Status Quo Effects in Fairness Games: Reciprocal Responses to Acts of Commission vs. Acts of Omission

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Abstract

Both the law and culture make a central distinction between acts of commission that overturn the status quo and acts of omission that uphold it. In everyday life acts of commission often elicit stronger reciprocal responses than do acts of omission. In this paper we compare reciprocal responses to both types of acts and ask whether behavior of subjects in three experiments is consistent with existing theory. The design of the experiments focuses on the axioms of revealed altruism theory (Cox, Friedman, and Sadiraj, 2008) that make it observationally distinct from other theories. We find support for this theory in all three experiments.

1. Introduction

Does it make a difference whether an event results from action or inaction by another person? In this paper we compare reciprocal responses to acts of commission that actively impose harm or kindness and acts of omission, representing failure to prevent harm or to act kindly. We use three experiments to test a hypothesis implied by revealed altruism theory (Cox, Friedman and Sadiraj, 2008), that acts of commission induce stronger reciprocal responses than comparable acts of omission.

There are many everyday examples where acts of commission yield stronger reciprocal responses than do acts of omission. For example, a waiter may be rewarded with an extremely large tip for going out of his way to serve a customer but might still be tipped according to the norm even if he failed to fulfill an extraordinary request. A mobster may retaliate with a bloody vengeance because someone intentionally hurt his family member but might not hurt a bystander who did not prevent the harm. Legal consequences may vary from probation to capital punishment to damages in millions of dollars depending on level of intent inferred from acts of commission or omission.

Acts of commission vs. acts of omission have important implications for legal decisions because they are often used to infer defendants' intentions. In criminal law, *actus reus* (the act of committing a crime) and *mens rea* (the state of mind) are crucial when deciding whether a person is guilty of a specific crime, some other crime, or no crime. The party responsible for the death of a human being can be convicted of criminally negligent homicide if the death was caused (beyond reasonable doubt) by a form of gross negligence. For example, gross negligence includes the failure to stop and render aid in a hit-and-run accident, which is an act of omission. A murder conviction, however, requires that the person had (beyond reasonable doubt) an intention to kill, which (in the vast majority of known murder cases) is inferred from acts of commission.

In tort law, compensatory damages are awarded for ordinary negligence due to the harmful consequences of an act of omission. However, in a particularly egregious case where the tort was reasonably foreseeable and, despite this, the harmful act was committed then punitive damages may be awarded.[1, 2]

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[1] "To support award of punitive damages, act which constitutes the cause of action must be activated by or accompanied with some evil intent, or must be the result of such gross negligence - such disregard of

The distinction between acts of commission and acts of omission has been explored in depth by philosophers whose main focus was on morality of the action. Some philosophers conclude that the distinction between the two types of acts is often morally irrelevant (Bennett 1966, 1981, 1983; Singer, 1979; Hare, 1981) while others argue for the relevance of the distinction (Kagan, 1988; Kamm, 1986; Steinbock, 1980).[3] Psychologists point out that some of the cases studied by philosophers often differ in other aspects than just acts of commission vs. omission and that philosophers themselves are often subject to psychological biases, and therefore it is reasonable to assume that there is no difference in morality between the two types of acts. Under this assumption they study causes of the *omission bias* (i.e., when subjects judge harmful commissions as worse than the corresponding omissions), such as loss aversion, exaggeration effect, overgeneralization, and commissions being linked to causality judgments.[4] The omission bias is closely related to the *bias toward the status quo*, "doing nothing or maintaining

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another's rights - as is deemed equivalent to such intent." (Newport v. USAA 11 P.3d 190 Okla., 2000, July 18, 2000). See also Feinberg (1984) on further discussion on how the law distinguishes between acts of commission and acts of omission.

[2]An interesting example of awarding punitive damages is the tobacco litigation. In Florida, the information that the tobacco industry knew that cigarettes were harmful, nicotine was addictive, and there were risks from second-hand smoking, obtained in the mid-nineties by whistleblowers Merrell Williams and Jeffrey Wigand, was used for the first time in a jury trial. It was the first time that an individual won a lawsuit for lung cancer. In 2000, a Florida jury awarded the biggest punitive damages in US history at the time, $144.8 billion. This lawsuit explored the pattern of lies and bogus claims produced by tobacco companies while knowing that the use of their product was detrimental to consumers' health and could cause death. The jury foreman said: "This verdict wasn't about the state of the tobacco industry today. It was about 50 years of fraud, misrepresentation, and lying to the American public." (Tobacco News, www.tobacconews.org) According to the jury verdict, the amount of punitive damages was not as important as the strong message of the large judgment and that Big Tobacco must – and will – be held accountable (Schlueter, 2005, p. 573-577).

[3] A representative of this debate is the famous ethics thought experiment involving a trolley: "A trolley is running out of control down a track. In its path are five people who have been tied to the track by a mad philosopher. Fortunately, you could flip a switch, which will lead the trolley down a different track to safety. Unfortunately, there is a single person tied to that track. Should you flip the switch or do nothing?" (Foot, 1978). See also Thomson 1985; Unger, 1996; Kamm, 1989, Greene, 2007, Moll and de Oliveira-Souza, 2007.

[4] For a further discussion see Spranca, Minsk, and Baron (1991) who also present an interesting psychology experiment showing that subjects often rate harmful omissions as less bad than harmful commissions. Subjects' ratings are associated with judgments that omissions do not cause outcomes.

one's current or previous decision" that Samuelson and Zeckhauser (1988) found in risky as well as in riskless choices and which has also been found in reactions to outcomes (Kahneman and Tversky, 1982; Viscusi, Magat, and Huber, 1987; Knetsch, Thaler, and Kahneman, 1988; Ritov and Baron, 1992; Baron and Ritov, 1994). The current paper digs deeper in exploring the impact of the status quo, which distinguishes acts of commission from acts of omission, by focusing on its relevance for the strength of reciprocal responses.

The above examples offer straightforward illustration of the relationship between reciprocity and the status quo. In fact, the intuition is so convincing that it has been formally embedded in the theory of revealed altruism (Cox, Friedman, and Sadiraj, 2008). A careful reader may quickly note that the examples are not fully spot-on with the theory (and they are not meant to be). As is often the case with examples from everyday life, there are numerous features of the examples that vary systematically between the scenarios, which prevents their clean interpretation.[5] A controlled laboratory environment, however, makes feasible a clean manipulation of the status quo while keeping everything else constant. This enables us to test the hypothesized relationship between reciprocity and the status quo.

The central question of our study can be stated as: Do acts of commission that overturn the status quo generate a stronger reciprocal response than acts of omission which uphold it? Consider the following two stylized thought experiments.

Scenario 1: Your initial wealth is $100K and John's initial wealth is $100K.

A. Suppose John had an opportunity to give you $10K but did not do so. Would you want to punish him?
B. Now suppose John does give you $10K. Would you want to reward him?

[5] For example, most, if not all, everyday life examples suffer from the fact that acts of commission differ from acts of omission in some other aspect(s) of behavior, usually the amount of effort necessary to take an action. Such confounds can cloud the intuition and make it hard to unambiguously attribute the causality solely to the difference between commission and omission.

Scenario 2: Your initial wealth is \$110K and John's initial wealth is \$90K.

C. Suppose John had an opportunity to take \$10K from you but did not do so. Would you want to reward him?
D. Now suppose that John does take \$10K from you. Would you want to punish him?

The two scenarios highlight the relationship between reciprocity and status quo. In Scenario 1, the status quo is that you did not own the \$10K and John: (i) did not give it to you (an act of omission); or (ii) did give it to you (an act of commission). In Scenario 2, the status quo is that you did own the \$10K and John: (i) did not take it from you (an act of omission); or (ii) did take it from you (an act of commission).

The importance of status quo and acts of commission or omission are particularly compelling when comparing scenario 1.A with 2.D and 1.B with 2.C. In both scenarios 1.A and 2.D, your final payoff is \$100K and John's final payoff is also \$100K. But in scenario 2.D John actively takes \$10K from you while in scenario 1.A he passively makes no change in payoffs. In both scenarios 1.B and 2.C your final payoff is \$110K and John's is \$90K. But in scenario 1.B John actively gives you \$10K while in scenario 2.C he passively makes no change.

Distributional preference theories do not discriminate between acts of commission, acts of omission, and no opportunity to act and, hence, make no distinction between scenarios 1.A and 2.D nor between 1.B and 2.C. These distinctions, however, are central to understanding reciprocal preferences. Cox (2004) focused on the importance of the distinction between acts of commission vs. no opportunity to act in experimental designs for studying trust and reciprocity. Cox, Friedman, and Sadiraj (2008) developed a theory of reciprocity that focuses on all three types of acts. Their Axiom S captures the intuition behind the distinction between Scenarios 1 and 2: an act of commission implies stronger reciprocal response than an act of omission. (We give a detailed description of Axiom S in a later section.)

Little empirical work, however, has focused on the effects of acts of commission vs. acts of omission defined relative to the status quo. In this paper we report direct evidence on this topic. We present three experiments specifically designed to discriminate between revealed altruism theory and theories of distributional preferences that make no distinction between opportunities and payoffs resulting from acts of commission or acts of omission. Experiments differ in the manner in which the status quo is induced. This allows us to perform a check of robustness of the predictions of revealed altruism theory to alternative experimental protocols.

Each experiment has two treatments in which we compare the behavior in two games that vary in terms of their induced status quo, i.e. with respect to their initial endowments, which creates the distinction between acts of commission and acts of omission. Importantly, we keep the terminal payoffs in both games the same, which gives us a clean test of the empirical significance of opportunities and payoffs that result from acts of commission versus acts of omission.

