Trust in Second Life

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Abstract: Some issues are raised with regard to conducting economic decision-making experiments in virtual worlds. The issues are illustrated via a visit to an experimental laboratory on Second Life. Some suggestions for addressing these issues are proposed.

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1. Introduction

Traditionally, economic decision-making experiments have been conducted within the confines of the laboratory where researchers can exert a high degree of control over the environment in which the paid human subjects make decisions. This control enables researchers to more confidently evaluate whether any *single* change in a "treatment" variable has, *ceteris paribus*, an effect on subjects' choices, and if so, whether the change in the treatment variable affects behavior in the manner predicted by some theory. This methodology is the best that economists have for assessing whether a change in a single aspect of the environment is *causal* for a change in the behavior of economic agents.

While the controlled laboratory approach to experimentation is "internally valid" – it provides researchers with an ideal method for understanding causal relationships (see, e.g., Guala (2005)) – the *external* relevance of laboratory experiments to the "real world" has been greeted with much skepticism by the economics profession (see, e.g., Levitt and List (2007). In response, a number of experimentalists have begun venturing outside the laboratory, conducting field experiments with aim of increasing the "external validity" of the experimental methodology (see, e.g., Harrison and List (2004)). One field in which experimentalists have begun to play is the virtual world of Massively Multiplayer Online Role-Playing Games (MMORPGs), where large numbers of participants interact with one another in the guise of *avatars* in a 3-D, computer-generated environment. Among the

largest such games (in terms of the number of subscribers) over the past few years are: World of Warcraft (WoW), Runescape, Lineage I&II and Second Life.[1]

The idea of conducting controlled, economic decision-making experiments in virtual worlds is intriguing and has a number of advantages (see, e.g., Bainbridge (2007), Bloomfield (2007), Castranova (2006)). These games have millions of subscribers, many of whom are online at any given moment in time.[2] Further, the population of players in these games is surely more diverse in terms of socioeconomic characteristics than is the standard laboratory subject population (undergraduate students). However, further exploration of the possibility of doing experiments in virtual worlds reveals that there are a number of problems with conducting experiments in such environments. For instance, there is little control over who shows up to participate, their attentiveness/cognitive abilities/educational attainment, their incentives to participate, and indeed, the truthfulness of any demographic or other information they provide to the researchers conducting the experiment. The aim of this note is to point out a number of such problems that I have encountered while trying to conduct my own experimental research in virtual worlds (Armstrong and Duffy 2010). A second aim is to suggest a number of methodological fixes that, while imperfect, may nevertheless allow researchers to overcome some of these problems.

2. An Illustration

By way of illustrating the problems that experimentalists can face in conducting research in virtual worlds, let me recount my February 1, 2008 visit to the "Experimental Economics Lab" on Linden Lab's *Second Life* virtual world where I participated in an experiment conducted by Stephen Atlas of Tufts University-see Atlas (2008).

The first screenshot shot (below) shows my avatar "Po Potez" outside the Brown-Tufts experimental laboratory. There were several experimental laboratories in operation on Second Life at that time, so I picked one randomly. Perhaps not surprisingly, the first efforts to conduct experimental research in virtual worlds have largely replicated the laboratory experience, right down to a physical space for the laboratory and the use of online recruiting, etc. I was able to "teleport" to the lab after searching for its location. Upon arrival, I found a strictly self-service type of individual-decision-making experiment. The sign over the door promises $100-400 Linden dollars (the Second Life currency) for 15 minutes of my time. At the exchange rate between Linden and $US dollars at that time (approximately $265 Linden per $1 US), these were relatively *low* stakes compared with typical economic decision-making experiments. On the other hand, it may be that the "in-game" value of Linden dollars to Second Life participants is greater than or equal to U.S. dollar equivalents – it is not so clear, as price indices for virtual worlds do not exist.

