OTTO-VON-GUERICKE-UNIVERSITY MAGDEBURG
FACULTY OF ECONOMICS AND MANAGEMENT

Trust and Trustworthiness in Anonymous Virtual Worlds

Sascha Füllbrunn • Katharina Richwien
Abdolkarim Sadrieh

FEMM Working Paper No. 33, October 2009

F E M M

Faculty of Economics and Management Magdeburg

Working Paper Series

Otto-von-Guericke-University Magdeburg
Faculty of Economics and Management
P.O. Box 4120
39016 Magdeburg, Germany
http://www.ww.uni-magdeburg.de/

Trust and Trustworthiness in Anonymous Virtual Worlds

Sascha Füllbrunn, Katharina Richwien, Abdolkarim Sadrieh

October, 2009

Abstract:

Virtual communities like Second Life represent an economic factor with increasing potential, but may induce behavior that deviates from real world experience. We introduce a new experimental design that is based on the trust game (Berg, Dickhaut, and McCabe 1995), but eliminates the problem of multiple virtual identities. We conduct one treatment of the experiment in the virtual world Second Life and compare the results to the First Life control treatment that we conduct on our university Campus. In Second Life, we find significantly lower investment levels, but significantly higher average returns than in our First Life treatment or in the literature. The lower investments may be due to the fact that the return schedules observed in Second Life are significantly more erratic than in First Life.

Keywords: investment game, online community,

JEL No: C9, C72, D63

Otto-von-Guericke-Universität Magdeburg

Faculty of Economics and Management

E-Business

Postbox 4120, 39016 Magdeburg

eMail: Sascha.Fuellbrunn@ovgu.de

INTRODUCTION

Virtual worlds have become a non negligible part of the social structure in information societies. While most of the virtual worlds started as a leisure activity, they are gaining more and more economic importance. Hundreds of millions users are active in numerous diverse virtual worlds, including the market leaders World of Warcraft and Second Life. In most of these virtual worlds substantial economic activity takes place (e.g. Castronova, 2001) which is more and more interconnected with the real economy. The open question is whether trust and trustworthiness among players is structurally different in these virtual worlds than in the real world.

In this study, we introduce a new experimental design based on the trust game (Berg, Dickhaut, McCabe, 1995) in order to uncover differences in trust and trustworthiness comparing anonymous interactions in real and virtual worlds. We conduct an experiment with two identical treatments, one implemented on the University Campus ("First Life") and one in Second Life. In both cases a number of passersby are first contacted and asked to make an investment decision in the role of the trustor. Then, others are contacted and asked to submit return schedules in the role of the trustee. After all decisions are collected randomly matched pairs play the one-shot game. Finally, participants are contacted again and paid according to their decisions.

The passersby design that we introduce in this paper has the advantage that it almost fully eliminates the probability of contacting different virtual personalities ("avatars") of the same real person in Second Life. Our virtual experimenter moved around in different areas of Second Life and recruited the subjects on the spot by simply asking them whether they would like to participate. If we had created a fixed virtual room (e.g. a virtual laboratory) and had posted invitations to the experiment, Second Life users could have easily created numerous avatars to participate (and possibly collude) in our experiment simultaneously. To ensure the comparability

of the Second Life results with real world decisions, we conducted the First Life treatment with the same procedure.

We find behavior in the virtual world differs from behavior in the real world in three major ways. First, we find that the level of trust is significantly lower in the virtual world than in the real world setting. Second, we find that the level of trustworthiness is significantly higher in the virtual world than in the real world setting. Third, we find that the return schedules elicited in the virtual world are significantly more erratic than in the real world setting.

RELATED LITERATURE

Ever since its introduction by Berg et al. (1995), the trust game has been studied numerous times under different conditions and with various populations. Table 1 and table 2 provide overviews of the experimental results from 26 related studies. Our selection contains only treatments in which the multiplier was three and both players started out with an equal endowment. For this reason, all games compared in the overviews have the same relative payoff structure, even if the absolute payoff level may differ.[1] Furthermore, we only include data from treatments that have the same informational setting as the Berg et al. (1995) "no history" treatment. The treatments we consider are often the control or baseline treatments in the surveyed experiments.[2]

We have ordered the studies by the average relative investment in table 1 and by the average relative return on investment in table 2.[3] We use relative measures for the sake of comparability. The average relative investment (table 1) ranges from 0.76 to 0.31 with the distribution almost

[1] Obviously, the equilibrium predictions in all studies are analogous to those in Berg et al. (1995).

[2] Although the research questions may differ across the studies, the treatments we consider are comparable.

[3] Not all authors report whether the figures for the percentage returned were calculated including or excluding the endowment of the trustee. This can affect the ROI substantially.

symmetric around the 0.52 originally observed by Berg et al. (1995). The observed differences are generally attributed to subject pool differences.[4] Differences in the experimental protocol that are present across studies do not seem to lead to systematic differences in investment behavior.

