Trust Signaling

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Abstract

We conduct an experiment to examine the strategic use of trust in an environment similar to Berg, Dickhaut, and McCabe (1995) investment game. The environment differs in that the second mover is restricted to the binary choice of returning half of the tripled amount (fair split) or zero (selfish split). We test a conjecture that given the first mover’s expectations that the second mover will return a fair split, the first mover has stronger incentives to send more if the game is played sequentially than simultaneously. We call this behavior trust signaling. We find that in the sequential treatment first movers indeed send significantly more than when the transfer decisions are conducted simultaneously. Moreover, in line with our prediction, second movers reward trust signaling: 91% of first movers who invested the entire endowment received half of the surplus. On the other hand, only 5% of first movers who invested anything less than the entire endowment received half. In the simultaneous treatment the proportions yield 11% and 32% respectively. We also find that trust signaling is welfare enhancing.

Classification codes: C70; C91

Keywords: Experimental economics; Trust; Dynamic psychological game

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1. Introduction

In many institutions people transact sequentially and the success of the interaction often relies on the first mover having trust in the second mover to share the created surplus. An important feature of these trust situations is that the first mover can choose a level of credible (costly) commitment which can possibly reveal information about her degree of trust in the favorable response of the second mover. For example, in an Internet auction, the final price may signal the level of trust that the winning buyer has in the seller’s credibility; in labor relations, the size of the salary signals the firm’s trust in the ability and the diligence of the worker; and last but not least a co-payment requirement signals the bank’s trust (or lack of) in the entrepreneur’s ability to pay back the loan. If the second mover can ascertain the level of trust from the first mover’s action and in turn responds to it positively, then the first mover may want to manipulate her level of commitment in order to induce the most favorable response. We refer to this interaction as trust signaling.

Whether the first mover’s action signals trust and how the second mover responds to it is an empirical question. In this paper, we report the results of an experiment that addresses this question by comparing decisions of the first mover in two modified trust games. The only difference between the two games is that in one case player’s A decision (commitment) is observable and in the other it is not. In our trust game, the first mover initially chooses an amount $t$ to be sent to the second mover that is tripled, and the second mover must decide whether to send back half of this triple amount (fair split) or to keep everything for herself (selfish split). When the game is played sequentially and thus $t$ is observable, trust signaling is possible because the second mover can condition her decision on $t$. Conditioning the response on $t$ is not possible if the game is played simultaneously because $t$ is not observed. If the amount sent signals trust, then the first mover should face incentives in the sequential game to take one of two actions, (1) increase $t$ if she thinks this sufficiently improves her chances of receiving a fair share (half) of the surplus, or (2) send nothing if she thinks that no level of $t$ signals a high

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1 Fair division in our understanding would correspond to any division which allocates positive amount of surplus to both parties and makes them reasonably happy. At this point we do not want to go into any deeper discussion into the meaning of fairness.
enough trust to justify taking the risk of losing the amount sent. Therefore, we propose and test the following conjecture: When \( t \) is observable, the ability to signal trust creates a stronger positive relationship between the first mover’s trust as represented by her belief, denoted as \( \mu \), of the second mover’s response and her action than when \( t \) is not observable. This is reinforced by a positive and monotone response to \( t \) by the second mover.

Our results provide strong support for trust signaling. That is, the first mover chooses \( t \) strategically. There is significantly stronger positive relationship between the belief \( \mu \) of the first mover and \( t \) in the game where \( t \) is observable than when it is not observed. Given this, one would expect that the second mover would reward higher \( t \) with higher chances of a fair split. Surprisingly, this monotone relationship is rejected by the data. In particular, the second mover responds in a very strict manner. If she is fully trusted, i.e., if \( t \) is maximal, then she almost always responds with the fair split. However, if she senses any doubt, no matter how small, i.e., \( t \) is less than maximal, then she almost always keeps the whole surplus. This brings us to an unexpected observation that the incentives to signal trust are quite extreme: either trust all the way or don’t trust at all.

The possibility of trust signaling gives rise to another interesting question: Is the strategic use of trust efficiency enhancing or reducing? Observability of \( t \) is an important aspect of many institutions around us. Knowing its marginal contribution to social surplus may have important implications for understanding and designing institutions. Our design allows us to measure this marginal effect by comparing the average level of \( t \) in our two environments, where in one trust signaling is possible and in the other it is not. It may seem natural that trust signaling enhances efficiency because the first mover can increase her chances of a fair split by increasing \( t \). But, this is only one side of the story. Increasing the chances of receiving a fair share (half) comes at a cost of having to commit more resources. Because of this it may be that no level of \( t \) signals sufficiently high trust for the first mover to take the chance and send a positive amount. Therefore, the ability to signal trust can be a double-edged sword. Nonetheless, we have good news; the results of our experiment indicate that the efficiency is higher when signaling is allowed.