[1] http://www.mmogchart.com/

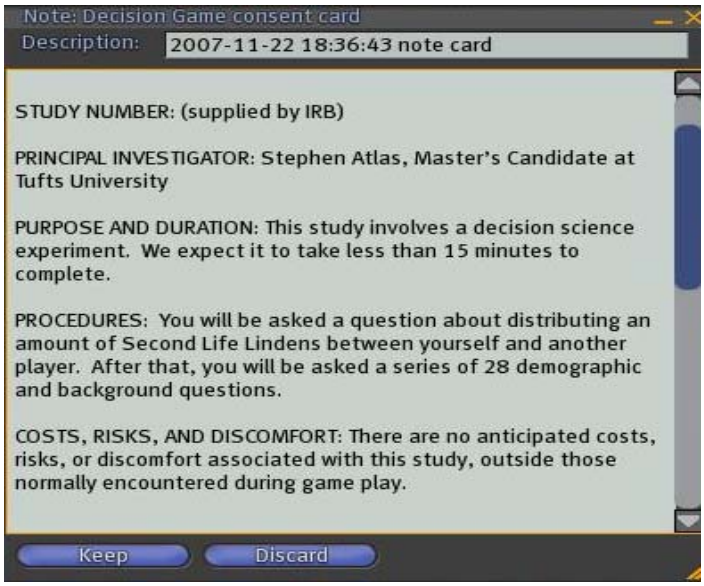
[2] As a macroeconomist, I find such environments exciting as they may more closely approximate competitive market assumptions, and the use of various forms of money in all MMORPs suggests intriguing experiments with regard to monetary policy that would be impossible (not to mention unethical) to do in the real world.

No one greets me at the door and there is no screening of any type. I just enter the lab and sit down in the chair as the sign over the door instructs.

After sitting down on a chair in a pleasant virtual environment, I am prompted by a pop up box to read a consent form

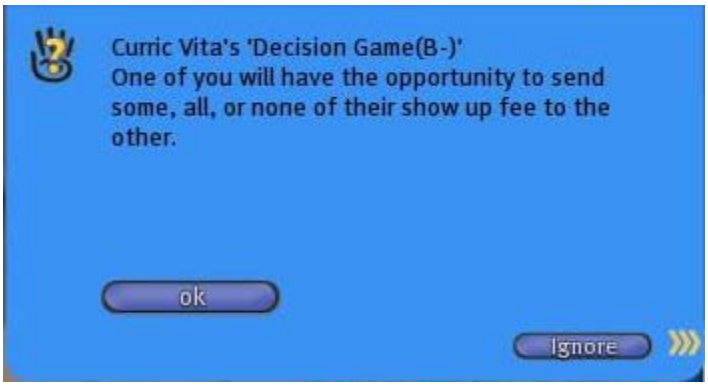
A portion of this consent form is shown below. After scrolling through it, at the bottom I give my consent to participate in the study. In the U.S., the conduct of experimental

research in virtual worlds falls in the “expedited category” and so continues to governed by the appropriate Institutional Review Board (IRB).

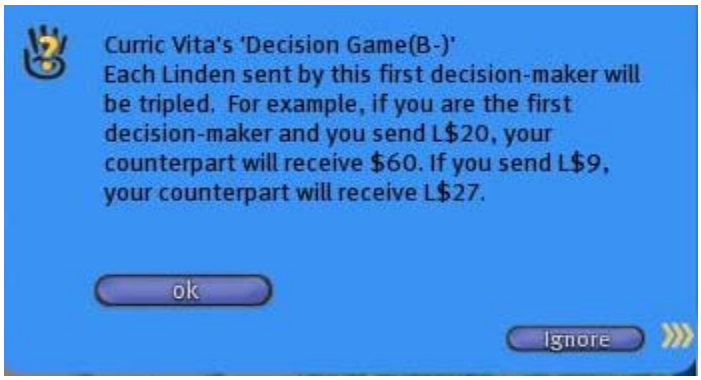


After giving consent I am immediately asked my real-life *age*. Thinking of my avatar as a younger version of myself, I *lie* and state that I am younger than I really am.

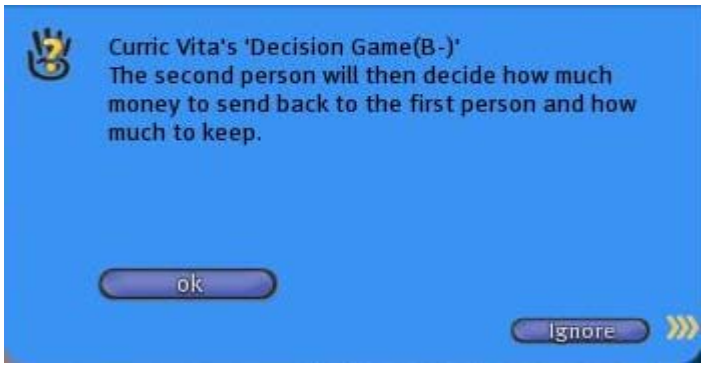
Next, the experimental instructions appear in a series of boxes in the upper right hand corner of the screen. I learn that I and another anonymous participant have been matched and that both of us have been endowed with a show-up fee of L$100 Linden dollars (US $0.38). There is another chair in the room but it is empty. I see no other participants in the room with me, or any other avatar besides myself. This does not inspire confidence in the notion that I am playing a game with another player. The instructions indicate that in the experiment, one of us will have to decide whether to give up some, all or none of our show-up fee (endowment) to the other participant:



The instructions continue,



and it becomes evident that I am playing Berg et al.'s (1995) trust game:



This well-known experimental game is shown in extensive form below in Figure 1.

