

Social distance in a virtual world experiment*

Marina Fiedler^a, Ernan Haruvy^b and Sherry Xin Li^c

^a Institute for Information, Organization & Management, Ludwig-Maximilians University

^b School of Management, University of Texas at Dallas

^c Economic, Political & Policy Sciences, University of Texas at Dallas

Abstract

We conduct a field experiment to explore the effect of social distance on the choice of economic opportunities in a virtual world community. We design trust games with partner selection, in which potential responders vary in social distance from the proposer, and the investment multiplier *increases* with social distance. The proposer can choose between the two trust games with the two different responders. This design allows us to study how individuals make decisions when it involves tradeoffs between economic opportunities and social distance. We compare participants' behavior to that in a benchmark standalone trust game and investigate three questions: (1) To what extent do proposers prefer to sacrifice potential payoff in favor of lower social distance, and to what extent such choices are rational? (2) Is there evidence for reciprocity by the chosen party? (3) To what extent do preferences over the passive player enter this decision? We find that proposers are more likely to select socially closer responders despite the lower rate of investment returns, and the latter reciprocate by returning a higher proportion than socially distant responders. The choice of socially distant responders does not increase significantly with the investment returns.

Keywords: Experiments, Social Distance, Trust, Partner Selection, Communication, Cheap Talk, Virtual Worlds.

JEL classification: C93, C99, D63

* We are indebted to Rachel Croson and the behavioral/experimental economics reading group at UT–Dallas for helpful advice. We thank Tian Yu and Yufei Ren for excellent research assistance. Fiedler: Institute for Information, Organization & Management, Ludwig-Maximilians University, Ludwigstraße 28 VG II/Zi. 203, Munich, Germany 80539 (Email: fiedler@lmu.de). Haruvy: School of Management, SM 32, the University of Texas at Dallas, 800 West Campbell Road, Richardson, TX 75080-3021 (Email: eharuvy@utdallas.edu). Li: School of Economic, Political and Policy Sciences, University of Texas at Dallas, 800 West Campbell Road, Richardson, TX 75080-3021 (Email: sherry.xin.li@utdallas.edu).

1. Introduction

Social distance can greatly affect economic outcomes (Eckel and Wilson, 2002; Charness, Haruvy and Sonsino, 2007; Cox and Deck, 2005; Rao and Schmidt, 1998). Studies show that social distance may play a crucial role in one's choice between alternative partners in economic interactions, and result in a selection of partners that are perceived as more trustworthy (Eckel and Wilson, 2000; Slonim and Garbarino, 2006).

In this work, we examine how social distance affects partner selection in a virtual world using the framework of the trust game. Trust has been extensively researched in various environments, geographic locations, and social settings and has been instrumental in gaining an understanding of the role of trust and reciprocity in economic exchanges in a wide variety of economic settings and relationships including employer-employee relationships (in a variation known as gift exchange, Fehr et al. 1993, Charness et al. 2004), accounting audit relationships (King, 2001), legal and contract enforcement (Bohnet et al., 2001), and international business alliances (Rao and Schmidt, 1998).

In a standard trust game (Berg, Dickhaut, and McCabe, 1995), a first mover—the proposer—can choose how much money to send to a second mover. The money sent is multiplied by a factor, typically 2 or 3 by the experimenter. Then the second mover—the responder—can choose to send some amount back. However, decisions rarely take place in a world with a single investment opportunity. Typically, investors face the decision not only of whether to trust and how much to trust, but also whom to trust. The present work attempted to model the interplay between these decisions, and how social distance may affect these decisions in an environment of communication. We augment a standard trust game by including partner selection, where potential partners (responders) vary in social distance from the proposer, and the investment multiplier *increases* with social distance. The proposer makes a choice between the two trust games with the two different responders, facing a tradeoff between economic opportunities and social distance. We compare results to the benchmark standalone trust game and investigate three questions. To what extent do proposers prefer to sacrifice potential payoff in favor of lower social distance, and to what extent such choice are rational? Does the chosen responder reciprocate for the mere fact of being selected, above and beyond for the amount being passed? And lastly, to what extent do preferences over the passive player enter this

decision? We then suggest some implications for generalizing trust game results to broader economic settings.

Partner selection has several potential implications. First, the choice of one partner over another is in itself a favorable action towards the chosen partner, and may be met with positive reciprocity by that partner (e.g., Segal and Sobel, 2007), thereby fundamentally changing both proposer and responder's behavior relative to that in the standalone trust game. Second, this choice reflects the beliefs of the first mover about the comparative payoffs of the two alternatives, and therefore reflects beliefs and attitudes towards differentiating characteristics between the two potential second movers, such as gender (see overview in Croson and Gneezy, 2004), ethnicity (e.g., Fershtman and Gneezy, 2001), or facial expressions (Eckel and Wilson, 2000). This decision task could apply to hiring or promotion differentials between genders or races as well as to business cronyism (Khatri and Tsang, 2003; Khatri, Tsang and Begley, 2006) and reluctance to enter joint ventures with foreign entities (e.g., Weiss, 1993; McLarney and Rhyno, 1998). When beliefs are correct, selection increases the amount sent and therefore efficiency relative to no selection (Slonim and Garbarino, 2006). However, when beliefs are incorrect, inefficiency may result. Attitudes also matter. Slonim (2006) found that the preference of male first movers for female second movers in the trust game is primarily driven by taste, rather than expectations. Such preferences, even when well intentioned, may reduce social welfare (Becker 1957). Third, social preferences such as altruism and equity preferences now involve one passive player and may enter in various ways. In other works (e.g., Guth and Van Damme, 1998; Chakravarti and Haruvy, 2003) it appears that proposers do have some regard for the passive player.

We implement our experiment in a virtual world called Second Life. A virtual world is a computer-mediated environment that simulates some aspects of the physical world. In a virtual world, users interact via their avatars—computerized graphical representation of the users. Groups of people meet to share information, discuss mutual interests, play games, or carry out business, possibly without exposing their real-world identity (Bloomfield, 2007). Virtual world interaction has been perceived as an important and increasingly popular way for people to socialize in the modern life.

A virtual world has advantages over a traditional laboratory for studying social distance and partner selection. It provides a natural social context, allows a certain degree of manipulation of social distance, and completely preserves participants' anonymity. From researchers' perspective, it offers reasonable control by experimenters while allowing for social interaction in a natural environment familiar to virtual world residents (Bainbridge, 2007; Bloomfield, 2007; Castronova, 2001), a combination of features not previously available in a traditional laboratory (Bainbridge, 2007). Previous studies on partner selection are conducted in the lab and involve pre-play observation (Mulford et al., 1998) or communication (Frank et al., 1993) through face-to-face interaction. The problem of the design is that face-to-face interaction introduces social confounds (Eckel and Wilson, 2000). The alternative, proposed by Eckel and Wilson (2000), is to substitute faces with experimenter-generated smiley or frowning faces. This latter option removes confounds inherent in face-to-face interaction but also removes the information about the partner that comes with communication. In contrast, virtual worlds offer the possibility for users to have virtual-face-to-virtual-face communication without compromising real-world anonymity. We realize that the use of a virtual world as a platform for an economics experiment is unconventional, and the advantages it presides come with caveats. However, we consider the present investigation on social distance in the realm of a virtual world a reasonable compromise. We elaborate on our choice in Section 3 on experimental design.

The paper is organized as follows. In Section 2, we review the related literature and introduce virtual worlds. In Section 3, we present our experimental design. Section 4 discusses hypotheses. Section 5 presents the main results. In Section 6, we conclude and discuss implications of our results.

2. Background and Literature

Our paper crosses the boundaries of three related streams of the literature. First, we discuss works on partner selection in investment and ultimatum games. Second, we highlight seminal works on social distance in games, which will allow us to speculate on the merger of social distance with partner selection. Third, we review recent literature on

virtual worlds, which is essential to understanding both the advantages and limitations of the present setup.

