Theory-of-Mind Mechanism in Personal Exchange

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March 16, 2000

KEYWORDS: Exchange, Trust, Reciprocity, Goodwill Accounting, Theory-of-Mind, Delayed Gratification, Experimental Economics

Abstract

We postulate a system of mental modules necessary for personal exchange. This system includes a 'good-will' accounting system which tracks trading partners together with a 'mind-reading' system which attributes mental-states to partners in order to achieve greater expected gains from exchange. Our hypothesis is that humans have a propensity to establish long-term reputations as cooperators and non-defectors, and consequently believe that their anonymous counterparts in our experiments are like-minded persons. We test whether Theory of Mind Mechanism (ToMM) is activated during strategic interactions in games with underlying reciprocity responses by examining the within group behavior of two different subject pools (assistant professors of economics and undergraduates). We find that assistant professors take longer, trust less, and do worse in terms of final payoffs than undergraduates. However, within each group levels of trust are well matched with the resulting levels of reciprocity. This suggests that individuals are quite successful in reading the intentions of their paired in-group partner. In contrast, when members of these groups play a computer with a fixed (known) strategy behavior looks identical across groups. Our interpretation is that ToMM is activated when shared intentions are relevant to the decision of whether or not to cooperate, and that ToMM is inactive when shared intentions are not relevant.

1. Background

Non-cooperative game theory makes an over-simplistic assumption about the nature of self-interested behavior by rational agents. This assumption seems to contradict the observations by anthropologists, psychologists, and economists, that humans are social individuals with a unique ability to specialize their productive abilities and then trade on the resulting gains from specialization. In this paper we provide one possible synthesis of game theory with an understanding of the human minds' ability to search out and implement gains from exchange.

Given the assumption that people prefer more money to less, game theory further assumes that rational agents, with common knowledge and perfect information, will always choose the strategy that maximizes their own monetary payoff. Consider the following Investment Game studied by Berg, Dickhaut, and McCabe (1995): Player 1 must choose how much of $10 to send to player 2. Both players know that whatever is sent will be tripled when it reaches player 2. Player 2 must then decide how much of the tripled money to send back to player 1 and how much to keep. The money sent back to player 1 does not triple again. Game theory predicts that rational agents playing once will act as follows: Player 2, acting in his or her own self-interest, has a dominant strategy to keep all of the tripled money sent by player 1; Player 1 should infer this behavior by player 2, and send nothing. In fact this does not happen. Over 90% of the player 1's exhibit some degree of trust by sending some amount of money, and over a third of the player 2's showed themselves to be trustworthy by sending back more than player 1 initially sent.

While the concept of trust and trustworthiness seems to be antithetical to that of self-interest, this need not be the case. If there are gains from two-person exchange, then at least one person to the exchange is made better off and the other person is made no worse off. Since all exchange is inter-temporal, one person moving first, must trust the other person to reciprocate. Thus to get the benefits from exchange people must overcome their propensity for immediate self-gratification. Therefore, trust and reciprocity can be seen as self-interested behavior generated by a system of delayed gratification that enables individuals to capture the temporal gains from exchange.

Psychologists have long observed that adult humans develop strategies to solve the problem of delayed gratification in making inter-temporal choices. This ability increases desirable outcomes by overcoming the brains 'hot-system' propensity for immediate gratification. See Metcalfe and Mischel (1999). The 'hot system' is generally thought to be governed by the emotions, and is balanced by an interconnected cognitively cool system. At this stage it would be difficult to give an actual connectionist account of exchange behavior. So instead, we consider a more cognitive approach to modeling the minds ability to solve the problem of who to trust and when to reciprocate in personal (interactive) exchange.

Some subjects even in single extensive form games will opt for, or respond to, moves whose intentions are to signal a desire for positive reciprocity. Our hypothesis is that human minds have a propensity to establish long-term reputations as cooperators and non-defectors, and consequently people are willing to incur the risk that their anonymous counterparts are like-minded persons. In McCabe and Smith (2000) we present a possible mechanism, which we call Goodwill Accounting, that generates this behavior. Goodwill accounting is a reputation scoring mechanism whereby people keep mental accounts of the extent to which potential trading partners can be relied upon to use trust in exchange settings. Subjects then weigh the subjective risk of using trust against the goodwill of their trading partner to decide whether or not to initiate, or reciprocate, an exchange. Not only do people keep goodwill accounts, but research by cognitive neural psychologists suggests that people are good at reading how much goodwill they have with others.

We hypothesize that Goodwill Accounting relies heavily on a Theory-of-Mind mechanism (ToMM). Thinking of other's mind is an innate and normal module of our species that has evolved over time as a result of social (interpersonal) interactions. Whether or not a Theory of Mind mechanism is an exclusive human ability is still an open question. (See: Baron-Cohen ,1995 and 1996, Woodruff and Premack, 1979; Gallup, 1970; Tomasello, Kruger and Ratner, 1993; Povinelli, 1993).

