. These studies use the allocation choices in the ring test or actual contributions in the public good game. In contrast, our instrument measures preferences using attitudinal questions.

The contribution of this paper is to provide a methodology to predict social preferences using a cultural survey drawn from WVS questions, and to analyze to

what extend these survey measures correlate with economic behavior in the two-person games laboratory experiment. Whereas previous studies employ choice-based instruments, or use attitudinal instruments to measure only certain attitudes (e.g., trust), we show that general dimensions of culture that explain altruism and reciprocity may be reliably measured by a survey, and used to predict people's economic choices. This study further suggests promising ways integrating tools developed in sociology and cultural anthropology into economic research.

2 Experimental design

Subject participated in laboratory experimental sessions which had two main parts: survey and games. The survey consisted of twenty two questions selected from the WVS. Eleven questions were used to measure reciprocity (grid) scores, and eleven questions to measure altruism (group) scores. In line with Chai et al. (2009), we calculate reciprocity and altruism indexes as weighted averages, measured on zero to one scale. The survey questions and the details on the index construction are given in Appendix A.[1] Similar to Liebrand (1984) and Van Dijk et al. (2002), the survey preceded games. Immediately after the survey, the subjects participated in five two-person games: dictator game, non-convex ultimatum game, convex ultimatum game, binary trust game and convex trust game, in the listed order.[2] We choose games that are the most commonly-studied in experimental literature on social preferences (e.g., Camerer 2003) to allow for comparison with other studies. Each subject was matched with a different person in each task. This feature of experimental design reflects the one-shot situation to minimize repeated-game motives for other-regarding behavior, and thus focus on culture as a determinant of behavior. Both the survey and the experimental games were implemented using z-tree software (Fischbacher 2007).

Sessions varied depending on whether the subjects made decision in one role or in both roles in each game. In the one-role treatment, each subject was placed either in the player 1 role or player 2 role for all games. In the two-role treatment, each subject was first placed in player 1's role, and then in a player 2's role, each time matched with a different person. We employed the strategy method in all games so

---

[1] Cronbach alpha coefficient of .7219 for the grid-group scale shows high reliability. Appendix A provides detail for the questionnaire and the construction of the grid and group measures.

that both players made choices without the knowledge of the other player's actual decision. In all sessions, we provided no feedback on the results after each task, and the subjects were not given any information to identify their matched person in each task. No feedback design minimizes ordering and learning effects. To decrease the income effect, we used a random payment similar to Charness and Rabin (2002) and Chen and Li (2009): at the end of the session, two game decisions made by each subject were randomly chosen for the payment. The subject computer screen then displayed the subject earnings for each part of the session, and the final random payment. The experimental instructions, and a sample screenshot, are provided in the Supplementary Materials.

Next we review the details of each game, and discuss the hypotheses to be tested.

2.1 Dictator game

In the dictator game (e.g., Forsythe et al. 1994), a sender (player 1) is endowed with ten dollars and is given an opportunity to split the money between herself and the counterpart. For this game, the grid-group theory suggests that people with higher altruism measured by the group index will offer more to their counterpart. The corresponding hypothesis is as follows:

H1: Individuals with higher altruism (group) score give more than individuals with lower altruism score.

2.2 Ultimatum game

In the ultimatum game, a proposer (player 1) decides on the division of ten dollars between himself/herself and a responder (player 2). In the sequential version of the ultimatum game (Guth et al. 1982), responder moves knowing the offer made by proposer. We use two simultaneous versions of the ultimatum game: a non-convex and a convex ultimatum game. In the non-convex ultimatum game, a proposer chooses the split of ten dollars, and a responder submits the lowest acceptable amount

---

[2] We did not randomize the order of games, on the grounds that order effects, if present, are unlikely to vary across cultural types. Hence a fixed game order does not contradict our research objective of studying the effect of culture on behavior in games.

without the knowledge of the offered amount. In the convex version of the game (Andreoni et al. 2003), a proposer's task is to choose the dividing rule, i.e. the percentage of the total amount offered to the responder. A responder's task is to specify how many dollars total, between zero and ten dollars, she wants to divide for each possible dividing rule. Including both versions of the ultimatum game allows us to consider rejection rates as a function of levels of offer, which is helpful in examining reciprocity. Standard theory predicts the equilibrium offer of one dollar (one percent share of the total in the convex game) by the player 1, and acceptance of any offer (designation of all ten dollars to divide) by player 2. We address the following questions: Do individuals with a higher altruism score offer more than those with low altruism scores? Would individuals with higher reciprocity scores reject more offers in the non-convex game, and choose to divide less money in the convex game, to enforce social norms? Do individuals with low altruism scores give less in the dictator game than in the ultimatum game? Would the amount of giving for individuals with higher altruism scores be the same across dictator and ultimatum games? The hypotheses, based on the grid-group cultural theory, are as follows:

H2-A: Individuals with higher altruism (group) scores offer higher amounts than individuals with lower altruism scores;

H2-B: Individuals with higher reciprocity (grid) scores reject more (choose less money to divide in the convex game) than individuals with lower reciprocity scores.

H2-C: Individuals with low altruism scores give less in the dictator game than in the ultimatum game;

H2-D: The amount of giving by individuals with high altruism scores is no different between the dictator and the ultimatum games.

Regarding the hypothesis H2-B above, we note that if subjects in our pool share the same social norm (e.g., the 50-50 split), then we may expect higher rejection rates by reciprocal subjects away from this norm, but not near the norm. If, on the other hand, our subjects have heterogeneous norms, then we may expect higher rejection rates by reciprocal norm-followers at any offer levels. Grid-group theory allows for norm heterogeneity and thus higher rejection rates at all offer levels, rather than at specific levels (such as away from the 50-50 split). We will discuss the implications of our

results on norm homo- or heterogeneity when we analyze the experimental results in Section 3 below.