The average relative return on investment (table 2) ranges from -0.79 to 1.14 with the distribution almost symmetric around zero, i.e. the investors on average neither gain, nor lose by investing. Again, the observed differences in return are generally attributed to subject pool differences, while differences in the experimental protocol do not seem to lead to systematic differences.

As can be seen in the tables, our results for the First Life treatment are in line with most of the results of earlier studies. Our Second Life results, however, are clearly outliers, with our trustors investing substantially less than the median of the other studies and our trustees returning substantially more than observed in any study so far.

Table 1: Overview of experimental results in trust games by Investment[5]

Study	Subjects	Investment
Füllbrunn et al. (2009)	Second life	0.30
Burns (2003)	South Africa	0.33
Johansson-Stenman et al. (2004)	Bangladesh (high)	0.37
Ashraf et al. (2006)	US	0.41
Willinger et al. (2003)	France	0.42
Ashraf et al. (2006)	South Africa	0.43
Barr et al. (2003)	Zimbabwe	0.43
Ensminger (2000)	Kenya	0.44
Johansson-Stenman et al. (2004)	Bangladesh (median)	0.46
Kurzban et al. (2008)	Penn (US)	0.46
Schechter (2003)	Paraguay	0.47
Ashraf et al. (2006)	Russia	0.49
Castillo and Carter (2003)	Honduras	0.49
Mosley and Verschoor (2003)	Uganda	0.49
Cardenas (2003)	Colombia	0.50
Cochard et al. (2004)	France	0.50

[4] Johansson-Stenman et al. (2004) is the only study that we find reporting systematic stake size differences.

[5] Investment = average invested fraction of the endowment

Atlas and Putterman (2009)	Second life baseline	0.50
Holm and Danielson (2005)	Sweden	0.51
Wilson and Bahry (2002)	Russia	0.51
Berg et al. (1995)	**US**	**0.52**
Carter and Castillo (2002)	South Africa	0.53
Holm and Danielson (2005)	Tanzania	0.53
Haile et al. (2006)	South Africa (Control)	0.55
Füllbrunn et al. (2009)	First life	0.55
Johansson-Stenman et al. (2004)	Bangladesh (low)	0.56
Ortmann et al. (2000)	Baseline	0.58
Kurzban et al. (2008)	Mason (US)	0.60
Solnick (2007)	Message (US)	0.62
Koford (2001)	Bulgaria	0.63
Buchan et al. (2004)	South Korea	0.64
Buchan et al. (2004)	US	0.65
Burks et al. (2003)	US	0.65
Willinger et al. (2003)	Germany	0.66
Buchan et al. (2004)	Japan	0.68
Croson and Buchan (1999)	China/Japan/Korea/US	0.68
Solnick (2007)	Cash (US)	0.69
Solnick (2007)	Strategy (US)	0.69
Buchan et al. (2004)	China	0.71
Solnick (2007)	Play money (US)	0.76

Table 2: Overview of experimental results in trust games by ROI[6]

Study	**Subjects**	**ROI**
Füllbrunn et al. (2009)	Second life	1.14
Atlas and Putterman (2009)	Second life baseline	0.52
Kurzban et al. (2008)	Penn (US)	0.44
Koford (2001)	Bulgaria	0.38
Johansson-Stenman et al. (2004)	Bangladesh (median)	0.38
Johansson-Stenman et al. (2004)	Bangladesh (low)	0.35
Schechter (2003)	Paraguay	0.32
Willinger et al. (2003)	Germany	0.29
Barr et al. (2003)	Zimbabwe	0.29
Castillo and Carter (2003)	Honduras	0.26
Cardenas (2003)	Colombia	0.23
Burks et al. (2003)	US	0.2
Willinger et al. (2003)	France	0.17
Ortmann et al. (2000)	Baseline	0.17
Füllbrunn et al. (2009)	First life	0.16

[6] ROI = (payback – investment)/investment, Not all authors report whether the figure for the percentage returned were calculated including or excluding the endowment of the trustee. This can affect the ROI substantially