2. Status Quo Treatments

Our experimental design includes two treatments. In treatment $T_{15,5}$, shown in Figure 1, the first mover, Player A has an endowment of 15 dollars and the second mover, Player B has an endowment of 5 dollars. Player A has two possible moves: she can choose "Uphold (15,5)," that is make no change in the endowments, or she can choose to "Give 5" out of her 15 dollar endowment to Player B. If Player A chooses "Uphold (15,5)" then Player B has two possible choices: he can choose "No Decrease" or

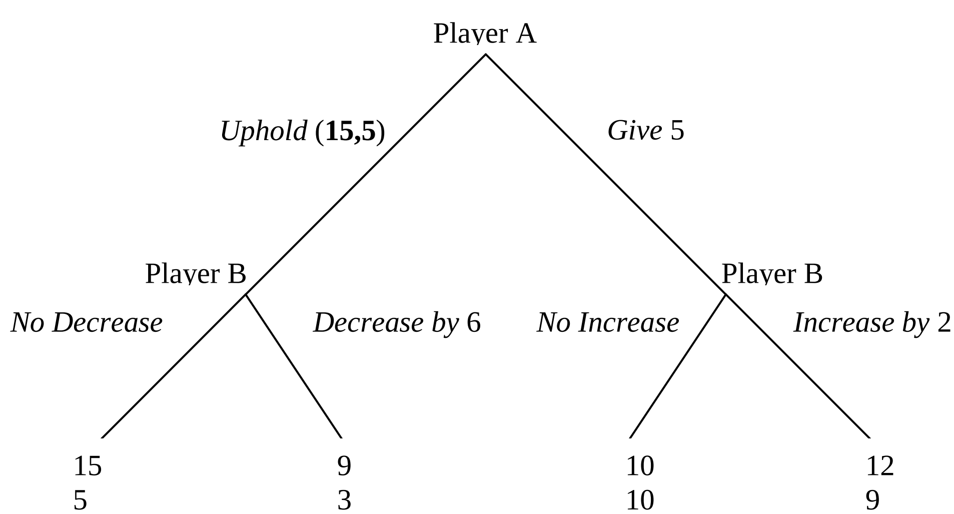

Figure 1. Treatment $T_{15,5}$

he can choose to "Decrease by 6" the endowment of Player A at a cost to himself of 2 dollars. These possible choices in treatment $T_{15,5}$, and the money payoffs they yield, are shown on the left side (or leg) of Figure 1. The top number at a terminal node of the game tree is the dollar payoff to Player A and the bottom number is the dollar payoff to Player B. If Player A decides to "Give 5" to Player B then Player B has two possible choices: she can choose "No Increase" or she can choose to "Increase by 2" the endowment of Player A at a cost to herself of 1 dollar. These possible choices in treatment $T_{15,5}$, and the money payoffs they yield, are shown on the right side (or leg) of Figure 1.

In treatment $T_{10,10}$, shown in Figure 2, both Player A and Player B have 10 dollar endowments. Player A has two possible moves: she can choose to "Take 5" from Player B or choose "Uphold (10,10)", that is make no change in the endowments. If Player A chooses "Take 5" then Player B has two possible choices: he can choose "No Decrease" in the modified endowments or he can choose (to) "Decrease by 6" the modified endowment of Player A at a cost to himself of 2 dollars. These possible choices in treatment $T_{10,10}$, and the money payoffs they yield, are shown on the left side (or leg) of Figure 2. If Player A chooses "Uphold (10,10)" then Player B has two possible choices: she can choose "No Increase" or she can choose (to) "Increase by 2" the endowment of

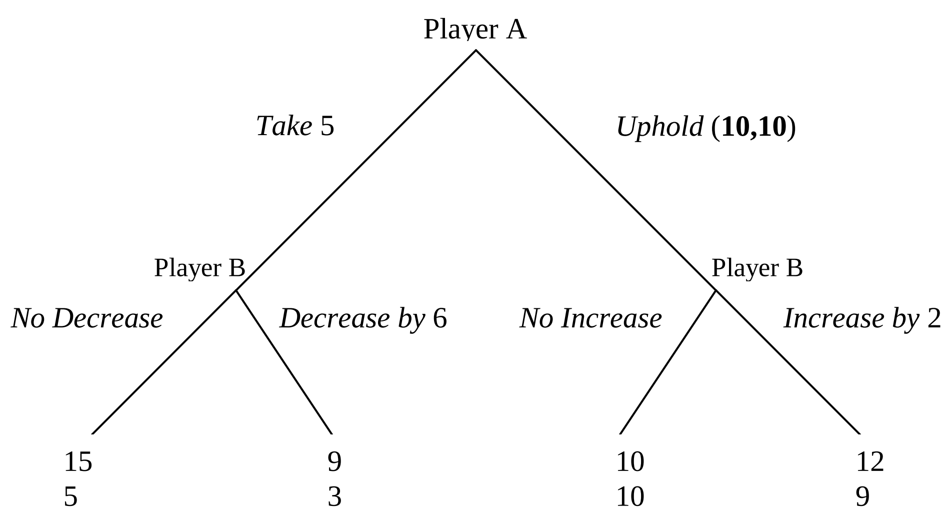

Figure 2. Treatment $T_{10,10}$

Player A at a cost to herself of 1 dollar. These possible choices in treatment $T_{10,10}$, and the money payoffs they yield, are shown on the right side (or leg) of Figure 2.

Figure 1 and Figure 2 have the same ordered pairs of money payoffs at their corresponding terminal nodes. However, in order to reach a terminal node with given money payoffs (*x*, *y*), Player A and Player B must choose a different sequence of actions in treatment $T_{15,5}$ than in treatment $T_{10,10}$. Whether or not it is only the payoffs at the terminal nodes that are predicted to determine agent choices or, alternatively, both payoffs and actions, depends on the theoretical model. In a theory of reciprocity, such as Cox, Friedman, and Sadiraj (2008), a first mover's more or less generous action can make a second mover more or less altruistic.

3. Implications of Alternative Theoretical Models for Play in the Two Treatments

3.1. The Two Status Quo Treatments Are Equivalent for Most Theories

The theoretical predictions of the special case version of game theory for self-regarding (or "economic man") preferences are obvious. Given that each player only cares about his own money payoff, Player A will choose Uphold (15,5) and Player B will choose No Decrease in treatment $T_{15,5}$, which results in the ordered pair of (Player A, Player B) payoffs of (15,5). In treatment $T_{10,10}$, Player A will choose Take 5 and Player B will choose No Decrease, which results in the ordered pair of (Player A, Player B) payoffs of (15,5). For this special case interpretation, treatment $T_{15,5}$ and treatment $T_{10,10}$ involve the same game; the only difference between the games is a theoretically-irrelevant difference in how the game is framed.

Models of (unconditional) distributional preferences such as Fehr and Schmidt (1999), Bolton and Ockenfels (2000), Cox and Sadiraj (2007), and the model in (the text of) Charness and Rabin (2002) do *not* imply that all play will end at the (15,5) node in the two treatments because they model other-regarding or social preferences which are not necessarily the same as economic man preferences over ordered pairs of money payoffs. Furthermore, the different distributional preference models may have different implications about which of the ordered pairs of payoffs at the terminal nodes will be preferred by Player B. But all of these models represent social preferences in which an agent's utility of alternative allocations of material payoffs depends only on the (absolute and relative) amounts of the payoffs themselves or on *a priori* beliefs, not on the agents' acts of commission or omission that may be necessary to generate the allocations in any particular game. Therefore, all of these models imply that Player B will make the same choice between two final payoff allocations, (a,b) or (c,d), in treatment $T_{15,5}$ as in treatment $T_{10,10}$. According to these models, the only difference between treatment $T_{15,5}$ and treatment $T_{10,10}$ is a difference in the framing of the same game that is theoretically irrelevant to prediction of play of the game.[6,7] In contrast, according to revealed altruism theory treatments $T_{15,5}$ and $T_{10,10}$ involve two different games for which the theory makes distinct predictions about play of the games.

3.2. The Two Status Quo Treatments are Not Equivalent for Revealed Altruism Theory

Revealed altruism theory (Cox, Friedman, and Sadiraj, 2008) or its special parametric form (Cox, Friedman, and Gjerstad, 2007) has previously predicted outcomes quite successfully in several different types of experiments including the dictator game (with and without earned endowments), ultimatum game, ultimatum mini-game, investment game, moonlighting game, Stackelberg duopoly game, Stackelberg mini-

[6] The model in the text of Charness and Rabin (2002) implies that play in the two games will be the same. In contrast, an interpretation of the reciprocal preferences model in their appendix can lead to a different prediction, as follows. If according to "social consensus" the choice of Take 5 in the $T_{10,10}$ game is considered to be "misbehavior" while choice of Uphold in the $T_{15,5}$ game is not, then Player B may place a higher weight on Player A's payoff on the left branch of $T_{15,5}$ that on the left branch of $T_{10,10}$. The Dufwenberg and Kirchsteiger (2004) and Falk and Fischbacher (2006) models can have multiple equilibria. Adding an equilibrium selection criterion to either model will not discriminate between predicted equilibria for our $T_{15,5}$ and $T_{10,10}$ games. Rather, the first-mover's perception of what is "kind" would have to be made dependent on the (status-quo) endowment of the game, which would be an extension/reinterpretation of the models that could produce different behavioral predictions for our $T_{15,5}$ and $T_{10,10}$ games.

[7] It has been argued that cumulative prospect theory (with loss aversion) implies that the $T_{15,5}$ and $T_{10,10}$ games are not isomorphic. This argument is critically examined in Appendix D.

game, and carrot and stick games. The theory has also successfully predicted behavior in paired private property and common property trust games (Cox and Hall, 2010) and in paired asymmetric-power provision and appropriation games (Cox, Ostrom, Sadiraj, and Walker, 2013).

