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Delegated Trust: The Role of Agency in Trust Relationship *

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ABSTRACT

Trust is an important ingredient of human interaction. Would two players trust each other more when they play the game directly with each other or the use of an "agent" that play the game on their behalf may promote such trust? The paper conducts an experiment in which the players play different variations of the trust game. While in the original trust game it is the second player that decides how much he wishes to return to the first player, in our experiment we let an agent make this decision. All the treatments in our experiment were strategically equivalent and the agents' payoffs were identical and independent of their decisions. We vary the description or the title of the agent. In the first treatment the agent was labeled just as an agent. In the second treatment he was labeled as the agent of the first player while in the third treatment he was labeled as the agent of the second player. In the last two treatments we strengthen the association of the agent with the players such that the "source" of the agents' payment can be identified. While all the treatments have been strategically equivalent there was an interesting variation in the players' payoffs but the only effect which we found significant is that the agents' returns have been higher than those of the original players.

1. Introduction:

There are many daily life situations in which agents or delegates represent players and make decision on their behalf. Why do players use agents to play games? In some games, players choose agents who have special skills that make them perform better. For example, players may send lawyers to negotiate on their behalf if knowledge of the law may yield an advantage in the negotiation. Sometimes players may send agents when they are under the impression that these agents are more intelligent or more experienced than themselves, and therefore may play the game better than they do. Delegation may also play the role of commitment device; see for example Schelling (1960).[2]

The focus of this paper is on the use of agents to promote trust between players. Trust is an important ingredient of human interaction (see Knack and Keefer (1997) for economic perspective). When two players are involved in a game in which trust plays an important role, is it possible that by using agents, players will achieve a better outcome, as agents will be more trustworthy than the original players? Would two players trust each other more when they play the game directly with each other or when they use agents that represent them? Does agency promote trust or do players prefer to play the game "face to face"? There is clearly no uniform answer to these questions. Moreover if there is such an effect it would probably depend on the specific game that the players play and the circumstances in which they play it.

The paper conducts an experiment in which the players play different variations of the trust game (see Berg, Dickhaut and McCabe (1995)). The original trust game is a two player game with the following structure: Player A receives a fixed amount of money. He may keep it or transfer part of it to player B. Any amount that is transferred is automatically tripled. Player B after getting the money that was transferred to him/her may decide to keep it or to transfer back to player A any amount that he/she wishes. Into this two player game we introduce a third player whom we

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[2] For some discussion on strategic delegation see Fershtman and Judd (1987).

call the "agent". In all the treatments it is the first player who makes the decision on the amount he/she transfers to the second player, but while in the original trust game it is the second player that decides how much to return to the first player, in our experiment we let this agent make this decision on behalf of player B. All the treatments in our experiment were strategically equivalent; the agents' payoffs were identical and independent of their decisions. We vary the description or the title of the agent. In the first treatment the agent was labeled just as an agent. In the second treatment he/she was labeled as the agent of the first player while in the third treatment he/she was labeled as the agent of the second player. In the last two treatments we strengthen the association of the agent with the players. We set the experiment such that the fixed payment of the agents are deducted from the amount initially given to the players they represent but we set up the amounts so all these treatments has been strategically equivalent (i.e., the amounts given to the players were adjusted to incorporate these payments).

While all the treatments were strategically equivalent the variation in payoffs between the treatments was up to 50%. However, most of this variation is due to the choices made by the agents. The only significant effect that we identified in our experiment is that the agent sends back higher amounts than the original players. We failed to identify framing effects that were supposed to strengthen the agent effect. Also, while it seems logical that the player that sends the money will take advantage of the generous response of the agent would send larger amount, there was no such significant effect in our data. While this seems like a negative result we feel that experimental work should report also on negative results.