Wilson and Bahry (2002)	Russia	0.14
Cochard et al. (2004)	France	0.14
Carter and Castillo (2002)	South Africa	0.14
Johansson-Stenman et al. (2004)	Bangladesh (high)	0.11
Holm and Danielson (2005)	Tanzania	0.11
Kurzban et al. (2008)	Mason (US)	0.05
Holm and Danielson (2005)	Sweden	0.05
Buchan et al. (2004)	China	0.02
Solnick (2007)	Play money (US)	-0.01
Mosley and Verschoor (2003)	Uganda	-0.01
Buchan et al. (2004)	Japan	-0.04
Croson and Buchan (1999)	China/Japan/Korea/US	-0.07
Solnick (2007)	Message (US)	-0.10
Berg et al. (1995)	**US**	**-0.10**
Buchan et al. (2004)	South Korea	-0.13
Ashraf et al. (2006)	Russia	-0.13
Buchan et al. (2004)	US	-0.16
Ashraf et al. (2006)	South Africa	-0.19
Burns (2003)	South Africa	-0.31
Ashraf et al. (2006)	US	-0.31
Ensminger (2000)	Kenya	-0.46
Solnick (2007)	Cash (US)	-0.58
Solnick (2007)	Strategy (US)	-0.79

Fiedler and Haruvy (2009) conducted experiments on Second Life using the trust game in a virtual laboratory. In their Second Life treatment, trustors invest about 60 percent of the endowment, while the proportion returned equals about 30 percent. However, they included pre-play communication and, thus, their results cannot be compared to our results. Atlas and Putterman (2009) also use a virtual laboratory to study the trust game with different textual and visual cues. In their baseline group, the investment is about 50 percent, i.e. in line with the majority of other studies. However, the return on investment is about 52 percent, i.e. higher than in all other studies.

EXPERIMENTAL DESIGN

The participants play a one-shot investment game (Berg et al. 1995). The investment game is a two-player sequential game with a trustor and a trustee. Both players receive an endowment of 1000 ECU. The trustor can choose to invest a fraction of her initial endowment by transferring it to the trustee. If the trustor has chosen to invest a positive amount, this amount is tripled and added to the trustee's initial endowment.

The trustee is informed of the amount invested and chooses which amount to return to the trustor. The amount returned must lie in the closed interval from zero to the sum of the initial endowment plus the tripled investment. The amount returned is transferred to the trustor's account (i.e. the return is not multiplied).

Since this is a one-shot anonymous game, the dominant strategy for the trustee is to return zero. Knowing the dominant strategy of the trustee, the trustor invests zero in equilibrium. The equilibrium yields the lowest possible joint payoff and reflects the complete lack of trust. Maximum joint payoff is achieved if the trustor invests her entire endowment. In this case, however, the trustor must trust the trustee to return a positive amount in order to achieve positive payoff. Hence, achieving the maximum joint payoff requires a high level of trust.

Our experiment consisted of two treatments that differed only in the environment in which the participants made their decisions. In the *Second Life* treatment (SL), we conducted the experiment online in the virtual world of secondlife.com. In the *First Life* treatment (FL), we conducted the experiment offline on the university campus. In both cases, we used a simple protocol. An experimenter approached individuals and asked them whether they would like to participate in an experiment.

In the SL treatment, the experimenter was the female avatar *Alea Lilliehook* (Figure 1). She wore a shirt with the university emblem and her profile affiliated her to the University of Magdeburg. Alea recruited the participants on several Islands in *Apfelland*, a German-speaking area of second life.

Figure 1: Alea Lilliehook

In the FL treatment, the experimenter was a female student assistant wearing a badge affiliating her to the University of Magdeburg. She recruited participants at the entrance to the university cafeteria. If an individual agreed to participate, the experimenter provided the written instructions and collected the decisions. In the SL treatment, the participants clicked on Alea's backpack to start the interaction script. The script first displayed the instructions on the participant's screen. In the FL treatment, the instructions were given to the participants on paper. After reading the instructions, each participant received either a trustor or a trustee decision sheet. The distribution of roles was fixed beforehand, assigning the role of the trustor to the first ten, the role of the

trustee to the second ten, and so forth. The participants' decisions were collected using the decision sheets. In the SL treatment, the decision sheet was part of the interaction script. In the FL treatment, it was a separate piece of paper.

In the SL treatment, the participant was endowed with 1000 Linden Dollars (L$).[7] In FL treatment, each participant was endowed with 1000 ECU. [8] The trustor chose an investment that was an element of the set {0, 100, 200, ..., 1000}. The trustee was asked to make a decision how much to return for each possible investment level. The returns were not constrained to be divisible by 100, but had to be integers. The pairs were randomly matched after all decisions were collected. In the SL treatment, the participants were located using the unique avatar name and the payoff was transferred via the instant messaging system of Second Life. Thus, this setup was double blind because subjects were anonymous among each other and anonymous to the experimenter. In the FL treatment, the participants could pick up their earnings at a faculty office. It was evident to the participants that the administrative assistants who handed out the payments were not involved in the experiment. This created a double blind setting in this treatment, because, on the one hand, the decisions were not known to the administrative assistants and, on the other hand, the participant remained anonymous to the experimenters.[9]

---

[7] At the time of the experiment, the exchange rate was 1US$ = 268 L$.

