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Outcome Based Fairness and Reciprocity**

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The Effect of Ersatz Property Rights on  
Outcome Based Fairness and Reciprocity

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## Abstract

We report laboratory data on earned wealth effects in a series of anonymous dictator bargaining games. In addition to a standard (baseline) treatment in which the wealth to be bargained over was determined by the experimenter, we conduct treatments in which either the dictator or the receiver earned the wealth used in a subsequent bargaining phase. In our baseline treatment, we observe the standard result: on average, dictators offer receivers 20%. In treatments where the sender (i.e. dictator) earned wealth, we observe the theoretic prediction of zero offers to receivers. In treatments where the receiver earned wealth, we observe many hyper-fair offers (i.e. offers greater than 50%). We interpret these results as evidence of the importance of property rights in determining individuals' social preferences.

*JEL Classification:* C70, C91, D63

*Keywords:* Dictator Games, Earned Wealth Effects,  
Experiments, Social Preferences

# 1 Introduction

Experiments have demonstrated the presence of “other regarding behavior” and “social preferences” in which individuals reveal a preference over not only their own payoffs, but also those of others. For example, in simple ultimatum and dictator games where standard theory predicts near zero offers to receivers, senders typically offer in excess of 20% of their endowments. These results are strikingly robust across varying degrees of anonymity (Hoffman et al., 1996) and different cultures (Henrich et al., 2001; Roth et al., 1991). The insights gleaned from these experiments have motivated various theoretical approaches characterizing social preferences (see Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Fehr and Schmidt, 1999) and the intentions underlying individual behavior (see Dufwenberg and Kirchsteiger, 2004; McCabe and Smith, 2000; Rabin, 1993).

Experimental participants’ displayed preferences for fairness, reciprocity, and social welfare are multi-faceted; motivated by many aspects of the decision environment and the context of interactions. Here, we test the power of asset legitimacy and wealth entitlement through a series of dictator games in which one party must earn the wealth used in bargaining. (Thus, our experiments are in spirit similar to those conducted by Cherry et al, 2002, and Ruffle, 1998.) In particular, we conduct bargaining experiments in which receivers exert effort to earn money. This earnings stage is followed by a bargaining stage in which an anonymous dictator must allocate the money

between herself and the receiver, knowing that the receiver has exerted effort to earn this wealth. Note that this treatment mirrors a trust game akin to that of Berg et al. (1995) in which the receiver's exertion of (costly) effort indicates trust in the dictator not expropriating the wealth via a zero offer. Results from our receivers earning treatment are compared to a baseline (unearned wealth) dictator game treatment and a treatment in which dictators must exert effort to earn money.

We find that legitimacy of assets plays a crucial role in the way individuals bargain and display their concerns for others. Relative to the standard dictator game, we observe the theoretically predicted zero offer in our dictators earning treatments (demonstrating the robustness of the results in Cherry et al., 2002). Thus, dictators' perceived entitlement to wealth effectively eliminated any aversion to payoff inequities. On the other hand, dictators in our receivers earnings treatment allocate significantly more to receivers when they perceive receivers as entitled to the money through their efforts. Indeed, the fact that receivers exert any effort to earn money (money which they were fully aware could be expropriated by the dictator) indicates an expectation that the dictator will not follow the theoretic prediction of allocating receivers nothing.<sup>1</sup> One may interpret this as a strong indication of positive reciprocity in which the degree of reciprocity (as demonstrated by dictators' substantial offers to receivers) is increasing in the perceived enti-

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<sup>1</sup>The distribution of receiver's scores suggest that some receivers did indeed exert significant effort (see figure 1).

tlement of receivers (as inferred from receivers' earnings efforts): As receivers exert greater effort in the earnings phase (and thereby create greater wealth), we observe an increase in the number of "hyper-fair" offers made by senders (i.e. offers greater than 50%).

We attribute these decisions to the strength of asset legitimacy in creating perceived property rights among participants, a characteristic of the decision environment which appears to augment "other regarding" behavior. Most importantly, our results demonstrate the importance of asset entitlements in reducing individuals' attention to outcome based fairness at the expense of intention based fairness. That dictators who earned wealth uniformly extended zero offers indicates that the earned wealth effect trumps other regarding behavior associated with outcome based fairness (e.g. aversion to payoff inequities). On the other hand, earned wealth effects appear to deepen the positive reciprocity exhibited by dictators (i.e. intention based fairness): Receivers who generated greater wealth benefited from greater positive reciprocity on the part of dictators. Note that since earnings efforts (by either dictators or receivers) are sunk costs at the time of bargaining, our results provide strong evidence of the importance of sunk costs in determining the manner in which "fair" allocations are construed.<sup>2</sup>

We proceed as follows: section 2 outlines our experiment. As a benchmark, we conduct a canonical dictator game under anonymity against which

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<sup>2</sup>Thus our results are consistent with the literature in equity theory (see Walster et al., 1978). Konow (2000) finds experimental support for equity theory and differences in the ways individuals interpret fair allocations.

we measure our other results.<sup>3</sup> We conduct two earnings treatments in which either the dictator (sender) or the receiver must exert effort to earn wealth to be subsequently used in a bargaining phase. Section 3 presents our results. For the earnings treatment in which dictators exert effort, we observe 100% support for the theoretic prediction based on self-interested preferences. Strikingly, when it is receivers who must exert effort to earn wealth, offers are significantly higher relative to the baseline dictator game. Indeed, 42% of offers are hyper-fair. Section 4 briefly discusses our results in terms of recent research on fairness and reciprocity, the legitimacy of assets, and found money effects. Section 5 concludes.