2.3 Trust games

Trust plays important facilitating role in exchange economies that promote growth and development (Knack and Keefer 1997). We use the trust game to study how grid-group cultural attributes affect trusting behavior among individuals. In each version of our trust game, a truster (player 1) is given six dollars, while a trustee (player 2) has no endowment. In the binary trust game, player 1 either sends all six dollars to player 2 or keeps it all. In the convex trust game, player 1 may send any integer dollar amount between zero to six dollars to player 2, which is then doubled by the experimenter. We allow for various levels of dollars sent to better measure the degree of trust. In both binary and convex trust games, player 2 is then free to send back to player 1 any portion of the doubled money. Our convex trust game differs from Berg et al. (1995) investment game by the fact that we employ the strategy method, so that the second player does not know the first player's action when making a decision. In addition, in our setting the sent money is doubled instead of tripled, as it allows for better separation across cultural types.[3]

The subgame perfect Nash equilibrium of the trust games is to send nothing, while the social optimum requires sending all. We pose the following questions: Do we find more trust among individuals with higher altruism scores? Do individuals with higher reciprocity scores enforce social norms and thus return less than those with lower reciprocity scores? The hypotheses based on the grid-group theory are as follows:

H3-A: Individuals with higher altruism (group) scores trust more often in the binary trust game, and send more in the convex trust game;

H3-B: Individuals with higher reciprocity (grid) scores return less than individuals with low reciprocity scores.

---

[3] If the sent money is tripled, the Pareto Optimality motive to trust becomes stronger, and we may see less variation in behavior across distinct cultural types.

2.4 Procedures

The subjects were recruited from the student population at the University of Hawaii at Manoa during May-July 2009. The sessions ranged in size from ten to twenty participants. Each subjects participated in only one session. Each session consisted of two main parts. In the first part, the subjects answered the survey questions, which took 15-20 minutes. In the second part, the subjects participated in experimental games. The sessions lasted about one hour. The subjects were paid, on average, 19 dollars US, with the minimum of 10, the maximum of 42, and the standard deviation of 4.96 dollars.

3 Results

The total 220 subjects participated in the experiment conducted over the course of fifteen sessions. Nine sessions with the total 120 subjects were conducted using the one-role setting, and six sessions with the total of 100 subjects were conducted with the two-role setting. As we find no significant role reversal effects[4], below we report the results for the pooled data, while controlling for the treatment in our regression analysis.

3.1 Distribution of cultural types

In the sample of 220 subjects, the average altruism (group) score was .41 with the minimum at .045, maximum at .83 and standard deviation of .17. The average reciprocity (grid) score was .5 with the minimum score at .15, maximum at .85 and deviation of .12. The survey instrument allows us to distinguish between three cultural types: altruists (low in reciprocity and high in altruism dimensions), self-interested type (low in both dimensions) and reciprocal (high in reciprocity dimension but either low or high in the altruism dimension). Given that reciprocity and altruism scores range between zero and one, we define a reciprocity or altruism score to be high if the score is above (.5) and low if the score is at or below (.5). These cut points for defining types are in accordance with grid-group theory; see Chai et al. (2009). The results of this classification are listed at the bottom of Table 1. We classify 35.5 percent of our subjects as altruists, 34 percent as self-interested, and 30.5 percent as

---

[4] See Dorj et al. (2011) for a detailed comparison of the one-role and two-role treatment results.

reciprocal (15 percent with high-reciprocity and low-altruism, and 15.5 percent with high-reciprocity and high-altruism).

TABLE 1 ABOUT HERE.

Let us compare our classification results with other studies. A closely related notion used in previous studies for altruist is an unconditional cooperator, for self-interested type is a free rider (Kurzban and Houzer 2005), and for reciprocal type is a conditional cooperator (Fischbacher et al. 2001). Kurzban and Houzer (2005) find the following distribution of types using a linear public good environment: 20 percent free riders, 13 percent cooperators and 63 percent the reciprocal type. Fischbacher et. al. (2001) and Gachter et al. (2003) employ one-shot unconditional and conditional contributions in the public good setting and find the following distribution of types: 33 percent of free riders, 50 percent of conditional cooperators. Van Dijk et al. (2002) use the ring test and find that about half of the subjects concerned about other's interest. The majority of their subjects (38-48 percent) show positive orientations, i.e. they are willing to sacrifice own resources to the benefit of other. Less than 24 percent of subjects express a negative orientation towards others evidenced by their negative marginal rates of substitution between others' payoff and own payoff.

Qualitatively, the distribution of types that we obtain is consistent with the above findings. Interestingly, the percent of reciprocal type found in our study is smaller than the percent of conditional cooperators found in other studies. This difference is likely due to the differences in instruments employed. Most importantly, we find that our classification into cultural types has a strong predictive power for the behavior in economic games, as we discuss next.

3.2 Behavior in two-person games

The features of our experimental design (re-matching of subjects for each decision, employment of the strategy method, and no feedback following the decisions) allows us to treat each decision as an independent observation. In what follows, we use non-parametric Wilcoxon-Mann-Whitney (WMW) tests and parametric Tobit regressions to study if behavior differs across cultural types. Descriptive statistics for each game overall, and by cultural type, are reported in Table 1 above. The table also reports the results WMW two-tailed tests for differences of decisions between types. The Tobit

regressions model behavior in each game as a function of reciprocity (grid) and altruism (group) scores, controlling for personal characteristics such as gender, education, age, citizenship, religion.[5] A session dummy and treatment dummy (equal to zero if one-role and one if two-role treatment) variables are included to control for variation across fifteen sessions of two treatments. The results of these regressions are displayed in Table 2 and Table 3.

<center>TABLES 2 AND 3 ABOUT HERE</center>

The variable gender equals 0(1) for fe(males). Education is equal to 1, 2, …, 7 for freshman, sophomore, junior, senior, M.A., PhD students, staff correspondingly. Age specifies the age of a participant. The citizenship dummy equals to 1 if a person is a U.S. citizen and zero otherwise. No religion variable equals to 1 if the person has no religion and zero otherwise.

We start the analysis with the dictator game.

3.2.1 Dictator game

Previous experiments show that donations in the dictator game vary dramatically from zero in double blind designs (Hoffman et al. 1994) to half of the endowment in designs where the recipient gives a brief description about herself or himself to the proposer (Bohnet and Frey 1999). In line with many previous studies, average donations in our sessions were above zero, but below fifty percent of the endowment. In the divide ten dollars dictator game, the mean donation for all sessions was 35.5 percent, as reported in Table 1, column 1. Modal offers were fifty percent of the endowment. Overall 28 percent of subjects offered half of their endowment, 44 percent of subjects offered from 1 to 4 dollars, and 16 percent of population sent zero money. Since in the dictator game there is no strategic concern to offer and the fear of rejection removed, altruism, moral norms or social norms explain giving. We find that

---

[5] The participants' demographic characteristics were collected several days prior to experimental sessions through an on-line survey administered through the SurveyMonkey tool. Along with basic demographic questions, the survey included questions to measure several alternative dimensions of participant personality. The results of the online survey are discussed in a separate study; see Chai et al. (2010). We believe that participation in this survey did not have an effect on the subject behaviour in our laboratory sessions, as the online survey and the lab session were separated by a significant time interval, and were administered in two very different environments.

subject behavior varies by their cultural values, measured by the grid-group scores which relate to reciprocity and altruism.