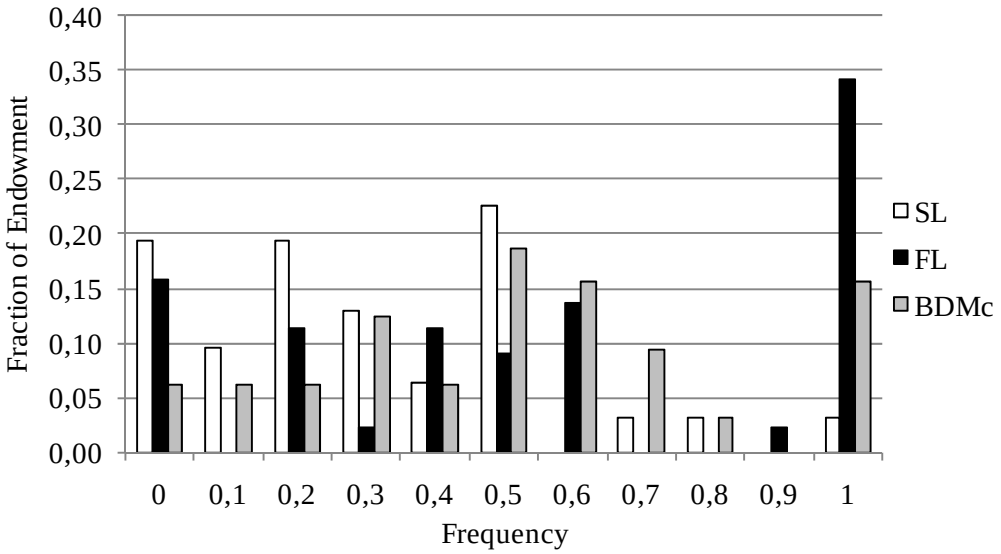
[8] The participant knew that 1000 ECU was equivalent to 4 €. At the time of the experiment, the exchange rate was 1US$ = 0.74 €.

[9] The procedure we used was rather complicated to ensure that the treatment is double blind. Each decision sheet was connected to a unique code which was not visible to the experimenter. After noting the decision on the decision sheet the participants folded and inserted their decision sheets in ballot boxes. Hence, there was no possibility to connect a subject to his decision sheet at the time of the experiment. After the experiment the payments were made by administrative assistants who were not involved in the experiment. Thus, the experimenters were not able to associate subjects to decisions at the time of payment either.

RESULTS

Figure 2 displays the distribution of investments as a fraction of the endowment in our FL treatment, in our SL treatment, and in the "no history" treatment of Berg et al. (1995) to which

Figure 2: Distribution of investment



we refer as BDMc. Table 3 shows the corresponding descriptive statistics. Trustors in the SL treatment invest 31 percent of their endowment on average. That is significantly less than the 56 percent in our FL treatment (Mann Whitney, two-tailed, p = 0.003) and significantly less than the 52 percent in BDMc (Mann Whitney, two-tailed, p = 0.003).[10] Trust is obviously lower in the SL treatment than in the other two treatments. Only 10 percent of the trustors invest more than 50 percent of their endowment in the SL treatment compared to 50 percent in the FL treatment and 44 percent in BDMc. This difference is highly significant using Fisher's exact test (Fishers exact, two-tailed, p = 0.001). The frequency of trustors investing their entire endowment (i.e. showing

[10] The result also holds using the Kolmogorov-Smirnov Test. We find that the distribution of investments in SL differs significantly from that in FL (p = 0.003) and that in BDMc (p = 0.031).

full trust) is lowest in SL. Using Fisher's exact test, however, we only find a significant difference in the comparison of SL to the FL treatment (Fishers exact, two-tailed, $p = 0.001$). Finally, the frequency of trustors investing zero is the highest in the SL treatment, which – even if not significantly different – again shows the low level of trust in Second Life. Note that the differences between the FL treatment and BDMc are not significant in any of these comparisons.

	SL	FL	BDMc
Observations	31	44	32
Average	0.31	0.56	0.52
Median	0.30	0.55	0.50
Modus	0.50	1.00	0.50
Frequency: Investment = 0	0.19	0.16	0.06
Frequency: Investment = Endowment	0.03	0.34	0.16
Frequency: Investment > half Endowment	0.10	0.50	0.44

Investment as fraction of endowment

Table 3: Descriptive statistics of investments

As in Bellemare and Kröger (2007) we measure trustworthiness using the *return ratio*, i.e. the ratio of the observed return to the maximum amount that can be returned. The maximum return equals the tripled investment plus the endowment. Because we used the strategy elicitation method, we have data from every trustee on every level of investment.