In this paper, we design an experiment to test whether or not ToMM is activated during strategic interactions in games with underlying reciprocity responses. We find that assistant professors (faculty) take longer, trust less, and do worse in terms of final payoffs than undergraduates (students). However, within each group levels of trust are well matched with the resulting levels of reciprocity. This suggests that individuals are quite successful in reading the intentions of their chosen in-group partner. In contrast, when members of these groups play a computer with a fixed (known) strategy behavior looks identical across groups. Our interpretation of this data is that ToMM is activated when humans are playing other humans and shared attention is relevant, but largely inactive when shared attention is not relevant to the decision whether or not to cooperate.

2. Goodwill Accounting and ToMM

Figures 1 and 2 show how we envision the process of goodwill accounting working in the human mind. We do not imply that the information processing taking place in the brain is literally sequential, but instead present it this way for expository purposes. In Figure 1a, player 1 sees that he or she can do better than $10 by playing down and getting $15. But what are the risks of playing down? In Figure 1b, player 1 sees that player 2 has an incentive to play down and get $40 instead of $25. Given this is so, why should player 1 trust player 2 to move right? In Figure 1c, player 1 realizes that moving down can result in gains from exchange for both player 1 and player 2.

Once player 1 realizes the potential for gains from exchange the goodwill accounting mechanism is activated. In Figure 1d player 1 assesses what they know about player 2. In making this assessment player 1 uses both public information about player 2 as well as any private information from previous encounters. Note that the numbers r_1 and g_{12} are only used here as notational placeholders for the subjective risk and goodwill account and not meant to be the actual data structures used by the brain.

At this point player 1 may have decided that $g_{12} > r_1$ but still be uncertain whether or not player 2 will cooperate? If player 2 is like minded on this game, and players 1 and 2 have no bad history between them, then it is likely that $g_{21} > r_2$. As shown in figure 2a, player 1 must use his or her ToMM to evaluate player 2's goodwill accounting towards 1. Player 1 moves down, if and only if, both $g_{12} > x_1$ and $\breve{g}_{21} > \check{r}_2$, where $\breve{g}_{21}$ and $\check{r}_2$ are player 1's assessment of player 2's intentions. If player 1 moves down player 2 can infer that $g_{12} > x_1$. Furthermore, player 1 should expect player 2 to make this inference. But what happens if player 2 defects by moving down? As shown in Figure 2b, player 1 should realize that g_{12} was too high and decrease it by some amount β. If player 2 cooperates, then player 1 should increase g_{12} by α.

If a goodwill accounting mechanism exists, it was probably designed for repeat interaction with the same partner. Data from experiments, see McCabe and Smith (2000), show that cooperative exchange is best achieved in repeat interactions with the same partner, but data also suggests that cooperative exchange occurs even in one-shot anonymous exchanges. It is this later result that suggests that the goodwill accounting mechanism is an evolved specialized module designed to solve the problem of inter-personal exchange. See Cosmides (1989), Cosmides and Tooby (1992), and Hoffman, McCabe, Smith (1998), for more on the evolutionary psychology approach to human behavior.

The trust game shown in figure 2a can be contrasted with the mutual advantage game shown in 2c. In this game player 1 should assess the risk of player 2 playing down as very small since player 2 should prefer 35 from playing right to 25 from playing down. Therefore, the decision by player 1 to play down does not require any assessment of goodwill, or shared attention on mutual gains. This game then serves as the baseline experiment for generating cooperative behavior that does not rely on goodwill accounting.

3. Experimental Procedures

In each session, six subjects participated in four sequences of three types of two-person extensive form games. Each sequence of games consisted of a trust game (T), a punishment game (P), and a mutual advantage game (MA). These games are shown in Figures 3 and 4. In each game player 1 moves first by playing “left” or “right”. If player 1 moves “left” the game is over. If player 1 moves “right”, then player 2 can play “left” or “right” thus ending the game. When the game ends, player 1 gets the first number as a payoff in cents, and player 2 gets the second number as a payoff in cents. Players see all the payoff information, and player 2 sees player 1’s move, before making a decision.

The payoffs, shown in Figures 3 and 4, determine the type of each game. Looking at Figure 3 (condition 1) we see that a trust game requires player 1 to make the tradeoff between moving left and getting 15 cents for sure or moving right for a chance to make 60 cents. Player 2 may defect, by playing right, in order to get 135 cents leaving player 1 with zero, or player 2 can reciprocate by moving left. In the mutual advantage game player 1 should realize that player 2 will want to go left to get 35 cents, and therefore player 1 should move right to get 35 cents instead of left and only getting 25 cents. In this paper we will not present the results from the punishment game.

The design consists of two conditions with each condition consisting of two sequences. In Condition 1 (human-human) subjects know that they are playing against another subject from the same group (either students or faculty), in Condition 2 they know they are playing against the computer (human-computer). In condition 1 each subject plays an entire sequence of games either, as player 1, or as player 2. Players then change their player role in the next sequence of three games. A different partner is randomly assigned each game, and each subject plays each counterpart twice, once as player 1 and later as player 2. Players do not know the identity of the person they are playing. Figure 5 shows our matching rule for the six participants in one session of our experiment. Notice that the payoffs used in the 2nd sequence (condition 1), 1st sequence (condition 2) and 2nd sequences (condition 2) are proportional to the first sequence (condition 1) by 0.8, 1.2, and 0.6 respectively.