Result 1: *In the dictator game, altruists (low in grid and high in group dimensions) donate more than reciprocal types (high in a grid dimension) and self-interested (low in both dimensions) type.*

Support: Table 1 row 1, and Figure 1. As predicted by hypothesis H1, group scores that are accountable for the altruism are positively correlated with donations. Considering offers across cultural types, altruists offer significantly more than reciprocal type (p=.026) and self-interested type (p=.019). See Figure 1 and Table 1, row 1. In the regression, this result was not strong enough to be significant (p=.15).

<div align="center">FIGURE 1 ABOUT HERE</div>

Based on WMW test, we conclude that hypothesis H1 is confirmed. We next consider the ultimatum games.

3.2.2 Non-convex ultimatum game:

Mean offers increase to 45 percent of ten dollars as compared to 35.5 percent in the dictator game. Consistent with previous findings, percent of population offering half of their endowment rose from 28 in the dictator game to 38, and percent of subjects offering from 1 to 4 dollars fell from 44 percent in the dictator game to 39, and only 3 percent of population offered zero money to their match as compared with the 16 percent in the dictator game. In the ultimatum game, cultural values such as altruism and reciprocity both played significant roles.

Result 2: *Offers in the non-convex ultimatum game were higher for individuals with higher altruism (group) scores. Individuals with higher altruism (group) scores accepted lower offers while the minimal acceptable amount was higher for individuals with higher reciprocity (grid) scores.*

Support: Tables 1 and 2, Figure 1. As Table 1 indicates, altruists offer 49.5 percent, as compared to 43.3 percent offered by self-interested people, and 42.7 percent offered by reciprocators. The difference between the altruists and self-interested people is marginally significant (p-value is 0.096). The regression results in Table 2 show that both reciprocity (grid) and altruism (group) attributes explain variations in behavior.

The altruism score significantly and positively affects offers (p=.064). Moreover, those with a higher altruism score have a lower acceptable amount than those with a lower altruism score (p=.012). Consistent with the hypothesis in H2-B, those with a higher reciprocity (grid) score have a higher minimum acceptable amount (p=.054).

Regarding hypotheses in 2C-2D, we find that donations in the dictator game were smaller than offers in the ultimatum game across all three cultural types (p<.001). However, the differences in donations in the dictator game and offers in the ultimatum game become insignificant for altruism scores below 0.3 or above 0.7 (p=.1447 and p=.1020).

In sum, the hypothesis H2-A, the positive impact of altruism score on offers is supported by the results in the ultimatum game. Hypotheses H2-B on the higher rejection rates by reciprocators is also supported. While the hypothesis H2-C (individuals with low altruism scores give less in the dictator game than in the ultimatum game) is confirmed, the hypothesis H2-D (individuals with high altruism scores offer the same amounts in the dictator and the ultimatum games) is only marginally supported for individuals with altruism scores above 0.7.

We next consider the behavior in the convex ultimatum game.

3.2.3 Convex ultimatum game:

In the convex ultimatum game as in Andreoni et al. (2003), a proposer (player 1) offers a percentage of the total pie to the player 2 who in turn decides on the amount of dollars to be divided for each possible dividing rule. The maximum money to divide was ten dollars. The average offer was 37 percent of the total pie. About one third of subjects (34 percent) offered equal split, which was also the modal choice. 48 percent of total offers were between ten to forty percentages of the pie. Only 12 percent of offers were at the subgame perfect equilibrium of (99, 1), and 37 percent of them were rejected. The total rejection rate was 9 percent in which proposers' offers vary from 1 to 30 percent of the pie. We find significant effects of cultural characteristics on behavior.

Result 3: *In the convex ultimatum game, altruists offer higher shares than the self-interested type. Individuals with higher reciprocity (grid) score divide fewer dollars than low-reciprocity individuals.*

Support: Tables 1, Figures 1 and 2. As hypothesized in H2-A, altruists offer higher shares than the self-interested type (39.3 vs. 33.5 percent respectively with p=.032). See Table 1and Figure 1. For player 2 decisions, more than half of the subjects (61 percent) in player 2 role choose to divide the maximal amount of ten dollars. Consistent with the hypothesis H2-B, regression results show a negative and significant effect of reciprocity (grid) score on the responder's decision on how much to be divided (p=.009 in Table 2). Therefore, those with higher reciprocity scores divide fewer dollars than those with lower reciprocity scores. Moreover, this result is significant for each dividing rule when player 1 offered more than ten percent to player 2; see Table 4 in Appendix B. This indicates that high-reciprocal subjects were willing to bear a cost of punishing others by dividing fewer dollars for the level of offer above 10 percent. This suggests heterogeneity of perceived social norms among reciprocal subjects. For some reciprocal types their perceived social norm may be below the 50:50 split, and they may reject offers above fifty percent.

The non-parametric test shows that strong reciprocators divide fewer dollars than altruists (p=.054)[6] and self-interested individuals (p=.02). See Table 1, Figure 2.

FIGURE 2 ABOUT HERE

Interestingly, conditional on the dividing rule we find distinct behavior across types. For example, for dividing rules at 60 percent (p<.05 in Table 1) and above (p<.01) reciprocators divide fewer dollars than altruists. This implies that reciprocal subjects punish others for misbehavior (i.e. offering more than 50 percent of a pie) by dividing less money for shares above 50:50 split. This suggests that for reciprocal type social norm may be different depending on their beliefs. Similar story can be seen comparing self-interested subjects with reciprocal ones. We find no differences in behavior between these types for the shares in the 1-40 percent range. Again, for offers of 50-60 percent of the pie (p<.05) and 70-99 percent (p<.01) reciprocators divide fewer dollars than self-interested types. Note that dividing fewer dollars means that both players' earnings are reduced.

In sum, the hypotheses H2-A, H2-B are verified for the convex ultimatum game. Higher rejection rates and fewer dollars to divide observed for reciprocal

---

[6] The significance level increases to p=.031 for the rules above 1 percent of share.

subjects for almost all dividing rules suggest the norm heterogeneity among our subject population.

We analyze the results of the binary trust game next.