Figure 2 displays the three quartiles of the return ratio at each investment level in the FL treatment and the SL treatment, respectively. We also provide benchmarks. The lowest solid line represents the return ratio when the return is exactly equal to the investment. The dashed line represents the return ratio when the return is equal to the investment plus half of the surplus, i.e. when there is a perfectly equal split. Finally, the upper solid line represents the return ratio when the return is equal to the investment plus the total surplus, i.e. when the trustees return all but their own endowment.

Figure 3: Quartiles of Return Ratio

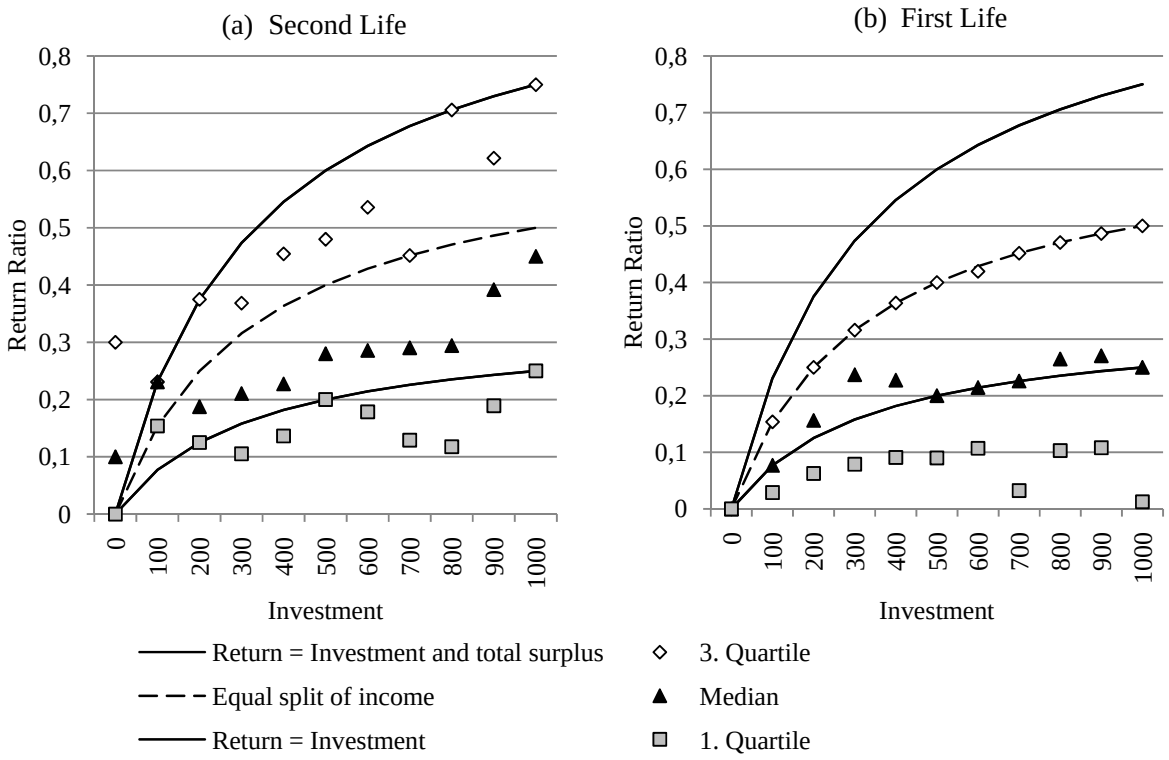


Figure 3 suggests that the level of trustworthiness is higher in the SL treatment than in the FL treatment. The corresponding quartiles in SL lie above those in FL for almost all investment levels. Comparing the return ratios with the Mann-Whitney U-test at each investment level, we find that the ratios are significantly higher in SL than in FL in a number of cases, but not significantly higher in FL than in SL in any case. Comparing the overall return ratios, we apply the Mann-Whitney U-test to the distribution of the area below the return ratio function across treatments. We find weakly significant evidence for higher overall return ratios in SL than in FL (Mann-Whitney U-test, two-tailed, $p = 0.066$). If we only compare trustees, who submitted

monotonically non-decreasing return ratio functions, the difference becomes more pronounced (Mann- Whitney U-test, two-tailed, $p = 0.015$).[11]

Another treatment difference that we observe concerning the return ratio, is that in the SL treatment, the fraction of erratic return ratio functions (i.e. functions that are non-monotonic in investment levels) is much higher (24 of 31, i.e. almost 80 percent) than in the FL treatment (21 of 44, i.e. less than 50 percent). This difference is significant (Fishers exact, two-tailed, $p = 0.025$). Furthermore, while we can identify different types of systematic behavior amongst the trustees with non-erratic return ratio functions in the FL treatment, we find none of these patterns in the SL treatment. In the FL treatment, we observe 5 trustees who return zero for all investment levels. We observe 16 trustees who submit strictly increasing return ratios. Amongst them, one trustee returned exactly the investment at every investment level. Finally, we observe 4 trustees who choose the equal split at every investment level. All in all, the behavior of the trustees in FL seems clearly less erratic.