2.1. Partner Selection in Trust games

In the small but growing literature on partner selection in trust games, Eckel and Wilson (2000) is most closely related to our study. In their experiment, each subject faced a choice between trust games with different partners and different rates of return. Specifically, the first mover chose between two potential partners labeled with facial icons that were designed to appear friendly, neutral or unfriendly. The purpose of the design was to examine subjects' inclinations to choose partners represented by particular facial expressions. In two of the four trust games, the returns on the branches associated with the second mover choice differed between the potential partners. These different returns for the two responders could be interpreted as multipliers of 2 and 2.2.¹ This design allows the researchers to gauge the strength of the preference one has for the differentiating variable, the facial icon in this case. The study found that first movers exhibited a strong tendency to choose a partner represented by a friendlier looking icon. Trust was not significantly affected by the choice of icon, but this is likely due to the restricted choice space (two branches) given to the first movers.

Slonim (2006) and Slonim and Garbarino (2006) examined how selection affected choice in a trust game with a multiplier of 3, with and without partner selection. Available partners were identified by gender and one other attribute (score on an addition task in Slonim, 2006 and age in Slonim and Garbarino, 2006). In the selection condition, first movers could choose between partners (three in Slonim, 2006; two in Slonim and Garbarino, 2006), whereas in the no selection condition, first movers were not given a choice between possible partners. They found that selection increased the amount sent and thus efficiency and that first movers' selection was not independent of the amount sent.

¹ Alternatively, they could be interpreted, as different amounts passed, 5 to one and 6 to the other, and then multiplied by the same multiplier of 3.

Selection can shed light in other settings as well where previously only within-setting decisions were studied. For example, Ivanova-Stenzel and Salmon (2004) examined bidder choices between alternative auction institutions.

2.2. Social Distance

Social distance increases with the degree of anonymity. Economic research on the impact of anonymity on behavior and preferences yield mixed results. Charness and Gneezy (2007) show that anonymity can increase selfishness, whereas Dufwenberg and Muren (2006) suggest that anonymity may at times reduce selfishness.

Anonymity or its absence interacts with preferences of individuals over a number of personal and demographic characteristics they value in a partner. For example, findings in the extant literature from dictator, bargaining and trust games appear to suggest that males are more generous to females than to other males (Kahn, Nelson, and Gaeddert, 1980; Saad and Gill 2001a, 2001b; Dufwenberg and Muren, 2006; Slonim, 2006). This finding seems contradictory to the gender gap in earnings that substantially favors males. However, this finding abstracts from selection, and it is possible that men partner with other men (although, we caution that in our study, men prefer to partner with women). Dana et al (2004) and Dana et al. (2005) show that selection and the amount contributed need not go in the same direction. Dana et al. (2005) found that about one third of participants were willing to exit a \$10 dictator game and take \$9 instead, a behavior that clearly shows the contradiction between selection and giving.

In a virtual environment, the direction of social distance can be a difficult to pinpoint. That is, the virtual interaction may either increase or decrease perceived social distance. On the one hand, with avatar-based interaction, real-world anonymity is maintained in that participants do not know the real-world identities of those who they interact with. Many people enjoy participating in activities in virtual worlds because they do not have to behave in the consistent ways as they do in the real life. By this argument, one could say that anonymity, and therefore social distance, increases in virtual worlds. Adding to this point of view is the fact that participants recruited in the virtual world are likely to be from geographically distant locations, hence farther increasing social distance (Charness et al. 2007). On the other hand, the virtual persona is very real to many

participants, and so is its reputation. The medium is used by many for the exact purpose of fostering deep relationships, and to the extent that the medium is used in this way, it may reduce social distance.

2.3. Virtual Worlds

Recent years have witnessed an increasingly popular use of virtual world for conducting research (Bainbridge, 2007; Bloomfield, 2007) and business. For example, Castronova (2001) conducted the first economic study on virtual world economies and markets in Norrath, the most market-oriented virtual environment at the time. Today, Second Life, where our experiment is conducted, is the most widely covered virtual world in the business press, with numerous S&P500 companies, including IBM, Wells Fargo, and Nike establishing presence online. Other examples of business applications in virtual worlds are hotels that allow their customers and business partners to walk through the virtual hotel, thus providing useful and inexpensive feedback; clothing companies that enable customers to try out clothes and furniture based on their avatar's specifications, as well as intercultural sensitivity simulations (Breuer 2007, Piller and Salvador 2007).

A virtual world, particularly Second Life, is well suited for our research as an experimental platform for three primary reasons. First, partner preference is a complicated paradigm with many influencing factors. This is the reason the studies on the issue of partner selection hitherto have elected to avoid face-to-face interaction and limit partner identification to a few factors such as age, gender, score, or a smiley icon. If we were to conduct this experiment in the laboratory, and allow face-to-face communication we would need to control for many possibly important features of partners. In virtual worlds, the features of the partner can likewise be varied (potentially, as partner could have blue skin, spikes, wings, a tail, or may not even be human), but the stereotypes and associations that these features evoke are presumably weaker. Second, we believe virtual worlds are a promising experimental platform, providing access to a diverse pool and practically infinite number of subjects and access to potentially more flexible experimental designs. Third, Second Life offers great convenience in infrastructure and logistics for formal experiments in social and cognitive sciences. It allows researchers to construct duplicates of facilities that are comparable to a real-world laboratory, and in the

meantime minimize the potential confounds in traditional lab setting because some subjects may know each other *ex prior*. Logistically, it is a much easier proposition given the multi-room setup and the need to monitor and control communication. Bloomfield (2007) argues that Second Life suites economics research due to its rich economy, naturally evolving markets, and active commerce.

One main feature of our experiment design is that participants communicate face-to-face, although it is done virtually. To the extent that virtual faces matter, social distance may be reduced. The concept of computer-mediated face-to-face interaction has not been previously explored. Face-to-face interaction seems to be important to collaborative interpersonal relationships (Jarvenpaa and Leidner 1999; Nardi and Whittaker, 2002; Nohria and Eccles 1992; O'Hara-Devereaux and Johansen 1994). Although computer-mediated communication leads to higher cooperation levels than no communication, it produces weaker cooperation than *real* face-to-face communications (Bochet et al. 2006; Brosig et al. 2003; Duffy and Feltovich 2002; Frohlich and Oppenheimer 1998; Jensen et al. 2000). Other works have argued that computer-mediated communication may help individuals to communicate more clearly than face-to-face communication since the interference of many stigmatized features can be reduced (Sheeks and Birchmeier, 2007). The concept of computer mediated face-to-face interaction via a virtual world may provide a hybrid that allows for features from both environments.

3. Experimental Design

The experiments have two treatments, *Selection 2-3* and *Selection 2-4*, and two controls, *Control 3* and *Control 4*. The treatments involve three players who participate in trust games with partner selection, whereas the controls involve two players who participate in standard standalone trust games.

We design the trust games with partner selection by manipulating potential responders' social distance from the proposer, and varying the investment multiplier with a potential responder. The investment multiplier *increases* with social distance. The proposer, when choosing between the two trust games with the two different responders, faces a tradeoff between economic opportunities and social distance. Both of the

treatments start by having two players, whose avatars preside in the same room, communicate through online chat for 10 minutes. They are randomly assigned with roles, proposer or responder, after the chat is over. The proposer then has a choice between two trust games of different multipliers with one of the two responders, the person he chatted with (hereafter ingroup responder), or a third person, a total stranger whose avatar presides in a separate room (hereafter outgroup responder). The trust game in *Selection 2-3* has a multiplier of 2 with the ingroup responder, and a multiplier of 3 with the outgroup responder. *Selection 2-4* has a multiplier of 2 with ingroup or 4 with outgroup.

In contrast, the control sessions consist of only two players who participate in a standard standalone trust game. They are randomly designated as proposer or responder, and play a trust game with a multiplier 3 in *Control 3* and a multiplier 4 in *Control 4*. The proposer cannot choose the responder in the controls. Next, we explain the experiment procedures in more details.

Communication. In the two treatments, two of the three participants were engaged in 10-minute pre-play irrelevant communication before the trust game began, while the third participant was excluded from the communication. The purpose of the chat stage is to generate some personal interaction of the kind that one normally experiences in a virtual community, while maintaining some control over the topics of discussion. Specifically, two of the three participants' avatars were invited to one room. They were told that they could communicate with each other for 10 minutes on the suggested topics. The communication was conducted through the imbedded text-messaging window on Second Life. The suggested topics were posted on the walls of the room where the communication took place and were accessible to both participants. None of the topics was related to the trust game they were about to play. During the entire communication process, participants' discussions were monitored by one experimenter avatar to ensure that instructions were properly followed. The third participant whose avatar was presiding in a separate room was aware of the fact that communication was occurring between the other two participants, but was not informed of the context of the communication. Screenshots of the chat sessions and the suggested topics are included in Appendix A. The control sessions did not have the chat stage. In stead, two participants were engaged only in the trust game and post-experiment survey.