A modified version of the Berg et al. (1995) trust game is a centerpiece of our design. They were the first to study the trust game in laboratory conditions. Their
experiment identifies trusting behavior by observing that subjects playing the role of the first mover often invest and those in the role of the second mover often reciprocate by returning positive amounts. Whether the first mover’s decision reflects a degree of trust or rather a variation of risk preferences has been recently looked at by several studies (Eckel and Wilson (2004), Kosfeld et al. (2005), and Houser and Schunk (2007)). Houser and Schunk find that variations in risk-preferences are not an important determinant of the first mover’s decision in the trust game. More specifically, they argue that trust games measure trust, which is important for us because it implies that there is a close relationship between first mover’s trust and the amount sent. Therefore, it is plausible that the first mover could be signaling trust by manipulating $t$.

There is a large body of literature exploring behavioral foundations of trust. Our trust signaling conjecture can be derived from several models that attempt to explain trust as a product of rational behavior. For example, Dufwenberg (2002), Dufwenberg and Gneezy (2002), Charness and Dufwenberg (2006), Battigalli and Dufwenberg (2007), and Dufwenberg et al. (2007) rely on the theory of guilt aversion. The main idea is that if the second mover is (sufficiently) guilt-averse, then she will experience a disutility from feeling guilty whenever she "lets her counterpart down," i.e., returns less than what was expected. To avoid guilt, she optimally splits the surplus in a way that matches her belief about what is expected by the first mover. Therefore, in this framework, the first mover invests only if she is sufficiently confident that her counterpart knows about her expectations of a fair division.

To see how trust signaling can be derived from the theory of guilt aversion, notice that trusting behavior might be quite different when $t$ is observable compared to when it is not. When the $t$ is not observed, the expectations of the first mover are not clear to the second mover. The second mover will react solely to her inherent, idiosyncratic (initial) belief about what is expected. Depending on whether the second mover’s inherent beliefs about the first mover’s expectations of a fair return are strong or weak, one could observe

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2 There are other possible motivations why players would send and return positive amounts, such as other-regarding preferences (Cox (2004)) or preferences for increasing social welfare (Charness and Rabin (2002)). Nevertheless, the behavior of the first and second mover can be seen as ‘proxies’ for trusting and trustworthy behavior (Charness et al. (2007)).

3 First mover's utility depends on her belief about second mover’s expectations, which makes it an example of a dynamic psychological game (Battigalli and Dufwenberg (2005)).
the second mover returning a fair share or keeping everything to herself. This is in contrast to the case when \( t \) is observable and thus sending the whole endowment by the first mover signals high expectations. The reason is that the greater the \( t \), the greater the loss if the second mover decides to keep everything. Due to this credible exposure, it should be unambiguous that the first mover has a high expectation. Therefore, high \( t \) induces a sufficiently guilt-averse second mover to respond with a fair share, which in turn gives extra incentives to the first mover to send more.

Another important theory explaining trust is based on the concept of reciprocity (Cox et al. (2007), Dufwenberg and Kirchsteiger (2006), and Falk and Fischbacher (2006)). The basic idea is that because the amount sent creates a large surplus on the side of the second mover, she perceives it as a “kind action” and reciprocates by returning a fair share. It is not hard to imagine that if this perception of kindness is increasing in the level of \( t \), then the first mover may have stronger incentives to invest when the \( t \) is observed than when it is not.

While the present paper focuses on trust signaling, Falk and Kosfeld (2006) and Schnedler and Vadovič (2007) study distrust in a dictator game, and find that a signal of distrust, represented by restricting the agent’s action space, negatively affects the performance of the agent. In their experimental design, a principal can choose either to trust the agent or to “control her” by eliminating her most opportunistic actions. Their experiments confirm that subjects interpret the control as a signal of distrust and lower their (voluntary) performance. In contrast to Falk and Kosfeld study, where controlling could harm the agent and signal distrust, the \( t \) in our case signals trust by benefiting the second mover.

Comparing the behavior of subjects playing the trust game sequentially and simultaneously is somewhat similar to the hot versus cold effect of elicitation procedure in economic experiments. According to the standard game-theoretic view, the outcome of the sequential play in our setting should be equivalent to the simultaneous play, just like the outcome of sequential play is equivalent to the strategy method. Indeed, in reality the sequential play and the strategy method often yield similar results, e.g. Brandts and Charness (2000), Falk and Kosfeld (2006), and others. However, sometimes in combination with other factors, such as context in which the game is played, the
qualitative results can be reversed, e.g. Brosig et al. (2003), Cox and Deck (2005), and Falk et al. (2003). Nevertheless, if trust signaling is behaviorally important, we can expect higher amounts to be both sent and returned in the treatment when the game is played sequentially.