3.2.4 Binary trust game:

In the binary version of trust game, overall 55.2 percent of subjects in the role of player 1 trusted others and sent six dollars which was doubled by experimenter. In this game a trustee (player 2) may return all or some portion of money back to a truster (player 1). Among subjects in the role of player 2 (trustee), 17.5 percent acted in a self-interested manner and returned zero to the trusting person. The modal return of six dollars involved responses from 46 percent of the subjects. On average subjects sent 55.2 percent and returned 75 percent of six dollars (37.4 percent of 12 dollars)[7].

Result 4: *In the binary trust game, altruists trust more and return more than individuals with low altruism. Reciprocal types return fewer dollars than altruists.*

Support: Tables 1 and 3, Figures 3 and 4. In line with the hypothesis H3-A, there were more trusting altruists (61.8 percent) than trusting self-interested (44.7 percent) individuals (p=.085); see Table 1 and Figure 3. Regression result in Table 3 shows that altruism (group) score positively correlates with a return from the doubled money (p=.031). This suggests that altruists may be trustful and trustworthy. In line with the hypothesis in H3-B, reciprocators returned fewer dollars than altruists (p=.011). See Table 1, Figure 4.

FIGURES 3 AND 4 ABOUT HERE

In sum, hypotheses H3-A and H3-B are verified for the binary trust game. Next, we report results of the convex trust game.

3.2.5 Convex trust game:

In the convex version of the trust game, player 1 (truster) has an option to send all or any portion of six dollars. The amount trusted was doubled, and player 2 (trustee) may send back any portion of the doubled money back to player 1. The data show that 36 percent of subjects kept all money for themselves. In this game, only 20 percent of

15

subjects trusted all six dollars in comparison with 55.2 percent in the binary trust game. The mean amount trusted was 44.6 percent of the six dollars endowment. Further, 58 percent of responders kept all money and did not reciprocate trusting behavior while 8 percent returned back half of the doubled money. The rest of data lies in the range between 1 and 5 dollars.

Result 5: *In the convex trust game, altruism (group) scores were positively correlated with the amount returned. Reciprocity (grid) scores were negatively correlated with amounts returned to trusters. Reciprocators returned fewer dollars than altruists.*

Support: Tables 1, 3 and Figure 4. While the differences across types in trusting behavior are not significant (Table 1), we still note that, in line with the hypothesis H3-A, there were more altruists than other types among trusting individuals. Among those trusting any positive amount, altruists trust on average 47.9 percent as compared to 43.6 percent by self-interested individuals and 44.7 percent by reciprocators. From Table 3, the effect of group score on trusting behavior just misses the significance level of ten percent (p=0.104). Regarding player 2 (trustee), regression results in Table 3 show that subjects with higher reciprocity (grid) scores returned less money than those with lower reciprocity scores (p=.019). Behavior across types (Table 1, Figure 4) also shows that reciprocal people returned less than altruists (p=.045). This again shows that reciprocal types exhibit strong reciprocity and are willing to punish others for misbehavior.

We now consider trustee responses conditional on the level of trust. From Table 1, for any amounts above two dollars sent by player 1, altruists returned more than the reciprocal types (p<.1 if three dollars were sent, and p<0.05 for higher amount). See Figure 4 for the responders' decisions across cultural types. Results of the Tobit regressions of amount returned conditional on the amount trusted, presented in Table 5 in Appendix B, also show that for any level of trust above one dollar, the altruism (group) scores were positively correlated with the amounts returned (p<.05). Hence, altruists reward those sending more than two dollars by returning more, and show more trustworthiness.

In sum, in the convex trust game, we find only weak support for hypothesis H3-A, that altruists trust more than other types. However, altruists reward those

---

[7] In comparison, Orma herders in Kenya sent 40 percent and repaid 55 percent (Camerer 2003).

sending higher amounts by returning more, thus showing more trustworthiness. Hypothesis H3-B is verified: reciprocators return less than altruists. Combining the evidence from both binary and convex trust games, we conclude that hypotheses H3-A and H3-B are both supported by the data.

3.3 Effect of demographics: age, citizenship and religion

Demographics are often found to have a significant effect on behavior (e.g., Camerer 2003). Before turning to the conclusions, we briefly discuss the effects of demographics on subject decisions in our experiment.

Result 6: *Older people, U.S. citizens and religious individuals donate more in the dictator game, offer more in the convex ultimatum game, and trust more in both trust games.*

Regression results in Table 2 and Table 3 show that age and US citizen variables positively affected giving actions in the dictator game (p<.01). Religion is positively correlated with donations as well at 5 percent significance level. These three variables positively affected offers in both ultimatum games and significantly so in the convex version of the game (p<.05). At the same time, in the non-convex ultimatum game US citizens accepted lower offers (p=.038). Older subjects and those with U.S. citizenship trusted more in both trust games than younger cohort and non-U.S. citizens (p<.01). Religion positively affected trusting action and significantly so in the non-convex trust game (p<.05).

Our findings on demographics are broadly consistent with existing studies. Camerer (2003) notes that with age, self-interest is replaced with compromise and fair-mindedness. The result that the U.S. citizens trust more is similar to findings from cross-societal experiments by Yamagishi et al. (1998). They report that U.S. citizens have a higher level of general trust than Japanese. Interestingly, we find no significant differences in behavior by gender.

4 Conclusion

We explain behavior in the dictator, ultimatum and trust games based on two cultural dimensions adopted from social and cultural anthropology: grid, which translates into

reciprocity, and group, which translates into altruism. Altruism and reciprocity characteristics are measured for each individual using selected items from the WVS. We find that altruism and reciprocity attributes systematically affect behavior. In particular, the amounts of giving in the ultimatum game were higher for individuals with higher altruism score. As predicted, individuals with higher altruism scores accepted lower offers while individuals with higher reciprocity scores accepted a higher amount. The norm-enforcement behavior, such as dividing fewer dollars the convex ultimatum game, was more prevalent among those with a higher reciprocity scores than among those with lower reciprocity scores. Individuals with higher altruism score were trustworthy. Individuals with higher reciprocity scores returned less from the trusted money.

These conclusions are confirmed if we classify individuals into altruists, reciprocal and self-interested cultural types. We find that altruists donate more in the dictator game, offer higher shares of a pie in both ultimatum games and trust more than self-interested individuals. As predicted, reciprocal types divide fewer dollars than other types in the convex ultimatum game. In both versions of the trust game, reciprocal types return fewer dollars than altruists because they are willing to punish others.

This research has both practical and methodological implications. Practically, a variety of exchanges in our life involve interpersonal relations where one side decides on the amount of giving or trusting, and the other side may reciprocate those decisions. Further, two-person relations serve as a basis of more complex group relations within a team, company, organization or country. The results obtained here may be used for the improvement of social exchange within a group. Methodologically, our work provides a tool for investigating the pro-social behavior using general cultural dimensions that were developed in branches of social sciences outside economics. The survey tool suggested here allows to predict and explain behavior in a variety of economically-relevant games.