There are several experimental papers that examine the delegation problem. The role of agency in bargaining games was also considered by Schotter, Zheng, and Snyder (2000). The main issue in that paper was the effect of agency on the efficiency of bargaining. That is, do we expect a greater breakdown of the bargaining process when it is executed by agents rather than by the original players themselves? Fershtman and Gneezy (2001) examine the effects of strategic delegation in a simple ultimatum game experiment. The main concern of that paper was to examine the effect of delegation on the way players perceive the game and play it. Using the

ultimatum game setup, the paper introduced agents who represented either the Responder or the Proposer. The experiment indeed indicated that the Proposers' payoffs are significantly higher when they use delegates. A possible explanation is that the delegate's offer is more easily accepted by the Responder as it is not made directly by the Proposer but by a third party. Another explanation is that the Responder may be less keen to punish the Proposer since by doing so he also punishes the delegate. Given such behavior, the Proposer optimally provides incentives to his agent to make tough offers. The use of a delegate by the Responder also alters the outcome of the game and provides the Responder with a strategic advantage.

2. Experiment Design

We use different variations of the trust game. In all the treatment (beside the first one that replicates the original trust game) will use an agent that makes the decision on behalf of the Responder. We specify below the game that we constructed and explain how agency trust will be measured.

(a) The Trust Game (no agents):

This is the original Trust game. There are two players denoted as {A, B}.

The game proceeds as follows:

- Player A gets an amount of money x_a.
- Player B gets an amount of money x_y.
- Player A can keep the money or transfer part of it to player B. Any amount that he transfers is automatically tripled.
- Player B decides how much of the amount he received he wishes to transfer back to player A.
- The game ends.

(b) The Delegated Trust Game: A "neutral" agent

This is a 3-player game {A,B,C}. Player B has the role of a neutral agent.

The game will have the following steps:

- Player A gets an amount of money x_a at the outset of the game.

- Player C gets the amount of money x_c.

- Player A can keep the money or transfer part of it to player C. However, player A can transfer the money to C only via player B (the agent). Any amount that he transfers is automatically tripled.

- Player B decides how much of the amount given to him (to be transferred to player C) will be returned to player A. The rest of the amount is transferred to player C.

- Player B is paid fixed amount x_b and his decision does not affect this amount.

- The game ends.

(c) Delegated Trust Game: Player A's agent with neutral payment procedure

- This is a 3-player game {A,B,C}.

- Player B is assigned the role of a player A's agent (see the instructions in the Appendix).

The game is played as the game described in "the Delegated Trust Game: Control Condition 1", with one variation: Player B is known to all participants as "A's agent".

(d) Delegated Trust Game: Player A's agent

This is a 3-player game {A,B,C}. Player B has the role of a player A's agent.

The game will have the following steps:

- Player A gets an amount of money x_a, and an additional amount, x_b, that will be paid to the agent for his work.

- Player C gets (a relatively small) amount of money x_c.

- Player A can keep the money or transfer part of it (up to the amount of x_a) to player C.

- Player A transfers the money to C via player B (C's agent) and the amount is tripled.

- Player B gets the amount transferred by player A, and decides (on A's behalf) how much of the amount given to player C will be returned to player A. The rest of the amount is transferred to player C.
- Player B is paid fixed amount (x_b), of player A's initial amount, and his decision does not affect this amount.
- The game ends.

(e) The Delegated Trust Game: Player C's agent with neutral payment procedure
- This is a 3-player game {A,B,C}.
- Player B has the role of a player C's agent.
- The game is played as the game described in "the Delegated Trust Game: Control Condition 1", with one variation: Player B is known to all participants as "C's agent".

(f) The Delegated Trust Game: Player C's agent
This is a 3-player game {A,B,C}. Player B has the role of a player C's agent.
- Player A gets an amount of money x_a.
- Player C gets the amount of money x_c, and an additional amount, x_b, that will be paid to the agent at the end of the experiment.
- Player A may keep the money or transfer part of it to player C.
- Player A transfers the money to C via player B (C's agent) and the amount is tripled.
- Player B gets the amount transferred by player A, and decides (on C's behalf) how much of the amount given to player C will be returned to player A. The rest of the amount is transferred to player C.
- Player B is paid fixed amount (x_b), of player C's initial amount, and his decision does not affect this amount.
- The game ends.

The experiment was conducted at Tel Aviv University. The participants were all undergraduate students of Economics in the first two years of their study. The experiment was conducted in big

classes that were randomly divided into three groups according to their role in the experiment – each group was sent to a different classroom. The participants were told that they participate in a "decision-making" experiment. The instructions of all the different treatments are provided in the appendix.[3] The instruction that appear here are the instructions handed to the entire group. After reading these instructions in class, we divided the students to two or three separate rooms (depending on the treatment). The students did not know the identity of their partner (or partners) in the game.