To compare our results to BDMc, we consider the return on investment of the observed matchings.[12] Table 4 summarizes the results. Average return on investment is positive in the FL treatment and the SL treatment. This suggests that investments on average are worthwhile in both of our treatments. Note, however, that for non-zero investments the trustors in the FL treatment only earn a positive return on investment in 40 percent of the cases, while the trustors in the SL treatment earn a positive return on investment in about 56 percent of the cases. The results of the BDMc matchings are very similar to those in our FL treatment. About 37 percent of the positive

[11] We cannot compare the return ratio functions to BDMc, because the strategy elicitation method was not used in that experiment.

[12] Return on investment = (Return – Investment)/Investment.

investments in BDMc earn a positive return on investment. The average return on investment, however, is even lower in BDMc than in our FL treatment. Using the Wilcoxon test, we only find a significant positive return on investment in the SL treatment (Wilcoxon test, two-tailed, $p = 0.030$). In contrast, for the investments in the FL treatment and in BDMc returns on investment are not significantly different from zero.

	SL	FL	BDMc
Observations	25	37	30
Average return on investment	1.14	0.16	-0.11
Median return on investment	0.50	0.00	-0.32
Frequency of return on investment > 0	0.56	0.41	0.37
Frequency of return on investment = -1	0.24	0.22	0.20
Frequency of return on investment = 0	0.16	0.21	0.13
Frequency of equal splits	0.00	0.03	0.13

Table 4: Descriptive statistics of the return on investment

CONCLUSIONS

Using the trust game, we find evidence for significantly less investments by trustors, but significantly higher returns by the trustees in the virtual world Second Life when compared to the results of our First Life treatment and to the results of the seminal experiment by Berg, Dickhaut and McCabe (1995). We also find that responders' return schedules – while much more generous on average – are significantly more erratic in Second Life compared to First Life.

On first sight, our results may seem puzzling. Why would trustors in Second Life invest less, when trustees return much more than in First Life? One possible explanation is that the erratic behavior of the trustees increases the investment risk of the trustors and induces their reluctance to invest. Observing erratic behavior in virtual worlds is perhaps not very surprising, because many users of virtual worlds report that they enjoy being someone else and enjoy acting in ways

that they usually may not act. Knowing this – from experience or introspection – trustors in Second Life may be cautious to invest more.

Our results indicate that economic behavior in virtual worlds may be significantly different from real world behavior. This implies that both individuals and businesses should cautiously examine the situation, before assuming that their real world experience will be indicative of the behavior they encounter in virtual worlds. Although very little is known so far about the way that behavior in virtual worlds is different from behavior in the real world, our study suggests that one essential aspect may be the higher degree of behavioral inconsistency that stems from the pleasure of being capricious in virtual worlds.

REFERENCES

Ashraf, N., Bohnet, I., and Piankov, N. (2006). Decomposing trust and trustworthiness. *Experimental Economics*, 9, 193-208.

Atlas, S., and Putterman, L., (2009). Trust among the avatars: playing trust games in a virtual world, with and without textual and visual cues. Working paper.

Brown University.

Barr, A. (2003). Trust and expected trustworthiness: experimental evidence from zimbabwean villages. *Economic Journal*, 113(489), 614-630.

Bellemare, C. & Kröger, S. (2007). On representative social capital. *European Economic Review*, 51(1), 183-202.

Berg, J., Dickhaut, J., & McCabe, K. A. (1995). Trust, reciprocity, and social history. Games and Economic Behavior, 10, 290–307.

Buchan, N. R., Croson, R.T.A. & Solnick, S. (2008). Trust and gender: An examination of behavior and beliefs in the Investment Game. *Journal of Economic Behavior & Organization*, 68(3-4), 466-476.

Burks, S., Carpenter, J.P., & Verhoogen, E. (2003). Playing both roles in the trust game. *Journal of Economic Behavior & Organization*, 51, 195-216.

Burns, J. (2003). Insider-Outsider Distinctions in South Africa: The impact of race on the behavior of High School Students. *Mimeo*, University of Cape Town.

Castillo, M., & Carter, M. (2002). The Economic Impacts of Altruism, Trust and Reciprocity: An Experimental Approach to Social Capital, Wisconsin-Madison Agricultural and Applied Economics Staff Papers 448, Wisconsin-Madison Agricultural and Applied Economics Department.

Castillo, M., & Carter, M. (2003). Identifying social effects in economic field experiments. *Mimeo*, University of Wisconsin.

Castronova, E. (2001). Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier. *CESifo Working Paper Series* 618.