## 2 Experimental Design

### Participants

Participants were recruited from the student body at our university. We conducted 7 sessions consisting of 168 bargaining pairs. Participants were randomly divided into two groups (A and B) with each group assigned to a separate room. When recruited, individuals were told the room and time they should arrive. Each group arrived at different times and individuals remained in their assigned rooms for the experiment's duration. Finally, each

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<sup>3</sup>The anonymity in our experiment is slightly weaker than the double blind procedure of Hoffman et al. (1996). The sessions were conducted entirely by graduate research assistants who we verified were not familiar with any of the participants. Despite this, our results match closely with the results of Hoffman et al. (1996) and Cherry et al. (2002) under the double blind protocol. See appendix A for a description of our protocols.



group was dismissed from the experiment at different times. The objective of these procedures was to eliminate any contact between participants. Further, participants in each room were only allowed to talk with the experiment's administrators.

### **Earnings Treatments**

To create a sense of asset entitlement or legitimacy, some subjects participated in an earnings stage prior to any bargaining.

In our *receiver earnings treatment*, individuals in group B had the opportunity to take an exam of 20 questions culled from the Graduate Management Admissions Test (GMAT) and the Graduate Record Examination (GRE).<sup>4</sup> Based on their performance, individuals in group B earned a sum of money to be used in the bargaining stage of the experiment. Specifically, if individuals in group B correctly answered between 0 and 8 questions, \$10 was generated; if they correctly answered between 9 and 14 questions, \$20 was generated; if they correctly answered 15 or more questions, \$40 was generated.

In the bargaining stage, an individual in group A was given information about the exam and the resulting sum of money. This individual had to allocate the amount of earned wealth through a one-shot dictator game. That is, individuals in group A decided how much of the money generated by individuals in group B would be kept for themselves and how much would be returned to the individual who had "earned" the money.

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<sup>4</sup>Copies of the instructions and the exam are provided in appendices B and C.

In our *dictator (sender) earnings treatment*, individuals in group A took the same exam and faced the same earnings (incentive) structure. This wealth was used in the bargaining stage where group A individuals made offers to group B individuals.

In our *baseline dictator treatment*, no exam was administered and group A dictators received randomly determined wealth levels of either \$10, \$20, or \$40 to allocate between themselves and group B receivers. This followed previous experiments in which the wealth to be distributed was determined by the experimenter.

### 3 Results

To begin, we consider the theoretical predictions from the above games. In all three treatments, standard theory (based on pure self-interest) predicts the dictator will allocate nothing to the receiver and, in the dictator earnings treatment, exert effort on the exam to yield a higher level of earned wealth. Thus, the dictator should keep everything and receivers should receive payoffs of zero. Given the dictator's behavior, in the receiver earnings treatment one would expect individuals in group B to exert no effort on the exam, thereby correctly answering (on average) between 0 and 8 questions and generating \$10.<sup>5</sup>

Figure 1 presents the distributions of exam scores in the dictator earnings

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<sup>5</sup>Each question had possible answers labelled A through E. An individual guessing on each question would expect, on average, to receive 4 correct answers.

and receivers treatments. Notice that the distribution of scores for subjects in the dictator earnings treatment is quite normal, while the distribution of scores for the subjects in the receiver earnings treatment is almost bi-modal. This suggests that some receivers “trusted” that dictators would reciprocate their effort on the test by allocating them a larger share of the pie than they would have otherwise. Notably, the proportion of receivers who scored 11 or more (and thereby mirror the earnings behavior in our dictators earning treatment) is 66%. This is very similar to the proportion who choose the trust strategy in McCabe et al. (2003).<sup>6</sup>

We provide the cumulative distributions of offers by wealth level (\$10, \$20, and \$40) in Figures 2, 3 and 4.<sup>7</sup> Figure 5 compares the cumulative distributions across the three different wealth levels for the receiver earnings treatment, while Figure 6 presents the frequency distributions for the baseline and receiver earnings treatments by wealth level. Table 1 presents the mean, median and percentage offers from our baseline and receiver earnings treatments.

In the baseline dictator treatments, the theoretically predicted “zero offer” occurred in 35% of \$10, 26% of \$20, and 11% of \$40 wealth levels. This is consistent with previous dictator game experiments (see Camerer, 2003).

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<sup>6</sup>Recall that the \$10 wealth level could be obtained with minimal effort and persists for scores of 8 or less.

<sup>7</sup>RE represents the receiver earning treatment, DE represents the dictator (sender) earnings treatment, and Baseline represents the baseline (i.e. unearned wealth) treatment. We had no \$10 wealth levels under the dictator earnings treatment: all dictators in this treatment exerted effort sufficient to earn at least \$20. The CDF labelled DE in Figure 2 is simulated based on the data presented in Cherry et al. (2002), Figure 1 (p. 1220).