The rest of the paper is organized in the following manner. Section 2 provides the experimental design. Section 3 describes the procedures, Section 4 presents the experimental results, and Section 5 concludes with a discussion.

2. The Experiment

Our experiment contains two treatments in which players A and B play a modified trust game. The first mover, player A, decides how much of her initial endowment to invest, i.e., she chooses an amount $t$ from the interval between 0 and 10. The invested amount is tripled by the experimenter. The second mover, player B, then decides whether to return a fair split, $3t/2$, or a selfish split, 0, back to the player A. Before player A chooses $t$, we elicit her beliefs about the chances of a fair split in a salient way (see Dufwenberg and Gneezy (2002)). The treatments vary in the timing of play and thus, in the availability of information that player B has at the time of making her decision. In the first treatment, SEQ, players A and B play the game sequentially. Player B chooses the split of the tripled amount only after she observes how much player A has sent. In the second treatment, SIM, both players make their decisions simultaneously. Therefore, player B chooses a split without knowing how much player A has sent.

Let us discuss several features of our design in more detail. First, notice that player’s A action space is rich while player’s B action space is binary. The reason for this design feature is that we focus on the behavior of player A and want to observe the relationship between her level of trust and a costly message $t$ that she sends to player B. Observe that if player A faced just a binary decision to either invest or not, then her action could not signal various degrees of trust. Player’s B action space is also important because it determines the belief of player A which we take as a measure of trust. If player B also faced a rich action space, as in the original trust game (Berg et al. (1995)), she

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4 Notice that we are now assuming a particular concept of fairness. A fair split is equal to exactly a half of the generated surplus. This concept of fairness also corresponds to the notion of Shapley value which has been shown to bear empirical validity in experiments, e.g., see Eckel and Gilles (1997).
would have to decide what whole dollar amount to return. In that case, player A would have to form her expectations over the whole distribution of possible player’s B choices. Because player’s B decision is simple then player’s A decision is also simple, which in turn makes our measurement more precise. Moreover, the decision of player B is stated as a fraction in order to make the behavior of subjects comparable between the two treatments.

In our view player’s A belief in a fair response from player B and her level of trust are innately related. Therefore, we elicit player’s A belief and use it as a measure of trust. The amount $t$ will likely correlate with this belief, but we do not assume that ex ante. We simply consider $t$ to be a costly message. It is the relationship between player’s A belief and $t$ that is of interests to us.

Given our design, we derive three testable hypotheses. First, we test whether player A signals her trust to player B. In the SEQ treatment where trust signaling is possible, we expect that the rate of increase in $t$ for a given $\mu$ is higher in SEQ than in SIM.

H1: The mean $t$ conditional on player’s A belief $\mu$ is greater in SEQ than in SIM

Trust signaling is a response to the expected behavior of player B. Therefore, it only pays off if player’s A beliefs $\mu$ are correct, and indeed player B rewards higher $t$ with higher propensity of a fair split.

H2: There is an increasing monotonic relationship between $t$ and frequency of fair split decisions made by player B.

Finally, we want to compare the efficiency levels between the two treatments. In SEQ if $\mu$ is high it is optimal for player A to send high $t$ (possibly maximal), but if $\mu$ is low, it is optimal to send $t = 0$. Thus, in SEQ trust signaling can have positive as well as negative effect on $t$. For this reason it is not clear that efficiency as measured by $t$ is higher in SEQ or in SIM.
H3: There is no difference in efficiency between the two treatments.

3. Procedures

The experiment consisted of eight sessions conducted in March of 2007 at the University of Canterbury, Christchurch, New Zealand. A total of 156 subjects were recruited from economics and mathematics undergraduate courses. Some of the students had previously participated in economics experiments, but none had experience with trust games. Each subject only participated in a single session of the study. On average, a session lasted 60 minutes including initial instructional period and payment of subjects. Subjects earned on average 18.85 NZD.\(^5\) All sessions were hand run in a classroom.

Each session included between 18 and 22 subjects who were randomly matched into two person groups that consisted of a player A and player B participants. The assignment of these groups was done according to the following process. The classroom was segmented in half such that all subjects of a given type would be located in the same half of the room. The desks for each type were arranged in two rows facing the wall, and thus neither type would be able to see the other when making decisions. The subjects were free to choose any seat upon entering the classroom. Once everyone was seated, a coin was publicly flipped to determine which side of the room was to be which type. The allocation of a player A and player B to a particular group was done by experimenter randomly pairing one subject from each type together.