Cochard, F., Van, P.N. & Willinger, M. (2004). Trusting behavior in a repeated investment game. *Journal of Economic Behavior & Organization*, 55, 31-44.

Chaudhuri, A., & Gangadharan, L. (2007). An Experimental Analysis of Trust and

Trustworthiness. *Southern Economic Journal*, 73(4), 959-985.

Ensminger, J. (2000). Experimental economics in the bush: Why institutions matter. In: Menard, C. Ed., Institutions, contracts, and organizations: Perspectives from new institutional economics, Edward Elgar, London, 158-171.

Fiedler, Marina & Haruvy, Ernan (forthcoming). The lab versus the virtual lab and virtual field – An experimental investigation of trust games with communication. *Journal of Economic Behavior & Organization.*

Haile, D., Sadrieh, A., & Verbon, H. (2008). Cross-Racial Envy and Underinvestment in South Africa. *Cambridge Journal of Economics*, 32 (5), 703-724.

Holm, H.J., & Danielson (2005). Tropic trust versus nordic trust: Experimental Evidence from Tanzania and Sweden. *The Economic Journal*, 115, 505-532.

Johansson-Stenman O, Mahmud M, Martinsson P (2005). Does stake size matter in trust games? *Economic Letters*, 88 (3), 365-369.

Koford, K. (2001). "Trust and Reciprocity in Bulgaria: A Replication of Berg, Dickhaut

and McCabe (1995)," Working Paper

Kurzban, R., Rigdon, M. & Wilson, B. (2008). Incremental approaches to establishing trust. *Experimental Economics*, 11(4), 370-389.

Verschoor, A. & Mosley, P. (2004). The Development Of Trust And Social Capital In Rural Uganda: An Experimental Approach. Royal Economic Society Annual Conference 2004 106, Royal Economic Society.

Ortmann, A., Fitzgerald, J., & Boing, C. (2000). Trust, Reciprocity, and Social History: A Re-examination. *Experimental Economics*, 3, 81-100.

Schechter, L. (2007). Traditional trust measurement and the risk confound: An experiment in rural Paraguay. *Journal of Economic Behavior & Organization*, 62(2), 272-292.

Solnick, S.J. (2007). Cash and alternate methods of accounting in an experimental game. *Journal of Economic Behavior & Organization*, 62 (2), 316-321

Willinger, M., Keser, C., Lohmann, C. & Usunier, J. (2003). A comparison of trust and reciprocity between France and Germany: Experimental investigation based on the investment game. *Journal of Economic Psychology*. 24, 447-466.

INSTRUCTIONS (translated from German, condensed form)

Second Life

Instructions for both players

- Welcome to our experiment!
- The instructions are available throughout the entire experiment in the instant message archive.
- In this experiment you will be randomly assigned to another avatar.
- At the beginning each player receives 1,000 L$ as a disbursement.
- Consecutively, each of you decides how much money to transfer to the other avatar.
- The first decider is called player A and the second is player B.
- The assignment follows after the instructions.

- If you're a player A,
- You decide how much of your disbursement to transfer to player B.
- The transfer payment must be divisible by 100, so
- (0; 100; 200; 300; 400; 500; 600; 700; 800; 900; 1,000).
- Your transfer payment to B will be tripled.
- If you're player A and transfer 300 L$ to player B, Player B receives 3 x 300 = 900 L$.
- Note that the transfer fee may also be 0.
- If you transfer nothing to player B, nothing will be tripled, and each of you gets its disbursement of 1,000 L$
- After player B receives its transfer fee, B decides on how much to send back to player A
- Your payment for the experiment equals: 1,000 - transfer fee to B + Transfer fee from B.

- If you're player B,
- You will receive the tripled amount transferred from player A.
- This tripled amount will be added to your 1,000 L$.
- For example: if you're Player B and Player A has transferred 300 L$,
- Then you will receive a total of 1000 + 900 = 1900 L$.
- Afterwards, you have to decide if you want to send back
- money to player A
- The transfer payment to player A must not be divisible by 100
- Your transfer payment to player A will not be tripled.
- Note that the transfer fee may also be 0.
- Your payment for the experiment: 1,000 + 3 x transfer fee from A - Transfer fee to A.

- The instructions are available throughout the entire experiment in the instant message archive.
- It is important that you understand the instructions properly.

A pop-up window opens with the query

- Do you understand the instructions?

Clicking the No-button allows the resident to ask questions to Alea.

Clicking the YES-button starts the decision tasks.

Instructions for player A

- You are player A.

- Please write your transfer fee (0; 100; 200; 300; 400; 500;600; 700; 800; 900; 1000) to player B in the chat line.

A pop-up window opens with the query

- Is the amount X correct?

Clicking the No-button yields

- Enter again.

Clicking the YES-button yields

- What repayment of player B do you expect?
- Please enter your expected amount in the chat line.