The investment game. The stage of trust game began after the chat was over. Each of the players, including the third player in the separate room, is endowed with 1000 Linden Dollars (hereafter LD), the currency used in Second Life that can be instantly converted to US dollars.² The two participants who chatted with each other were randomly designated as a proposer and a responder, respectively. The proposer then can choose to play some trust game with either the ingroup responder whom she just finished conversing with, or the outgroup responder who is an anonymous stranger in the different room. She was told she can choose to send some amount of her initial endowment to the responder and keep the rest. The amount sent will be multiplied by 2 if she chose the person in the same room, or multiplied by 3 (in *Selection 2-3*, or multiplied by 4 in *Selection 2-4*) if she chose the person in the different room. The responder then chose an amount to send back to the proposer. He can choose any amount up to his initial endowment plus the amount sent by the proposer multiplied by the multiplier. If the outgroup responder was selected, the amount sent back to the proposer is also awarded to the ingroup responder in the room. This design is to eliminate any potential guilt feelings of the proposer's that may prevent her from choosing the outgroup responder. The control sessions had only two participants and hence one responder. The proposer didn't have the choice of responders and only decided how much to pass to the responder given the multiplier. After the game was over, all participants were asked to fill out a survey. Their earnings were immediately deposited into their Second Life accounts before they were dismissed.

Second Life subjects. We recruited Second Life users via website postings in several Second Life forums and group notices. Individuals replied via email or an in-world instant message indicating interest in participating. They were asked to check in five minutes prior to the assigned time slot to avoid delays. Once everyone checked in, a standard procedure was employed where the experimenter avatar asked them to open their chat history commonly used in Second Life through which they could receive instructions or review chat messages. We also made sure that the two participants in the same room didn't know each other, and rescheduled those who knew each other to avoid any potential confounds.

² The exchange rate was 374 Linden dollars for 1 Euro, or 265 Linden dollars for 1 US dollar.

One treatment session took 25 minutes on average to complete and one control session took 15 minutes. In total, 538 Second Life subjects participated in 200 sessions including 138 treatment sessions and 62 control sessions. Of these participants 43.6% were reported as male, and the average age was 33.2 with standard deviation 11.1. 33% were reported to come from the United States, 37% from Europe, and 30% from other places, including Australia, New Zealand, Canada, Mexico, South America, and the Middle East. The four experiment conditions are summarized in Table 1.

Table 1: The experimental conditions

Treatments	Number of Players	Chat	Choice of Responder	Multiplier(s)	Number of Sessions
<i>Control 3</i>	2	No	No	3	31 pairs
<i>Control 4</i>	2	No	No	4	31 pairs
<i>Selection 2-3</i>	3	Yes	Yes	Ingroup: 2 Outgroup: 3	69 triplets
<i>Selection 2-4</i>	3	Yes	Yes	Ingroup: 2 Outgroup: 4	69 triplets

4. Theory and Hypotheses

We investigate the behaviors of the proposers' and the elected responders', and ask three questions: (1) To what extent do proposers prefer to sacrifice potential payoff in favor of lower social distance, and to what extent such choices are rational? (2) Is there evidence for reciprocity by the chosen responder? (3) To what extent do preferences over the passive player enter this decision? We first discuss the hypotheses on proposers' behavior and then the hypotheses on responders' behavior.

Proposers make joint decisions on which responder to invest in and with what amount. Both psychology and economics literature on identity has documented that individuals show favoritism to ingroup members and discriminate against outgroup members. In our experiment, the proposer and the ingroup responder have the opportunity to interact virtually for 10 minutes. Familiarity may foster trust and thus reduce the perceived risk. As a result, the proposal may consider investing in socially close option as less risky than the outside option. Therefore, we predict that proposers show favoritism towards ingroup responders despite the higher outgroup multiplier. The

ingroup favoritism is manifested by two aspects, a) ingroup responder will be selected with a higher probability, and b) the amount of investment in ingroup will be higher than that in outgroup. In addition, proposer may respond to the change in the relative rate of return in the investment. The outgroup-ingroup ratio of investment return increases from 1.5 to 2, comparing *Selection 2-3* with *Selection 2-4*. Hence, the outgroup investment option in *Selection 2-4* may appear more desirable than in *Selection 2-3*. As the result, we expect that rational proposers react by increasing the likelihood of selecting outgroup responders, all other considerations remaining equal. The proposer-related hypotheses are summarized as follows.

Hypothesis 1. Proposers are more likely to choose ingroup over outgroup responders.

Hypothesis 2. More proposers substitute outgroup responders for ingroup ones when the relative rate of return increases with the former.

Hypothesis 3. Proposers invest greater amounts in ingroup responders.

Our conjectures regarding responders pertain to their reciprocal behavior. The first question is whether responders who differ in social distance to the proposer may act differently when chosen to respond. Given the literature on group identity and social distance discussed earlier, we expect that ingroup responders will honor the perceived social closeness and familiarity, and are more likely to reward the proposer for his trust. Therefore, we hypothesize that ingroup responder will return a larger proportion than outgroup responder.³ In addition, findings in the literature on the standard trust games show that higher investments result in a higher percentage returned. We expect it to be true in the present setting regardless of the social distance. These two hypotheses can be summarized as follows.

Hypothesis 4. Ingroup responders return more in percentage terms than outgroup responders.

³ Chen and Li (forthcoming) find that subjects in the lab are more likely to award their ingroup members for behaviors out of good intentions.

Hypothesis 5. Percentage returned by responder increases in the amount invested.

In our experiment design, the outgroup multiplier in *Selection 2-3* (or *Selection 2-4*) is the same as the multiplier in *Control 3* (or *Control 4*). This feature allows us to directly compare outgroup responders' reciprocal behavior with the responders in the control. On the one hand, an outgroup responder in the selection treatments may appreciate the mere fact that he is chosen over the ingroup responder, since the latter may be perceived as a less risky choice from the proposer's viewpoint. On the other hand, the proposer's election of outgroup responder may be perceived as being pecuniarily motivated and the outgroup responder may decide not to reciprocate. So the last hypothesis is that outgroup responders, when elected in the selection treatments, may respond differently from those in the control, conditional on the amount sent by the proposer. In other words, outgroup responders in the selection treatments (*Selection 2-3* and *Selection 2-4*) would return a different amount in percentage term than responders in the parallel control sessions (*Control 3* and *Control 4*, respectively).

Hypothesis 6. Percentage returned by outgroup responders is different in the selection treatments from that in the control.

5. Results

In this section, we first describe our data and present the summary statistics. We then present the econometric analyses and discuss results.

5.1. Data Descriptions

We begin with a qualitative exploration of subjects' motives. In the post-experiment questionnaire, we solicited the reasons on proposers' choice. Table 2 presents representative proposers' quotes. Most proposers who favored ingroup responders indicated that they did so because of reduced anonymity, perceived shortened social distance, and increased feeling of familiarity and trust due to the 10-minute virtual communication. Many mentioned "connection" with the person they chatted with, or communication that made them feel they "know" (or can "see") the other person who is

therefore more “trustworthy”, despite of the fact that the virtual communication was conducted anonymously through text messages, was restricted on certain topics, and lasted only for ten minutes. In contrast, most of those who chose outgroup responders indicated that this choice was motivated by the higher rate of return, either out of self-interest, or out of efficiency concerns for the group (of the proposer and the ingroup responder) or for the three participants altogether. These proposers often mentioned multiplier (or returns), or win-win situation in the survey. Some proposers who chose outgroup perceived the two responders as indifferent because he knew little about either of them in spite of the ten-minute virtual communication. One subject explained that his choice of outgroup was to avoid dealing with money issues with someone he knew since it may cause “trouble” (see quote number 9 in Table 2). This responder is not representative yet his preference does not appear unreasonable.