At no time during the experiment was there direct interaction. Each subject was provided a set of decision sheets that were identical across subjects. Subjects recorded any decisions during the experiment on these sheets. In order to transfer information between matched pairs, the experimenters collected all decision sheets, copied the decisions from one sheet to another, and then redistributed the sheets to the subjects. This prevented the exchange of superfluous information and aided in maintaining the anonymity of individual decisions.

The general structure of the trust game is similar to Berg et al. (1995). In the first stage of each trust game, players A were endowed with $10NZ. They had to decide how

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\(^5\) The adult minimum wage in New Zealand at the time of the experiment was 10.25 NZD per hour (1 NZD = 0.6943 USD).
much of this endowment they wanted to keep for themselves and how much to transfer to their anonymous player B counterpart. This was done by circling one of the whole numbers ranging from zero to ten on their decision sheet. It was common knowledge that any amount transferred by player A would be tripled by the experimenter. That is, players B would receive three times the amount that their player A counterpart transferred to them. In the second stage, players B must decide how much of the tripled amount they want to keep for themselves and how much to transfer back to their player A counterpart. This decision is restricted to a binary choice of either half or zero. Just as for players A, this decision was done by circling one of the two choices on their decision sheet.

We elicited player A’s beliefs about their counterpart player prior to them playing both trust games. The protocol used follows closely to Dufwenberg and Gneezy (2000). Players A were asked to predict the percentage of all players B who will transfer half in the second stage by completing the following statement, "I believe that ...% of players B in the room will return HALF of the tripled amount." The subjects' earnings depended upon the accuracy of their prediction. For this task, all subjects were endowed with $5. For every one percentage point deviation from the actual outcome, ten cents was deducted from the $5. Therefore, a deviation of 50% or more resulted in zero earnings.

We have two treatments in the experiment, i.e., sequential (SEQ) and simultaneous (SIM) play of the trust game. Four sessions in total were conducted for each treatment. The sequence of events in a session was the following. (1) A coin was flipped to determine player types. (2) The instructions were read aloud for the subjects, who followed along with their own copy. To assist in their understanding, a copy of the instructions was also placed on an overhead and any decision sheets, tables, etc. were illustrated specifically. The subjects were encouraged to ask questions relating to the rules of the game at any time. (3) Players A completed the belief elicitation task. (4) The experimenter collected the belief decision sheets and distributed the trust game decision sheets. (5) The sequence of events differed slightly between sessions implementing the sequential and simultaneous trust games. In the sequential trust game sessions, players A first made their transfer decision to players B. All decision sheets were collected and the amount transferred from players A were copied to their counterpart players' B decision sheets, which were then returned to players B. Presented with the decision of their player
A counterpart, players B made their decision on whether to return half or zero. The experimenter collected all decision sheets, transferred the decision information of players B to their player A counterparts' decision sheet, and returned the decision sheets to all players to reveal their earnings. In the simultaneous trust game sessions, both player types of participants made their transfer decisions simultaneously. The experimenter collected all decision sheets, transferred the decision information each decision sheet to their counterparts', and returned the decision sheets to all players to reveal their earnings. (6) Subjects completed a short survey on the experiment and general demographic information for which they were paid $5 instead of a show up fee. This was not announced to the subjects at the start of the experiment. (7) Subjects were privately paid their earnings for the session.

4. Results

Given our modification to the Berg et al trust game, we want to verify the robustness of our results to previous studies. Figure 2 provides a summary of players’ decisions across treatments. SEQ (n=41) is displayed on the left and SIM (n=37) is displayed on the right. The average \( t \) sent by players A in SEQ and SIM was 6.59 and 5.22 respectively. The subgame perfect equilibrium for both SEQ and SIM is for all players A to send \( t = 0 \) and all players B to return Zero. Players A sent \( t = 0 \) only 5 out of 41 (12%) instances in SEQ and 4 out of 37 (11%) instances in SIM. Irrespective of the particular subgame in SEQ for a chosen \( t \), players B returned ZERO 21 out of 41 (51%) instances. In SIM, players B returned ZERO 27 out of 37 (73%) instances. Much like most of the previous literature on trust, we also find only very little support for the subgame perfect equilibrium predictions for self-regarding players in our data.
We expect there to be a positive relationship between A’s belief and the amount \( t \) that she invests. To verify this relationship, we run a tobit regression of players’ A beliefs (\( \mu \)) onto \( t \). The bounds for the tobit estimation were imposed by the experimental design: \( t \in [0,10] \). We find that the estimated coefficient of \( \mu \) is positive for SEQ (0.27) and SIM (0.12), and both are highly statistically significant (p=0.000).

Next we turn our attention to Hypothesis 1, which states that the mean \( t \) conditional on player’s A belief \( \mu \) is greater in SEQ than in SIM.