Our dictator earnings treatment follows the theoretic prediction perfectly: 100% of dictators allocated nothing to receivers (Figures 3 and 4). This demonstrates the robustness of the results in Cherry et al. (2002): the legitimizing of dictators' claims over wealth increased the occurrence of the theoretic predictions over the baseline treatment. Again, that none of our dictators in the dictator earnings treatments scored less than 11 (the \$10 wealth level cut-off) suggests that they exerted significant effort on the test.

Our receiver earnings treatment paints a more striking picture of the importance and role of asset legitimacy. The results indicate that not only do individuals in group B exert significant effort on the exam (as evidenced by Figure 1), dictators in group A reward this effort, in some cases offering the entire amount of the money earned by the individual in group B. Legitimizing the *receiver's* claim to the wealth with the earnings stage dramatically *reduced* dictators' self-interested behavior, with zero offers arising in none (0%) of the \$40, one (3%) of the \$20, and six (38%) of the \$10 wealth levels. Fisher's exact  $p$  and Wilcoxon ( $W$ ) tests indicate that the distributions of offers (Figures 2, 3, and 4) are significantly different between the earnings and baseline treatments for the \$20 wealth level (Fisher's exact  $p = 0.001$ ;  $W = -3.803$ ,  $p = 0.0001$ ) and \$40 wealth level (Fisher's exact  $p < 0.001$ ;  $W = -5.114$ ,  $p < 0.0001$ ), but not for the \$10 wealth level (Fisher's exact  $p = 1.000$ ;  $W = -0.149$ ,  $p = 0.8813$ ). That there is no significant difference between the baseline and receiver earnings treatment for the \$10 wealth level supports our asset legitimacy hypothesis: Receivers who do not exert

a verifiable level of effort are treated in the same way as receivers in the endowment baseline treatment. Consistent with results in Berg et al. (1995) and McCabe et al. (2003), when dictators observe no verifiable evidence of receivers' trust (i.e. earnings effort in the face of potential expropriation), dictators do not reciprocate as with higher wealth levels.

Moreover, the incidence and degree of positive reciprocity was *increased* in the receiver earnings treatment, with hyper-fair offers arising in twenty (63%) of the \$40, eleven (31%) of the \$20, and two (13%) of the \$10 wealth levels. This contrasts sharply with the behavior of dictators in standard (unearned) wealth treatments: No dictator offers more than 50% of (unearned) wealth to receivers, regardless of wealth level.<sup>8</sup> The behavior of our dictators in the receiver earning treatment is inconsistent with most outcome based models of fairness but is consistent with intention based models of fairness.

Dictators' positive reciprocity is also evidenced by the wealth effect observed in our receiver earnings treatment. This wealth effect implies that greater levels of effort exerted by receivers (as evidenced by higher wealth levels) are rewarded not only with larger offers in absolute value, as is the case for the baseline, but also larger percentages of the total pie (see Table 1). Both the Kruskal-Wallis (*KW*) and Fisher's exact *p* tests for equality of populations suggest that the distributions of offers across wealth levels in the receiver earnings treatment (Figures 5 and 6) are highly signif-

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<sup>8</sup>This is also true in the baseline treatments from Cherry et al. (2002) and Ruffle (1998). Other dictator experiments observe a small number of offers in excess of 50%. See Andreoni et al. (2003) and Forsythe et al. (1994).

icant ( $KW\chi^2(2) = 19.538$ ,  $p = 0.001$ ; Fisher's exact  $p < 0.001$ ). Thus we can reject the hypothesis that receivers' efforts did not matter in the decision-making of dictators. In contrast, there is no significant wealth effect in the baseline treatments ( $KW\chi^2(2) = 0.067$ ,  $p = 0.9669$ , Fisher's exact  $p = 0.730$ ).

Comparing wealth levels across the receiver earning treatments in pairs suggests that offers made under the \$40 wealth level are significantly different from those made under both the \$10 and \$20 wealth levels. However, Fisher's exact test is unable to rule out the possibility that the median offer under the \$10 wealth level is significantly different from the median offer under the \$20 wealth level.<sup>9</sup> Both Figures 5 and 6 show that these three distributions are quite different with the \$20 wealth level falling in between the \$10 and \$40 wealth levels. Notice that in Figure 5 (the cumulative distribution diagram) the \$20 wealth level is very similar to the \$40 wealth level for low offers and very similar to the \$10 wealth level for the high offers. Figure 6 provides another view of the differences between wealth levels. Notice that in the receiver earnings treatment, the modal offer is zero for the \$10 wealth level, 50% for the \$20 wealth level, and 75% for the \$40 wealth level. In contrast,

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<sup>9</sup>Fisher's exact  $p = 0.185$ ,  $W = -2.486$ ,  $p = 0.0129$  comparing \$10 and \$20; Fisher's exact  $p = 0.001$ ,  $W = -3.824$ ,  $p = 0.0001$  comparing \$10 and \$40; Fisher's exact  $p = 0.003$ ,  $W = -3.131$ ,  $p = 0.0017$  comparing \$20 and \$40.

there is no discernable wealth effect in our baseline treatment.<sup>10</sup>

As in the comparison of offers under each wealth level between the receiver earnings and baseline treatments, this wealth effect implies that receivers earning larger endowments are rewarded by dictators via larger offers. Since a receiver can generate \$10 with minimal effort, dictators do not reward these individuals with the same type of offers made when either \$20 or \$40 is generated (i.e. more fair or hyper-fair offers). Thus, it appears that the strength of asset entitlement accruing to receivers and dictators' positive reciprocity are sensitive not only to the mere fact that effort was exerted in generating the bargaining "pie," but also to the inferred level of effort exerted.<sup>11</sup>