Table 2: Selected quotes from proposers on why they selected ingroup or outgroup

Choosing ingroup responder	Choosing outgroup responder
1. As person B and I spoke and had become <i>familiar</i> , I figured that due to this <i>connection</i> it was more likely she would return money.	1. The money is <i>tripled</i> and I’m hoping he’ll be generous, instead of just <i>doubled</i> with B, and I don’t know either person very well.
2. The fact that person B had <i>communicated</i> with me meant they were <i>less anonymous</i> and therefore more ‘ <i>trustworthy</i> ’ in my mind.	2. It has the most <i>potential</i> based on the <i>multiplier</i> so I took the risk.
3. Because I felt a <i>connection</i> with her.	3. Best chance of making <i>greater return</i> .
4. I had established a <i>rapport</i> with Person B. Person C is an <i>unknown</i> quantity, he may choose not to give anything back. Person B might not either, however at least I’ve had a chance to get to <i>know</i> him. I have a better idea of whether he would or not.	4. The possibility of a <i>higher return</i> for myself and Person B.
5. I have somebody <i>in front of</i> me. I feel better <i>seeing</i> the person. I know it’s virtual and I don’t know him/her, but the decision was easier for me.	5. It was <i>better for the group</i> . I think it was worth the risk.
	6. I’m looking for a <i>win/win</i> situation, with this decision I’m hoping that C will decided to return the money for a <i>win/win</i> situation also.
	7. So <i>all of us can win</i> , not only two of us.
	8. There will be <i>more money available to share</i> among the players.
	9. I like to give my money to the people I don’t know so if something happens I don’t know him. I don’t like to get money stuff with persons that I know because it causes trouble.

* In the experiment, person B and C refer to the ingroup and outgroup responder, respectively. Key words are italicized for the convenience of readers. They were not in italics in participants’ response in the questionnaire.

Summary statistics from the four conditions are reported in Table 3. We find the numbers of proposers who choose either the ingroup or the outgroup responder are both

significantly greater than zero and that proposers are more likely to choose ingroup than outgroup responders in the selection treatments. Specifically, 64% choose ingroup vs. 36% outgroup in *Selection 2-3*, whereas 55% choose ingroup vs. 45% outgroup in *Selection 2-4*.

Table 3: Summary statistics

Treatments	Number of Cohorts	# Proposers Choosing Ingroup / Outgroup	Sent to Ingroup (LD)	Sent to Outgroup (LD)	Returned by Ingroup Responder	Returned by Outgroup Responder
<i>Selection 2-3</i>	69	44 / 25	710	708	42%	31%
<i>Selection 2-4</i>	69	38 / 31	582	650	40%	32%
<i>Control 3</i>	31	n. a.	n. a.	534	n. a.	23%
<i>Control 4</i>	31	n. a.	n. a.	757	n. a.	37%

A one sample binomial test allows us to test whether the proportion of ingroup choices significantly differs from the hypothesized value of 0.5. The test gives us two-sided p-values of 0.030 and 0.470 for *Selection 2-3* and *Selection 2-4* respectively, showing that the preference for the ingroup responder is significant in *Selection 2-3*. Note that the ingroup favoritism occurs despite the greater rate of potential *private* returns (multipliers of 2 vs. 3 and 2 vs. 4) and *social* returns (2 vs. 6 and 2 vs. 8) with an outgroup responder.⁴ In fact, the proposer's election of ingroup responder not only risks his own private earning but results in a loss of social efficiency, due to a smaller multiplier and the fact that money returned by ingroup is received only by the proposer whereas money returned by the outgroup accrues to both the proposer and ingroup responder. Table 4 reports players' average payoffs by role, joint payoffs of the three players, as well as the proposer's ranking of payoffs. The joint payoffs of the three players are used to measure social efficiency. We find that although proposer's choice of ingroup responder yields a slightly higher private payoff (1342 for ingroup vs. 1299 for outgroup) in *Selection 2-3*, it leads to a significant lower private payoff (1344 for ingroup

⁴ Recall that in the selection treatments, if the outgroup responder was selected, the amount sent back to the proposer is also awarded to the ingroup responder in the room. The design is meant to eliminate any potential guilt feelings of the proposer's that may prevent her from choosing the outgroup responder.

vs. 1523 for outgroup) in *Selection 2-4*. Average joint payoffs of the three players are 31% and 41% lower in the ingroup selection than in the outgroup selection for *Selection 2-3* and *Selection 2-4*, respectively. Why does a proposer prefer the ingroup responder even if it may lower private earnings and social efficiency? An explanation is that one values social connection, and is willing to forgo certain amount of private earnings to honor it. This concern for social distance may dominate the concern for social efficiency. It suggests that social distance is a powerful driving force for the partner selection in trust games.

Table 4: Summary on payoffs

Treatments	Matching	Average payoffs (LD)			Joint Payoffs (LD)
		Proposer	Ingroup responder	Outgroup responder	
<i>Selection 2-3</i>	Outgroup	1299	2007	2117	5423
<i>Selection 2-3</i>	Ingroup	1352	1358	1000	3710
<i>Selection 2-4</i>	Outgroup	1523	2173	2427	6123
<i>Selection 2-4</i>	Ingroup	1344	1238	1000	3582

Although an ingroup responder is more likely to be chosen, the amount sent to ingroup is not greater than the amount sent to outgroup. It is about the same in *Selection 2-3*, and even slightly *lower* in *Selection 2-4*, as shown in Table 3. It appears that the primary decision by proposers is *who* to trust, rather than *how much* to invest. Last but not least, Table 3 shows that ingroup responders return a larger proportion than outgroup responders. On average, ingroup responders returned 42% in *Selection 2-3* (40% in *Selection 2-4*), in comparison with 31% (32% in *Selection 2-4*) returned by outgroup responders.

5.2. Hypothesis Testing and Results

In this subsection, we use econometric models to analyze the effect of social distance on proposers' partner selection, amount of investment, and responders' reciprocal behavior.

We first use a logistic model to investigate the proposers' decision on partner selection. The dependent variable is the likelihood of proposer selecting the ingroup responder. We pool the data of the two selection treatments, and control for the effect of

different treatments by including a dummy variable *Condition*. The dummy variable *Condition* takes a value of 1 if the outgroup multiplier is 4 and 0 otherwise. Note that since in Table 5 we only examine the selection treatments, *Condition* is essentially a dummy for *Selection 2-4*. Other control variables include proposer gender and age. The coefficient estimates are reported in Table 5. The positive and significant coefficient estimate of the intercept term (0.565, $p < 0.05$ in column 1; 2.303, $p < 0.01$ in column 2) suggests that proposers are more likely to select the ingroup responders over the outgroup responders, despite of the higher rate of investment returns with the outgroup. The dummy variable *Condition* enters with a negative sign, implying that the likelihood of selecting ingroup decreases when the outgroup multiplier rises from 3 (*Selection 2-3*) to 4 (*Selection 2-4*), but we cannot reject the effect is zero due to the large standard error. Proposers' favoritism towards ingroup decreases with their age, but does not depend upon their gender.

Table 5: Determinants of proposers' partner selection

	(1)	(2)
Data	Selection only	Selection only
Experiment variables	Yes	Yes
Demographics		Yes
<i>Condition</i>	-0.362 (0.348)	-0.378 (0.371)
Proposer gender (male)		-0.471 (0.377)
Proposer age		-0.044*** (0.017)
Constant	0.565** (0.251)	2.303*** (0.678)
Pseudo R ² (Stata formula)	0.006	0.053
Observations	138	132

Standard errors in parentheses.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Result 1 (Proposers' partner selection). *Proposers are more likely to choose ingroup responder than outgroup responder. The ingroup favoritism doesn't decrease significantly as the rate of investment return with the outgroup responder increases from 3 to 4.*

Support. In Table 5, the coefficient estimate of the intercept term is 0.565 ($p < 0.05$) in column 1, and 2.303 ($p < 0.01$) in column 2 when we control for proposer gender and age. The coefficient estimate of the dummy variable *Condition* is -0.362 ($p > 0.10$) in column 1 and -0.378 ($p > 0.10$) in column 2.

Result 1 supports Hypothesis 1 on the higher probability that proposers choose the ingroup responder. But we reject Hypothesis 2 that an increase in the rate of investment return (from 3 to 4) attracts more proposers to select the outgroup responder.