**Result 1: Players A signal trust in SEQ treatment.**

**Support for result 1:** We compare the slopes of regressions of \( t \) on beliefs in SEQ and SIM treatments. The tobit analysis of pooled players’ A decisions based on the treatment he participated in has the form:

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t_i = \alpha + \beta_1 \mu_i + \beta_2 T_{SEQ} \cdot \mu_i + \gamma T_{SEQ} + \epsilon_i,
\]

where \( T_{SEQ} \) represents a dummy variable that equals 1 for SEQ treatment and 0 otherwise. Once again, the bounds for the tobit estimation were imposed by the
experimental design: \( t \in [0,10] \). If the trust signaling hypothesis is true, we will expect that the slope of the regression in SEQ to be higher than in SIM, i.e. \( \beta_2 > 0 \). The estimated coefficients are provided in Table 1 and scatter plot of the data and regression lines are illustrated in Figure 3. The estimated slope of the regression in SEQ is significantly higher than in SIM, thus confirming our expectations.

| Coef. | Std. Err. | \( t \) | \( P >| t | \) |
|------|----------|------|---------|
| A’s Beliefs (\( \beta_1 \)) | 0.128 | 0.036 | 3.55 | 0.001 |
| Product (\( \beta_2 \)) | 0.109 | 0.058 | 1.89 | 0.032 |
| Dummy (\( \gamma \)) | -2.748 | 2.813 | -0.98 | 0.332 |
| Cons. (\( \alpha \)) | -0.248 | 1.829 | -0.14 | 0.893 |

Sigma | 4.883 | 0.623 |

Product = A’s Beliefs x Dummy

We now analyze the behavior of players B. Do players B react to the level of \( t \) sent to them by players A in SEQ? More precisely, do players B respond to trust signaling by returning HALF with a higher frequency when they observe a higher \( t \) as conjectured in Hypothesis 2?
Result 2: Players B only reward highest signals of trust.

Support for result 2: Figure 4 provides the distribution of decisions SEQ. The columns labeled Player A (t) present the instances that Players A sent t. The Player B (HALF) columns present the instances that Player B returned HALF for a given t received. It is clear from the figure that there is not an increasing monotonic relationship between t sent by players A and the frequency of HALF returned by players B. Notice that among the 41 pairs, 21 (51%) of the players A sent t=10 and 19 (91%) of players B who received t=10 returned HALF. On the other hand, only 1 out of the 20 players B (5%) who received t<10, returned HALF. Thus, we reject the hypothesis that an increase in t induces a higher frequency of returning HALF by players B. □

Figure 4: Instances of Decisions in SEQ.

![Bar chart showing instances of decisions](chart.png)

Obviously in SEQ, the decision of players B of whether to return HALF or ZERO depended heavily upon the observed decision of player A. This clear pattern is not present in the SIM data where t is not observable to players B before they make their decisions. When player A sent t=10 in SIM, only 1 out of 9 (11%) players B returned HALF compared to 9 out of 28 (32%) when player A sent t<10.
We now compare the efficiency levels between SEQ and SIM. Although we suspect that trust signaling is efficiency enhancing, our intuition about this is not clear-cut. In order to subject our conjecture to a stronger test the Hypothesis 3 posits that there is no difference in efficiency between the two treatments.

**Result 3:** SEQ treatment has a higher efficiency level than the SIM treatment.

**Support for result 3:** The mean \( t \) sent by players A in SEQ and SIM was 6.59 and 5.22 respectively. A two-sided Mann-Whitney test indicates that they are significantly different at the 10% level \((p=0.092)\). It is worthwhile to highlight the source of higher \( t \) in SEQ. A closer look at the data reveals that the number of players A who signal trust by sending \( t = 10 \) (maximal) is significantly higher in SEQ than in SIM \((p=0.013, \text{ 1-sided Fisher’s exact test})\), but the number of those who sent nothing does not differ between treatments \((p=0.566)\). □

The previous result indicates that social welfare as measured by \( t \) is higher in SEQ than in SIM. However, it is not so clear that player A is better off in SEQ than she is in SIM. The reason is although a higher \( t \) raises the chances of getting a HALF, it also becomes more costly if player B keeps everything to herself. Because player’s B decision in SIM is not conditional on \( t \), the appropriate test compares the proportions of player’s B returning HALF after observing \( t = 10 \) in SEQ (19 out of 21) with the proportion of all player’s B returning HALF in SIM (10 out of 37). Not surprisingly, the difference is statistically significant \((p = 0.000)\) using 2-sided Fisher’s exact test.

**5. Discussion**

We set out to study trust in two environments that allow different degrees of strategic behavior. In the first environment players A and B make decisions in a trust game sequentially and in the second they make decisions simultaneously. In the

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\(^6\) We define efficiency as the percentage of maximum potential earnings realized by the subject’s decisions. The level of efficiency in our trust game is solely dependent upon the amount \( t \) sent by player A because it is only their decision that determines any increase in the size of the pie. The decision by players B determines the distribution of the pie increase.
sequential game player A can signal trust. The structure of the game also implies that player B observes whether she was trusted or not before she makes her decision. Hence, her response will likely depend on player’s A action. Therefore, player A has the ability to behave strategically.