In all the treatments Player A receives 100 points, Player C receives 20 points and the agent gets 100 points. At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

3. Results

3.1 The possible effects of agency on trust.
Let us start by describing the possible effects that the use of agents may affect the trust between the two players.

The role of agency: One objective of this experiment is to examine the role of agency in promoting trust between the two players. We plan to compare the outcome of the original trust game with no agents to the outcome of the game with agents (the different versions of it), trying to find if the use of agents promotes trust between the two sides. The measure of agency trust would be the difference between the transfers in the games with and without agents.

Framing: In each type of treatment the role of the agent - player B – has been labeled differently. In one treatment the label was "Agent", in the next treatment, "Player A's Agent"

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[3] The experiments were conducted in Hebrew. The instructions in the Appendix are the exact translation of the original Instructions.

while in the third treatment - "Player C's Agent". Strategically all these games were equivalent. Moreover, the amounts given to player B were identical in the three cases and were not affected by his/her choices. The question is how the different framing will affect the trust between the players and the amounts they transfer.

"Payment" Effect: The amounts are chosen in such a way that in both cases the net amounts (before the game is being played) are identical. Player B's final amount is independent of his/her choice of action, and is identical across all groups that include an agent. The only difference is the choice of player that holds Player B's final amount, at the beginning of the game. For example, in the group of "Player A's agent with neutral payment procedure", player A cannot take the agent's payment into his/her consideration, whereas in the group of "Player A's agent", player A is told that at the end of the game he/she will pay the agent an amount of x_b. Our objective is to find out how the payment procedure to the agent will affect the trust between the players, the amount transferred and overall efficiency.

3.2 The results
In Table 1 we provide the results of all groups in the different treatments. We examine in this section the role of agency, the framing effect and the payment procedure effect on the way the players behaved in our version of the trust game.

Group		Amount Transferred by A	Amount transferred back to A	Profit of player A	Profit of player C	Agent profit	Amount transferred back to A	no. of obs.
A's Agent	Average	52.5	78.5	126.0	98.9	100.0	43%	25
	Std. Dev.	37.2	74.1	45.6	59.7	0.0	0.3	
A's agent with neutral payment procedure	Average	60.2	97.6	137.4	103.1	100.0	51%	21
	Std. Dev.	37.8	73.7	41.1	52.5	0.0	16%	
B's Agent	Average	56.1	74.8	118.7	113.6	100.0	42%	23
	Std. Dev.	37.1	65.2	42.5	71.9	3.0	21%	
B's agent with neutral payment procedure	Average	62.3	79.6	117.3	127.4	100.0	35%	15
	Std. Dev.	35.3	86.2	67.9	80.4	0.0	30%	
Neutal Agent	Average	64.0	112.5	148.5	99.5	100.0	56%	15
	Std. Dev.	31.0	59.7	36.5	51.4	0.0	0.2	
No Agent	Average	51.0	49.0	98.0	124.0	100.0	25%	10
	Std. Dev.	44.3	59.9	27.3	82.9	0.0	0.2	

Table 1. Summary of Results – all groups

We can see that agency indeed affects the outcome of the trust game. Player A was better off in games in which agents were used than in games with no agency (the original trust game). The results of the comparison between the group playing the trust game with a neutral agent and the group of that played the game with no agents appear in Table 2. We see, however, that there is no significant difference in the amount transferred by player A. However, there is a significant difference in the amount transferred back to A. From Table 1 we can see that when no agent is

involved, player A gets a much lower amount of money back from player C. Consequently, the profit of player A is significantly different in the two treatments.

mann-whitney U tests (median)		Comparison of the trust game with no agent to the game with a neutral agent			No Agent (Amount in NIS)	Neutral Agent (Amount in NIS)
Amount transferred by A	value	**0.7766**		value	**51.0**	**64.0**
	probablity	0.4374		std. dev.	44.3	31.0
Amount transferred back to A	value	**2.3020**		value	**49.0**	**112.5**
	probablity	0.0213		std. dev.	59.9	59.7
Profit of player A	value	**3.0786**		value	**98.0**	**148.5**
	probablity	0.0021		std. dev.	27.3	36.5
Profit of player C	value	**0.6102**		value	**124.0**	**99.5**
	probablity	0.5417		std. dev.	82.9	51.4

Table 2. The Role of Agency

We used the Mann-Whitney U test to compare the results of different groups.