Revealed altruism theory (Cox, Friedman, and Sadiraj, 2008) predicts that play will differ between the $T_{15,5}$ and $T_{10,10}$ treatments in the experiments reported here. Elements of that theory include a partial ordering of opportunity sets, a partial ordering of preferences, and two axioms about reciprocity. The partial ordering of opportunity sets is as follows. Let *m* denote Player B's ("my") money payoff and let *y* denote Player A's ("your") money payoff. Let m_H^* denote my maximum money payoff in opportunity set H and let y_H^* denote your maximum money payoff in opportunity set H.[8] Opportunity set G is "more generous than" opportunity set F if: (a) $m_G^* - m_F^* \geq 0$ and (b) $m_G^* - m_F^* \geq y_G^* - y_F^*$. In that case, one writes $G\,\text{MGT}\,F$. Part (a) in the definition of the MGT partial ordering is the statement that opportunity set *G* is more generous (to me) than is opportunity set *F* if my largest possible payoff in *G* is not less than my largest payoff in *F*. The role of part (b) in the MGT definition is to discriminate between choices by you that are clearly intended to benefit me and other choices that might reflect "self-serving generosity" in which you mainly intend to benefit yourself: $y_G^* - y_F^* > m_G^* - m_F^*$.

For example, our treatments $T_{15,5}$ and $T_{10,10}$ include the same two opportunity sets for Player B. Let $F = \{(15,5),(9,3)\}$ denote Player B's opportunity set if Player A moves "left" and $G = \{(10,10),(12,9)\}$ denote Player B's opportunity set if Player A moves "right" in either treatment. Note that, for these sets, $G\,\text{MGT}\,F$ for Player B.

The partial ordering of preferences is as follows. My willingness to pay (amounts of my material payoff, *m*) to increase your material payoff, *y* can depend on the absolute and relative amounts of our payoffs. In the case where marginal utilities are well-defined, my willingness to pay is given by the ratio of marginal utilities:

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[8] More formally, $m_H^* = \sup\{m : \exists y \geq 0\, s.t. (m,y) \in H\}$ and $y_H^* = \sup\{y : \exists m \geq 0\, s.t. (m,y) \in H\}$.

$WTP(m,y) = u_y(m,y)/u_m(m,y)$. Two different preference orderings, A and B, over allocations of material payoffs might represent the preferences of two different agents or the preferences of the same agent in two different situations. For a given domain D, preference ordering A is "more altruistic than" preference ordering B if $WTP_A(m,y) \geq WTP_B(m,y)$ for all $(m,y) \in D$. In that case, we write A MAT B.

Revealed altruism theory states that an individual's preferences can become more or less altruistic depending on the actions of another agent. Reciprocity, denoted as Axiom R, states that *if a first mover provides a more (resp. less) generous opportunity set to the second mover then the second mover's preferences will become more (resp. less) altruistic towards the first mover*.[9] Axiom R implies that Player B's preferences will be more altruistic if Player A moves "right" than if she moves "left" in either treatment $T_{15,5}$ or treatment $T_{10,10}$.

Although the collection of opportunity sets that Player A can offer Player B are identical in treatments $T_{15,5}$ and $T_{10,10}$, the status quo set that corresponds to the endowments is different. The more generous opportunity set in treatment $T_{15,5}$ is selected by an act of commission by Player A (giving \$5 to Player B). The more generous opportunity set in treatment $T_{10,10}$ is selected by an act of omission by Player A (making no change). Similarly, the less generous opportunity set in the $T_{10,10}$ treatment is selected by an act of commission while the less generous opportunity set in the $T_{15,5}$ treatment is selected by an act of omission.

Axiom S is the element of revealed altruism theory that implies that treatments $T_{15,5}$ and $T_{10,10}$ are not isomorphic. This axiom distinguishes between acts of commission, which overturn the status quo, and acts of omission which uphold the status quo. Axiom S says that the effect of Axiom R is stronger when a generous (or ungenerous) act overturns the status quo than when the same act merely upholds the status quo. Axiom S states that *if the decision made by a first mover overturns the status quo then the*

[9] See Appendix A for a formal definition of Axiom R.

reciprocal response, for individuals with preferences consistent with Axiom R, will be stronger than when the status quo is upheld.[10]

A Player B with preferences consistent with Axioms R and S will care about how the opportunity set actually chosen by Player A compares to the other opportunity sets Player A could have chosen and also how the chosen set compares to the status quo opportunity set. The theory predicts that a Player B will respond more altruistically towards a Player A who overturns the status quo in treatment $T_{15,5}$ by choosing Give 5 than to a Player A in treatment $T_{10,10}$ who chooses Uphold (10,10), even though these actions provide Player B with the same opportunity set. Similarly, a Player B will respond less altruistically to a Player A who overturns the status quo in treatment $T_{10,10}$ by choosing Take 5 than to a Player A who chooses Uphold (15,5) in treatment $T_{15,5}$ even though these actions provide Player B with the same opportunity set.

The theoretical models reviewed in the preceding discussion provide testable hypotheses. The null hypothesis is implied by economic man theory and all unconditional distributional preference theories. The alternative hypothesis is implied by revealed altruism theory.

H_o *: The distribution of play across the four terminal nodes is the same in treatments* $T_{15,5}$ *and* $T_{10,10}$.

H_a *: Frequency of observation of nodes with payoffs (15,5) and (12,9) is greater in treatment* $T_{15,5}$ *than in treatment* $T_{10,10}$.

Revealed altruism theory includes self-regarding (or economic man) preferences as well as other-regarding preferences, and it includes non-reciprocal preferences as well as reciprocal preferences, because the partial orderings and statements of Axioms R and S all involve weak orderings ("greater than or equal to" or "preferred or indifferent to").

[10] See Appendix A for a formal definition of Axiom S.

This implies that there are two ways in which data can be used to test the above hypothesis. The most straightforward way to test the hypothesis is to use data for all Players B in the experiment. A more nuanced use of the data reflects finer points in the structure of revealed altruism theory in that "Axiom S says that the effect of Axiom R is stronger …" This approach uses data to test the predictions of Axiom S only for subjects who have revealed consistency with the strict-preference version of Axiom R, that is, subjects whose choices in the experiment reveal that they are (positively or negatively) reciprocal. Data for other subjects, whose choices in the experiment are consistent with both self-regarding preferences and weakly reciprocal preferences, are not used in this more nuanced test of Axiom S. Tests based on both approaches are reported below.

4. Three Experiments

The key to experimental testing of Axiom S in the laboratory is a successful implementation of the status quo. Out in the field the status quo arises naturally. In a laboratory setting, however, subjects encounter stylized decision problems in which they often lack clear ex-ante expectations. In our experiments three different design features are used to induce status quo:

(i) *Initial endowments*: subjects start off playing the game with initial money balances of \$15 or \$5 in treatments $T_{15,5}$ and \$10 each in treatments $T_{10,10}$. Feasible actions are possible changes in these money balances.

(ii) *Labeling of actions*: we label actions that do not cause any change in payoffs as "no change in payoffs" and actions that lead to changes in payoffs as "give/take x" or "increase/decrease by y".

(iii) *Entitlements*: in Experiment 1 the initial endowments are assigned randomly. In Experiments 2 and 3 endowments are earned. We use a two-day experimental procedure which has subjects earn their monetary endowments in a laborious task on the Day 1 of the experiment. Experiment 2 employs a tournament format in which higher endowments are received for better performance. In Experiment 3 we randomly assign subjects into different sessions and ask everyone in a given session to attain the same target performance level. The higher the target level in a session, the higher the amount earned.

The first two design features complement one another and provide a natural way of establishing the status quo. By (i) and (ii) the status quo is set by the initial money balances that will subsequently be changed or preserved by Player A via feasible actions. Feature (iii), however, deserves a few more comments. In Experiments 2 and 3 we opted to have the subjects earn their endowments in order to induce property right entitlements that better justify the labeling of actions (as "give" or "take" and "decrease" or "increase"). In addition we used a two-day format that separates the earnings task from the strategic play of the game. The intention was to give subjects some time to "bond" with the earnings so they can perceive them as their own property rather than "house money." The so-called "house money effect" has been documented to encourage risk taking (Battalio, Kagel, and Jiranyakul, 1990; Thaler, 1990; Thaler and Johnson, 1990; Arkes, Joyner, Pezzo, Nash, Siegel-Jacobs, and Stone, 1994; Keasey and Moon, 1996; Cárdenas, De Roux, Jaramillo, and Martinez, forthcoming). Clark (2002) finds no effect of house money in the voluntary contributions mechanism public goods game using unconditional nonparametric methods. Harrison (2007), however, shows that the same data display a significant effect when analyzing responses at the individual level and accounting for the error structure of the panel data.

Several previous studies have found a notable effect of earned (rather than randomly assigned) endowments on subsequent behavior (e.g., Hoffman, McCabe, Shachat, and Smith, 1994; Rutström and Williams, 2000; Cherry, Frykblom, and Shogren, 2002; Gächter and Riedl, 2005, Oxoby and Spraggon, 2008). Cox and Hall (2010) tested robustness of the Cox, Ostrom, and Walker et al. (2009) empirical observation that the behavior of second movers does not differ between common-property and private-property trust games that include a rich strategy space for both players. Cox and Hall had their subjects earn their endowments in a real effort task prior to playing a common-property or private-property trust game and found the behavior of their second movers to be consistent with Axiom S, which has different predictions in the two games.

We conducted four one-day sessions in Experiment 1, six two-day sessions in Experiment 2 and five two-day sessions in Experiment 3. All sessions were held in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury. A total of 416 undergraduate subjects participated in the study. On average, a one-day session lasted about 60 minutes including the initial instruction period and payment of subjects. A two-day session lasted about 120 minutes. The experimental earnings, denoted in $, were converted into cash at the 3 to 4 exchange rate: $3 (or 3 lab $) equals 4 New Zealand dollars, henceforth NZD. In Experiment 1 subject payments included a 5 NZD show up fee. In Experiments 2 and 3 the show up fee was 10 NZD (i.e., 5 NZD for each of the two days), all paid at the end of the Day 2 session.

4.1 Experiment 1: Randomly Assigned Endowments

Experiment 1 presents a stylized test of Axiom S in which initial endowments (and thus also the roles) were randomly assigned by the experimenter. In what follows we refer to Experiment 1 treatments as RANDOM $T_{15,5}$ and RANDOM $T_{10,10}$. The treatments were implemented in a between-subjects design. All sessions were run manually using the strategy method (Selten, 1967; Brandts and Charness, 2011). The design also included use of a double blind payoff protocol in which a subject's decisions are never linked with the subject's identity.