In the simultaneous game, the behavior of both players A and B is solely driven by their personal beliefs. More specifically, the trust of player A in receiving a fair response derives purely from her subjective belief about the proportion of fair players B in the population. And thus, player’s A beliefs are dependent upon own experiences and biases. Because of the fact that player A’s decision is not observable, she has no opportunity to signal trust and thus cannot affect the decision of player B. Hence, we expect that in a sequentially played trust game player A sends more money in order to induce player B to behave fairly than if the game is played simultaneously.

The results of our experiments for the most part confirm our conjectures. We find that players A signal trust to their counterpart players B who in turn reward them by sharing the surplus. However, in the laboratory environment that we created, it is necessary for player A to signal complete trust in order to receive this reward. Therefore, we reject the monotone relationship between the amount sent by players A and the frequency of returning a fair share by players B. This result seems quite intuitive — players B reward only what they consider absolute trust and appear to interpret any $t$ smaller than 10 as a sign of distrust (Falk and Kosfeld (2006), Schnedler and Vadovič (2007)). As argued earlier, it is not obvious whether trust signaling is welfare improving or not. The experimental evidence suggests that welfare is higher when the display of trust is explicit as in our SEQ treatment.

Our results are relevant from theoretical standpoint and also from the point of view of designing institutions. We found that when interaction is sequential (i.e., agents have the ability to signal trust), then more transactions are initiated (increasing overall welfare) and more transactions are completed (thus making it profitable for the trusting party). Thus, we advocate designing institutions that allow for a display of trusting behavior.

The game subjects play in our experiment can be viewed, under certain assumptions (e.g., of guilt-averse or reciprocal preferences of player B), as an example of
a dynamic psychological game (Duwenberg and Battigalli, 2005). By signaling trust player A may be signaling her beliefs about receiving a fair share of the pie. The greater the amount sent, the greater the loss to player A if player B decides to keep everything. Because of such credible exposure, it should be unambiguous that player A has high expectations. Hence, player B should revise her initial belief upwards about what player A expects her to do. This reasoning is also known as psychological forward induction (Duwenberg and Battigalli, 2005). It seems reasonable to conjecture that changes in behavior between our two treatments are driven by the heterogeneity in players’ initial and updated beliefs, i.e., subjects induct forward. However, to further verify this claim a more appropriate design that will include a simpler game (with preferably binary choices) and will elicit beliefs of both players at appropriate moments of the game is necessary.

References


You are a Player ____          ID#:____

GENERAL INSTRUCTIONS

March, 2007

This is an experiment studying decision-making. The instructions are simple and if you follow them carefully and make good decisions, you might earn a considerable amount of money which will be paid to you in cash at the end of the experiment. It is therefore very important that you read these instructions with care.

No Talking Allowed
It is prohibited to communicate with other participants during the experiment. Should you have any questions please ask us. If you violate this rule, we shall have to exclude you from the experiment and from all payments.

Anonymity
Each person will be randomly matched with another person in the experiment. No one will learn the identity of the person she/he is matched with. You will be matched with the same person for the entire experiment.

Types
Each two person group will consist of two types of participants (Player A and Player B) that are assigned randomly. Your assigned type will be listed at the top of each task instruction sheet.

The Game
You are randomly paired with another individual. One member of your pair will be a player A and the other one will be player B. Find your type in the upper right corner of this sheet. You will never be able to find out the identity of the player you are paired with.

Each player’s earnings will be determined according to the process below.

(a) Player A begins the process with $10, and player B begins with $0.

(b) Player A then has the opportunity to transfer all, any portion, or none of his/her $10 to player B. Player A circles his or her decision on line (1) of the attached Decision Sheet. The amount that is not transferred is player A’s to keep. The amount that player A transfers triples when it reaches player B. For example, if A transfers $10 to B, B receives $30. If A transfers $5 to B, B receives $15. If A transfers $0 to B, B receives $0.

(c) Player B then has the opportunity to transfer half or none of the money he/she has received to player A. Player B indicates his/her decision in line (3) of the Decision Sheet by circling either HALF or ZERO. The amount that is not transferred is player B’s to keep, and the amount transferred is added to player A’s earnings.
You are a Player A

**Task 1 Instructions for Player A**

In task 2, the initially described two stage game is played *sequentially*. That is, player A makes their transfer decision and then player B makes their transfer decision after being able to see how much player A transferred to them. Therefore, player B is going to make their decision *knowing* how much player A has transferred to them.