Table 3 describes the pairs of groups compared in order to examine the framing effect. We can infer from the test results that there were no significant differences in player A's behavior, that can be traced to the title of player B's role. However, we can infer from the test results that there were some significant differences in player B's (the agent) behavior, that can be traced to the title of his/her role. When player B is named "C's agent", he or she tends to transfer back a lower amount than they would, had they been named "agent". This is also true after controlling for the payment procedure effect. We can also see that when player B is named "A's agent", he or she also tends to transfer back a lower amount that they would, had they been named "agent". This contradicts the hypothesis that the representation of one player tends to strengthen the inclination of the agent toward that specific player. Had this hypothesis been strengthened, we should have

seen a higher amount transferred back to C or to A, respectively. No significant results arise from the comparison of the behavior of "C's agent" to that of "A's agent" – either with or without controlling for the payment procedure effect.

mann-whitney U tests (median)		Comparison of "A's Agent" and "A's Agent with neutral payment procedure "	Comparison of "C's Agent" and "C's Agent with neutral payment procedure "
Amount transferred by A	value	0.7498	0.4480
	probablity	0.4534	0.6542
Amount transferred back to A	value	1.0916	0.1941
	probablity	0.2750	0.8461
Profit of player A	value	1.3011	0.9109
	probablity	0.1932	0.3624
Profit of player C	value	0.4080	0.1344
	probablity	0.6833	0.8931

Table 4. The Payment Procedure Effect

Examining Table 4, we can see that the tests show no significant differences that arise from the payment procedure effect.

4. Concluding Remark

The paper examines the role of agency in the trust game. The results showed that agency indeed changes the outcome of the game. It seems that, being "detached" from the final distribution, an agent would change the average outcome for the first player – ameliorating his or her condition.

However, the degree of trust that the first player showed did not change significantly. The results of this experiment are mainly negative results. We expected much stronger effects of framing and payment procedure effects but there were no such effects in our data. We do not have good explanation for our results but we feel nevertheless that we ought to report them as well.

5. References

Berg, J., J. Dickhaut and K. McCabe (1995), "Trust, Reciprocity and Social History" *Games and Economic Behavior* 10, 122-142.

Fershtman, C., and Judd, K.L. "Equilibrium Incentives in Oligopoly." *American Economic Review,* Vol 77 (1987), pp. 927-940.

Fershtman, C. and U, Gneezy "Strategic Delegation: An Experiment", *The Rand Journal of Economics* Vol. 32, 2001 (Summer), pp. 352-368.

Knack, S. and P. Keefer (1997), "Does Social Capital have an Economic Payoff? A Cross-country Investigation" *The Quarterly Journal of Economics* pp. 1251-1288.

Schelling, T.C., *The Strategy of Conflict*, Cambridge, Mass.: Harvard University Press, 1960.

Schotter, A., Zheng, W., and Snyder, B. "Bargaining through Agents: An Experimental Study of Delegation and Commitment." *Games and Economic Behavior*, Vol. 30 (2000), pp. 248-292.

Appendix A

Experiment Instructions for the participants:

These are the instruction handed to the participants in the different groups. The experiment was conducted in Hebrew and below we provide their direct translation.

A.1 Trust game with Neutral Agent

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:

- The experiment is performed in groups of three: two students will be "Player A" and "Player C", and the third student will play the "Agent".
- At the beginning of the experiment, Player A receives 100 points, and Player C receives 20 points.
- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.
- After the amount chosen is transferred and tripled, the Agent will decided how much of the amount transferred to transfer back to Player A, and how much to let Player C keep.
- Player C knows the amount of points transferred by Player A, and the amount that the agent decided to give back to Player A.
- At the end of the experiment, the Agent gets 100 points, regardless of his choice of action.
- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

A.2 The Trust Game with No Agents

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:

- The experiment is performed in groups of two: one student will be "Player A" and the other - "Player C".
- At the beginning of the experiment, Player A receives 100 points, and Player C receives 20 points.
- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.
- After the amount chosen is transferred and tripled, Player C decides how much of the amount transferred to transfer back to Player A.
- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