Result 1 suggests that when selecting investment partner, proposers show favoritism towards responders that are socially closer. The next question is whether the ingroup favoritism is manifested by the amount of investment? A proposer's decision on how much to invest may depend upon several factors, such as whether the responder is from ingroup or outgroup, and the rate of return of the investment. We present a regression model in Table 6 with the amount sent by a proposer as the dependent variable. Columns 1-2 only include data from the selection treatments. As in Table 5, *Condition* is a dummy variable that takes on the value of 1 if the outgroup multiplier is 4. Since we now look at both selection and control treatments, *Condition* takes on a value of 1 for either *Selection 2-4* or *Control 4*, and 0 for either *Selection 2-3* or *Control 3*. The independent variables are thus a dummy variable for *Ingroup* responder, a dummy variable *Condition*, and their interaction. Columns 3-4 pool all the data of the selection treatments and controls, and therefore have two additional explanatory variables, the *Outgroup* dummy and its interaction with *Condition*.

The coefficient estimates are presented in Table 6. In column 1-2, where the control treatments are excluded from the regression, the coefficient on ingroup is not statistically significant so we cannot reject that the ingroup dummy variable has no effect on the amount sent by proposers. In columns 3-4, which do include the control treatments and therefore enable us to estimate a separate coefficient on the outgroup dummy, both ingroup and outgroup dummies appear significant as well as their interaction with *Condition*. However, using an *F-test*, we cannot reject that the joint hypothesis that the coefficients on the ingroup and outgroup dummies are the same as well as the respective interaction terms of ingroup and outgroup with *Condition*. In column 4, the *F-test* value is

0.22 (0.51 in column 3), which gives a p-value of 0.80 (0.60 in column 3). We therefore conclude that there is no significant difference in proposers' investment in ingroup and outgroup responders.

Table 6: Determinants of proposers' amount sent

	(1)	(2)	(3)	(4)
Data	Selection only	Selection only	Selection + control	Selection + control
Experiment variables	Yes	Yes	Yes	Yes
Demographics		Yes		Yes
Ingroup is chosen	2.2 (67.4)	-8.1 (66.3)	176.4*** (65.7)	159.8** (67.2)
Outgroup is chosen			174.2** (75.3)	153.4** (77.5)
<i>Condition</i>	-58.0 (72.3)	-50.2 (70.9)	223.4*** (71.1)	229.4*** (73.0)
Ingroup is chosen × <i>Condition</i>	-70.6 (93.7)	-29.7 (92.1)	-352.1*** (94.4)	-312.0*** (94.9)
Outgroup is chosen × <i>Condition</i>			-281.5*** (103.6)	-262.1*** (105.3)
Proposer gender (male)		-39.4 (42.4)		14.4 (38.3)
Proposer age		6.3*** (2.2)		7.2*** (1.8)
Constant	708.0*** (53.8)	509.5*** (101.2)	533.8*** (50.3)	283.0*** (78.038)
R ²	0.040	0.097	0.072	0.150
Observations	138	135	200	192

Standard errors in parentheses.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Result 2 (Proposers' investment amount). *Proposers send the same amount to ingroup responders as they do to outgroup responders.*

Support. *In Table 6, the coefficient estimate of the Ingroup dummy variable is 2.2 ($p > 0.10$) in column 1, and -8.1 ($p > 0.10$) in column 2 when we control for proposers' gender and age. In columns 3 and 4, we cannot reject that the coefficients on ingroup and outgroup, including interaction terms, are different from each other.*

According to Result 2, we reject Hypothesis 3 that proposers invest greater amounts in ingroup responders.

Next, we use a regression to investigate what determines responders' reciprocal behavior. The dependent variable is the proportion of LDs returned by responders. Recall that responders may choose to return any amount up to his initial endowment plus the amount sent by the proposer times the multiplier. Table 7 presents the coefficient estimates and standard errors. Columns 1-2 are based on data from the selection treatments. The independent variables include a dummy variable for *Ingroup* responder, *Amount Invested* by the proposer, a dummy variable for *Condition*, and the interaction between *Ingroup* and *Condition*. Columns 3-4 pool all the data of the selection treatments and controls, and therefore have two additional explanatory variables, the *Outgroup* dummy and its interaction with *Condition*. We also control for responders' demographics including gender and age in columns 2 and 4.

We find the *Ingroup* dummy enters with a positive sign in all the specifications. The coefficient estimate is 0.115 and 0.124, statistically significant at 5 percent level in columns 1-2. It supports Hypothesis 4 that ingroup responders return a higher proportion than outgroup responders. The coefficient of *Ingroup* dummy (0.157 and 0.19) is statistically significant at 1 percent level in columns 3-4, suggesting that ingroup responders return a greater percentage than responders in the control conditions. Furthermore, outgroup responders in the selection treatments don't behave differently from responders in the control since the *Outgroup* dummy is not significantly different from zero in columns 3-4. We also observe that higher amount invested generates greater percentage returned, regardless of ingroup or outgroup. The coefficient of *Amount Invested*, which varies from 0.023 to 0.027 ($p < 0.01$), implies that a 100-LD increase in the amount invested by the proposer will lead to 2.3-2.7% of increase in the amount returned. The proportion returned increases with responders' age ($p < 0.05$). There's no gender difference.

Table 7: Determinants of proportion returned by responders

	(1)	(2)	(3)	(4)
--	-----	-----	-----	-----

Data	Selection only	Selection only	Selection + control	Selection + control
Experiment variables	yes	Yes	yes	yes
Demographics		Yes		yes
Ingroup Responder	0.115 ** (0.049)	0.124** (0.051)	0.157 *** (0.047)	0.19 *** (0.049)
Outgroup Responder			0.042 (0.054)	0.065 (0.056)
Amount invested (LD 100)	0.024 *** (0.006)	0.027*** (0.006)	0.023 *** (0.005)	0.025 *** (0.005)
Condition	0.026 (0.053)	0.004 (0.054)	0.088 * (0.052)	0.11 ** (0.053)
Ingroup Responder × Condition	-0.019 (0.068)	-0.001 (0.070)	-0.083 (0.069)	-0.107 (0.07)
Outgroup Responder × Condition			-0.063 (0.075)	-0.106 (0.076)
Responder gender (Male)		-0.001 (0.035)		-0.026 (0.029)
Responder age		0.003** (0.002)		0.004 *** (0.001)
Constant	0.136 ** (0.059)	0.019 (0.086)	0.104 ** (0.045)	-0.046 (0.065)
Adjusted R2	0.152	0.196	0.182	0.248
Observations	138	132	200	189

Standard errors in parentheses.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Result 3 (Responders' reciprocity). *Ingroup responders return significantly higher proportion of LDs than outgroup responders and responders in control. Proportion returned increases with the amount invested by the proposer. Outgroup responders return the same proportion in the selection treatment as those responders in the control.*

Support. *In Table 7, the coefficient estimate of the ingroup dummy variable is 0.115 ($p < 0.05$) and 0.124 ($p < 0.05$) in columns 1-2 where only selection treatments are considered. Its coefficient estimate is 0.157 ($p < 0.01$) and 0.19 ($p < 0.01$) in columns 3-4 where data from both selection and control sessions are included. The effect of the variable Amount Invested varies from 0.023 to 0.027 ($p < 0.01$). The Outgroup dummy variable enters with a coefficient of 0.042 and 0.065 ($p > 0.10$) in columns 3-4.*

Result 3 provides supporting evidence for Hypothesis 4 that ingroup responders reciprocate more than outgroup ones, and Hypothesis 5 that higher level of amount sent by proposers lead to greater proportion returned by responders. We cannot reject the null hypothesis for Hypothesis 6 that outgroup responders in the selection treatments don't behave differently from responders in the control.

6. Conclusions

The rise of virtual worlds enriches the concept of social distance. It poses new questions on how social distance may influence economic decision making in the midst of the new forms of socialization in modern life. As one of the early efforts to address this question, we design a series of trust games with partner selection and implement the experiment in one of the most popularly used virtual worlds called the Second Life.

By allowing a proposer in a trust game to choose between two investment responders—one with whom the proposer is familiar and the other completely anonymous—we are able to gauge the strength and importance of social distance in investment decisions. The outgroup responder had a substantially higher investment multiplier that could be sent back to the proposer, but also a higher social investment multiplier that would benefit “society”, the proposer and his ingroup partner. Hence, a decision to invest with the ingroup responder indicated a much higher degree of trust in that responder. We indeed find that the vast majority of proposer preferred to stay with the familiar responder, at a loss to themselves and to the group.