In treatment RANDOM $T_{15,5}$ Player A started with $15 and Player B with $5. The available choices were described to subjects as follows: Player A had to choose whether to give $5 to an anonymously paired Player B or to make no change in payoffs. If Player A decided to give $5, Player B could either make no further change in payoffs or decrease his own payoff by $1 in order to increase Player A’s payoff by $2. If Player A decided to make no change in endowments, Player B could either make no further change in payoffs or decrease her own payoff by $2 in order to decrease Player A’s payoff by $6.

In treatment RANDOM $T_{10,10}$ Player A had to choose whether to take $5 from an anonymously paired Player B or to make no change in endowments. If Player A decided to make no change in endowments, Player B could either make no further change in endowments or decrease his own payoff by $1 in order to increase Player A's payoff by $2. If Player A decided to take $5, Player B could either make no further change in endowments or decrease her own payoff by $2 in order to decrease Player A's payoff by $6. Experiment instructions are provided in Appendix B.

4.2 Experiment 1 Results

We first describe the data and then compare subjects' behavior in three ways: (i) for the whole game trees; (ii) for corresponding subgames; and (iii) for corresponding subgames after eliminating subjects who have not revealed reciprocal preferences.

Sixty-six subjects (or thirty-three pairs) participated in treatment RANDOM $T_{15,5}$ and sixty-eight subjects (or thirty-four pairs) in treatment RANDOM $T_{10,10}$. In treatment RANDOM $T_{15,5}$, twelve (=36.4%) A Players chose to Uphold (15,5) while twenty-one A Players chose to Give 5 to their counterpart Player B. In treatment RANDOM $T_{10,10}$, twenty-six (=76.5%) chose to Take 5 while only eight chose to Uphold (10,10).[11] This difference in A Players' behavior is statistically significant (p=0.001, Fisher's exact two-sided test).[12,13]

B Players' choices were elicited by the strategy method. Each player B thus made two choices, one for each of the two subgames. Data for All B Players are reported in the upper panel of Table 1. Following the Uphold (15,5) decision by Player A in treatment RANDOM $T_{15,5}$, seven (=21.2%) B Players punished Player A by Decreasing his payoff by 6, while the remaining twenty-six chose No Decrease. Following the Give 5 decision, twelve (=36.4%) B Players rewarded A Players by choosing Increase by 2, while the remaining twenty-one chose No Increase.

[11] Player A's behavior is summarized in Table 4 in Section 4.

[12] All subsequent p-values in this paper refer to Fisher's exact test.

[13] Throughout the paper we report one-sided test in all cases when we have clear theoretical predictions and when the nature of the data allows us to do so.

Table 1: Player B Behavior in Experiment 1

	No Decrease	Decrease by 6	No Increase	Increase by 2
All B Players				
RANDOM $T_{15,5}$	26/33 (78.8%)	7/33 (21.2%)	21/33 (63.6%)	12/33 (36.4%)
Axiom S Prediction	-	<	-	>
RANDOM $T_{10,10}$	20/34 (58.8%)	14/34 (41.2%)	32/34 (94.1%)	2/34 (5.9%)
Fisher's Test for Strategies	0.004[a]			
Fisher's Test for Subgames	0.067		0.002	
Reciprocal B Players				
RANDOM $T_{15,5}$	10/17 (58.8%)	7/17 (41.2%)	5/17 (29.4%)	12/17 (70.6%)
Axiom S Prediction	-	<	-	>
RANDOM $T_{10,10}$	1/15 (6.7%)	14/15 (93.3%)	13/15 (86.7%)	2/15 (13.3%)
Fisher's Test for Subgames	0.002		0.001	

[a] two-sided test.

Following the Take 5 decision by Player A in treatment RANDOM $T_{10,10}$, fourteen (=41.2%) B Players punished Player A by Decreasing his payoff by 6, while the remaining twenty chose No Decrease. Following the Uphold (10,10) decision by Player A, only two (=5.9%) B Players rewarded Player A by Increasing his payoff by 2, while the remaining thirty-two chose No Increase.

The data are consistent with the testable implications of Axiom S; our next question is whether the observed difference in play between the two games is statistically significant. First we test the null hypothesis that behavior of B Players does not differ between the two treatments.[14] However, we cannot simply compare the choice-frequencies at the terminal nodes because use of the strategy method makes the choice

[14] Recall that all models discussed in subsection 3.1 predict that the behavior of B Players in the two treatments will be the same.

data not independent across nodes within a subgame. However, each subject's chosen strategy (a pair of choices, one for each subgame) is an independent observation. Therefore, we first classify the behavior of each subject into one of four possible strategies: 1. No Decrease-No Increase (ND-NI); 2. No Decrease-Increase by 2 (ND-IB2); 3. Decrease by 6-No Increase (DB6-NI); 4. Decrease by 6-Increase by 2 (DB6-IB2). Then, we run Fisher's exact test on the strategies rather than the choices.[15] This implements the test of the null hypothesis from section 3.2, i.e., that the behavior in the two treatments is the same. The test rejects the null hypothesis in favor of the alternative (*p*=0.004, two-sided test), thus providing strong support for Axiom S in Experiment 1 data.

A tougher test of Axiom S would be to test its implication in each individual subgame. In particular, for the subgame on the left side of the game tree it implies that the frequency of "Decrease by 6" will be higher in treatment RANDOM $T_{10,10}$ than in RANDOM $T_{15,5}$. The one-sided Fisher's exact test detects a statistically significant difference between frequencies with which the Decrease by 6 choice was selected in the two treatments (*p*=0.067). For the subgame on the right side Axiom S implies that the frequency of Increase by 2 is higher in treatment RANDOM $T_{15,5}$ than RANDOM $T_{10,10}$. The one-sided Fisher's exact test detects a statistically significant difference (*p*=0.002).

Finally, recall that Axiom S states that if the decision made by Player A overturns the status quo then the reciprocal response, for B Players with preferences consistent with Axiom R, will be stronger than when the status quo is upheld. Therefore, a conservative test of the status quo effect focuses on individuals who revealed strictly reciprocal preferences by making at least one decision to punish or reward another participant at a monetary cost to themselves. In other words, we exclude B Players who chose No change in both subgames from further analysis. Player B's behavior after such elimination is presented in the bottom panel of Table 1. Using data from B Players who demonstrated reciprocal preferences, Axiom S passes a strict test in each of the individual subgames (*p*=0.002 and 0.001, respectively for the left and right subgames).

[15] The proper categorization of the data into strategies is presented in Table 5 at the end of this section.

4.3 Experiment 2: Endowments Earned in a Tournament

As argued above, the test of Axiom S hinges on saliency of the status quo. In Experiment 1 entitlements to the initial endowments were created by a stylized experimental procedure – random assignment. In everyday life, however, entitlements are usually created in a more natural way, for example by exchanging one's skills, effort and time for a payment. In what follows we present two additional experiments that serve as robustness checks for Axiom S with respect to procedures by which entitlements were induced. Our designs mimic two common labor market compensation practices, tournaments and absolute (or fixed) performance targets. Our subjects earn initial endowments by their performance in a GMAT quiz.

In Experiment 2 subjects compete in a tournament which places them in three different groups based on their performance in the quiz. Groups with better performance receive higher endowments. The subjects were recruited for a two-day experiment. On Day 1 of the experiment each participant was asked to answer the same set of 40 math questions, selected from the GMAT test bank. The quiz score was the number of questions the subject answered correctly minus 1/4 of a point for each incorrect answer. After everyone completed the computerized quiz (programmed in Visual Basic), the final scores were ranked from the highest to the lowest and ties were resolved randomly. Once the complete ranking of the participants had been determined, the participants who scored in the top 25% received an IOU certificate for $15, those in the middle 25-75% received a $10 certificate, and those in the bottom 25% received a $5 certificate.[16] These certificates provided the endowments for Day 2 participation. Subjects who earned $15 or $5 were invited to the same session on Day 2 while subjects who earned $10 were all invited to a session that started at a different time on Day 2.

[16] Note that the tournament procedure puts subjects to treatments based on their performance on the Day 1 task. This is, however, a natural consequence of assigning endowments in this manner and an important part of the robustness-check exercise. A reader might be curious about a possible link between reciprocal preferences and analytical skills. We are not aware of any such result published in the literature. Furthermore, our other two experiments (1 and 3) had random assignment to treatments and the results are very much in line with the results in the tournament experiment. See subsection 4.8 for a comparison of B Players' behavior across experiments.

The two different Day 2 sessions constituted our experimental treatments TOURNAMENT $T_{15,5}$ and TOURNAMENT $T_{10,10}$ implemented in a between-subjects design. Day 2 sessions used procedures identical to Experiment 1 with the only difference that the endowments were earned in Day 1. In treatment TOURNAMENT $T_{15,5}$ this implied that the roles were also determined based on subjects' performance on Day 1. In treatment TOURNAMENT $T_{10,10}$ the subjects were assigned to be either Player A or Player B in a random way.

4.4 Experiment 2 Results

Seventy subjects (or thirty-five pairs) participated in each of the two treatments in Experiment 2. In treatment TOURNAMENT $T_{15,5}$, twenty-three (=65.7%) A Players chose to Uphold (15,5) while twelve A Players chose to Give 5 to their counterpart Player B. In treatment TOURNAMENT $T_{10,10}$, twelve (=34.3%) chose to Take 5 while twenty-three chose to Uphold (10,10). This difference in A Players' behavior is statistically significant (p=0.016), suggesting that the status quo is an important consideration for the subjects.

Data for All B Players are reported in the upper panel of Table 2. Corresponding to the Uphold (15,5) decision by Player A in treatment TOURNAMENT $T_{15,5}$, only eight (=22.9%) B Players punished Player A by Decreasing his payoff by 6, while the remaining twenty-seven chose No Decrease. Corresponding to the Give 5 decision, sixteen (=45.7%) B Players rewarded Player A by choosing Increase by 2, while the remaining nineteen chose No Increase.