In condition 2 subjects are told they are playing the computer. They are told "for the next three rounds a computer program will make decisions as the second decision-maker. Neither the computer program, nor anyone else, will be paid the computer program's payoff. The computer has been programmed to play randomly, such that 75% of the time it will play left, and 25% of the time it will play right. Participants are informed about this probability distribution." For the last three rounds subjects are again told that the computer program will make decisions as the first decision-maker, and that in these rounds the computer will always play right.

4. Experimental Design and Hypotheses

First we hypothesize what will happen in condition 1. We predict that faculty will approach the trust game very differently from the undergraduates, since the faculty will use their game theoretic reasoning to consciously analyze the games using backward induction. If we look at the trust game in condition 1 of Figure 3, faculty will start at player 2's move and conclude that 135 > 75. They will then replace the decision node for player 2 with the payoff [0, 135]. Then they will look at player 1's move and conclude that 15 > 0, so player 1 should move left. At this point the faculty will realize their dilemma that [15, 15] is worse for both players than [60, 75]. Now the faculty member will have to translate their analysis into the goodwill accounting framework. Having just done the backwards induction and realizing that their counterpart has done the same the faculty ToMM will conclude that [60, 75] is unreachable, and therefore playing right is very risky. Thus we predict that most faculty player 1's will move left. If a faculty member player 1 moves right, his or her counterpart will treat that move as very unlikely to be due to their goodwill, but rather a mistake, and consequently they will play right to get the 135..

We can contrast this with the undergraduates who, as goodwill accounting predicts should focus on the mutual gains, since they have not been trained to see the move right by player 2 as that risky. Thus we predict that many more student player 1's will play right, and student player 2's will interpret this as a case of mutual goodwill and cooperate by playing left.

This gives us our first two hypotheses:

Hypothesis one: In the trust game undergraduate player 1s will trust (move right) significantly more often than faculty player 1s.

Hypothesis two: In the trust game undergraduate player 2s will cooperate (move left) significantly more often than the faculty player 2s.

Furthermore, the faculty having first consciously done the backwards induction and then having to reconcile this analysis with their goodwill accounting will take longer to decide than the students, Hypothesis three: In the trust game faculty will take longer to reach a decision than students.

In the mutual advantage game, shown in condition 1 of Figure 3, we again expect the faculty to use backwards induction to solve the game. But from this analysis the faculty should conclude that [35, 35] will be the outcome. Since this produces mutual gains without additional risk it does not create any dilemma. Here we suspect that the undergraduates will reach the same decision but once again the undergraduates should reach their decision more quickly since they do not have to consciously backward induct. This results in the following hypotheses:

Hypothesis four: In the mutual advantage game undergraduate player 1s will move right as often as the faculty player 1s.

Hypothesis five: In the mutual advantage game undergraduate player 2s will move left as often as the faculty player 2s.

Hypothesis six: In the mutual advantage game faculty will take longer to reach a decision than students.

In condition 2, subjects play the computer that is always programmed to play right 100% of the time as player 1, and as player 2, to play right 25% of the time and left 75% as player 2. This, and the fact that no one gets paid the computer's earning is made common information to the subjects. In this condition subjects should not evaluate the game as one of mutual gains but rather as a game against nature. As a game against nature both the students and the faculty should weigh expected benefits against expected costs. So in the trust game in Figure 4, condition 2, a subject as player 1 should assess the expected benefit of playing left as (.75 x 72) + (.25 x 0) = 54, which is far greater than 18 (the payoff for sure of moving left). Similarly in the mutual advantage game Player 1 should assess the expected benefit as (.75 x 42) + (.25 x 12) = 34.5, which is greater than 30 (the payoff for sure from moving left.) This leads to the following hypotheses:

Hypothesis seven: In the trust game, condition 2, undergraduate player 1s will trust (move right) as often as the faculty player 1s.

Hypothesis eight: In the trust game, condition 2, undergraduate player 2s will defect (move right) as often as the faculty player 2s.

Note, the expected benefit tradeoff made in deciding how to play against the computer is likely to take far less time than the ToMM analysis of another human being, with the consequent tradeoff between the risk of playing the game and the goodwill of one's partner.

Hypothesis nine: In the trust game, faculty and undergraduates will take less time to reach a decision playing the computer (condition 2) than when playing a human (condition 1).

For the mutual advantage game we again expect to see no differences between how players play the game.

Hypothesis ten: In the mutual advantage game, condition 2, undergraduate player 1s will move right as often as the faculty player 1s.

Hypothesis eleven: In the mutual advantage game, condition 2, undergraduate player 2s will move left as often as the faculty player 2s.

In the mutual advantage game the expected benefit calculations on how to play the computer and the analysis involved in playing a human should be roughly the same since ToMM is not involved in either case.

Hypothesis twelve: In the mutual advantage game faculty and students will take the same amount of time to reach a decision in both conditions, 1 and 2.