For task 1, you must answer the following question:

**After seeing how much is transferred to them from player A, what is the percentage of players B in the room that will return HALF of the amount that they receive, i.e. HALF of the tripled amount that is transferred to them from player A counterpart?**

Your payout will depend on your accuracy. The payout is calculated as follows:

You will start with $5. For every percentage point (1 % point) of mistake, 10 cents will be deducted from this $5. The mistake is the absolute value of (your answer – the actual percentage). For example, if you answer accurately, you will get $5. If you miss by 20% points (i.e., your answer is either twenty percentage points too high or twenty percentage points too low), you will be paid $3 (500 - 20 x 10 = 300). If your mistake will be larger than or equal to 50% points, then your earnings from this task will be zero.

*I believe that ........ % of players B in the room will return HALF of the tripled amount.*
You are a Player A

ID#:____

Task 2 DECISION SHEET

Player A begins with $10. Player B begins with $0.

Each dollar that Player A gives to Player B is multiplied by 3 by the experimenter.

The decisions of both players will be made sequentially. Therefore, player B will know how much player A has transferred to player B before player B makes their decision of whether to return HALF or ZERO.

(1) Player A’s decision:

Circle the amount that you want to transfer to player B

0  1  2  3  4  5  6  7  8  9  10

(3) Player B’s decision:

Circle the amount you want to transfer to player A:

HALF     or     ZERO

(4) Experimenter calculates total earnings:

Final payoff to player A: ___________________

Final payoff to player B: ___________________
DECISION SHEET

Player A begins with $10. Player B begins with $0.

Each dollar that Player A gives to Player B is multiplied by 3 by the experimenter.

The decisions of both players will be made sequentially. Therefore, player B will know how much player A has transferred to player B before player B makes their decision of whether to return HALF or ZERO.

(1) Player A’s decision:

Circle the amount that you want to transfer to player B

0 1 2 3 4 5 6 7 8 9 10

(3) Player B’s decision:

Circle the amount you want to transfer to player A:

HALF or ZERO

(4) Experimenter calculates total earnings:

Final payoff to player A: ___________________

Final payoff to player B: ___________________
Task 1 Instructions for Player A

In task 2, the initially described two stage game is played *simultaneously*. That is, player A makes their transfer decision at the same time that player B makes their transfer decision back to player A. Therefore, player B is going to make their decision *without knowing* how much player A has transferred to them.

For task 1, you must answer the following question:

Without knowing how much player A has transferred to them, what is the percentage of players B in the room that will return HALF of the amount that they receive, i.e. HALF of the tripled amount that is transferred to them from player A counterpart?

Your payout will depend on your accuracy. The payout is calculated as follows:

You will start with $5. For every percentage point (1 % point) of mistake, 10 cents will be deducted from this $5. The mistake is the absolute value of (your answer – the actual percentage). For example, if you answer accurately, you will get $5. If you miss by 20% points (i.e., your answer is either twenty percentage points too high or twenty percentage points too low), you will be paid $3 (500 - 20 x 10 = 300). If your mistake will be larger than or equal to 50% points, then your earnings from this task will be zero.

*I believe that …….. % of players B in the room will return HALF of the tripled amount.*
You are a Player A

ID#:_____  

Task 2 DECISION SHEET

Player A begins with $10. Player B begins with $0.

Each dollar that Player A gives to Player B is multiplied by 3 by the experimenter.

The decisions of both players will be made simultaneously. Therefore, player B will not know how much player A has transferred to player B before player B makes their decision of whether to return HALF or ZERO.

(1) Player A’s decision:

Circle the amount that you want to transfer to player B

0  1  2  3  4  5  6  7  8  9  10

(3) Player B’s decision:

Circle the amount you want to transfer to player A:

HALF    or    ZERO

(4) Experimenter calculates total earnings:

Final payoff to player A: ___________________

Final payoff to player B: ___________________
You are a Player B

ID#: _____

DECISION SHEET

Player A begins with $10. Player B begins with $0.

Each dollar that Player A gives to Player B is multiplied by 3 by the experimenter.

The decisions of both players will be made simultaneously. Therefore, player B will not know how much player A has transferred to player B before player B makes their decision of whether to return HALF or ZERO.

(1) Player A’s decision:

Circle the amount that you want to transfer to player B

0 1 2 3 4 5 6 7 8 9 10

(3) Player B’s decision:

Circle the amount you want to transfer to player A:

HALF or ZERO

(4) Experimenter calculates total earnings:

Final payoff to player A: ___________________

Final payoff to player B: ___________________
QUESTIONNAIRE

Thank you for participating in the experiment. While we calculate your final payout, please complete the following survey. All of your responses will remain anonymous and only linked to the decisions within the experiment via your ID#. Therefore, please answer as truthfully and completely as possible. You will be paid $5 for the completion of this questionnaire.