Corresponding to the Take 5 decision by Player A in treatment TOURNAMENT $T_{10,10}$, eleven (=31.4%) B Players punished Player A by Decreasing his payoff by 6, while the remaining twenty-four chose No Decrease. Corresponding to the Uphold (10,10) decision by Player A, six (=17.1%) B Players rewarded Player A by Increasing his payoff by 2, while the remaining twenty-nine chose No Increase.

Table 2: B Players' Behavior in Experiment 2

	No Decrease	Decrease by 6	No Increase	Increase by 2
All B Players				
TOURNAMENT $T_{15,5}$	27/35 (77.1%)	8/35 (22.9%)	19/35 (54.3%)	16/35 (45.7%)
Axiom S Prediction	-	<	-	>
TOURNAMENT $T_{10,10}$	24/35 (68.6%)	11/35 (31.4%)	29/35 (82.9%)	6/35 (17.1%)
Fisher's Test for Strategies	0.061[a]			
Fisher's Test for Subgames	0.296		0.01	
Reciprocal B Players				
TOURNAMENT $T_{15,5}$	13/21 (61.9%)	8/21 (38.1%)	5/21 (23.8%)	16/21 (76.2%)
Axiom S Prediction	-	<	-	>
TOURNAMENT $T_{10,10}$	4/15 (26.7%)	11/15 (73.3%)	9/15 (60%)	6/15 (40%)
Fisher's Test for Subgames	0.039		0.032	

[a] two-sided test.

We proceed to testing Axiom S with data from Experiment 2. Fisher's test for strategies rejects the null hypothesis in favor of the alternative (*p*=0.061, two-sided), again providing support for Axiom S. As before, for the subgame on the left side of the game tree Axiom S implies that the frequency of Decrease by 6 will be higher in TOURNAMENT $T_{10,10}$ than in TOURNAMENT $T_{15,5}$. However, the one-sided Fisher's exact test does not detect a difference between frequencies with which the Decrease by 6 choice was selected in the two treatments (*p*=0.296). For the subgame on the right side, Fisher's test detects that the frequency of Increase by 2 is higher in TOURNAMENT $T_{15,5}$ than TOURNAMENT $T_{10,10}$ as predicted by Axiom S (p=0.01).

The lower panel Table 2 reports data for the subset of subjects who revealed strictly reciprocal preferences by making at least one decision to punish or reward. After removing B Players who chose No change in both subgames, the test rejects the null on both sides of the game tree (p=0.039 and p=0.032, respectively, for the left and right subgames).

4.5 Experiment 3: Earned Endowments by Reaching a Target Output

Experiment 3 presents a second robustness check for Axiom S with respect to procedures by which entitlements were induced. Recall that in Experiment 2 subjects' performance in a tournament determined their initial endowment (and thus also the roles) in Day 2 part of the experiment. In Experiment 3 subjects performed the same earning task of solving GMAT problems, except that their assignment to roles was random. This was accomplished by the following procedure. On Day 1 of the experiment participants were asked to correctly answer 10, 20 or 30 problems, depending on a session they were recruited for. There was no penalty for providing an incorrect answer. For reaching one of the three target performance levels they received an IOU certificate for $5, $10, or $15, respectively. These certificates provided the endowments for Day 2 participation. The rest of the procedures were identical to Experiment 2.

4.6 Experiment 3 Results

Seventy-two subjects (or thirty-six pairs) participated in each of the two treatments in Experiment 3. In treatment TARGET $T_{15,5}$, twenty-six (=72.2%) A Players chose to Uphold (15,5) while ten A Players chose to Give 5 to their counterpart Player B. In treatment TARGET $T_{10,10}$, eighteen (=50%) chose to Take 5 while the other eighteen chose to Uphold (10,10). This difference in A Players' behavior between the two treatments is weakly significant (p=0.090).

Data for All B Players in Experiment 3 are reported in the upper panel of Table 3. Following the Uphold (15,5) decision by Player A in treatment TARGET $T_{15,5}$, ten

(=28.6%) B Players punished Player A by Decreasing his payoff by 6, while the remaining twenty-five chose No Decrease.[17] Following the Give 5 decision, eleven (=30.6%) B Players rewarded Player A by choosing Increase by 2, while the remaining twenty-five chose No Increase.

Table 3: Player B Behavior in Experiment 3

	No Decrease	Decrease by 6	No Increase	Increase by 2
All B Players				
TARGET $T_{15,5}$	25/35* (71.4%)	10/35* (28.6%)	25/36 (69.4%)	11/36 (30.6%)
Axiom S Prediction	-	<	-	>
TARGET $T_{10,10}$	19/36 (52.8%)	17/36 (47.2%)	30/36 (83.3%)	6/36 (16.7%)
Fisher's Test for Strategies	0.211[a]			
Fisher's Test for Subgames	0.084		0.133	
Reciprocal B Players				
TARGET $T_{15,5}$	8/18 (44.4%)	10/18 (55.6%)	7/18 (38.9%)	11/18 (61.1%)
Axiom S Prediction	-	<	-	>
TARGET $T_{10,10}$	4/21 (19%)	17/21 (81%)	15/21 (71.4%)	6/21 (28.6%)
Fisher's Test for Subgames	0.086		0.042	

[a] two-sided test.

* One Player B did not provide an answer on the left side of the game tree.

Following the Take 5 decision by Player A in treatment TARGET $T_{10,10}$, seventeen (=47.2%) B Players punished Player A by Decreasing his payoff by 6, while the remaining nineteen chose No Decrease. Following the Uphold (10,10) decision by

[17] Although there were 36 B Players in treatment TARGET $T_{15,5}$, one of them provided only an answer on the right side of the game tree, but not on the left one. We report this decision in the summary statistics but since we do not know this person's strategy, we have excluded the data point from the statistical analysis.

Player A, six (=16.7%) B Players rewarded Player A by Increasing his payoff by 2, while the remaining thirty chose No Increase.

As before, we test the null hypothesis that behavior of B Players does not differ between the two treatments using the Fisher's exact test for strategies. Although the pattern of behavior goes in the right direction, i.e., as predicted by Axiom S, the difference is not significant (*p*=0.211, two-sided). Next, we proceed with testing the implications of Axiom S for the individual subgames. On the left hand side of the game tree we find that the frequency of Decrease by 6 is higher in TARGET $T_{10,10}$ than in TARGET $T_{15,5}$ (*p*=0.084), as predicted by Axiom S. For the subgame on the right hand side, Axiom S predicts that the frequency of Increase by 2 will be higher in TARGET $T_{15,5}$ than TARGET $T_{10,10}$, however, the result of the Fisher's exact test reveals that this difference is marginally insignificant in Experiment 3 (*p*=0.133).

As shown in the lower panel of Table 3, when performing the same tests on reciprocal B Players only, we find significant differences in behavior on both sides of the game tree (*p*=0.086 and *p*=0.042, respectively, for the left and right subgames).

4.7 The Effect of Endowment Allocation Procedures on A Players' Behavior

While the main focus of the current paper is on the reciprocal behavior of B Players, let us start by briefly discussing the differences in A Players' behavior who show a great sensitivity to procedures under which the initial endowments were allocated. Table 4 summarizes and compares their behavior in our three experiments. We observe a significant difference in A Players' behavior between the two treatments in all three experiments (*p*=0.001 for RANDOM $T_{15,5}$ vs. RANDOM $T_{10,10}$; *p*=0.016 for TOURNAMENT $T_{15,5}$ vs. TOURNAMENT $T_{10,10}$ and *p*=0.09 for TARGET $T_{15,5}$ vs. TARGET $T_{10,10}$). We also find a significant difference in frequencies of choosing to Give 5 between RANDOM $T_{15,5}$ treatment where the windfall initial endowments were assigned randomly by the experimenters and treatments TOURNAMENT $T_{15,5}$ and TARGET $T_{15,5}$ where the endowments were earned (*p*=0.028 and *p*=0.004, respectively). The evidence that A Players were less generous when they had to earn their endowments

Table 4. Comparison of A Players' Behavior across the Three Experiments

	$T_{15,5}$		$T_{10,10}$	
	Give 5	Uphold (15,5)	Uphold (10,10)	Take 5
Experiment 1: RANDOM assignment	21/33 (63.6%)	12/33 (36.4%)	8/34 (23.5%)	26/34 (76.5%)
RANDOM $T_{15,5}$ vs. RANDOM $T_{10,10}$	0.001			
Experiment 2: TOURNAMENT	12/35 (34.3%)	23/35 (65.7%)	23/35 (65.7%)	12/35 (34.3%)
TOURNAMENT $T_{15,5}$ vs. TOURNAMENT $T_{10,10}$	0.016			
Experiment 3: TARGET	10/36 (27.7%)	26/36 (72.3 %)	18/36 (50%)	18/36 (50%)
TARGET $T_{15,5}$ vs. TARGET $T_{10,10}$	0.09			
Tests for $T_{15,5}$ Treatments (Give 5)				
RANDOM $T_{15,5}$ vs. TOURNAMENT $T_{15,5}$	0.028			
RANDOM $T_{15,5}$ vs. TARGET $T_{15,5}$	0.004			
TOURNAMENT $T_{15,5}$ vs. TARGET $T_{15,5}$	0.614			
Tests for $T_{10,10}$ Treatments (Take 5)				
RANDOM $T_{10,10}$ vs. TOURNAMENT $T_{10,10}$	0.001			
RANDOM $T_{10,10}$ vs. TARGET $T_{10,10}$	0.028			
TOURNAMENT $T_{10,10}$ vs. TARGET $T_{10,10}$	0.232			

All Fisher's tests reported in Table 4 are two-sided.

is in line with previous findings by Cherry, Frykblom, and Shogren (2002), Oxoby and Spraggon (2008), and Carlsson, He, and Martinsson (2012) on this issue. We do not find any differences in giving behavior between TOURNAMENT $T_{15,5}$ and TARGET $T_{15,5}$ treatments (p=0.614).