## 4 Discussion

Asset legitimacy plays a crucial role in decision-making, serving as a counterweight against individuals' attention to the payoffs of others. Thus, the implications drawn from more standard bargaining experiments regarding fairness concerns and inequity aversion should be tempered against the influence of "found money" effects (Arkes et al., 1994; Thaler, 1999). As demonstrated

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<sup>10</sup>For the difference between the \$10 and \$20 wealth levels, Wilcoxon and Fisher's exact  $p = 0.544$ ,  $W = 0.237$ ,  $p = 0.8130$ ; for the difference between \$10 and \$40 wealth levels, Wilcoxon and Fisher's exact  $p = 0.745$ ,  $W = 0.119$ ,  $p = 0.9056$ ; for the difference between \$20 and \$40 wealth levels, Wilcoxon and Fisher's exact  $p = 1.000$ ,  $W = -0.174$ ,  $p = 0.8620$ .

<sup>11</sup>If dictators did not believe that responders had exerted more effort to achieve a higher score we would not expect to see significant differences between the baseline and the receiver earning treatment. This is consistent with the results from Ruffle (1998).

by Cherry et al. (2002), legitimizing assets via earning by dictators can alter the ways in which individuals construe equity and fairness, resulting in behaviors that appear to defy the presence of social preferences.

Our results suggest that asset legitimacy goes both ways, creating an ersatz property right that mitigates a dictator’s self-interest during bargaining. Not only do individuals recognize their own entitlement to assets, but they recognize the entitlements of others. In fact, our results indicate that this observance of others’ “rights” to assets is increasing in the strength of asset legitimacy (i.e. the effort exerted in earning the assets). Moreover, individuals expect that others will recognize their entitlements: Receivers in our receiver earnings treatment exerted significant effort, although they had no way to guarantee this would be reflected in their final payoffs. From the perspective of dictators, the efforts of receivers created a motivation for hyper-fair offers, even though these efforts are sunk costs incurred by an anonymous individual.<sup>12</sup>

Thus, we observe a dichotomous effect of earned wealth in dictator game bargaining. First, individuals’ own entitlements to assets appear to dominate over the fairness concerns characterized in outcome based models of other regarding behavior (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999). Secondly, others’ entitlements to assets appear to amplify individuals’ observed adherence to intention based models of fairness (Dufwenberg

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<sup>12</sup>Our results provide a new interpretation of why sunk costs may matter to individuals (Arkes and Blumer, 1985; Thaler, 1980), even if these costs are incurred by another.



and Kirchsteiger, 2004; Rabin, 1993). Receivers' earning efforts reveal a trust in dictators not opting to fully expropriate the available wealth. This is reciprocally rewarded with greater offers (akin to greater trust yielding greater trustworthiness; see Berg et al., 1995; Fehr et al., 1993). This demonstrates how earned wealth effects influence outcome based fairness (which disappears in our dictator earnings treatment) and intention based fairness (which appears to be heightened in our receiver earnings treatment).

Our experiments complement the dictator experiments of Cherry et al. (2002) and Ruffle (1998). In Cherry et al. (2002), dictators (not receivers) earned wealth via a 17 question exam. In these experiments, legitimizing assets in this way resulted in 95% support for the theoretical zero offer.<sup>13</sup> In Ruffle (1998), receivers were ranked by their performance on a general knowledge quiz in which participants scoring in the top half of the score distribution were allocated \$10 with the remainder allocated \$4. As in our results, Ruffle (1998) finds that offers made to receivers in the top of the score distribution (mean offer 45%) exceed those made to receivers in the bottom of the score distribution (mean offer 23%) and in treatments in which endowments are randomly determined (mean offer 34%).

Our results provide stronger evidence as to the import of perceived property rights in decision-making. The strength of our results (particularly mean offers exceeding those in Ruffle, 1998, see Table 1) is due to earnings based on absolute, rather than relative, performance and the size of incentives. In

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<sup>13</sup>Similar results are presented in Cherry (2001).

particular, the use of absolute score to determine earnings implies that (in our context) dictators have a stronger signal of receivers' efforts than under a relative earning mechanism. This, combined with larger wealth levels, yields stronger evidence of the import of perceived property rights and dictators' "gratefulness" to receivers in determining senders' behavior. The presence of a wealth effect in our receivers earning treatment and the absence of any difference between offers made to receivers earning \$10 and our \$10 baseline treatment indicates that the "gratefulness" of dictators towards receivers is increasing in the inferred efforts of the latter.<sup>14</sup>

## 5 Conclusion

Many aspects of a decision environment influence how individuals perceive fairness in that environment. The experiments conducted here demonstrate how perceived property rights (asset legitimacy or asset entitlement) have a strong effect on individuals' behavior, and hence their demonstrated preferences over fairness. This points to a need to consider the import of asset legitimacy in models of individual decision-making. Asset legitimacy (as perceived property rights) appears to be something individuals readily observe in our experiments. Moreover, the other regarding behavior evidenced in our

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<sup>14</sup>Other experiments, notably Gächter and Riedl (2003), find further evidence of asset entitlement or "moral property rights." In these experiments, bargaining pairs consider a split of resources based on proportional (i.e. relative) performance as more fair than equal split allocations. Sonnegard (1996) finds that behavior in bargaining experiments is sensitive to framing effects in which property rights are reinforced by reminding senders of their "right to exploit their bargaining power."

results is most consistent with intention, rather than outcome, based models of fairness. These results should inform our models of social preferences and reciprocity by demonstrating another aspect of how individuals construe fairness and evaluate the welfare of others.