5. Results

We ran three sessions for each group (students and faculty). The students were 18 undergraduate students from the University of Arizona. The faculty were 18 young professors attending "The1999 Visiting Young Faculty Workshop". Tables 1 and 2 report the data for each individual.

Table 3 summarizes the results from Trust, and Mutual Advantage games. It shows decision frequencies for each group (faculty and students). In the trust game player 1 can end the game going left or "trust" by going right, giving an opportunity to player 2 to move. Player 2 then can "reciprocate" by playing left, or "defect" by going right. Consistent with Hypothesis One, students trust more than faculty. To test this hypothesis we used a bootstrap test of the frequency differences against the null hypothesis of no difference. This test accepts Hypothesis One at the 1% significance level. While the data show that the student player 2s reciprocate more (4 out of 5) than the faculty player 2s, we cannot show this is significant given the few (only 5) observations of faculty player 1's playing right. Given the observed frequency of plays by player 2s one can see that player 1 going right is always a best response (for the students), but not for the faculty. In condition 2 (human-computer), hypothesis seven and eight are accepted at the 1% significance level.

In the Mutual Advantage Game there is a mutual advantage in going right for player 1 and left for player 2. In condition one we find again that a bootstrapping procedure accepts hypothesis four and five at the 1% level. When the computer makes the decisions, in condition 2, we find that the data also supports hypothesis ten and eleven.

In all games, faculty members' play reflects a wider implementation of game theoretic principles, while students play more consistently with the desire to earn gains from exchange. These behaviors are reflected in average earning of the two groups: students' average earnings are 53.5$, while faculty's average earnings are 40.8$. Faculty seems to be less cooperative than students are and this implies less efficient social outcomes.

Tables 4 shows the timing results. We collect timing data on all subjects' decisions. In the table, timing (in seconds) is referred to each player's position and to the condition under which they play (condition 1 – two subjects on choice, condition 2 – subject vs. computer). Data refer to average decision timing over the twelve rounds of the experiment. In Table 5 we report the Fisher Exact Test for differences in mean decision times between the students and the faculty. Results seem to confirm all of our timing hypotheses 3, 6, 9, and 12.

6. Conclusion

We find that assistant professors take longer, trust less, and do worse in terms of final payoffs than undergraduates. However, within each group, levels of trust are well matched with the resulting levels of reciprocity. This suggests that individuals are quite successful in reading the intentions of their randomly paired in-group partner. In contrast, when members of these groups play a computer with a fixed (known) strategy behavior looks identical across groups. Our interpretation is that ToMM is activated when shared intentions are relevant to the decision of whether or not to cooperate, and that ToMM is inactive when shared intentions are not relevant.

The data supports our hypothesis that people have a natural way to play games with gains from exchange and that ToMM plays an important role in supporting this behavior. The conscious theorizing of the faculty actually gets in the way of capturing these gains from exchange. Note that this does not mean that the faculty will perform as poorly in the field. In the laboratory, the faculty are faced with anonymous conditions, no ability to communicate, and therefore cannot overcome their conscious game theoretic analysis of the situation. But ToMM is working well, and we suspect that so is their goodwill accounting, and thus in the field we suspect the faculty will find ways to trade, even with each other.

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Figure 1
Information Processing in Goodwill Accounting