Comparison of treatment RANDOM $T_{10,10}$ with TOURNAMENT $T_{10,10}$ and TARGET $T_{10,10}$ reveals that the frequency of Take 5 is higher when the endowments are assigned randomly than when they are earned (p=0.001 and p=0.028, respectively), indicating that subjects honor property rights created by performance in the math quiz. Despite the fact that there appears to be more taking when the endowments were earned by reaching a target output than in a tournament (50% vs. 34.3%, respectively), the Fisher's exact test does not detect a significant difference between TOURNAMENT $T_{10,10}$ and TARGET $T_{10,10}$ treatments (p=0.232).

4.8 Tests for Differences in B Players' Behavior across the Three Experiments

To assess the impact of earned endowments on Player B reciprocal responses, we compare their behavior in the respective treatments using data categorized by strategies, presented in Table 5.

Table 5. Raw Data on B Players' Behavior Categorized According to Strategies

	Strategies			
Treatment	**ND-NI**	**ND-IB2**	**DB6-NI**	**DB6-IB2**
RANDOM $T_{15,5}$ n = 33	16	10	5	2
RANDOM $T_{10,10}$ n = 34	19	1	13	1
TOURNAMENT $T_{15,5}$ n =35	14	13	5	3
TOURNAMENT $T_{10,10}$ n = 35	20	4	9	2
TARGET $T_{15,5}$ n =35	17	8	7	3
TARGET $T_{10,10}$ n = 36	15	4	15	2
POOLED DATA $T_{15,5}$ n =103	47	31	17	8
POOLED DATA $T_{10,10}$ n = 105	54	9	37	5

ND = No Decrease; DB6 = Decrease by 6; NI = No Increase; IB2 = Increase by 2

We begin by testing the impact of endowment protocols in the $T_{15,5}$ treatments. Fisher's exact tests, reported in the first two rows of Table 6 reveal that there are no differences in B Players' behavior whether their endowments represent a windfall gain and are randomly assigned or earned in a tournament or by reaching a target output (p=0.897 and 0.882, respectively). Given that, it is not surprising that the (tournament or target) type of earning procedure does not influence their decisions either (p=0.606). A similar pattern emerges for the $T_{10,10}$ treatments where the respective p-values are equal to 0.488, 0.500, and 0.520, suggesting that a random assignment of endowments was sufficient to establish strong enough property right entitlements for the manifestation of Axiom S effects in subjects' reciprocal behavior. Moreover, it also provides evidence that the tournament procedure in Experiment 2 did not incidentally select different reciprocal types into different treatments based on their GMAT performance.[18]

However, in light of the above results the weak support of Axiom S in Experiment 3 might seem a bit puzzling. When inspecting the data in Tables 2 and 3, one might notice that this could be driven by a marginally greater percentage of subjects who punished (chose Decrease by 6) Player A for *not* giving them 5 in the TARGET $T_{15,5}$ treatment and a slightly lower percentage of subjects who rewarded (chose Increase by 2) Player A for giving 5 than in TOURNAMENT $T_{15,5}$. While this change in behavior was not sufficient to detect significant differences in play between the two treatments, it had implications for the support of Axiom S when using data categorized according to strategies which could be due to entitlements. When designing the experiments we conjectured that property right entitlements depend on the following three factors: (1) opportunity cost of coming to the lab, *f*; (2) effort-based performance in the lab, *p(e)*; and (3) time spent bonding with money, *b(m(e))*, i.e., an entitlement is a function $E\left(f, p(e), b\left(m(e)\right)\right)$ increasing in all its arguments. Based on the current data we speculate that in Experiment 3 the factor *f* dominated the other two factors, since the \$5 subjects who also had to come to the lab on two consecutive days as the \$15 subjects behaved as if they felt entitled to more than \$5. In Experiment 2 this effect appears to be muted by subjects' performance in a tournament that possibly legitimizes the differences in payoffs.

[18] Recall that in Experiment 2 the subjects were ranked based on their performance, which determined their initial endowments. Our experimental design thus compares reciprocal behavior of subjects who were better in math and earned \$10 with those who scored worse and earned \$5.

Table 6. Tests for B Players' Behavior across the Three Experiments

Tests for $T_{15,5}$ Treatments	
RANDOM $T_{15,5}$ vs. TOURNAMENT $T_{15,5}$	0.897
RANDOM $T_{15,5}$ vs. TARGET $T_{15,5}$	0.882
TOURNAMENT $T_{15,5}$ vs. TARGET $T_{15,5}$	0.606
Tests for $T_{10,10}$ Treatments	
RANDOM $T_{10,10}$ vs. TOURNAMENT $T_{10,10}$	0.488
RANDOM $T_{10,10}$ vs. TARGET $T_{10,10}$	0.500
TOURNAMENT $T_{10,10}$ vs. TARGET $T_{10,10}$	0.520

All Fisher's tests reported in Table 6 are two-sided.

Finally, it is also possible that having to earn one's endowment increased the costs of reciprocity which in turn decreased the frequency of punishment and rewarding. However, this is not what we see in the data. Moreover, a recent study by Danková and Servátka (2013), where in a two-player Taking Game the extent and frequency of punishment increases when subjects use their earned endowments as opposed to when a windfall endowment is assigned to them by the experimenter, rejects this conjecture.

4.9 Testing for Axiom S Using Pooled Data

Given that we do not find any differences in B Players' behavior across the three experiments, we pool all data together and perform tests for the overall effect. The Fisher's exact test for data categorized according to strategies rejects the null hypothesis that the distribution of play across the four terminal nodes is the same in treatments $T_{15,5}$ and $T_{10,10}$ with very high confidence (p=0.000). The pooled data in the strategy form is presented in the bottom two rows of Table 5.

Table 7 presents pooled data on Player B's behavior according to the distribution of play. For the subgame on the left side, Fisher's test detects that the frequency of Decrease by 6 will be higher in $T_{10,10}$ than in $T_{15,5}$ as predicted by Axiom S (p=0.011). For the subgame on the right side, Fisher's test detects that the frequency of Increase by 2 is higher in $T_{15,5}$ than $T_{10,10}$ as predicted by Axiom S (p=0.000). After removing self-regarding B Players who chose No change in both subgames (lower panel in Table 7), the test also rejects the null on both sides of the game tree (p=0.000 for both subgames).

Table 7. Pooled Data on B Players' Behavior

	No Decrease	Decrease by 6	No Increase	Increase by 2
All B Players				
$T_{15,5}$	78/103* (75.7%)	25/103* (24.3%)	65/104 (62.5%)	39/104 (37.5%)
Axiom S Prediction	-	<	-	>
$T_{10,10}$	63/105 (60%)	42/105 (40%)	91/105 (86.7%)	14/105 (13.3%)
Fisher's Test for Strategies	0.000[a]			
Fisher's Test for Subgames	0.011		0.000	
Reciprocal B Players				
TARGET $T_{15,5}$	31/56 (55.4%)	25/56 (44.6%)	17/56 (30.4%)	39/56 (69.4%)
Axiom S Prediction	-	<	-	>
TARGET $T_{10,10}$	9/51 (17.6%)	42/51 (82.4%)	37/51 (72.5%)	14/51 (27.5%)
Fisher's Test for Subgames	0.000		0.000	

[a] two-sided test.

* Recall that in Experiment 3 one Player B did not provide an answer on the left side of the game tree.

6. Discussion

We have presented three experiments that discriminate between revealed altruism theory (Cox, Friedman, and Sadiraj, 2008) and alternative theories of social preferences. The design of our experiments is focused on the empirical validity of Axiom S, the component of revealed altruism theory that implies that (positively and negatively) reciprocal responses will be more pronounced when they are motivated by acts of commission than by acts of omission. We find clear evidence in favor of Axiom S (status quo) and Axiom R (reciprocity) and against theories of unconditional social preferences in which willingness to pay to increase or decrease another person's material payoff is invariant to their actions.

The primary difference between Experiment 1 and Experiments 2 and 3 is the saliency of entitlements to endowments. Based on previous experimental evidence on earned endowments and behavior, we conjectured that *earned* endowments could be key to the empirical bite of Axiom S and the intensity of reciprocal reactions towards acts of commission. In everyday life the money in one's wallet is in most cases earned and regarded by the owner as being well deserved. People routinely exchange their time and effort for wages to which they form a strong sense of ownership or entitlement. In the laboratory, we cannot ask subjects to play with their own money and therefore entitlements are not easily established. In our Experiments 2 and 3 we approached this problem by splitting the experiment into two days and having subjects earn their endowments on Day 1 of the experiment. Not only did the subjects have to work for the endowments but they also had some time between the earning part and the game part to develop a sense of ownership of their earnings (Strahilevitz and Loewenstein, 1998). Earned endowments significantly affected giving and taking by first movers but to our surprise had insignificant effect on second movers' reciprocal responses. The behavior predicted by Axiom S was prevalent in Experiments 1 and 2, but the effect, although visible, was not significant in Experiment 3. However, since we do not observe any significant differences in behavior across the three experiments, we pool the data and find clear support for Axiom S in pooled data as well as in Experiment 1 and 2 data separately. Our results highlight the importance of the clear distinction between acts of commission and acts of omission (see also Blount, 1995; Charness, 2004).

Our data show that subjects with reciprocal preferences are quite sensitive to acts of commission, i.e., acts that overturn the status quo. In our experiments we have developed a procedure that makes the status quo salient rather naturally. It involves an experimental design with specification of endowments and feasible actions that make acts of commission, such as giving or taking, stand in stark contrast with acts of omission, such as not giving or not taking when there is an opportunity to do so.

One can ask whether this approach would be generally effective for establishing a status quo in experiments. Experience, habits, customs and norms are likely to play an important role in some contexts. From this perspective field experimentation might be another fruitful avenue for future research on the empirical significance of acts of commission vs. acts of omission. The field has the advantage that both the status quo and entitlements to endowments arise naturally. However, the complexity and richness of the field environment might make it difficult for researchers to identify the status quo conditions that are perceived by participants.