Appendix A : GRID/GROUP SURVEY QUESTIONS

Please say, for each of the following, how important it is in your life. Would you say...

	Very Important	Rather Important	Not Very Important	Not at all Important
1. Family	1	2	3	4
2. Friends	1	2	3	4
3. Religion	1	2	3	4

4. With which of these two statements do you tend to agree?

      1. Regardless of what the qualities and faults of one's parents are, one must always love and respect them
      2. One does not have the duty to respect and love parents who have not earned it by their behavior and attitudes

5. Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?
      1. Most people can be trusted
      2. Can't be too careful (have to be very careful)

Do you agree or disagree with the following statements?

	Agree	Neither	Disagree
6. When jobs are scarce, older people should be forced to retire from work early	1	2	3
7. When jobs are scarce, men should have more right to a job than women	1	2	3

8. Imagine two secretaries, of the same age, doing practically the same job. One finds out that the other earns considerably more than she does. The better paid secretary, however, is quicker, more efficient and more reliable at her job. In your opinion, is it fair or not fair that one secretary is paid more than the other?
      1. Fair
      2. Not fair

9. There is a lot of discussion about how business and industry should be managed. Which of these four statements comes closest to your opinion?
      1. The owners should run their business or appoint the managers
      2. The owners and the employees should participate in the selection of managers
      3. The government should be the owner and appoint the managers
      4. The employees should own the business and should elect the managers

10. People have different ideas about following instructions at work. Some say that one should follow one's superior's instructions even when one does not fully agree with them. Others say that one should follow one's superior's instructions only when one is convinced that they are right. With which of these two opinions do you agree?
      1. Should follow instructions
      2. Depends
      3. Must be convinced first

11. Do you think that a woman has to have children in order to be fulfilled or is this not necessary?
      1. Needs children
      2. Not necessary

The following items contain a list of various changes in our way of life that might take place in the near future. Please tell me for each one, if it were to happen, whether you think it would be a good thing, a bad thing, or don't you mind?

	Good	Don't mind	Bad
12. Less emphasis on money and material possessions	1	2	3
13. Less importance placed on work in our lives	1	2	3
14. More emphasis on the development of technology	1	2	3
15. Greater respect for authority	1	2	3

For the following questions, please place your views along the accompanying scale. 1 means you agree completely with the first statement; 10 means you agree completely with the second statement; and if your views fall somewhere in between, you can choose any number in between.

16. 1. Private ownership of business and industry should be increased
      10. Government ownership of business and industry should be increased

     1   2   3   4   5   6   7   8   9   10

17. 1. The government should take more responsibility to ensure that everyone is provided for
      10. People should take more responsibility to provide for themselves

     1   2   3   4   5   6   7   8   9   10

18. How important is God in your life? Please use this scale to indicate - 10 means very important and 1 means not at all important.

     1   2   3   4   5   6   7   8   9   10
     Not at all   Very

Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between, using this card.

	Never Justifiable	Always Justifiable
19. Homosexuality	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10	
20. Prostitution	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10	
21. Abortion	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10	
22. Divorce	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10	

Constructing grid/group measures:

We compute grid/group indexes as weighted averages of the above questions, using the following formula (Chai et al. 2009):

Gridscore=((4-Answer[3])/3+(3-Answer[6])/2+(3-Answer[7])/2+(3-Answer[10])/2+(2-Answer[11])/1+(3-Answer[15])/2+(Answer[18]-1)/9+(10-Answer[19])/9+(10-Answer[20])/9+(10-Answer[21])/9+(10-Answer[22])/9)/11;

Groupscore=((4-Answer[1])/3+(4-Answer[2])/3+(2-Answer[4])/1+(2-Answer[5])/1+(Answer[8]-1)/1+(Answer[9]-1)/3+(3-Answer[12])/2+(3-Answer[13])/2+(Answer[14]-1)/2+(Answer[16]-1)/9+(10-Answer[17])/9)/11.

Appendix B

TABLES 4 AND 5 ABOUT HERE

References

Akerlof, G. A., Kranton, R. E., 2005. Identity and the economics of organizations. Journal of Economic Perspectives 19 (1), 9-32.

Anderson, L. R., Mellor, J. M., Milyo, J., 2004. Social capital and contributions in a public-goods experiment. The American Economic Review 94 (2), 373-376.

Andreoni, J., 1995. Warm-glow versus cold-prickle: the effects of positive and negative framing on cooperation in experiments. The Quarterly Journal of Economics 110(1), 1-21.

Andreoni, J., Castillo, M., Petrie, R., 2003. What do bargainer's preferences look like? Experiments with a convex ultimatum game. American Economic Review 93 (3), 672-685.

Becker, G. S. 1957. The Economics of Discrimination. Chicago: University of Chicago Press.

Berg, J., Dickhaut, J., McCabe, K., 1995. Trust, reciprocity, and social history. Games and Economic Behavior 10, 122–142.

Bohnet, I., Frey, B., 1999. Social distance and other-regarding behavior in dictator games: comment. American Economic Review 89 (March), 335-339.

Buchan, N. R., Croson, R. T. A., 1999. Gender and culture: international experimental evidence from trust games. American Economic Review 89(2), 386-391.

Camerer, C. F., 2003. Behavioral Game Theory. Russell Sage Foundation, New York, New York/Princeton University Press, Princeton, New Jersey.

Chai, S., Wildavsky, A., 1994. Culture, Rationality and Violence In: Coyle, D. J., Ellis, R. J. (Eds.). Politics, Culture and Policy: Applications of Cultural Theory. Boulder, CO: Westview Press. Reprinted in Chai and Swedlow (Eds.). Culture and Social Theory, 281-98.

Chai, S., Kim, M., Liu, M., 2009. Cultural comparisons of beliefs and values: applying the grid-group approach to the World Values Survey. Beliefs and Values 1 (2), 193-208.

Chai, S., Kim, M., Liu, M., 2010. Comparison of the grid-group, individualism/collectivism, materialism/posmaterialism instruments. Mimeo, University of Hawaii.

Dorj, D., Sherstyuk K., Chai, S., 2011. Playing both roles: role reversal effect and culture in simple games. Mimeo, University of Hawaii.

Charness, G., Rabin, M., 2002. Understanding social preferences with simple tests. Quarterly Journal of Economics 117 (3), 817-69.