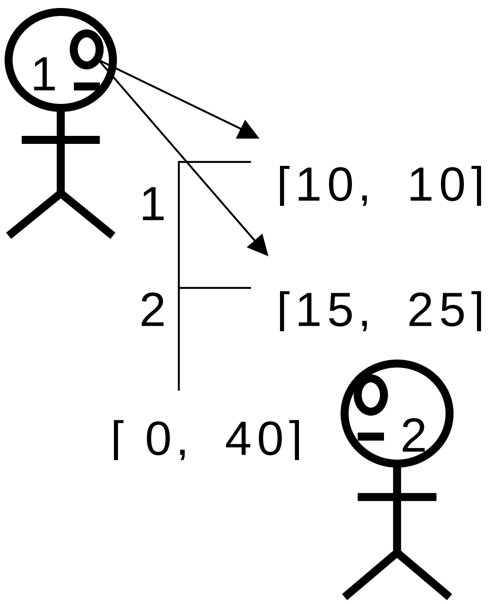


Figure 1a: Recognition of gain

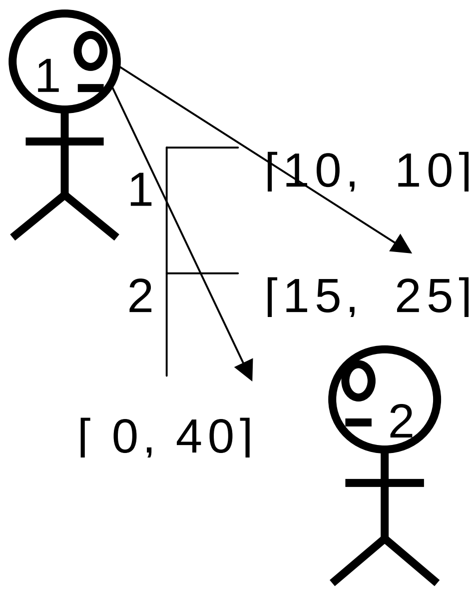


Figure 1b: Risk Assessment

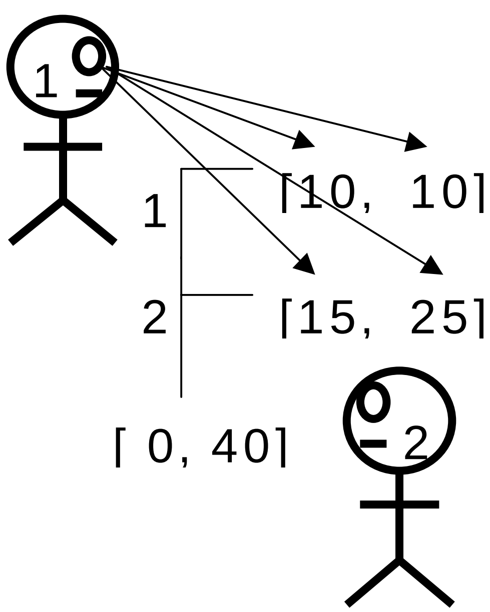


Figure 1c: Recognition of gains
from exchange.