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Appendix A: Definitions and Axioms of Revealed Altruism Theory

These definitions and axioms are taken from Cox, Friedman, and Sadiraj (2008). Let A and B denote two preference orderings, those of two different agents or the same agent in two different situations. Preference orderings for a second mover are defined on the second-mover agent's own ("my") money payoff m and the first-mover agent's ("your") money payoff y. $WTP_A(m, y)$ is the willingness of the agent with preferences A to pay an amount of their own money payoff to change the payoff of the other agent. $WTP_B(m, y)$ is defined similarly, for preferences B. $WTP_A(m, y)$ or $WTP_B(m, y)$ can be positive, zero, or negative and their magnitude and sign can change with different values of m or y.

Definition of More Altruistic Than (MAT): For a given domain $D \subset R_+^2$ we say that A MAT B on D if $WTP_A(m, y) \geq WTP_B(m, y)$ for all $(m, y) \in D$.

Let $m_H^* = \sup\{m : \exists y \geq 0 s.t. (m, y) \in H\}$ and $y_H^* = \sup\{y : \exists m \geq 0 s.t. (m, y) \in H\}$.

Definition of More Generous Than (MGT): Opportunity set $G \subset R_+^2$ is more generous than opportunity set $F \subset R_+^2$ if: (a) $m_G^* - m_F^* \geq 0$ and (b) $m_G^* - m_F^* \geq y_G^* - y_F^*$. In that case, one writes G MGT F.

The second mover knows the collection $\mathcal{C}$ of possible opportunity sets. Prior to her choice of payoffs, the second mover learns the actual opportunity set C chosen by the first mover from the set $\mathcal{C}$ and acquires preferences A_C.

Axiom R: Let the first mover choose the actual opportunity set for the second mover from the collection $\mathcal{C}$. If $F, G \subset \mathcal{C}$ and G MGT F, then A_G MAT A_F.

Suppose that the collection of opportunity sets $\mathcal{C}$ contains at least two elements. Let $C^* \in \mathcal{C}$ be the status quo opportunity set. Let A_{C^*} denote the second mover's acquired preferences when the opportunity set chosen by the first mover is the status quo set. Let A_C denote the second mover's acquired preferences when the first mover choses an opportunity set C that differs from the status quo set. When $\mathcal{C}$ is a singleton, the first mover has no choice distinct from the status quo set, and we write $\mathcal{C} = \{C^o\}$ with corresponding second mover preferences A_{C^o}.

Axiom S: Let the first mover choose the actual opportunity set for the second mover from the collection $\mathcal{C}$. If the status quo is either F or G and G MGT F then:

1. A_{G^C} MAT A_{G^*}, A_{G^o} and A_{F^*}, A_{F^o} MAT A_{F^C} ,
2. A_{G^*} MAT A_{G^o} if G MGT C for all $C \in \mathcal{C}$, and A_{F^o} MAT A_{F^*} if C MGT F for all $C \in \mathcal{C}$.

Appendix B: Subject Instructions and Decision Forms

Experiment 1 (RANDOM $T_{15,5}$)

INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups
You will be divided randomly into two groups, called Players A and Players B.

Anonymity
Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy
This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately. You should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant

Starting Money Balances
Before the decision tasks begin, the experimenter provides a starting balance of $15 to each Player A. The experimenter provides each Player B with a starting balance of $5.

Player A's Decision Task

- Each Player A decides whether or not to give $5 to the paired Player B.

- If Player A decides to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to give $5 to Player B"** statement on the decision form. If Player A decides not to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task
Each Player B makes a decision <u>for both of the two possible</u> Player A decisions:

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to give $5 to Player B**, Player B chooses between:

Decision G1: Make **no further change** in payoffs
OR
Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Players B will not know in advance which one will be chosen. Therefore, please think about your decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 15/5)

Experiment ID of Player A: ______________

Player A starts with $15. Player B starts with $5.

DECISION (1): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to give $5 to Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 1)

Experiment ID of Player B: ______________

Player A starts with $15. Player B starts with $5.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 2)

Experiment ID of Player B: ______________

Player A starts with $15. Player B starts with $5.

IF Player A has decided to give $5 to Player B THEN

Player B chooses between:

Decision G1: Make **no further change** in payoffs

OR

Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION G1 OR DECISION G2 BUT NOT BOTH.

Experiment 1 (RANDOM $T_{10,10}$)
INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups
You will be divided randomly into two groups, called Players A and Players B.

Anonymity
Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy
This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately; you should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant

Starting Money Balances
Before the decision tasks begin, the experimenter provides a starting balance of $10 to each Player A. The experimenter also provides each Player B with a starting balance of $10.

Player A's Decision Task

- Each Player A decides whether or not to take $5 from the paired Player B.
- If Player A decides to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to take $5 from Player B"** statement on the decision form. If Player A decides not to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task

Each Player B makes a decision for <u>both of the two possible</u> Player A decisions:

- If **Player A has decided to take $5 from Player B**, Player B chooses between:

Decision T1: Make **no further change** in payoffs
OR
Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Player B will not know in advance which one will be chosen. Therefore, please think about your all of decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 10/10)

Experiment ID of Player A: _____________

Player A starts with $10. Player B starts with $10.

DECISION (1): Player A decides to take $5 from Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 1)

Experiment ID of Player B: ______________

Player A starts with $10. Player B starts with $10.

IF Player A has decided to take $5 from Player B THEN

Player B chooses between:

Decision T1: Make **no further change** in payoffs

OR

Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION T1 OR DECISION T2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 2)

Experiment ID of Player B: ______________

Player A starts with $10. Player B starts with $10.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

DAY 1

(Experiment 2: Both treatments)
INSTRUCTIONS

Earnings quiz
In today's part of the experiment you will be asked to complete a quiz. Each participant will be asked to answer the same set of 40 questions, selected from a large test bank. Your quiz score will be the number of questions you answer correctly minus 1/4 of a point for each question that you answer incorrectly (i.e., 1 correct answer = 1 point; 1 incorrect answer = - 1/4 point).

After everyone has completed the experiment the final scores will be ranked from the highest to the lowest and ties will be resolved randomly. Once the complete ranking of the participants has been determined, the participants who scored in the top 25% will receive a certificate for $15, those in the middle 25-75% will receive a certificate for $10, and those in the bottom 25% will receive a certificate for $5.

IMPORTANT: Please bring your certificates to the DAY 2 part of the experiment. They provide your start up money for the second part of the experiment. At the end of the DAY 2 session your experimental earnings will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD in cash).

Please mark your answer in the quiz by clicking inside the dialog box to the left of the option you want to select. You have 40 minutes to complete the quiz.

DAY 2

(Experiment 2: TOURNAMENT $T_{15,5}$)

INSTRUCTIONS

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups

You have been divided into two groups, called Players A and Players B. Participants who scored in the top 25% in the quiz on DAY 1 will be Players A and participants who scored in the bottom 25% will be Players B.

Anonymity

Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy

This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately. You should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant

Starting Money Balances

Your starting balances for this DAY 2 part of the experiment were determined by your performance on DAY 1 of this experiment:

Each Player A earned $15 on DAY 1 by scoring in the top 25% on the quiz.
Each Player B earned $5 on DAY 1 by scoring in the bottom 25% on the quiz.

Player A's Decision Task

- Each Player A decides whether or not to give $5 to the paired Player B.

- If Player A decides to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to give $5 to Player B"** statement on the decision form. If Player A decides not to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task
Each Player B makes a decision <u>for both of the two possible</u> Player A decisions:

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to give $5 to Player B**, Player B chooses between:

Decision G1: Make **no further change** in payoffs
OR
Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Players B will not know in advance which one will be chosen. Therefore, please think about your decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 15/5)

Experiment ID of Player A: ______________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

DECISION (1): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to give $5 to Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 1)

Experiment ID of Player B: ______________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 2)

Experiment ID of Player B: _____________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

IF Player A has decided to give $5 to Player B THEN

Player B chooses between:

Decision G1: Make **no further change** in payoffs

OR

Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION G1 OR DECISION G2 BUT NOT BOTH.

DAY 2

(Experiment 2: TOURNAMENT $T_{10,10}$)

INSTRUCTIONS

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups

You have been divided randomly into two groups, called Players A and Players B.

Anonymity

Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy

This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately; you should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant

Starting Money Balances

Your starting balances for this DAY 2 part of the experiment were determined by your performance on DAY 1 of this experiment:

Each Player A earned $10 on DAY 1 by scoring in the middle 25 – 75% on the quiz.
Each Player B earned $10 on DAY 1 by scoring in the middle 25 – 75% on the quiz.

Player A's Decision Task

- Each Player A decides whether or not to take $5 from the paired Player B.
- If Player A decides to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to take $5 from Player B"** statement on the decision form. If Player A decides not to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task

Each Player B makes a decision for <u>both of the two possible</u> Player A decisions:

- If **Player A has decided to take $5 from Player B**, Player B chooses between:

Decision T1: Make **no further change** in payoffs
OR
Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Player B will not know in advance which one will be chosen. Therefore, please think about your all of decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 10/10)

Experiment ID of Player A: _____________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

DECISION (1): Player A decides to take $5 from Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 1)

Experiment ID of Player B: ______________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

IF Player A has decided to take $5 from Player B THEN

Player B chooses between:

Decision T1: Make **no further change** in payoffs

OR

Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION T1 OR DECISION T2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 2)

Experiment ID of Player B: ______________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

DAY 1

(Experiment 3: TARGET $T_{15,5}$ ***)***

INSTRUCTIONS

Earning $5

Earnings quiz

In this part of the experiment you will be asked to complete a quiz. Each participant will be asked to answer a set of questions, selected from a large test bank. However, participants in different sessions are asked to provide a different minimum number of correct answers (10, 20, or 30) for which they are paid different amount ($5, $10, or $15, respectively). You have been randomly selected to be in a $5 session, which means that in order to participate in DAY 2 of the experiment, you have to answer 10 questions correctly. If you provide 10 correct answers, you will receive a certificate for $5.