## References

- Andreoni, J., W. Harbaugh, and L. Vesterlund (2003). The carrot or the stick: Rewards, punishment and cooperation. *American Economic Review* 93(3), 893–902.
- Arkes, H. R. and C. Blumer (1985, June). The psychology of sunk cost. *Organizational Behavior and Human Decision Processes* 35(2), 124–140.
- Arkes, H. R., C. A. Joyner, M. V. Pezzo, K. Siegel-Jacobs, and E. Stone (1994, September). The psychology of windfall gains. *Organizational Behavior and Human Decision Processes* 59(3), 331–347.
- Berg, J., J. Dickhaut, and K. McCabe (1995). Trust, reciprocity, and social history. *Games and Economic Behavior* 10, 122–142.
- Bolton, G. E. and A. Ockenfels (2000). A theory of equity, reciprocity, and competition. *American Economic Review* 30(1), 166–193.
- Camerer, C. F. (2003). *Behavioral Game Theory*. Princeton NJ: Princeton University Press.
- Charness, G. and M. Rabin (2002, August). Understanding social preferences with simple tests. *Quarterly Journal of Economics* 117(3), 817–869.
- Cherry, T. L. (2001). Mental accounting and other-regarding behavior: Evidence from the lab. *Journal of Economic Psychology* 22, 605–615.

- Cherry, T. L., P. Frykblom, and J. F. Shogren (2002, September). Hardnose the dictator. *American Economic Review* 92(4), 1218–1221.
- Dufwenberg, M. and G. Kirchsteiger (2004). A theory of sequential reciprocity. *Games and Economic Behavior*, forthcoming.
- Fehr, E., G. Kirchsteiger, and A. Riedl (1993). Does fairness prevent market clearing? An experimental investigation. *Quarterly Journal of Economics* 108(2), 437–460.
- Fehr, E. and K. Schmidt (1999, August). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics* 114(3), 817–868.
- Forsythe, R., J. L. Horowitz, N. Savin, and M. Sefton (1994). Fairness in simple bargaining experiments. *Games and Economic Behavior* 6(3), 347–369.
- Gächter, S. and A. Riedl (2003, May). Moral property rights in bargaining with infeasible claims. CESifo Working paper No. 697.
- Henrich, J., R. Boyd, S. Bowles, C. Camerer, E. Fehr, H. Gintis, and R. McElreath (2001, May). In search of homo-economicus: Behavioral experiments in 15 small-scale societies. *American Economic Review* 91(2), 73–78.
- Hoffman, E., K. McCabe, and V. Smith (1996, June). Social distance and other-regarding behavior in dictator games. *American Economic Review* 86(3), 653–660.

- Konow, J. (2000). Fair shares: Accountability and cognitive dissonance in allocation decisions. *American Economic Review* 90(4), 1072–1091.
- McCabe, K. A., M. L. Rigdon, and V. L. Smith (2003). Positive reciprocity and intentions in trust games. *Journal of Economic Behavior and Organization* 52, 267–275.
- McCabe, K. A. and V. L. Smith (2000). Goodwill accounting in economic exchange. In G. Gigerenzer and R. Selten (Eds.), *Bounded Rationality: The Adaptive Toolbox*, pp. 319–340. Cambridge MA: MIT Press.
- Rabin, M. (1993). Incorporating fairness into game theory and economics. *American Economic Review* 83, 1281–1302.
- Roth, A. E., V. Prasnikar, M. Okuno-Fujiwara, and S. Zamir (1991, December). Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An experimental investigation. *American Economic Review* 81(5), 1068–1095.
- Ruffle, B. J. (1998). More is better, but fair is fair: Tipping in dictator and ultimatum games. *Games and Economic Behavior* 22, 247–265.
- Sonnegard, J. (1996). Determination of first movers in sequential bargaining games: An experimental study. *Journal of Economic Psychology* 17, 359–386.
- Thaler, R. H. (1980). Towards a positive theory of consumer choice. *Journal of Economic Behavior and Organization* 1, 39–60.

Thaler, R. H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making* 12, 183–206.

Walster, E., G. Walster, and E. Berscheid (1978). *Equity: Theory and Research*. Boston: Allyn and Bacon.

## A Experimental Protocols

The following protocol was observed for each receiver earnings treatment. These protocols were adapted from the double-blind protocols in Hoffman et al. (1996). Our intent was to provide as much anonymity as possible. Due to the absence of a Canadian one dollar bill, following the double-blind procedures in Hoffman et al. (1996) was not feasible.