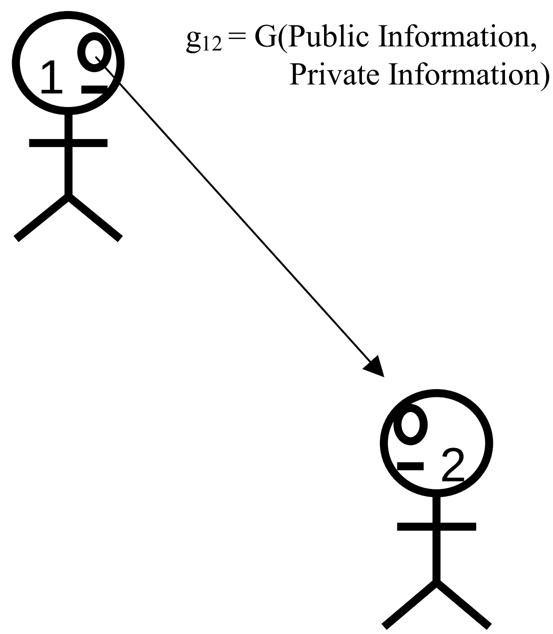


Figure 1d: Goodwill Assessment

Figure 2
Goodwill Accounting and Theory-of-Mind

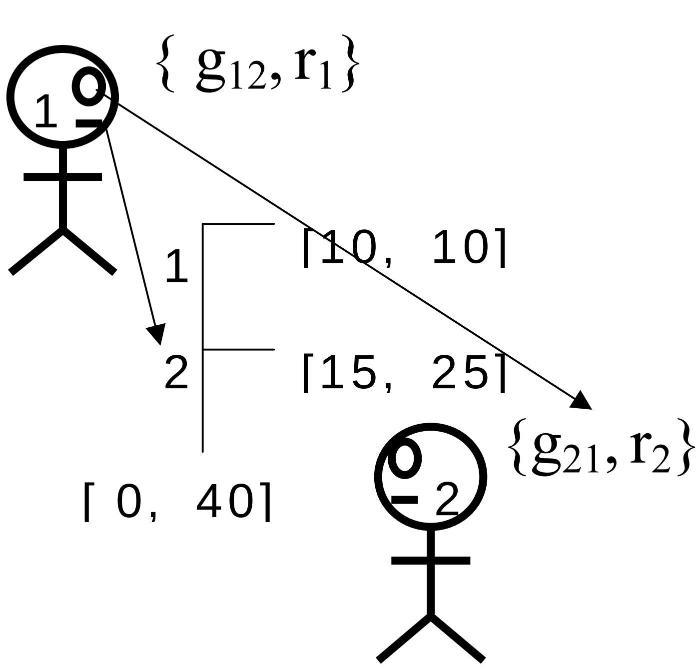


Figure 2a: Reading 2's Intentions

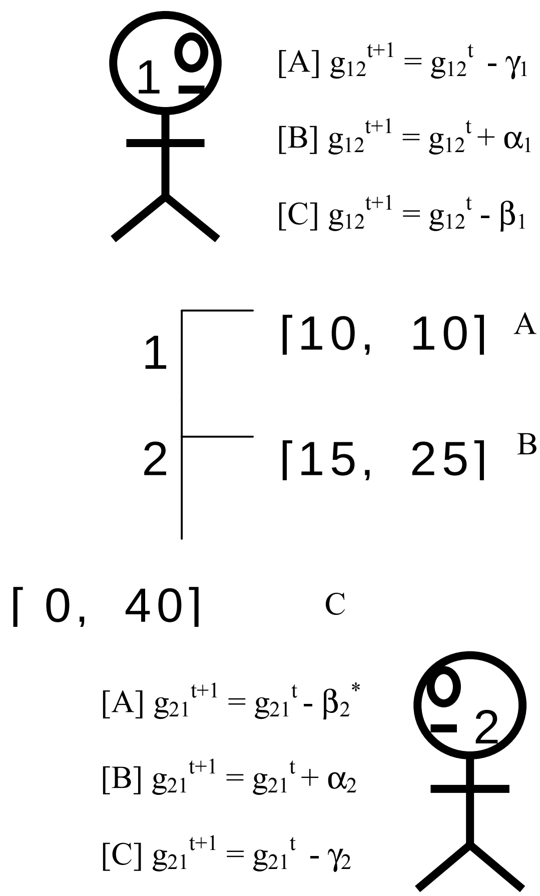


Figure 2b: Updating good will

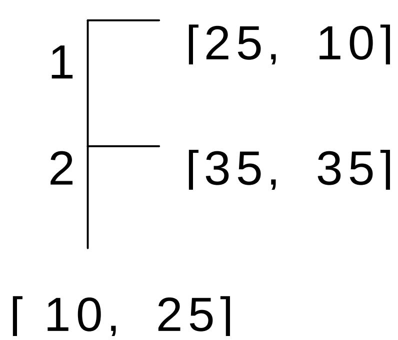
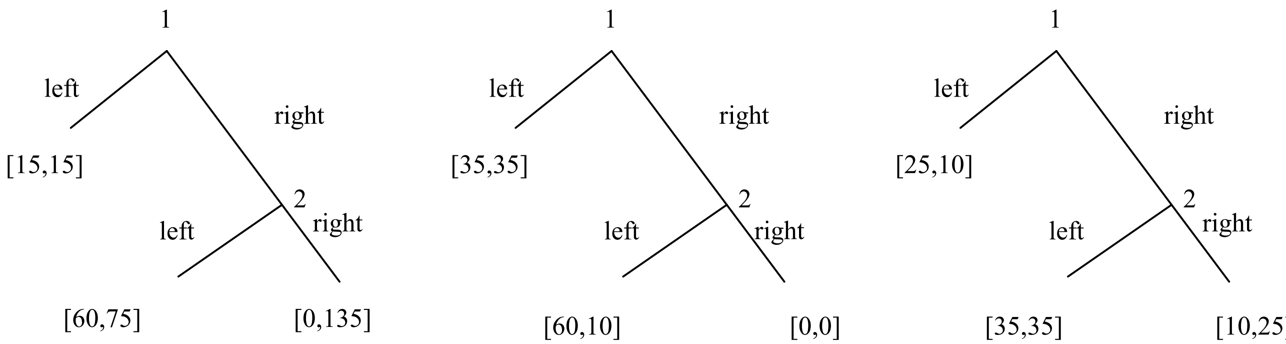


Figure 2c: Mutual Advantage Game

Position \ Type of Game	1st SEQUENCE T	P	MA	2nd SEQUENCE T	P	MA
1st position 2nd position	ID#1 ID#2	ID#1 ID#4	ID#1 ID#6	ID#2 ID#1	ID#4 ID#1	ID#6 ID#1
1st position 2nd position	ID#3 ID#4	ID#3 ID#6	ID#3 ID#2	ID#4 ID#3	ID#6 ID#3	ID#2 ID#3
1st position 2nd position	ID#5 ID#6	ID#5 ID#2	ID#5 ID#4	ID#6 ID#5	ID#2 ID#5	ID#4 ID#5

Fig. 5
Matching Protocol
(Condition 1)

1ST SEQUENCE
(Condition 1)

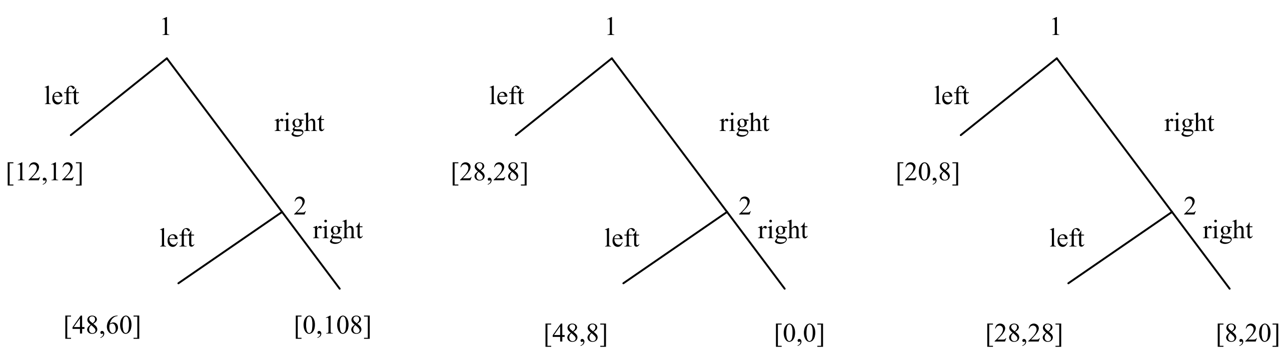


Trust Game

Punishment Game

Mutual Advantage Game

2nd SEQUENCE
(Condition 1)