A.3 Player A's Agent with neutral payment procedure

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:

- The experiment is performed in groups of three: two students will be "Player A" and "Player C", and the third student will play the "Player A's Agent".
- At the beginning of the experiment, Player A receives 100 points, and Player C receives 20 points.
- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.
- After the amount chosen is transferred and tripled, Player A's Agent will decided how much of the amount transferred to transfer back to Player A, and how much to let Player C keep.
- Player C knows the amount of points transferred by Player A, and the amount that Player A's agent decided to give back to Player A.
- At the end of the experiment, Player A's Agent gets 100 points, regardless of his choice of action.
- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

A.4 Player A's Agent

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:
- The experiment is performed in groups of three: two students will be "Player A" and "Player C", and the third student will play the "Player A's Agent".
- At the beginning of the experiment, Player A receives 200 points, and Player C receives 20 points.

- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.

- After the amount chosen is transferred and tripled, Player A's Agent will decided how much of the amount transferred to transfer back to Player A, and how much to let Player C keep.

- Player C knows the amount of points transferred by Player A, and the amount that Player A's agent decided to give back to Player A.

- At the end of the experiment, Player A pays his agent 100 points, regardless of the agent's choice of action.

- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

A.5 Player C's Agent with neutral payment procedure

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:

- The experiment is performed in groups of three: two students will be "Player A" and "Player C", and the third student will play the "Player C's Agent".

- At the beginning of the experiment, Player A receives 100 points, and Player C receives 20 points.

- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.

- After the amount chosen is transferred and tripled, Player C's Agent will decided how much of the amount transferred to transfer back to Player A, and how much to let Player C keep.
- Player C knows the amount of points transferred by Player A, and the amount that Player C's agent decided to give back to Player A.
- At the end of the experiment, Player C's Agent gets 100 points, regardless of his choice of action.
- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

A.6 Player C's Agent

You are now handed a simple line of instructions. If you follow them, you have the opportunity to gain an amount of money, which will be handed to you at the end of the experiment.

Please note: at the beginning of the experiment each and every one of you will be handed an envelope, containing an ID number. Please note your ID number at the top of the page. Please keep the ID number till the end of the experiment, in order to receive your money.

The Experiment:
- The experiment is performed in groups of three: two students will be "Player A" and "Player C", and the third student will play the "Player C's Agent".
- At the beginning of the experiment, Player A receives 100 points, and Player C receives 120 points.
- Player A can keep the money, or transfer a part of it, up to 100 points, to player C. The amount chosen will be tripled.
- After the amount chosen is transferred and tripled, Player C's Agent will decided how much of the amount transferred to transfer back to Player A, and how much to let Player C keep.

- Player C knows the amount of points transferred by Player A, and the amount that his/her agent decided to give back to Player A.
- At the end of the experiment, Player C pays his agent 100 points, regardless of the agent's choice of action.
- At the end of the experiment points will be changed for money at the ration of 5:1 (for every 5 points that you have, you will receive 1 NIS).

mann-whitney U tests (median)		Comparison of "A's agent" and "C's Agent"	Comparison of "neutral" agent and "A's Agent"	Comparison of "neutral" agent and "C's Agent"	Comparison of "A's agent with neutral payment procedure " and "C's Agent with neutral payment procedure "	Comparison of "neutral" agent and "A's Agent with neutral payment procedure "	Comparison of "neutral" agent and "C's Agent with neutral payment procedure "
Amount transferred by A	value	0.3302	0.9499	0.5674	0.1123	0.1444	0.1452
	probablity	0.7412	0.3422	0.5704	0.9106	0.8852	0.8846
Amount transferred back to A	value	0.1445	1.6343	1.7620	0.8824	0.7220	1.5969
	probablity	0.8851	0.1022	0.0781	0.3776	0.4703	0.1103
Profit of player A	value	0.0413	1.9137	2.1801	1.8450	0.9947	2.2813
	probablity	0.9671	0.0557	0.0293	0.0650	0.3199	0.0225
Profit of player C	value	0.5572	0.1537	0.5226	0.5936	0.1925	0.5807
	probablity	0.5774	0.8779	0.6012	0.5528	0.8473	0.5614

Table 3. The Framing Effect