1. The rules were read aloud to individuals in each group.<sup>15</sup> Several warm-up questions were asked to ensure individuals understood the structure of the game, particularly the bargaining stage. After the instructions were read and any questions were answered, the experimenter left the room and two student monitors entered to administer the experiment.<sup>16</sup>
2. Individuals in group B were given exams and told that money would be generated based on the following (incentive) structure: if they correctly answered at least 8 questions, \$10 would be generated; if they correctly answered between 9 and 14 questions, \$20 would be generated; if they correctly answered between 15 and 20 questions, \$40 would be generated. Individuals were given 45 minutes to complete the exam. After completing the exam, the monitors marked the exams and gave each participant a receipt with their randomly assigned participant number, their exam score, and the amount of money corresponding to their exam score. This receipt was retained by the individual in group B. A second receipt was produced, indicating only the funds generated and the participant's number, and placed in an envelope.
3. Individuals in group A were asked to arrive 45 minutes later than individuals in group B. These individuals were read the instructions and any questions were answered. Each individual received a copy of the exam participants in group B had taken and was given a maximum of 10 minutes to review the exam. In addition, individuals in group A were given a copy of the payment schedule used to determine the amount of money associated with exam scores.<sup>17</sup> Although not mentioned to

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<sup>15</sup>To avoid semantic difficulties, the words “earned” and “allocated” were never used in describing the experiment to participants.

<sup>16</sup>As individuals were arriving for the exam, the student monitors had an opportunity to observe the participants and were asked if they knew anyone participating in the exam. If they did, they were excluded from administering that group's session.

<sup>17</sup>Exam scores were known only to individuals in group B.



participants, the intent was that they would attempt to discern the difficulty of the exam and the effort necessary to generate each of the possible wealth levels. After the instructions were read and materials were distributed, the experimenter left and a student monitor entered the room.

4. The second receipts (generated during step 2) were taken to the room in which group A was located. Individuals in group A were randomly matched with individuals in group B and received an envelope containing a receipt indicating the amount of money generated by their bargaining partner. On this receipt they recorded their offer to the individual in group B. The monitor produced a third receipt indicating the initial amount of wealth (generated by an individual in group B during step 2) and the offer made by the group A bargaining partner. These receipts were retained by individuals in group A and the second receipts were placed in their envelopes and returned to the monitor. Individuals in group A then were asked to complete a demographic questionnaire and received their payoffs in private.
5. The second receipts, which now included information on the amount of money generated and the offers made to group B members, were returned to group B. Each individual provided their first receipt (produced in step 2) prior to receiving the receipt indicating their offer. This ensured proper matching of individuals with their exam performance. Members of group B received their payoffs in private and were allowed to leave approximately 15 minutes prior to individuals from group A.

Three treatments were conducted. Our receiver earnings treatment proceeded as described above. In our *dictator (sender) earnings treatment* the above protocols were observed except that individuals in group A took the exam and generated a level of wealth (step 2) prior to making offers to individuals in group B (step 4). In our *(baseline) dictator treatment*, the experiment essentially began with step 4 above (no exam was administered) and group A dictators received receipts indicating a randomly determined wealth level of \$10, \$20, or \$40 to allocate between themselves and group B receivers. This followed previous experiments in which the wealth to be distributed was determined by the experimenter.

## B Instructions

*The following instructions were used in the receiver earnings treatments. Similar instructions were used in the other treatments.*

### B.1 Instructions to Receivers

This is an experiment in economic decision-making. During the experiment you will be asked to make a number of decisions. Depending on the outcome of your decisions, you may receive certain sums of money.

Throughout the experiment, we request that you refrain from talking with one another. The experiment will proceed as follows:

You will be asked to complete an exam consisting of 20 questions pulled from the GMAT and the GRE. You will have 45 minutes to complete the exam. You may work as much or as little as you would like on the exam.

Based on your exam score, a sum of money will be assigned. Specifically, if you correctly answer between 0 and 8 questions, you will generate \$10; if you correctly answer between 9 and 14 questions, you will generate \$20; if you correctly answer 15 or more questions, you will generate \$40.

Once this amount of money is determined (by your exam score), another participant in another room will be asked to make a decision over the distribution of this money. Specifically, the amount of money you generate will be written on a receipt and delivered to a participant in another location (another room in this building). This participant will have an opportunity to review the same exam you completed to discern its difficulty. While she will not know your score on the exam, she will know your endowment and how it was determined by your score. This participant will then decide how much of this money you will retain. That is, she will decide how of the money you generated you will receive. She will keep the remainder.

Upon making this decision, the receipt will be returned to you, indicating the amount of money you generated and the amount of money you will keep. At the conclusion of the experiment you will receive this latter amount.

Thank you for participating in this experiment.

#### Warm-Up Exercises

1. Suppose you scored 11 on the exam, what is your endowment?

2. If your endowment is \$20 and the other participant chooses to keep \$8, how much will you receive?
3. If your endowment is \$10 and you receive \$6, how much does the other person receive?

## **B.2 Instructions to Senders**

This is an experiment in economic decision-making. During the experiment you will be asked to make a number of decisions. Depending on the outcome of your decisions, you may receive certain sums of money.

Throughout the experiment, we request that you refrain from talking with one another. The experiment will proceed as follows:

In each of your folders is an exam consisting of 20 questions pulled from the GMAT and the GRE. In a separate room, another participant has had 45 minutes to complete the same exam.