Trust Game

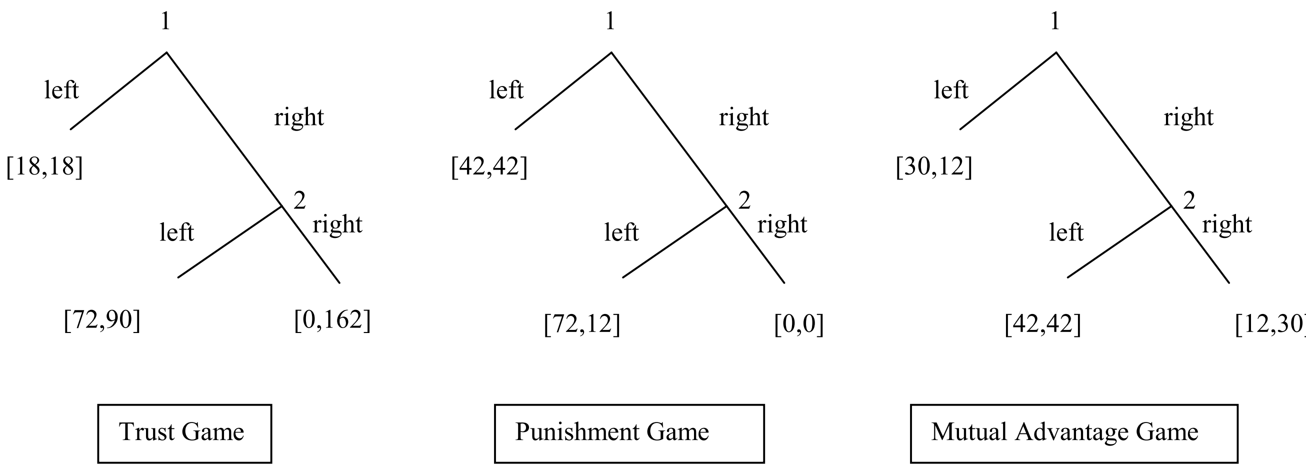
Punishment Game

Mutual Advantage Game

Fig.3

In each game player 1 moves first by playing “left” or “right”. If player 1 moves “left” the game is over. If player 1 moves “right” then player 2 can play “left” or “right”, ending the game. Wherever the game ends, player 1 gets the first payoff and player 2 gets the second payoff.

1ST SEQUENCE
(Condition 2)



2nd SEQUENCE
(Condition 2)

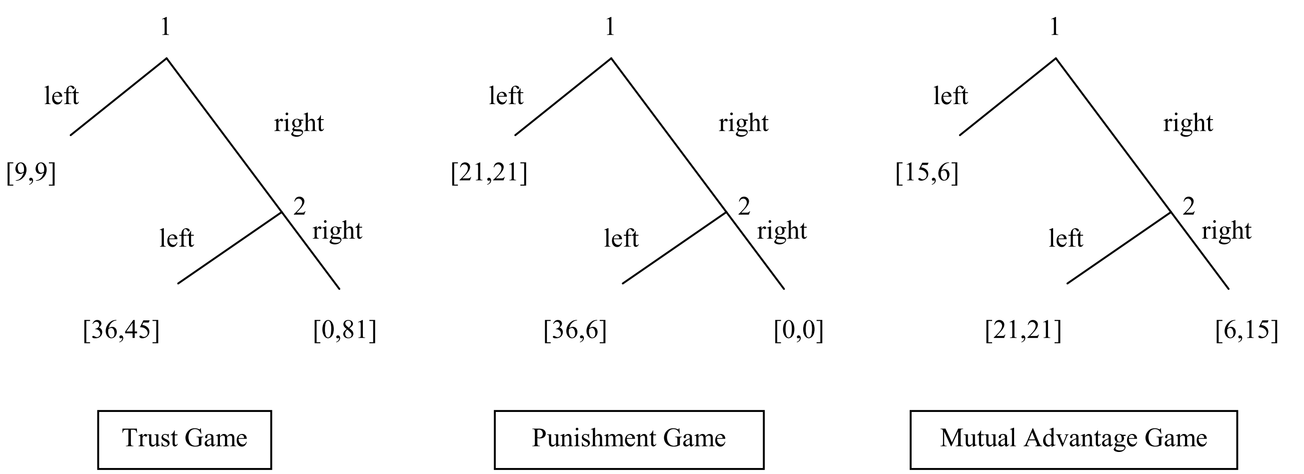


Fig.4

In each game player 1 moves first by playing "left" or "right". If player 1 moves "left" the game is over. If player 1 moves "right" then player 2 can play "left" or "right", ending the game. Wherever the game ends, player 1 gets the first payoff and player 2 gets the second payoff.