The decision by proposers to go with ingroup responders was likely at least partially based on the belief that ingroup responders would return a greater amount. Our findings indicate that ingroup responders unambiguously returned a greater proportion in every condition, but this was not always enough to offset the higher multiplier of the outgroup responder. In *Selection 2-3*, proposers fared better going with the ingroup responders, but not in *Selection 2-4*. With an outgroup multiplier of 4, more than twice the ingroup multiplier, proposers did worse for themselves by selecting ingroup responder. Moreover, given the social multiplier of 8, the ingroup responders also did

worse when the proposer selected ingroup responder. In fact, on average, players in every single role suffered a loss of payoff when the proposer selected to go with the ingroup responder. This is a stark example of a situation where greatly lowered social distance results in a large loss of efficiency and welfare for all involved.

There are undoubtedly other ways to pose multiple investment decisions to proposers. For example, in our design, a proposer does not have any information on the third person in the other room, and so we can only explain why he did or did not choose the ingroup responder, but offer little explanation on why he chose the outgroup responder. In an alternative design, the proposer may interact with both responders, so that the comparison between them can be done with richer information. In the current design, the ingroup responder gets the same return from the outgroup responder as the proposer. This design was intended to make the social multiplier much greater if the proposer chooses the outgroup responder than if he chooses the ingroup one. One could try to make the social multiplier somewhat more neutral by giving the outgroup responder the same return as the proposer. Additionally, one might introduce a passive outsider in the control treatments, to compare regards for the third party. One could sharpen the control by introducing control treatments with a multiplier of two or other multipliers, or reverse the multipliers in the two rooms to get a better sense of the strength of preferences. These are all treatments we considered and decided against for the sake of finiteness, but they all would shed additional light on what considerations drive investment choice in social settings.

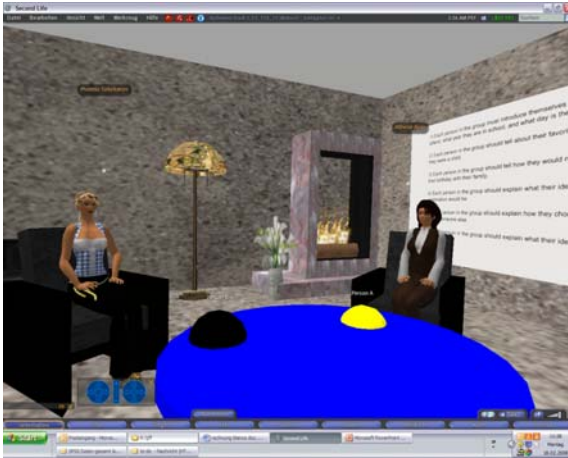
References

- Akerlof, George A. (1984), "Gift Exchange and Efficiency-Wage Theory: Four Views", *The American Economic Review*, Vol. 74, No. 2, 79-83
- Bainbridge, William Sims (2007). "The Scientific Research Potential of Virtual Worlds." *Science*, 317, 472-476
- Becker, Gary (1957) *The Economics of Discrimination*, Chicago: The University of Chicago Press 2nd edition).
- Berg, Joyce, John Dickhaut, and Kevin McCabe, "Trust, Reciprocity, and Social History," *Games and Economic Behavior*, (10)1995, pp. 122-142
- Bloomfield, Robert (2007), *Worlds for Study: Invitation (Virtual Worlds for Studying Real-World Business (and Law, and Politics, and Sociology, and...))*, working paper.
- Bochet, Olivier, Page, Talbot, and Putterman, Louis (2006) "Communication and Punishment in Voluntary Contribution Experiments." *Journal of Economic Behavior and Organization* 60(1), 11-26.
- Bohnet, Iris, Bruno S. Frey and Steffen Huck (2001), "More Order with Less Law: On Contract Enforcement, Trust, and Crowding", *American Political Science Review* (2001), 95: 131-144
- Bolton, G. and Katok, E. (1995) "An experimental test for gender differences in beneficent behavior", *Economics Letters*, 48, 287-92.
- Breuer, M. (2007) *Second Life und business in virtuellen Welten*, Whitepaper, Elephant Seven AG Hamburg, Germany, 2007.
- Brosig, Jeannette, Ockenfels, Axel, and Weimann Joachim. (2003). "The Effect of Communication Media on Cooperation." *German Economic Review* 4(2), 217-241.
- Buchan, Nancy, Rachel Croson, and Robyn Dawes. (2002) "Swift Neighbors and Persistent Strangers: A Cross-Cultural Investigation of Trust and Reciprocity in Social Exchange", *American Journal of Sociology*, Vol 108, 168-206.
- Castronova, Edward (2001), "Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier." working paper, Indiana University Bloomington
- Chakravarti, Sujoy and Ernan Haruvy (2003), "Other-Regarding Preferences in Indirect Trust Games", working paper.
- Charness, G., E. Haruvy, and D. Sonsino (2007), "Social Distance and Reciprocity: An Internet Experiment," *Journal of Economic Behavior and Organization* 63(1), 88-103.
- Charness, Gary, Guillaume R. Frechette, and John H. Kagel (2004), "How Robust is Laboratory Gift Exchange?" *Experimental Economics*, 7(2), 189-205.
- Chen, Yan and Sherry X. Li (forthcoming), "Group Identity and Social Preferences", *The American Economic Review*.
- Cox, James C. and Cary A. Deck (2005), "On the Nature of Reciprocal Motives", *Economic Inquiry*, Vol. 43, Issue 3, 623-635.
- Croson, Rachel T. A. and Uri Gneezy (2004). "Gender Differences in Preferences," mimeo.
- Dana, J. D., J. Kuang and R. A. Weber (2004), "Exploiting Moral Wriggle Room: Behavior Inconsistent with a Preference for Fair Outcomes", working paper
- Dana, J., D. M. Cain and R. M. Dawes (2005), "What you don't Know Won't Hurt me: Costly (but quiet) Exit in a Dictator Game", working paper
- Duffy, John, and Feltovich, Nick (2002) "Do Actions Speak Louder Than Words? Observation vs. Cheap Talk as Coordination Devices." *Games and Economic behaviour* (39), 2002, pp. 1-27.