Based on this individual's exam score, a sum of money has been generated. Specifically, if she correctly answered between 0 and 8 questions, she generated \$10; if she correctly answered between 9 and 14 questions, she generated \$20; if she correctly answered 15 or more questions, she generated \$40.

You will shortly be given an envelope. In this envelope is a receipt indicating the amount of money generated by another person having taken the exam. Although you do not have information on the individual's score on the exam, you can infer the range of her score from the above information.

You must decide how this money will be distributed between yourself and the individual having taken the exam. Specifically, you may choose how much of this money you will keep and how much will be given to the other individual. Thus, if the other individual has generated \$20 (implying her score was between 10 and 14 correct answers) you must decide how much of this money you will keep (an integer between \$0 and \$20) and how much the other individual will keep (an integer between \$0 and \$20). Please note that the amounts you and the other participant receive must sum to the amount of money generated.

Once you have chosen how to distribute this money, complete the receipt indicating the amount you shall receive and the amount the individual taking the exam will receive.

When you have made this decision, please put the receipt in the envelope and return it to the experimenter. The experimenter will review your receipt, making sure the amounts you and the other participant receive sum to the amount of the endowment. The receipt will then be returned to the participant having taken the exam. This participant will receive the amount of money you indicated on the receipt. After she has been paid, you will receive the amount you indicated on the receipt.

Thank you for participating in this experiment.

### **Warm-Up Exercises**

1. Suppose the other participant scored 11 on the exam, what is her endowment?
2. If the other participant's endowment is \$20 and you choose to keep \$8, how much will the other participant receive?
3. If the other person's endowment is \$10 and she receives \$6, how much will you taken?

## C Exam Questions

*The following exam was used in all earnings treatments.*

**Directions:** Solve the problem and indicate the best answer of the choices given.

- How many minutes does it take John to type  $y$  words if he types at the rate of  $x$  words per minute?
  - $\frac{x}{y}$
  - $\frac{y}{x}$
  - $\frac{60x}{y}$
  - $\frac{y}{60x}$
- The size of a television screen is given as the length of the screen's diagonal. If the screens were flat, then the area of a square 21-inch screen would be how many square inches greater than the area of a square 19-inch screen?
  - 2
  - 4
  - 16
  - 38
  - 40
- The positive integer  $n$  is divisible by 25. If  $\sqrt{n}$  is greater than 25, which of the following could be the value of  $\frac{n}{25}$ ?
  - 22
  - 23
  - 24
  - 25
  - 26

**Directions:** In these questions, you are to classify each problem according to the five fixed answer choices, rather than find a solution to the problem. Each problem consists of a question and two statements. You are to decide whether the information in each statement alone is sufficient to answer the question or, if neither is, whether the information in the two statements together is sufficient.

4. Is the integer  $n$  odd?
- (a)  $n$  is divisible by 3.
  - (b)  $n$  is divisible by 5.
- a. Statement (4a) ALONE is sufficient, but statement (4b) alone is not sufficient.
  - b. Statement (4b) ALONE is sufficient, but statement (4a) alone is not sufficient.
  - c. BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
  - d. EACH statement ALONE is sufficient.
  - e. Statements (4a) and (4b) TOGETHER are NOT sufficient.
5. On Monday a certain machine ran continuously at a uniform rate to fill a production order. At what time did it completely fill the order that morning?
- (a) The machine began filling the order at 9:30 a.m.
  - (b) The machine had filled  $\frac{1}{2}$  of the order by 10:30 a.m. and  $\frac{5}{6}$  of the order by 11:10 a.m.
- a. Statement (5a) ALONE is sufficient, but statement (5b) alone is not sufficient.
  - b. Statement (5b) ALONE is sufficient, but statement (5a) alone is not sufficient.
  - c. BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
  - d. EACH statement ALONE is sufficient.

- e. Statements (5a) and (5b) TOGETHER are NOT sufficient.
6. What is the number of 360-degree rotations that a bicycle wheel made while rolling 100 meters in a straight line without slipping?
- (a) The diameter of the bicycle wheel, including the tire, was 0.5 meter.
  - (b) The wheel made twenty 360-degree rotations per minute.
- a. Statement (6a) ALONE is sufficient, but statement (6b) alone is not sufficient.
  - b. Statement (6b) ALONE is sufficient, but statement (6a) alone is not sufficient.
  - c. BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
  - d. EACH statement ALONE is sufficient.
  - e. Statements (6a) and (6b) TOGETHER are NOT sufficient.

**Directions:** Select the best answer of the choices given.

7. Increases in the level of high-density lipoprotein (HDL) in the human bloodstream lower bloodstream-cholesterol levels by increasing the body's capacity to rid itself of excess cholesterol. Levels of HDL in the bloodstream of some individuals are significantly increased by a program of regular exercise and weight reduction.

Which of the following can be correctly inferred from the statements above?

- a. Individuals who are underweight do not run any risk of developing high levels of cholesterol in the bloodstream.
- b. Individuals who do not exercise regularly have a high risk of developing high levels of cholesterol in the bloodstream late in life.
- c. Exercise and weight reduction are the most effective methods of lowering bloodstream cholesterol levels in humans.
- d. A program of regular exercise and weight reduction lowers cholesterol levels in the bloodstream of some individuals.