Chen, Y., Li, S. X., 2009. Group identity and social preferences. American Economic Review 99 (1), 431-457.

Chuah, S-H., Hoffmann, R., Jones, M., Williams, J., 2009. An economic anatomy of culture: attitudes and behaviour in inter- and intra-national ultimatum game experiments. Journal of Economic Psychology, 30: 732–744.

Croson, R., 2007. Theories of commitment, altruism and reciprocity: evidence from linear public goods games. Economic Inquiry 45, 99-216.

Croson, R., Gneezy, U., 2009. Gender differences in preferences. Journal of Economic Literature 47 (2), 448-474.

Douglas, M., 1970. Natural Symbols: Explorations in Cosmology. New York: Pantheon

Douglas, M., Wildavsky, A., 1982. Risk and Culture. California U.P.

Eckel, C. C., Grossman, P. J., 2005. Managing diversity by creating team identity. Journal of Economic Behavior & Organization 58 (3), 371-392.

Falk, A., Fischbacher, U., 2006. A theory of reciprocity. Games and Economic Behavior 54, 293-315.

Fehr, E., Fischbacher, U., Rosenbladt, B., Schupp, J., Wagner, G., 2002. A nation-wide laboratory -examining trust and trustworthiness by integrating experiments in representative surveys. Schmollers Jahrbuch 122, 519-542.

Fischbacher, U., Gachter, S., Fehr, E., 2001. Are people conditionally cooperative? Evidence from a public goods experiment. Economics Letters 71, 397-404.

Fischbacher, U., 2007. z-Tree: Zurich toolbox for ready-made economic experiments. Experimental Economics 10, 171-178.

Fershtman, C., Gneezy, U., 2001. Discrimination in a Segmented Society: An Experimental Approach. Quarterly Journal of Economics February, 351-377.

Forsythe, R., Horowitz, J., Savin, N., Sefton, M. 1994. Fairness in simple bargaining experiments. Games and Economic Behavior 6, 347-69.

Gachter, S., Herrmann, B., Thoni, C., 2004. Trust, voluntary cooperation, and socio-economic background: survey and experimental evidence. Journal of Economic Behavior & Organization 55, 505-531.

Gachter, S., Herrmann, B., Thoni, C., 2003. Understanding determinants of social capital: cooperation and informal sanctions in a cross-societal perspective. Mimeo, University of St. Gallen

Glaezer, E. D. Laibson, Scheinkman, J., Soutter, C., 2000. Measuring trust. Quarterly Journal of Economics 115, 811–846.

Guth, W., Schmittberger, R., Schwarze, B., 1982. An experimental analysis of ultimatum bargaining. Journal of Economic Behavior and Organization 3 (4), 367-88.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., 2001. In Search of homo economicus: behavioral experiments in 15 small-scale societies. American Economic Review 91(2), 73-78.

Hoffman, E., McCabe, K., Smith, V., 1994. Preferences, property rights, and anonymity in bargaining games. Games and Economic Behavior 7, 346-380.

Knack, S., Keefer, P., 1997. Does social capital have an economic payoff? A cross-country investigation. Quarterly Journal of Economics 112 (4), 1251-1288.

Kurzban, R., Houser, D., 2005. Experiments investigating cooperative types in humans: a complement to evolutionary theory and simulations. PNAS 102 (5), 1803-1807.

Liebrand,W.B.G., 1984. The effect of social motives, communication and group sizes on behavior in an *n*-person multi stage mixed motive game. European Journal of Social Psychology 14, 239–264.

Offerman, T., Sonnemans, J., Schram, A., 1996. Value orientations, expectations and voluntary contributions in public goods. Economic Journal 106, 817–845.

Roth, A. E., Prasnikar, V., Okuno-Fujiwara, M., Zamir, S., 1991. Bargaining and market behavior in Jerusalim, Ljubljano, Pittsburgh and Tokyo: an experimental study. American Economic Review 81, 1068-95.

Sonnemans, J., Schram, A., Offerman, T., 1998. Public good provision and public bad prevention: the effect of framing. Journal of Economic Behavior and Organization 34, 143–161.

Van Dijk, F., Sonnemans, J., van Winden, F., 2002. Social ties in a public good experiment. Journal of Public Economics 85, 275–299.

Yamagishi, T., Cook, K. S., Watabe, M., 1998. Uncertainty, trust, and commitment formation in the United States and Japan. American Journal of Sociology 104 (1), 165-194.

Table 1. Behavior by Cultural Types

Decision	Overall		Mean by types,%			p-values*, Ho:		
	mean, %	std. dev.	Altruist (A)	Self-interested (S)	Reci-procal (R)	A=S	A=R	S=R
Dictator game:								
Donation, out of $10	35.5	25.7	41.7	33.3	30	.019	.026	.758
Non-convex ultimatum game:								
Offer, out of $10	45.4	22	49.5	43.3	42.7	.096	.187	.938
Minimum acceptable amount, out of $10	23.8	19.4	23	22.4	26	.972	.566	.681
Convex ultimatum game:								
Percent of share, 1-99%	36.5	21.8	39.3	33.5	36.3	.032	.149	.446
Amount divided, out of $10	77.3	34.3	78.9	82.2	70.8	.717	.054	.020
Offer by player 1, %	Percent of ten dollars divided by player 2							
1	53.1	45.8	53.9	49.8	55.6	.725	.896	.722
10	61.6	42.6	65.3	58.8	60.2	.379	.220	.848
20	64.7	39.8	65.4	62.9	65.6	.635	.610	.953
30	70.6	35.1	75.4	66.3	69.6	.307	.214	.956
40	78.1	29.3	81.4	78.6	74.0	.877	.079	.186
50	88.6	20.6	90.0	91.6	84.0	.686	.082	.038
60	86.1	22.9	87.9	90.0	80.4	.987	.028	.023
70	85.3	26.2	89.5	89.0	77.1	.802	.008	.007
80	84.6	28.2	89.3	88.8	75.2	.899	.004	.004
90	84.4	29.9	90.5	88.4	73.7	.751	.001	.006
99	83.4	32.9	91.2	88.8	69.4	.750	.001	.004
Binary trust game:								
Percent trusted $6	55.2		61.8	44.7	58.5	.085	.746	.197
Percent returned, out of $12	37.4	22.9	42.2	36.4	33.2	.143	.011	.399
Convex trust game:								
Percent trusted, out of $6	45.6		47.9	43.6	44.7	.615	.627	.931
Percent returned, out of sent	13.1	18.1	17.8	12.5	8.3	.209	.045	.463
Sent by player 1, $	Percent returned from original sent 0-6 dollars by player 2							
1	42.0	58.6	45.1	39.1	41.3	.405	.538	.840
2	47.2	53.0	52.0	48.9	40.2	.712	.304	.570
3	54.5	45.2	62.1	53.6	47.1	.281	.077	.535
4	58.9	43.1	66.2	60.9	48.9	.482	.024	.245
5	62.8	44.3	72.2	62.6	52.6	.201	.016	.352
6	70.9	47.1	85.6	69.9	55.4	.122	.002	.168
Frequency, %			35.5	34	30.5			