A pop-up window opens with the query

- Is the amount X correct?

Clicking the No-button yields

- Enter again.

Clicking the YES-button yields

- Thank you for participating in this experiment.
- Your payoff will be transferred to your account balance at the beginning of November after the experimental series has ended.

Instructions for player B

- You are player B.
- The possible transfer fee you might receive from player will be displayed.
- You decide on your repayment on all 11 possible transfer fees.
- But at the moment of you decision you do not know the amount transferred.
- Your payment depends on what decision you make in each case,
- And the transfer fee from player A that is randomly assigned to you.
- This means you only get one payment.
- The experiment starts now.

- The transfer payment from Player A is 0 L$.
- Player A reserves 1000 L$.
- You get 0 L$.
- Your total amount equals 1000 L$.
- Enter your repayment to Player A (at most 1000)

A pop-up window opens with the query

- Is the amount X correct?

Clicking the No-button yields

- Enter again.

Clicking the YES-button yields

- The transfer payment from Player A is 100 L$.
- Player A reserves 900 L$.
- You get 300 L$.
- Your total amount equals 1300 L$.
- Enter your repayment to Player A (at most 1300)

A pop-up window opens with the query

- Is the amount X correct?

Clicking the No-button yields

- Enter again.

Clicking the YES-button yields

- The transfer payment from Player A is 200 L$.

…

Subsequently, player B has to decide on all possibilities. Afterwards,

- What transfer fee from player A do you expect?
- Please enter your expected amount in the chat line.

A pop-up window opens with the query

- Is the amount X correct?

Clicking the No-button yields

- Enter again.

Clicking the YES-button yields

- Thank you for participating in this experiment.
- Your payoff will be transferred to your account balance at the beginning of November after the experimental series has ended.

First Life

Instructions for both players

Welcome to our experiment!
In this experiment you will be randomly assigned to another avatar.
At the beginning each player receives 1,000 points as a disbursement.
Consecutively, each of you decides how many points to transfer to the other avatar.
The first decider is called player A and the second is player B.
The assignment follows after the instructions.

If you're a player A, you decide how much of your disbursement to transfer to player B.
The transfer payment must be divisible by 100, so (0; 100; 200; 300; 400; 500; 600; 700; 800; 900; 1,000).
Your transfer payment to B will be tripled.
For example: If you're player A and transfer 300 points to player B, Player B receives 3 x 300 = 900 points.
Note that the transfer fee may also be 0.
If you transfer nothing to player B, nothing will be tripled, and each of you gets its disbursement of 1,000 points
After player B receives its transfer fee, B decides on how much to send back to player A
Your payment for the experiment equals: 1,000 - transfer fee to B + Transfer fee from B.

If you're player B, you will receive the tripled amount transferred from player A.
This tripled amount will be added to your 1,000 points.
For example: if you're Player B and Player A has transferred 300 points, then you will receive a total of 1000 + 900 = 1900 points.
Afterwards, you have to decide if you want to send back points to player A
The transfer payment to player A must not be divisible by 100
Your transfer payment to player A will not be tripled.
Note that the transfer fee may also be 0.
Your payment for the experiment: 1,000 + 3 x transfer fee from A - Transfer fee to A.

The final number of points will be transferred by the exchange rate of 1,000 points to 4 Euros.

It is important that you understand the instructions properly.
(If you have questions please ask the MaXLab Staff.)

Instructions for player A

You are player A.
Please write your transfer fee (0; 100; 200; 300; 400; 500;600; 700; 800; 900; 1000) to player B in the following line.
What repayment of player B do you expect? Please enter your expected amount in the following line (0;1;2;…;999;1000).
Thank you for participating in this experiment.
You receive your payment at room G22A B302 at the Faculty of Economics and Management.

Instructions for player B

You are player B.
The possible transfer fee you might receive from player will be displayed.
You decide on your repayment on all 11 possible transfer fees.
But at the moment of you decision you do not know the amount transferred.
Your payment depends on what decision you make in each case, and the transfer fee from player A that is randomly assigned to you.
This means you only get one payment.
The experiment starts now.

The transfer payment from Player A is 0 points.
Player A reserves 1000 points.
You get 0 POINTS.
Your total amount equals 1000 points.
Enter your repayment to Player A (at most 1000)

The transfer payment from Player A is 100 points.
Player A reserves 900 points.
You get 300 points.
Your total amount equals 1300 points.
Enter your repayment to Player A (at most 1300)

The transfer payment from Player A is 200 points.

…

Subsequently, player B has to decide on all possibilities. Afterwards,

What transfer fee from player A do you expect? Please enter your expected amount in the following line.
Thank you for participating in this experiment.
You receive your payment at room G22A B302 at the Faculty of Economics and Management.