- e. Only regular exercise is necessary to decrease cholesterol levels in the bloodstream of individuals of average weight.
8. The average normal infant born in the United States weighs between twelve and fourteen pounds at the age of three months. Therefore, if a three-month-old child weighs only ten pounds, its weight gain has been below the United States average.

Which of the following is a flaw in the reasoning above?

- a. Weight is only one measure of normal infant development.
- b. Some three-month-old children weigh as much as 17 pounds.
- c. It is possible for a normal child to weigh ten pounds at birth.
- d. The phrase "below average" does not necessarily mean insufficient.
- e. Average weight gain is not the same as average weight.

**Directions:** The question presents a sentence, part of which or all of which is underlined. Beneath the sentence you will find five ways of phrasing the italicized part. The first of these repeats the original; the other four are different. If you think the original is best, choose the first answer, otherwise choose one of the others.

9. In virtually all types of tissue in every animal species, dioxin induces the production of enzymes that are the organism's *trying to metabolize, or render harmless, the chemical that is irritating it*.
- a. trying to metabolize, or render harmless, the chemical that is irritating it
  - b. trying that it metabolize, or render harmless, the chemical irritant
  - c. attempt to try to metabolize, or render harmless, such a chemical irritant
  - d. attempt to try and metabolize, or render harmless, the chemical irritating it
  - e. attempt to metabolize, or render harmless, the chemical irritant
10. The psychologist William James believed that facial expressions not only provide a visible sign of an *emotion, actually contributing to the feeling itself*.



- a. emotion, actually contributing to the feeling itself
  - b. emotion but also actually contributing to the feeling itself
  - c. emotion but also actually contribute to the feeling itself
  - d. emotion; the also actually contribute to the feeling of it
  - e. emotion; the feeling itself is also actually contributed by them
11. Some bat caves, like honeybee hives, have residents that take on different duties such as defending the entrance, *acting as sentinels and to sound* a warning at the approach of danger, and scouting outside the cave for new food and roosting sites.
- a. acting as sentinels and to sound
  - b. acting as sentinels and sounding
  - c. to act as sentinels and sound
  - d. to act as sentinels and to sound
  - e. to act as a sentinel sounding

**Directions:** In each of the following antonym questions, pick the word most nearly OPPOSITE in meaning to the capitalized word.

12. TRANSIENCE:
- a. slowness
  - b. permanence
  - c. lack of caution
  - d. desire for perfection
  - e. original nature
13. FICKLE:
- a. spotless
  - b. industrious
  - c. welcome
  - d. urgent
  - e. loyal

14. ORTHODOXY:

- a. renown
- b. trepidation
- c. unconventionality
- d. inquisitiveness
- e. remoteness

15. CREDIT:

- a. believe false
- b. treat as equal
- c. make more difficult
- d. underemphasize
- e. forget

**Directions:** Choose the lettered pair of words whose relationship is MOST LIKE the relationship expressed in the original linked pair.

16. CAPTAIN : SHOAL ::

- a. lawyer : litigation
- b. pilot : radar
- c. soldier : ambush
- d. doctor : hospital
- e. corporal : sergeant

17. HELMET : HEAD ::

- a. pedal : foot
- b. gun : hand
- c. breastplate : chest
- d. pendant : neck
- e. knapsack : back

**Directions:** Below each sentence are five words or sets of words. For each blank, pick the word or set of words that BEST reflects the sentence's overall meaning.

18. Despite the mixture's . . . . . nature, we found that by lowering its temperature in the laboratory we could dramatically reduce its tendency to vaporize.
- a. resilient
  - b. volatile
  - c. homogeneous
  - d. insipid
  - e. acerbic
19. Normally an individual thunderstorm lasts about 45 minutes, but under certain conditions the storm may . . . . ., becoming ever more severe, for as long as four hours.
- a. wane
  - b. moderate
  - c. persist
  - d. vacillate
  - e. disperse
20. Her novel published to universal acclaim, her literary gifts acknowledged by the chief figures of the Harlem Renaissance, her reputation as yet . . . . . by envious slights, Hurston clearly was at the . . . . . of her career.
- a. undamaged . . . . . ebb
  - b. untarnished . . . . . zenith
  - c. untainted . . . . . extremity
  - d. blackened . . . . . mercy
  - e. unmarred . . . . . brink

Table 1: Percentage Offers by Treatment and Wealth Level

Wealth	Mean	Median	Offers Between			
			0%	1 - 49%	50%	51 - 100%
<b>Baseline Dictator Treatment</b>						
\$10	23.5% (4.717) [20]	20%	35.00%	35.00%	30.00%	0%
\$20	20.22% (3.604) [23]	25%	26.09%	60.87%	13.04%	0%
\$40	20% (3.776) [18]	18.75%	11.11%	77.78%	11.11%	0%
<b>Receiver Earnings Treatment</b>						
\$10	27.5% (7.665) [16]	20%	37.50%	25.00%	25.00%	12.50%
\$20	46% (4.220) [35]	50%	2.86%	40.00%	25.71%	31.42%
\$40	63.83% (3.663) [32]	75%	0.00%	15.63%	15.63%	62.86%

Standard Errors are in parenthesis and number of observations are in square brackets.

This paper can be downloaded without charge from  
<http://www.econ.ucalgary.ca/research/research.htm>