1. Were you a player A or player B?
2. Did you find the instructions clear and self-explanatory? If not, please specify.
3. What was your decision rule when making your choice?

General Demographic Information

1. What is your age? __________

2. What is your sex? (Circle one number.)
   01 Male 02 Female

3. Which ethnic group(s) do you belong to? (Circle as many as you need, then write the country you are from if applicable.)
   01 NZ European/Pakeha 04 Asian
   02 NZ Maori 05 Other
   03 Pacific Islander Country: ______________
   Country: ______________

4. What is your major? (Circle one.)
   01 Accounting
   02 Economics
   03 Finance or Information Systems
   04 Education
   05 Engineering
   06 Law
   07 Biological Sciences
   08 Math, Computer Sciences, or Physical Sciences
   09 Social Sciences or History
   10 Humanities
   11 Psychology
   12 Other Fields
5. What is your class standing? (Circle one.)
01 Undergraduate – first year 04 Honours
02 Undergraduate – second year 05 Masters
03 Undergraduate – third year 06 Doctoral

6. What is the highest level of education you expect to complete? (Circle one.)
01 Bachelor’s degree
02 Honour’s degree
03 Master’s degree
04 Doctoral degree

7. What was the highest level of education that your father (or male guardian) completed? (Circle one.)
01 Less than high school (Fifth Form Certificate or Sixth Form Certificate)
02 High school (Bursary or UE)
03 Vocational or trade school
04 College or university

8. What was the highest level of education that your mother (or female guardian) completed? (Circle one.)
01 Less than high school (Fifth Form Certificate or Sixth Form Certificate)
02 High school (Bursary or UE)
03 Vocational or trade school
04 College or university

9. What is your citizenship status in New Zealand?
01 NZ citizen
02 Permanent Resident
03 Refuge
04 Other

10. Are you a foreign student on a Student Visa?
01 Yes
02 No

11. Are you currently …
01 Single and never married?
02 Married?
03  Separated, divorced or widowed?

12. On a 9-point scale, what is your current GPA if you are doing a Bachelor’s degree, or what was it when you did a Bachelor’s degree? This GPA should refer to all of your coursework, not just the current year. Please pick one:

  01  Between 7.01 and 9.0 GPA (A- to A+ average)
  02  Between 5.01 and 7.0 GPA (B to A- average)
  03  Between 3.01 and 5.0 GPA (C+ to B average)
  04  Between 1.01 and 3.0 GPA (C- to C+ average)
  05  Between 0 and 1.0 GPA (D- to C- average)
  06  Have not taken courses for which grades are given

13. How many people live in your household? Include yourself, your spouse and any dependents. Do not include your parents or flatmates unless you claim them as dependents. ____________

14. Please circle the category below that describes the total amount of INCOME earned in 2005 by the people in your household (as “household” is defined in question 13). [Consider all forms of income, including salaries, tips, interest and dividend payments, scholarship support, student loans, parental support, social security, alimony, and child support, and others.]

  01  $15,000 or under
  02  $15,001 - $25,000
  03  $25,001 - $35,000
  04  $35,001 - $50,000
  05  $50,001 - $65,000
  06  $65,001 - $80,000
  07  $80,001 - $100,000
  08  Over $100,000

15. Please circle the category below that describes the total amount of INCOME earned in 2005 by your parents. [Consider all forms of income, including salaries, tips, interest and dividend payments, social security, alimony, and child support, and others.]

  01  $15,000 or under
  02  $15,001 - $25,000
  03  $25,001 - $35,000
  04  $35,001 - $50,000
  05  $50,001 - $65,000
  06  $65,001 - $80,000
  07  $80,001 - $100,000
  08  $100,001 - $120,000
<table>
<thead>
<tr>
<th></th>
<th>Current Income Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>09</td>
<td>$120,001 - $140,000</td>
</tr>
<tr>
<td>10</td>
<td>Over $140,000</td>
</tr>
<tr>
<td>11</td>
<td>Don’t know</td>
</tr>
<tr>
<td>12</td>
<td>Known only in foreign currency</td>
</tr>
</tbody>
</table>

Write currency and amount here: ________________

16. Do you work part-time, full-time, or neither? (Circle one.)
   - 01 Part-time
   - 02 Full-time
   - 03 Neither

17. Before taxes, what do you get paid? (Fill in only one.)
   - 01 _________ per hour before taxes
   - 02 _________ per week before taxes
   - 03 _________ per month before taxes
   - 04 _________ per year before taxes

18. Do you currently smoke cigarettes? (Circle one.)
   - 01 No
   - 02 Yes
   If yes, approximately how much do you smoke in one day?