Both players are endowed with L$100. The first mover, player A, chooses an amount $S \in [0, L\$100]$ to send to the second mover, player B. Amounts were restricted to be integers in the game I played. Any amount sent is then exogenously tripled by the experimenters. If $S>0$, Player B then decides how much of the tripled amount $3S$ to keep, K, for himself. Again choices for K are restricted to be integers. The game is then over. Payoffs to each player are shown at the bottom of the game tree.

In the one-shot version of this game – the game I was playing was one-shot- the unique subgame perfect equilibrium prediction is that the second mover, player B, will keep all $3S$ of the money for himself $K=3S$, and therefore, the first mover, player A, is better off not sending the second mover anything, $S=0$, keeping L$100 for himself.

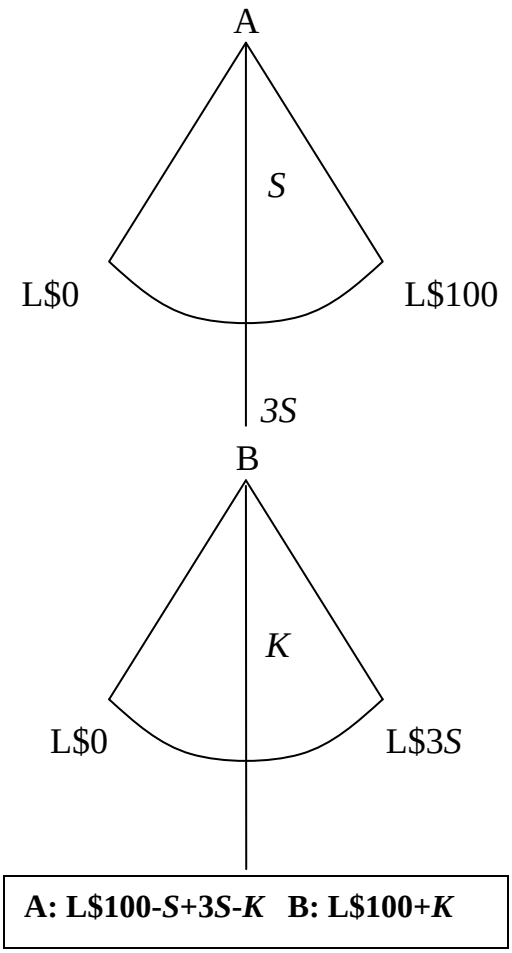
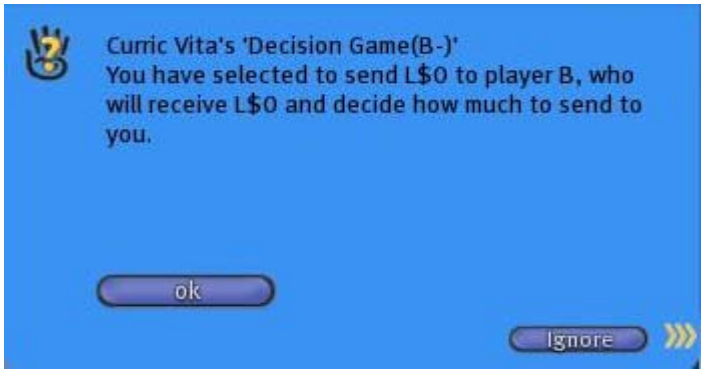


Figure 1: The Trust Game I Played on *SL*

In the experiment I participated in, I was designated as the first mover –Player A- and decided to play according to the subgame perfect equilibrium, that is, I chose to send L$0 to the second mover, Player B:



After clicking OK and earning L$100, I was prompted to answer 28 demographic and background questions about myself for no extra payment. Considering the real cash value of my final earnings, I decided this was not worth my time and I chose to quit the experiment. Hopefully, as a consequence, my data are not recorded by Mr. Atlas for publication purposes.

Nevertheless, by this stage in my illustration, a number of problems have arisen that are deserving of further discussion. For instance, I was able to lie about my age and participate in a decision-making experiment despite understanding the equilibrium prediction and presumably the hypothesis the researchers were testing. My misinformation and background were not properly vetted in any way. The low stakes offered for participating in the study caused me to drop out prematurely, which should raise concerns about possible selection biases.