*p-value of Wilcoxon-Mann-Whitney test, two-tailed;

Table 2. Tobit regression, dictator and ultimatum games

Independent variables:	Dictator game		Non-convex ultimatum game				Convex ultimatum game			
	Donation, $0-10		Offer, $0-10		Minimum acceptable amount, $0-10		Percent of share, 1-99%		Amount divided, $0-10	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
group score	3.53	.150	3.68*	.064	-3.93**	.012	-2.46	.898	7.33	.425
grid score	1.58	.434	0.37	.822	2.48*	.054	16.82	.290	-20.9***	.009
session	0.08	.280	0	.971	0.02	.570	0.08	.892	-0.12	.632
gender	-0.29	.615	-0.12	.790	-0.12	.760	-4.39	.338	2.22	.329
education	-0.11	.689	-0.2	.341	0.01	.931	-0.24	.909	-0.48	.618
age	0.11***	.008	0.06*	.076	0.04	.197	0.74**	.019	-0.08	.600
US citizen	1.41**	.043	0.67	.225	-0.95**	.038	10.28*	.061	2.96	.263
no religion	-1.22*	.085	-0.74	.191	-0.45	.341	-11.2**	.045	2.18	.436
treatment	-0.5	.403	-0.06	.896	-0.79*	.052	0.27	.954	-0.13	.956
constant	-1.58	.534	2.17	.289	3.23	.040	15.2	.448	18.7	.044
adj.R^2	.0342		.0221		.0421		.0122		.0406	
N	112		112		109		112		109	

*, **, *** significance level at 10, 5, 1 percent

Table 3. Tobit regression, trust games

Independent variables:	Binary trust game				Convex trust game			
	Amount trusted, 0 or $6		Amount returned, $0-12		Amount trusted, $0-6		Amount returned, $0-12	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
group score	8.03	.180	5.85**	.031	7.64	.103	3.78	.335
grid score	4.04	.363	0.33	.878	1.98	.552	-7.53**	.019
session	0.18	.282	0.1	.185	0.22	.101	0.18	.113
gender	-1.45	.236	-0.47	.453	-0.21	.827	0.65	.485
education	-0.15	.805	-0.18	.505	-0.03	.947	-0.36	.379
age	0.5***	.004	0.03	.550	0.29***	.004	0	.976
US citizen	6.28***	.001	0.19	.799	4.14***	.002	-0.79	.478
no religion	-3.12**	.048	0.27	.729	-1.48	.208	2.2*	.062
treatment	3.72***	.007	0.78	.239	1.38	.173	1.29	.200
constant	-16.8	.007	-0.17	.948	-13.8	.005	-1.03	.785
adj.R^2	.0855		.0215		.0719		.0373	
N	104		101		104		101	

*, **, *** significance level at 10, 5, 1 percent

Table 4. Tobit regression, convex ultimatum game (amount of dollars divided by player 2)

Independent variables:	if 1% amount divided		if 10% amount divided		if 20% amount divided		if 30% amount divided		if 40% amount divided		if 50% amount divided	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
group score	13.7	.262	9.4	.303	4.1	.600	3.1	.595	0.7	.898	-0.9	.883
grid score	-12.7	.199	-12.0	.112	-13.3**	.044	-11.7**	.020	-11.8***	.007	-14.5***	.009
session	-0.3	.395	-0.2	.337	-0.1	.589	-0.1	.611	-0.1	.719	-0.1	.734
gender	3.1	.302	1.4	.521	0.1	.945	0.4	.795	0.1	.926	-1.0	.502
education	0.6	.623	0.5	.607	0.3	.677	0.3	.614	0.1	.873	-0.3	.683
age	0.2	.325	0.0	.805	-0.1	.600	-0.1	.441	-0.1	.305	-0.1	.164
US citizen	7.4**	.045	4.4	.106	3.3	.148	2.4	.176	0.9	.553	0.7	.702
no religion	6.2	.104	2.9	.298	3.6	.143	1.6	.371	0.9	.565	-0.8	.674
treatment	1.8	.558	0.6	.808	0.6	.770	0.5	.735	-0.2	.908	-2.8	.110
constant	-11.3	.36	5.5	.543	9.8	.204	11.7	.050	16.5	.002	28.0	0
adj.R^2	.0326		.0203		.0199		.0241		.0296		.0803	
N	109		109		109		109		109		109	

*, **, *** significance level at 10, 5, 1 percent

Table 4 (continues). Tobit regression, convex ultimatum game (amount of dollars divided by player 2)

| Independent variables:	if 60% amount divided		if 70% amount divided		if 80% amount divided		if 90% amount divided		if 99% amount divided	
	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t	Coef.	P>t
group score	-0.1	.990	-1.6	.793	-1.4	.859	-0.9	.921	3.6	.807
grid score	-15.7***	.001	-17.7***	.002	-21.6***	.002	-24.6***	.003	-36.2**	.011
session	0.1	.526	0.1	.613	0.0	.909	-0.2	.399	-0.1	.747
gender	0.7	.573	0.9	.551	2.6	.175	3.3	.151	3.1	.396
education	0.3	.636	0.3	.626	0.7	.406	0.4	.660	0.3	.820
age	0.0	.705	0.0	.754	-0.1	.598	-0.1	.330	-0.2	.393
US citizen	0.6	.711	0.3	.862	0.4	.851	1.5	.564	2.0	.643
no religion	0.6	.721	0.1	.946	-0.6	.816	-1.5	.597	-3.7	.431
treatment	-1.2	.404	-1.1	.501	-1.5	.449	0.2	.950	-4.1	.303
constant	17.3	.001	19.7	.002	23.0	.004	29.3	.003	41.9	.012
adj.R^2	.0629		.0616		.077		.0872		.0937	
N	109		109		109		109		109	

*, **, *** significance level at 10, 5, 1 percent

Table 5. Tobit regression, convex trust game (amount returned by player 2)