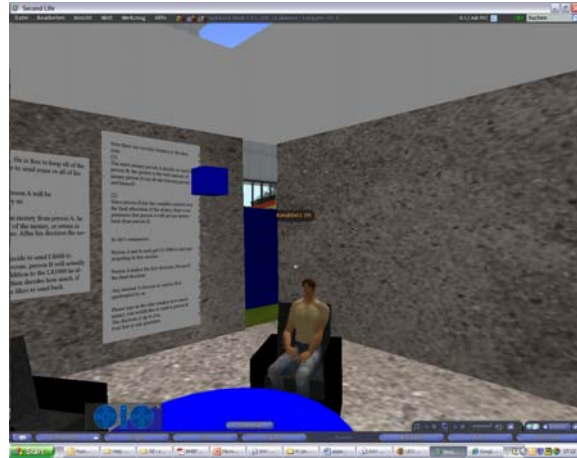
- Dufwenberg, M. and A. Muren (2006), "Generosity, Anonymity, Gender", *Journal of Economic Behavior & Organization* 61 (2006), 42-49.
- Frohlich, N., and Oppenheimer, J. (1998) "Some Consequences of Email vs. Face-to-Face Communication in Experiments." *Journal of Economic Behavior and Organization* 35, 389-403.
- Eckel, C. C. and Grossman, P. J. (1998) "Are women more selfish than men? Evidence from dictator experiments", *The Economic Journal*, 108, 726- 35.
- Eckel, C. and Wilson, R. (2000), "Whom to Trust? Choice of partner in a trust game," Rice University Discussion paper
- Eckel, C. and Wilson, R. (2002), "Conditional trust: sex, race and facial expressions in a trust game", working paper.
- Fehr, E., Kirchsteiger, G., and Riedl, A. (1993). "Does Fairness Prevent Market Clearing? An Experimental Investigation." *Quarterly Journal of Economics*. 108, 437-459.
- Fershtman, Chaim and Uri Gneezy (2001), "Discrimination in a Segmented Society: An Experimental Approach," *Quarterly Journal of Economics*, February 2001, 116 (1), 351-377.
- Frank, Robert, Thomas Gilovich and Dennis Regan (1993), "The evolution of one-shot cooperation", *Ethology and Sociobiology* 14, 247-256.
- Guth, W.R and Van Damme, E. (1998), "Information, Strategic Behavior, and Fairness in Ultimatum bargaining: An Experimental Study." *Journal of Mathematical Psychology*, 42, pp. 227-247.
- Ivanova-Stenzel. R. and Salmon, T. (2004), "Bidder Preferences among Auction Institutions," *Economic Inquiry*, 42, 223-236.
- Jarvenpaa, S., Leidner, D. (1999) "Communication and Trust in Global Virtual Teams," *Org. Science* (10:6), special issue November-December, 791-815.
- Jensen, C., Farnham, S.D., Drucker, S.M., and Kollock, P. (2000) "The effect of communication modality on cooperation in online environments," Proceedings of the SIGCHI conference on Human factors in computing systems, The Hague, The Netherlands, 470-477.
- Kahn, A., Nelson, R. E. and Gaeddert, W. P. (1980) "Sex of subject and sex composition of the group as determinants of reward allocations", *Journal of Personality and Social Psychology*, 38, 737-50.
- Khatri, Naresh and Eric W. K. Tsang (2003), "Antecedents and Consequences of Cronyism in Organizations", *Journal of Business Ethics*, 43(4), 289-303.
- Khatri, Naresh and Eric W. K. Tsang and Thomas M TB Begley (2006), "Cronyism: a cross-cultural analysis", *Journal of International Business Studies*, 37 (1), 61 - 75
- King, Ronald (2001), "An Experimental Investigation of Self-Serving Biases in an Auditing Trust Game: The Effect of Group Affiliation", working paper.
- McLarney, C. and S. Rhyno. (1998) "Beyond Agency Theory: International Joint Ventures as Reciprocating Relationships." *Research in International Business and International Relations*, 7, Greenwich, CT: JAI Press.
- McPherson, Miller, Lynn Smith-Lovin, and James M Cook (2001), "Birds of a Feather: Homophily in Social Networks", *Annu. Rev. Sociol.* 2001. 27:415-44
- Mulford, Matthew, John Orbell, Catherine Shatto and Jean Stockard (1998), "Physical attractiveness, opportunity and success in everyday exchange", *American Journal of Sociology* 103(6), 1565-1592.
- Nardi, B.; Whittaker, S. (2002) "The Place of Face-to-Face Communication in Distributed Work." in *Distributed Work: New Research on Working Across Distance Using Technology*, P.Hinds and S. Kiesler, eds., MIT Press, Cambridge, MA, 83-110.

- Nohria, N., and Eccles, R.G. (1992). *Networks and Organizations: Structure, Form, and Action*, Harvard Business School Press, Boston, Mass..
- O'Hara-Devereaux, M., and Johansen, R. (1994). *Globalwork: Bridging Distance, Culture, and Time*, Jossey-Bass, San Francisco, CA.
- Piller, F., and Salvador, F. (2007). "A Total Makeover of Retail - Rather Than Pursuing Marginal Improvements in Speed, the Next Source of Competitive Advantage For Retailers Lies in Creating Virtual Representations of Their Customers and Assortments." Working Paper, 2007
- Rao, Asha and Stuart M Schmidt (1998), "A Behavioral Perspective on Negotiating International Alliance", *Journal of International Business Studies*, 1998, vol. 29, issue 4, pages 665-694
- Saad, G. and Gill, T. (2001a) "Sex Differences in the Ultimatum Game: An Evolutionary Psychology Perspective", *Journal of Bioeconomics*, Volume 3, Numbers 2-3 / May, 2001, 171-193
- Saad, Gad and Gill, Tripat (2001b) "The effects of a recipient's gender in a modified dictator game", *Applied Economics Letters*, 8:7, 463-66
- Segal, Uzi and Sobel, Joel, (2007). "Tit for tat: Foundations of preferences for reciprocity in strategic settings," *Journal of Economic Theory*, Elsevier, vol. 127(1), 197-216.
- Sheeks, M.S., and Birchmeier, Z.P. (2007). "Shyness, Sociability, and the Use of Computer-Mediated Communication in Relationship Development." *CyberPsychology and Behavior* 10(1), 64-70.
- Slonim, Robert (2006). "Gender Selection Discrimination: Evidence from a Trust Game," Working Paper, Case Western Reserve University
- Slonim, Robert and Ellen Garbarino (2006), "Increases in efficiency from partner selection: experimental evidence", Working paper, Case Western Reserve University
- Weiss, S. (1993). "Analysis of complex negotiations in international business: The RBC perspective." *Organization Science*, 4: 269-300.

Appendix A. Screenshots from the experiment.



Proposer and ingroup responder



Outgroup responder

Appendix B. Experiment Instructions

Instructions Script for ingroup-outgroup sessions

Hello Everyone. Thank you for participating in this session. Before we begin we would like to ask you to open your chat history. Please type in “ok”, if your chat history is open.

Do you know each other?

We will first ask you to talk for 10 minutes exclusively via Chat to get acquainted. We will then give you detailed instructions on the experiment and ask you for a decision. Altogether this session will take approximately 25 minutes. All communication in this experiment is done via public chat.

Please type ok if you have understood so far.

Please use the next 10 minutes to introduce yourself and to chat about any other topics you like. If you like you can talk about the topics on the wall but you can also choose other topics. Please start now.

Thank you. We will now start with the instructions for the game.

The purpose of this experiment is to study how people make decisions in a particular situation. Feel free to ask questions as they arise.

Everyone will receive 1000 Linden-Dollars to start in this session. The final earnings depend on the decisions that you and others make. You cannot lose any personal money.

Upon completion of the session, your earnings will be paid to you individually and privately in your Second Life account.

Participants in this session are referred to as person A, person B and person C. The decision who is person A, person B and person C is done via random generator.

In this session [X] is person A and [Y] is person B. Person A and Person B are both in room blue. Person C is waiting in a different room.

We guarantee that there is a person C recruited just like person A and B in SL. Person C is getting the instructions as well.

Every participant will be given L\$1000 to start the session.

Person A decides first. He is free to keep all of the L\$1000, or can choose to send some or all of his L\$1000 to person B or to person C.

Any money sent by person A will be multiplied by us. Examples will follow in a minute.

Once the receiver gets the money from person A, he can decide to keep all of the money, or return as much to person A as he likes.

Note there are two key features to the decision:

(1) The more money person A decides to send to the receiver, the greater the total amount of money the receiver can divide between person A and himself.

(2) Since the receiver has the complete control over the final allocation of the money, there is no guarantee that person A will get any money back from the receiver.

Please type in ok, if you have understood so far. Please feel free to ask questions.

Person A can choose between person B in this room and person C in the other room as receiver.

We will double any amount person A sends to person B.

For example, if person A decides to send L\$600 to person B, person B will

that opens. Please return to SL once you are finished to receive your earnings.

.....
Continuation of Instructions for person C

Please read through the instructions positioned on the wall.
Feel free to ask us questions as they arise.
Person A has decided to send you L\$ YYYY. This amount is tripled, so that you receive L\$ YYYY. Now you have L\$ XXXX (the amount you received plus your initial L\$ 1000). Please decide how much, if any, you wish to send to person A. The decision is up to you. <This is for 2/3 treatment, In 2/4 treatment: quadrupled>
Please type in the amount now _____
So you will earn L\$ xxx, correct? Please confirm.
Person A has decided to play with Person B.
Please click on the hemisphere in front of you and answer the questionnaire that opens. Please return to SL once you are finished to receive your earnings.

[Instructions script for Control Sessions](#)

Instructions for person A

Thank you for participating in this session.
Please read through the instructions positioned on the wall.
Feel free to ask us questions as they arise.
So if person B decides to keep everything you will earn L\$ xxx, correct? Please confirm.
Please click on the yellow hemisphere in front of you and answer the questionnaire that opens. Please return to SL once you are finished. We will tell you then the decision of the receiver.

Instructions for person B

Thank you for participating in this session.
Please read through the instructions positioned on the wall.
Feel free to ask us questions as they arise.
Person A has decided to send you L\$ XXX. This amount is tripled, so that you receive L\$ XXX. Now you have L\$ XXX (the amount you received plus your initial L\$ 1000)
Please decide how much, if any, you wish to send to person A. <This is for control 3 treatment, In control 4 treatment: quadrupled>
Please type in the chat window how much money you would like to send to person A.
The decision is up to you. Feel free to ask questions.
So you will earn L\$ xxx, correct? Please confirm.
Please click on the black hemisphere in front of you and answer the questionnaire that opens. Please return to SL once you are finished to receive your earnings.