I have visited only one virtual laboratory, but others, e.g., the one shown in Chesney et al. (2009) appear similar. In any such virtual laboratory, there will be issues of sample selection and of the truthfulness of demographic information; in virtual worlds, pretending-to-be-someone-other-than-you-are is something of a norm (hence "*second* life") and indeed, may be the primary motivation for participation. More generally, this same critique applies to any anonymous experiment conducted over the internet. For example, there is little control over whether the *same* individual is logged in on multiple machines, under different identities, perhaps playing a two-person game with himself. Of course, traditional laboratory experiments also face a number of control issues, for instance the experience level that subjects bring with them. However, it does seem easier to monitor, screen and retain subjects when they meet together in a physical laboratory under the observation of an experimenter, than in a virtual world environment.

3. Problems and Potential Solutions

3.*1 Recruitment, Screening and Retention of Virtual World Subjects*

Recruiting participants in virtual worlds "in-game" can be difficult, as participants are likely to be rather engaged in the game's "quests," "battles" or other activities that offer greater rewards and are, in fact, the reason that they are playing the game in the first place. Recruitment is made all the more difficult if, as in our illustration, the researcher must get the informed consent of subjects prior to their participation in the experiment, or if pre-experiment screening procedures are to be employed. In my experience, such formal pre-experiment processes should be minimized to the extent possible so as to avoid discouraging participation; as discussed below, some screening can be postponed until after the experiment has been completed.

Once recruitment occurs, getting subjects to read, comprehend, and understand the public/private nature of experimental instructions may also be more difficult than in the typical laboratory experiment, again due to competing interests. Implementation of public knowledge (the approximation of common knowledge) of the experimental instructions is difficult if participants cannot observe that the other participants, with

whom they will interact, are also being read or quizzed about the same set of instructions. Further, in anonymous virtual worlds, unlike the physical laboratory, subjects may unexpectedly disappear for a variety of reasons; boredom, some urgent (human) task, or a server crash/power outage.

One potential solution is to use message boards or fan sites/blogs to direct subjects to the experimental locale (Fiedler and Haruvy (2009)). Better yet, participants can be directed to the researcher's own external website where potential recruits can read a consent form and the experimental instructions in advance of participating and then schedule a time to participate in an experiment. Directing all subjects to a common external website may also work to implement public knowledge of the instructions. Subjects can be instructed to open the instructions in one browser window while participating in the experiment in another window. As usual in experimental economics, requiring that subjects complete a quiz may also be useful. An external, experimental website will also enable subjects to reschedule their participation in an experiment, e.g., in the event that they unexpectedly have to leave the game.

3.2 Collection and Validation of Demographic Information

Often it is of interest to collect demographic data on variables such as the age, race and gender and educational background of participants, either because these variables are of interest in their own right, or for screening purposes (e.g., one only wants to consider the decisions of adults –those aged 18 years or older). The collection of such data in virtual worlds is confounded by the inability to physically observe the sender of that data. Alternatively, as in our illustration, the participant may be confused as to whether the demographic information refers to him/her or to his/her avatar. In either event, lying cannot be prevented.

To minimize such problems, experimenters should compensate participants for the time it takes to complete demographic data using the same in-game currency offered as payment for the experiment itself. A good practice is to pay subjects for their participation in the experiment first, thereby establishing a certain amount of trust that the experimenter makes good on promises to pay. Then, subjects can be directed to the external experimenter website to complete a demographic survey with the promise of additional payment (as e.g., in Chesney et al. 2009). Survey questions should be kept to a minimum to maximize participation and to ensure a complete data record. As for validation of the data submitted, the use of an external experimenter website to collect demographic data again has certain advantages. Questions can be presented in a multiple choice format, e.g. radio button for gender, educational attainment, etc., so as to avoid useless answers. Some questions, such as country of residence, may be validated by the collection of data on the domain/country of a participants' server using third party, web site analytics software coincident with the time a participant is answering the survey questions (as in Armstrong and Duffy (2010). If the country of residence collected using the analytic software matches that given in the survey, there is reason to be more confident that other survey answers may be truthful. Mismatches might be grounds for eliminating the data record.

The demographic data can be used to screen participants ex-post, provided that the researcher has well-defined screening criteria and adheres to these. For instance, one might want to restrict players to be 18 years of age and older with some minimum level of educational attainment, e.g., a high school diploma.