Independent variables:	if $1 amount returned Coef.	P>t	if $2 amount returned Coef.	P>t	if $3 amount returned Coef.	P>t	if $4 amount returned Coef.	P>t	if $5 amount returned Coef.	P>t	if $6 amount returned Coef.	P>t
group score	2.2	.127	4.3	.011	3.7	.006	3.5	.031	4.6	.027	6.9	.009
grid score	0.8	.488	0.8	.526	0.5	.662	-1.3	.306	-2.0	.209	-2.5	.210
session	0.0	.948	0.0	.893	0.1	.156	0.0	.369	0.0	.497	0.0	.596
gender	0.4	.273	0.2	.541	0.1	.734	0.1	.755	-0.1	.909	0.1	.930
education	-0.1	.550	-0.1	.607	0.1	.667	0.1	.448	0.1	.618	0.1	.710
age	0.0	.138	0.0	.692	0.0	.685	0.0	.998	0.0	.817	0.0	.993
US citizen	-0.3	.407	-0.2	.695	-0.2	.565	-0.2	.634	-0.1	.840	0.1	.933
no religion	-0.2	.609	-0.1	.893	0.5	.226	1.0	.037	1.4	.025	1.5	.052
treatment	0.1	.725	0.6	.164	0.6	.061	0.7	.066	1.0	.059	0.6	.329
constant	-2.3	.117	-2.3	.159	-2.0	.126	-0.7	.637	-0.1	.957	-0.3	.900
adj.R^2	.0405		.0365		.0498		.0339		.0339		.0288	
N	101		101		101		101		101		101	

*, **, *** significance level at 10, 5, 1 percent

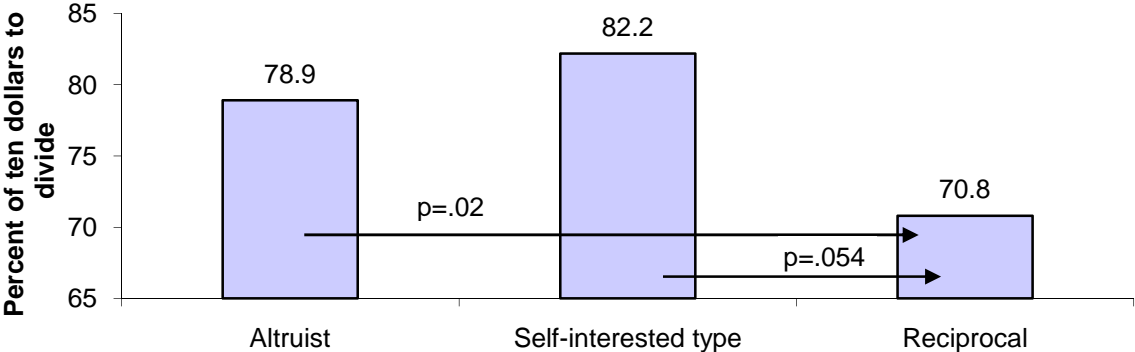**Figure 1. Dictator and Ultimatum games: Percent offered by player 1, by Typology**
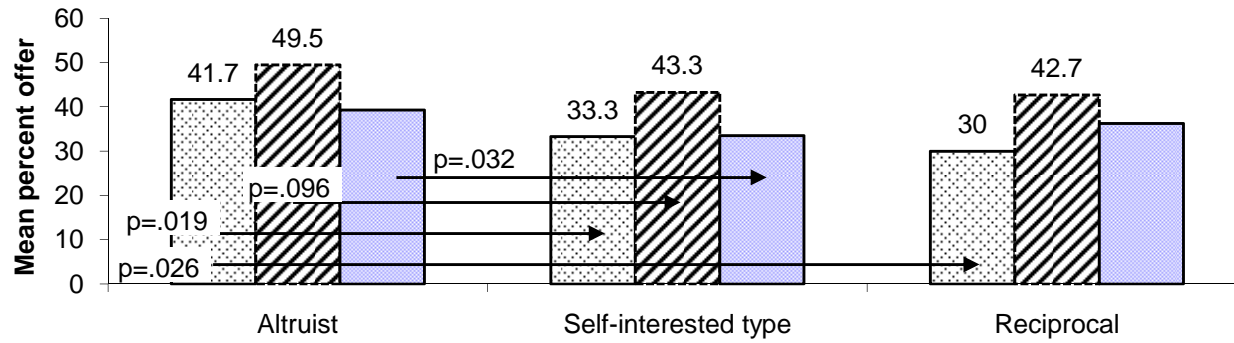
donation in dictator game

offer in non-convex ultimatum game

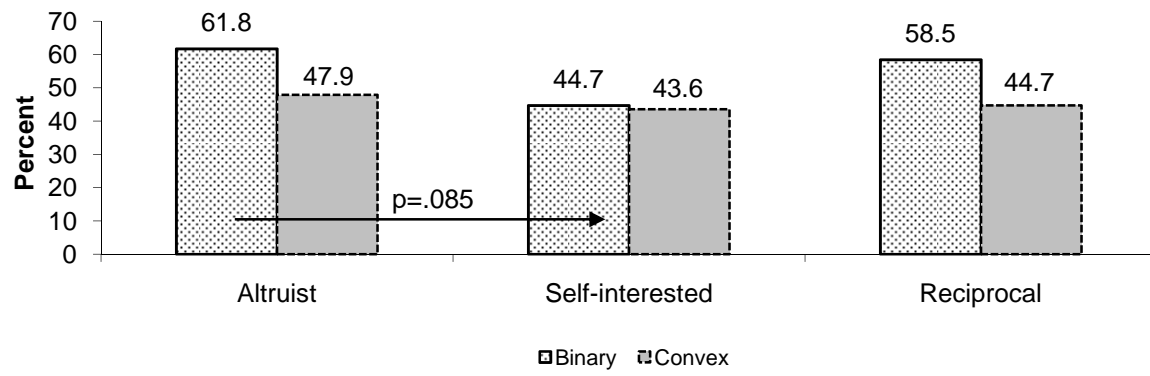dividing rule in convex ultimatum game;   p-values for Wilcoxon-Mann-Whitney test, two-sided

Figure 2. Convex Ultimatum game: Amount divided by player 2, by Typology

□Cut point for grid and group is 0.5; p-value for the Wilcoxon-Mann-Whitney test, two-sided

Figure 3. Trust game: Percentage of player 1 sent, out of $6, by Typology

Figure 4. Trust game: Percentage returned by player 2, by Typology