Instructions on the wall:

The purpose of this experiment is to study how people make decisions in a particular situation. Feel free to ask questions as they arise.
Everyone receives 1000 Linden-Dollars at the start of this session. Final earnings depend on the decisions you and others make. You cannot lose any personal money.

Upon completion of the session, the amount will be paid to you individually and privately in your Second Life account.

Participants in this session are referred to as person A, person B *<in ingroup-outgroup treatments, add "and person C">*. The assignment into person A, person B *<and person C>* is done randomly.

You are person _____.

<In the Instructions for person C in the ingroup-outgroup treatments>: Person A and person B are in the other room and have a chance talking to each other. Altogether this session will take about 25 minutes. Person A makes a decision first. He is free to keep all of the L\$1000, or can choose to send some or all of his L\$1000 to person B or C.

<In the instructions in the control treatments>: Person A decides first. He is free to keep all of the L\$1000, or can choose to send some or all of his L\$1000 to person B. Any money sent by person A will be multiplied by a factor.

Once the receiver gets the money from person A, he can decide to keep all of the money, or return as much to person A as he likes.

Note there are two key features to the decision:

(1) The more money person A decides to send to the receiver, the greater is the total amount the receiver can divide between person A and himself.

(2) Since the receiver has complete control over the final allocation of the money, there is no guarantee that person A will receive any money back from the receiver.

<Instructions for C in ingroup-outgroup treatments>: Person A can choose between person B in the other room or you. If person A decides to choose person B in the other room we will double any amount person A sends to the receiver. For example, if person A decides to send L\$600 to person B in the other room, person B will actually receive L\$1200 (in addition to the L\$1000 he already has). Person B then decides how much of the L\$ 2200 he likes to send back to person A. If person A decides to pick you, person B will get the same amount as person A receives from you. For example, if you decide to return L\$600 from your L\$ 2800, both person A and person B will actually receive L\$600. So person A will get L\$ 1000 and person B will receive L\$1600 and you would be left with L\$ 2200. After your decision the game is over. *<In 2/4 treatment: L\$ 3400 respectively L\$1000, L\$ 1600 and L\$ 2800>*

<Instructions for B in control and to C in ingroup-outgroup treatments>: If person A decides to choose you, we will triple/quadruple any amount person A sends to you. For example, if person A decides to send L\$600 to you, you will actually receive L\$1800 (in addition to the L\$1000 you already have). You then decide how much of the L\$ 2800 you like to send back. *<In control 4 and 2/4 treatment: quadrupled and L\$ 2400 respectively L\$3400>*

So let's summarize:

Every participant will be given L\$1000 to start the session.

Person A makes the first decision, Person B *<In ingroup-outgroup add "or C">* makes the final decision.

If person A chooses B any amount he sends is doubled by us. You will leave with the initial L\$1000.

If A chooses you, any amount he sends is tripled by us. In this case Person B will get the same amount as A receives from you. *<In control 4 and 2/4 treatment: quadrupled>*

Please type in "Ok" to indicate that you understand these rules. Feel free to ask us questions.

Appendix C. Post-experiment Questionnaires

(A for proposer questionnaire ; B for ingroup responder ; C for outgroup responder)

1A/1B/1C. What is your Avatars' name?

2A. Did you decide to go with Person **B** (in your room) or Person **C** (in the other room)?

2B/2C. Were you selected as receiver by person A?

3A. Why did you decide on this receiver?

3B/3C How much money did you return to Person A?

4A. How much money did you send to the receiver?

4B/4C Why did you choose to return that amount?

5A. Why did you choose to send that amount?

5B/5C. To what extent did you feel obligated to send money to the person A? (Likert scale: 1=not at all; 7=very much)

6A. To what extent did you feel obligated to send money to the receiver? (Likert scale 1-7, 1=not at all, 7=very much)

7A. To what degree do you trust the receiver to return to you at least as much money as you sent him? (That is, if you sent L\$400, he will return at least L\$400)? (Likert scale: 1=not at all, 7=very much)

8A. How much do you expect the receiver will return to you?

9A/6B/6C To what extent does it feel like you are competing or cooperating with the other person in this session? (Likert scale: 1=competing; 7 = cooperating)

10A/7B/7C What is more important to you in this session: maximizing the amount of money that you and the receiver will gain together, or maximizing the amount of money you alone will gain? (Liker: 1=Max individual gain; 7=Max joint gain)

8B/8C. To what extent do you trust person A? (Likert: 1=Not at all, 7=completely)

11A/9C. To what extent do you trust person B? (Likert: 1=Not at all, 7=completely)

12A. To what extent do you trust person C? (1=Not at all; 7=completely)

9B/10C To what extent do you feel person A is similar to you (Likert: 1=very similar; 7= very different)

13A/11C. To what extent do you feel person B is similar to you (Likert: 1=very similar; 7= very different)

14A/10B. To what extent do you feel person C is similar to you (Likert: 1=very similar; 7= very different)

15A/11B/12C. Knowledge of economic game theory? (Likert scale: 1=Know nothing; 7=know well)

16A/12B. Please answer the following questions regarding your communication:

	1 Not at all	2	3	4	5	6	7 very much	I don't know
How responsive was the other person to verbal communication that you initiated?								
How responsive was the other person to non-verbal communication (e.g. mimic, posture) that you initiated?								
How natural did your communication seem?								
How credible is your avatar with respect to representing human beings?								

17A/13B/13C. Please indicate to what extent you agree with the following statements:

	1 strongly disagree	2	3	4	5	6	7 strongly agree	I don't know
My avatar does <u>not</u> have much in common with my true personalty.								
My avatar's behaviour is very similar to mine.								
My behaviour in SL is not different from that in real life.								
My avatar's character is very similar to mine.								
I identify myself with my avatar								
I perceive other avatars only as computerized images, not as real persons.								
It often crosses my mind that the avatars I interact with are not real persons.								

18A/14B/14C. Please answer following questions:

	1 Not at all	2	3	4	5	6	7 very much	I don't know
Does your avatar allow you to express yourself?								
Does your avatar allow you to express your emotions?								
Does your avatar symbolise your relationship to other people?								
Do you feel an emotional attachment to your avatar?								
Does your avatar disclose information about you?								
Is the avatar representation important for contacting other people in the virtual environment?								
Is the avatar important for identification with the community?								
Does your avatar look similar to you?								

19A/15B/15C. Does your avatar...

	1 Not at all	2	3	4	5	6	7 very much	I don't know
...allow others to see what kind of person you are?								
...symbolise your personality?								
...indicate that you are a member of a particular club?								
...symbolise your social identity?								
...communicate your social identity?								

20A/16B/16C. Please indicate to what extent you agree with the following statements:

	1 Not at all	2	3	4	5	6	7 very much	I don't know
Are you able to anticipate what would happen next in response to the actions that you performed?								
How natural do your interactions with other avatars seem?								

21A/17B/17C. Please indicate to what extent you agree with the following statements (1=Strongly disagree; 7=Strongly agree)

Interaction with the SL-community is not only a game for me.

For me, SL is connected to real life.

I know many members of SL in person.

I often develop real-life relationships to other members of SL.

The boundary between this community and real life sometimes fades away.

I am never sure whether other SL-community members are acting a role in front of me.

22A/18B/18C. Please answer the following questions (1=Not at all; 7=very much)

Do you ever become so involved in a movie or a game that you are not aware of things happening around you?

Do you often find yourself closely identifying with the characters in a storyline?

Are you good at blocking out external distractions when you are involved in something?

Do you ever become so involved in doing something that you lose all track of time?

23A/19B/19C. Please indicate to what extent you agree with the following statements: (1=Not at all; 7=very much)

When I meet someone from my nation or group, I know we will have common goals and aspirations.

If I lose touch with my group, I will be a different person.

In general, I accept the decision made by my group.

When I meet someone from my own nationality or religion, I know we will have common goals and interests.

24A/20B/20C. Demographics:

Gender:

Age

From which City (country) did you log into Second Life?

Nationality

Education Level (<=High School, Some College, Graduate, PhD)

Profession (Self employed, Employee, Official, Student, Trainee, Pupil, Unemployed, Housewife/
-husband, Pensioner, Manager, Others)

Mother's tongue?