IMPORTANT: Please bring your certificate to the DAY 2 part of the experiment. It provides your start up money for the second part of the experiment. At the end of the DAY 2 session your experimental earnings will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD in cash).

Please mark your answer in the quiz by clicking inside the dialog box to the left of the option you want to select.

DAY 1

(Experiment 3: TARGET** $T_{15,5}$**)

INSTRUCTIONS

Earning $15

Earnings quiz
In this part of the experiment you will be asked to complete a quiz. Each participant will be asked to answer a set of questions, selected from a large test bank. However, participants in different sessions are asked to provide a different minimum number of correct answers (10, 20, or 30) for which they are paid different amount ($5, $10, or $15, respectively). You have been randomly selected to be in a $15 session, which means that in order to participate in DAY 2 of the experiment, you have to answer 30 questions correctly. If you provide 30 correct answers, you will receive a certificate for $15.

IMPORTANT: Please bring your certificate to the DAY 2 part of the experiment. It provides your start up money for the second part of the experiment. At the end of the DAY 2 session your experimental earnings will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD in cash).

Please mark your answer in the quiz by clicking inside the dialog box to the left of the option you want to select.

DAY 2

(Experiment 3: TARGET $T_{15,5}$***)***

INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups
You have been divided randomly into two groups, called Players A and Players B.

Anonymity
Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy
This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately; you should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant.

Starting Money Balances
Your starting balances for this DAY 2 part of the experiment were determined by your performance on DAY 1 of this experiment:

Each Player A earned $15 on DAY 1 providing 30 correct answers on the quiz.
Each Player B earned $5 on DAY 1 by providing 10 correct answers on the quiz.

Player A's Decision Task

- Each Player A decides whether or not to give $5 to the paired Player B.
- If Player A decides to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to give $5 to Player B"** statement on the decision form. If Player A decides not to give $5 to the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task

Each Player B makes a decision <u>for both of the two possible</u> Player A decisions:

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to give $5 to Player B**, Player B chooses between:

Decision G1: Make **no further change** in payoffs
OR
Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Players B will not know in advance which one will be chosen. Therefore, please think about your decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 15/5)

Experiment ID of Player A: ______________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

DECISION (1): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to give $5 to Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 1)

Experiment ID of Player B: ______________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 15/5, page 2)

Experiment ID of Player B: ______________

Player A starts with $15 he/she earned on DAY 1. Player B starts with $5 he/she earned on DAY 1.

IF Player A has decided to give $5 to Player B THEN

Player B chooses between:

Decision G1: Make **no further change** in payoffs

OR

Decision G2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION G1 OR DECISION G2 BUT NOT BOTH.

DAY 1

(Experiment 3: TARGET $T_{10,10}$***)***

INSTRUCTIONS

Earning $10

Earnings quiz

In this part of the experiment you will be asked to complete a quiz. Each participant will be asked to answer a set of questions, selected from a large test bank. However, participants in different sessions are asked to provide a different minimum number of correct answers (10, 20, or 30) for which they are paid different amount ($5, $10, or $15, respectively). You have been randomly selected to be in a $10 session, which means that in order to participate in DAY 2 of the experiment, you have to answer 20 questions correctly. If you provide 20 correct answers, you will receive a certificate for $10.

IMPORTANT: Please bring your certificate to the DAY 2 part of the experiment. It provides your start up money for the second part of the experiment. At the end of the DAY 2 session your experimental earnings will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD in cash).

Please mark your answer in the quiz by clicking inside the dialog box to the left of the option you want to select.

DAY 2

(Experiment 3: TARGET $T_{10,10}$***)***

INSTRUCTIONS

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get 5 NZD as a show up fee for today's session and, in addition, have the opportunity to earn money in the experiment. Your experimental earnings (in $) will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD.) All the money will be paid to you in cash at the end of the experiment.

Two Groups
You have been divided randomly into two groups, called Players A and Players B.

Anonymity
Each Player A will be randomly paired with a Player B. No one will learn the identity of the player (s)he is paired with.

Complete Privacy
This experiment is structured so that no one, neither the experimenters nor the other participants nor anyone else will ever know the personal decision of anyone in the experiment. This is accomplished by the following procedure. You will collect your money payoff, contained in a sealed envelope, from our research assistant in exchange for your experiment ID slip. Your privacy is guaranteed because neither your name nor your student ID number will appear on any form that records your decisions in this experiment. The only identifying mark in all records will be the experiment ID which is known only by you. Although the experimenters will not know your identity, they will know how much to pay you because you will write your experiment ID number on all response forms.

At the end of the experiment, each subject will walk by himself or herself to another room to collect their money payoff envelope from our research assistant who will not be present during the decision making part of the experiment. You will be the only person in possession of your experiment ID slip. When collecting the envelope, you are kindly requested not to open it immediately; you should wait until you leave the building. After collecting the envelope, you must return your experiment ID slip to our research assistant

Starting Money Balances
Your starting balances for this DAY 2 part of the experiment were determined by your performance on DAY 1 of this experiment:

Each Player A earned $10 on DAY 1 by providing 20 correct answers on the quiz.
Each Player B earned $10 on DAY 1 by providing 20 correct answers on the quiz.

Player A's Decision Task

- Each Player A decides whether or not to take $5 from the paired Player B.
- If Player A decides to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to take $5 from Player B"** statement on the decision form. If Player A decides not to take $5 from the paired Player B, (s)he makes his/her decision by circling the **"Player A has decided to make no change in payoffs"** statement.

Player A is asked to circle **only one** of the two decisions. If Player A does not circle a decision or circles both decisions, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decision, Player A places the decision form in the manila envelope and waits for the experimenter to collect it.

Player B's Decision Task
Each Player B makes a decision for <u>both of the two possible</u> Player A decisions:

- If **Player A has decided to take $5 from Player B**, Player B chooses between:

Decision T1: Make **no further change** in payoffs
OR
Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

- If **Player A has decided to make no change in payoffs**, Player B chooses between:

Decision N1: Make **no further change** in payoffs
OR
Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

Player B makes his/her decisions by circling one of the two possible decisions on each of the two decision forms. Player B is asked to circle **only one** of the two possible decisions on each of the two decision forms. If Player B does not circle any decision or circles both decisions <u>on the same decision form</u>, (s)he will be paid only the show-up fee at the end of the experiment. After making his/her decisions, Player B puts both decision forms in the large manila envelope and waits for the experimenter to collect it.

Note that Player A's decision will determine which decision of Player B will be relevant. However, Player B will not know in advance which one will be chosen. Therefore, please think about your all of decisions carefully. Are there any questions?

DECISION FORM FOR PLAYER A (Treatment 10/10)

Experiment ID of Player A: ______________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

DECISION (1): Player A decides to take $5 from Player B

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $2 in order to decrease player A's payoff by $6

OR

DECISION (2): Player A decides to make no change in payoffs

Subsequently, Player B will decide to:

Make no further change in payoffs
OR
Decrease his/her own payoff by $1 in order to increase player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION (1) OR DECISION (2) BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 1)

Experiment ID of Player B: ______________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

IF Player A has decided to take $5 from Player B THEN

Player B chooses between:

Decision T1: Make **no further change** in payoffs

OR

Decision T2: **Decrease** his/her own payoff by $2 in order to **decrease** player A's payoff by $6

YOU MUST CIRCLE EITHER DECISION T1 OR DECISION T2 BUT NOT BOTH.

DECISION FORM FOR PLAYER B (Treatment 10/10, page 2)

Experiment ID of Player B: _____________

Player A starts with $10 he/she earned on DAY 1. Player B starts with $10 he/she earned on DAY 1.

IF Player A has decided to make no change in payoffs THEN

Player B chooses between:

Decision N1: Make **no further change** in payoffs

OR

Decision N2: **Decrease** his/her own payoff by $1 in order to **increase** player A's payoff by $2

YOU MUST CIRCLE EITHER DECISION N1 OR DECISION N2 BUT NOT BOTH.

Appendix C: IOU Certificate

August 1, 2010

New Zealand Experimental Economics Laboratory

$15 IOU CERTIFICATE

Payable to: ________________________________

IMPORTANT: Please bring your IOU certificate to the DAY 2 part of the experiment. It provides your start up money for the second part of the experiment. At the end of the DAY 2 session your experimental earnings will be converted into cash at the 3:4 exchange rate (i.e., each $0.75 of your experimental earnings will be worth 1 NZD in cash).

Signed by the experimenter: ________________________________

Appendix D: Discussion of a Heuristic Application of Prospect Theory

It has been argued that cumulative prospect theory (Tversky and Kahneman, 1992) implies that the $T_{15,5}$ and $T_{10,10}$ treatments are *not* isomorphic because of loss aversion relative to the endowments as reference points. Here is a critical examination of this type of heuristic application of prospect theory. Recall that prospect theory models self-regarding ("selfish") preferences on a lottery space. Suppose one views the second mover's payoff at a terminal node as a degenerate lottery. Also suppose that the second mover's payoff at any terminal node is coded as the difference between the money payoff at the node and his endowed payoff (a reference point). Then the value function $v(\cdot)$ gives utilities for the payoffs at the four terminal nodes in the $T_{15,5}$ treatment as (from left to right in Figure 1.a): v(5-5), v(3-5), v(10-5), and v(9-5). Similarly, the value function evaluates payoffs at the four terminal nodes in the $T_{10,10}$ treatment as (from left to right in Figure 1.b): v(5-10), v(3-10), v(10-10), and v(9-10). These values (or utilities) imply the same choices as does the "economic man" model of choice on a commodity space: choose (15,5) on the left branch and (10,10) on the right branch *in both games*. In this way, a discussant's suggested heuristic application of prospect theory actually implies that the $T_{15,5}$ and $T_{10,10}$ treatments are isomorphic, not the opposite.