Table 1
Individual Data for Undergraduates

ID #	Session 1 Position	T	MA	Session2 Position	T	MA	Session3 Position	T	MA	Session4 Position	T	MA
1	1	R	R	2	L	L	1	R	L	2	R	R
2	2	L	L	1	R	R	1	R	R	2	L	L
3	1	R	R	2	X	L	1	R	R	2	R	L
4	2	L	L	1	L	R	1	R	R	2	R	L
5	1	R	R	2	R	L	1	R	R	2	R	L
6	2	L	L	1	R	R	1	R	L	2	R	L
7	1	R	R	2	L	L	1	R	R	2	R	L
8	2	L	L	1	R	R	1	R	R	2	R	L
9	1	R	R	2	X	L	1	R	R	2	L	L
10	2	R	L	1	L	R	1	R	R	2	R	L
11	1	L	R	2	R	L	1	R	L	2	R	L
12	2	X	L	1	R	R	1	R	R	2	R	L
13	1	R	R	2	L	X	1	R	L	2	R	L
14	2	L	L	1	R	R	1	R	R	2	R	L
15	1	L	R	2	R	L	1	R	L	2	R	L
16	2	X	L	1	R	L	1	R	L	2	R	L
17	1	L	R	2	R	X	1	R	L	2	R	L
18	2	X	L	1	R	L	1	R	R	2	R	L

Table 2
Individual Data for Faculty

	Session 1			Session2			Session3			Session4		
ID #	Position	T	MA	Position	T	MA	Position	T	MA	Position	T	MA
1	1	L	R	2	X	L	1	R	R	2	R	L
2	2	X	X	1	L	R	1	R	R	2	R	L
3	1	R	L	2	X	L	1	L	R	2	R	L
4	2	R	L	1	L	R	1	R	L	2	R	L
5	1	L	R	2	X	L	1	R	R	2	R	L
6	2	X	L	1	L	R	1	R	L	2	R	L
7	1	L	R	2	X	R	1	R	L	2	R	L
8	2	X	L	1	L	R	1	R	L	2	R	L
9	1	R	R	2	L	L	1	R	L	2	R	L
10	2	R	L	1	R	R	1	R	R	2	R	L
11	1	L	R	2	X	L	1	R	R	2	R	L
12	2	X	L	1	L	R	1	R	L	2	L	L
13	1	L	R	2	X	L	1	R	R	2	R	L
14	2	X	L	1	L	R	1	R	R	2	R	L
15	1	L	R	2	R	L	1	R	R	2	R	L
16	2	X	L	1	R	R	1	R	L	2	L	L
17	1	L	R	2	R	L	1	R	R	2	R	L
18	2	X	L	1	R	R	1	R	R	2	R	L

TABLE 3
Summary Data

Trust Game

Position	Faculty (N=18)				Students (N=18)			
	CONDITION 1*		CONDITION 2 **		CONDITION 1		CONDITION 2	
	left	right	left	right	left	right	left	right
Player 1	13/18=.72	5/18= .28	1/18=.06	17/18=.94	5/18=.28	13/18= .72	0	18/18=1
Player 2	1/5=.2	4/5= .8	2/18=.11	16/18=.89	8/13=.62	5/13=.38	2/18=.11	16/18=.89

Mutual Advantage Game

Player 1	1/18=.06	17/18=.94	7/18=.39	11/18=.61	2/18=.11	16/18=.89	7/18=.39	11/18=.61
Player 2	16/17=.94	1/17=.06	18/8=1	0	16/16=1	0	17/18=.94	1/18=.06

*   Condition 1 – two subject on choice
** Condition 2 – subject vs. computer

TABLE 4
Timing Results

Trust Game

Position	Faculty (18)				Students (18)			
	CONDITION 1		CONDITION 2		CONDITION 1		CONDITION 2	
	left	right	left	right	left	right	left	right
Player 1	43.5 **(27.1)**	36.9 **(42.9)**	13.6	25.7 **(13.2)**	14.8 **(5.2)**	16.6 **(18.2)**		15.7 **(11.8)**
Player 2	24.1	17.6 **(10.3)**	9.9 **(1.3)**	12.6 **(4.7)**	12.4 **(7.1)**	17.3 **(6.2)**	36.8 **(41.2)**	9.6 **(4.5)**

Mutual Advantage Game

Player 1	18.6	29.3 **(26.7)**	25.8 **(15.9)**	39.2 **(27.7)**	9.2 **(1.5)**	14.7 **(7.3)**	21.1 **(14.2)**	10.6 **(4.1)**
Player 2	13.1 **(5.6)**	31.7	7.3 **(2.2)**		7.3 **(2)**		6.5 **(2.3)**	6.3

* Condition 1 – two subject on choice
** Condition 2 – subject vs. computer
numbers in bold – standard deviation

Table 5
Fisher Exact Test for differences between two samples means of decision timing

Samples	Games	$\mu_x - \mu_y$	t-statistics	d.f.	P-value
between groups					
Young Faculty / Undergraduates	Trust	21.44	3.88	53	<0.001
Young Faculty / Undergraduates	Mutual A	10.34	3.17	67	<0.001
between games					
Human \ Computer	Trust	5.04	3.14	193	<0.001
Human \ Computer	Mutual A	0.06	0.1	210	0.461
between roles					
1st Decision Maker / 2nd Decision Maker		7.03	6.28	217	<0.001