3.3 Control of Communication/Collusion

The anonymity of virtual world interfaces means that control of collusion and communication between subjects must be addressed. In many MMORPGs, gamers are directed to choose a server ("shard") when they log on. Communication/movement of avatars across shards is not generally possible (e.g. in World of Warcraft) so one way to prevent communication is to conduct the experiment on two or more different shards. In Second Life, this is not possible, so stricter protocols limiting communication among participants must be adopted (as in Fiedler and Haruvy (2009)). Of course, one can always match participants up anonymously (as in the illustration), but this raises credibility problems, for instance, as to whether a player is really playing with one or more other players.

Another form of collusion that is difficult to avoid is repeat participation in a research study by the *same* individual using different avatars. This is difficult to address other than by using the screening methods suggested earlier. One screening/survey question might ask how many avatars an individual maintains in the game and restricting the data records based on the answer to that question.

3.4 Embedding the Experiment in the Game

Ideally, one would like to embed as many features of the virtual world in the experimental intervention as possible so that the experimental intervention makes maximal use of the virtual environment in which participants interact with one another. After all, why else should one experiment in a virtual world? One obvious feature to embed is the use of the in-game currency (or other game rewards) to pay experimental subjects. Transfer of in-game currency/goods can typically be done instantly via player-to-player transfers. As Chesney et al. note, the value of an in-game currency (e.g. Linden dollars in Second Life) may exceed the real-money equivalent value of the same amount of in-game currency, as it may be time-consuming to earn in-game currency. (Many games have active real-money markets that allow gamers to buy and sell in-game currency to others at a real-money (i.e. U.S. dollar), endogenously determined exchange rate).

Nicklisch and Salz (2008) go further and pay subjects in WoW the in-game currency--gold coins-- in exchange for subjects' avatars' performing an in-game task, namely fishing at a certain (virtual) lake for thirty minutes and returning to the experimenter's avatar their catch. Nicklisch and Salz also vary the amount of the gold offered and the rank level (status) of the experimenter's avatar. Armstrong and Duffy (2010) match virtual world players together to play one-shot, 2-player coordination games in WoW and

prior to play of these games, they reveal to each player in-game characteristics of the opposing player, i.e. their WoW race, class and level to see whether differences in these characteristics matter for equilibrium selection.

4. Conclusions

Virtual worlds are potentially rich environments for experimental interventions, as they have many players from a wide variety of backgrounds interacting with one another at any moment in time. This pool of subjects is more easily accessible to researchers than the typical pool of subjects "in the field." For these reasons, virtual world experimentation has become an increasingly attractive choice for experimental research. However, as I have argued and illustrated in this note, there are a number of potential pitfalls involved in conducting experimental research in virtual worlds that researchers should be aware of and seek to minimize to the extent possible. Addressing these issues will require that researchers modify the standard protocols used in laboratory studies to address both problems and benefits of virtual world environments.

References

Armstrong, C. and J. Duffy (2010), "Status and Coordination in World of Warcraft." (in preparation).

Atlas, S. (2008), "Inductive Metanomics: Economic Experiments in Virtual Worlds "Virtual Worlds Research: Past, Present & Future," *Journal of Virtual Worlds Research* 1, July.

Bainbridge, W.S. (2007), "The Scientific Research Potential of Virtual Worlds," *Science* 317, 472-476.

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

Bloomfield, R.J. (2007), "Worlds for Study: Invitation - Virtual Worlds for Studying Real-World Business (and Law, and Politics, and Sociology, and....)," working paper, Johnson Graduate School of Management, Cornell University.

Castranova, E. (2006), "On the Research Value of Large Games: Natural Experiments in Norrath and Camelot," *Games and Culture* 1, 163-186.

Chesney, T., S-H Chuah, R. Hoffmann (2009), "Virtual World Experimentation: An Exploratory Study," *Journal of Economic Behavior and Organization* 72, 618-635.

Fiedler, M. and E. Haruvy (2009), "The Lab versus the Virtual Lab and Virtual Field – An Experimental Investigation of Trust Games with Communication," *Journal of Economic Behavior and Organization.* 72, 716–724.

Guala, F. (2005), *The Methodology of Experimental Economics*, Cambridge: Cambridge University Press.

Harrison, G.W. and J.A. List (2004), "Field Experiments," *Journal of Economic Literature* 42, 1009–1055.

Levitt, S.D. and J.A. List (2007), "What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World?," *Journal of Economic Perspectives* 21, 153–174.

Nicklisch, A. and T. Salz (2008), "Reciprocity and Status in a Virtual Field Experiment," Working paper no. 2008-37, Max Planck Institute for Research on Collective Goods Bonn, Germany.