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MEASURING TRUST IN VIRTUAL WORLDS:
AVATAR-MEDIATED SELF-DISCLOSURE

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Psychology
in the College of Sciences
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Major Professor: Valerie Sims

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ABSTRACT

This study investigated the development of trust between strangers interacting via avatars in virtual worlds. The first part of the study analyzed perceived trustworthiness based on the visual appearance of avatars; the second part makes observations of two strangers self-disclosing information via avatars in a virtual world; the third part analyzed an experimental situation of two individuals interacting via avatars, where avatar appearance was changed and participants were recruited based on their experience with interacting with others via avatars.

Findings showed that perceived trustworthiness does vary based on the visual appearance of the avatar. A positive relationship was found for self-disclosure and experience, in that those who have previously chosen to participate in a virtual world were more likely to share more detailed information about themselves. Non-significant differences in self-disclosure were found for avatar appearance; however, experience in using virtual worlds was significantly different for the willingness to share information before engaging in a task: experienced participants shared more information than inexperienced participants. This suggests that self-disclosure might be influenced by appearance at the point of formation in that the experienced are willing to overlook the avatar, and less so when there are other sources of information to base trust-behavior on (Altman & Taylor, 1973; Nowak & Rauh, 2006).

Recommendations were made for modifications for similar experiments trying to validate an objective measure of trust, and for continued research in the development of trust between strangers interacting via avatars.

To my loving and supportive husband, Jim, and our family.

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CHAPTER ONE: INTRODUCTION

Social networking, teamwork, distance learning, and telecommuting have all been impacted by the Internet (Ellison, Steinfield, & Lampe, 2007; Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, & Scherlis, 1998). Interacting with others who are not colocated has been made easier and more convenient with the opportunities available to connect via the Internet and the help of many different types of social networking websites and programs (e.g., email, *Facebook*, *MySpace*, *AOL Instant Messenger*, *Microsoft Office Live Meeting*, *Second Life*). A recent trend with online interactions is the inclusion of avatars to represent the user in various online forums in order to make the interactions more personal (Bente, Rüggenberg, & Krämer, 2004; Bray & Konsynski, 2007; Nowak & Biocca, 2003; Nowak & Rauh, 2008; and others).

The current studies were conducted to examine the trust relationship between strangers that is developed while only interacting via the Internet, and more specifically via avatars in a virtual world. Chapter Two takes a closer look at the literature on virtual worlds and avatars. Chapter Three examines the development of trust, and Chapter Four explores the foundational trust studies for interpersonal relationships and connects those threads to the literature on trust among those interacting on the Internet. Chapter Five discusses the research rationale and the hypotheses made for the current set of studies given the literature, while Chapters Six, Seven and Eight lay out the three studies that were conducted to investigate avatar-mediated trust between strangers. Finally, Chapter Nine contains a final discussion of the results and how these findings can be applied to various online interactions.

CHAPTER TWO: VIRTUAL WORLDS AND AVATARS

A virtual world is an environment through which a virtual reality, a reality that is constructed and created through computers and programming codes, comes to life (Sherman & Craig, 2003). Online virtual worlds are cyber spaces in which users can be located in different places but still interact via avatars, or visual representations of the user in real time (Bailenson, Yee, Merget, & Schroeder, 2006). Avatars allow the users to meet just as they would if they were physically colocated: “face”-to-“face”. Bray and Konsynski (2007) further describe that virtual worlds that are available on the World Wide Web not only allow the user to have an avatar, but he or she can interact in real-time with others’ avatars, code-built buildings and businesses. In virtual worlds there are thousands of people to interact with, community rules to follow, money and economic systems in place, and even houses, stores, classrooms and other places to visit. The world that is created via intricate computer code is an ever-changing and bustling community of several thousand users, all connected via computers and the Internet.

The unique advantage of a virtual world over other online social networking websites is the use of the avatar. These digital representations of the user were first termed by Neal Stephenson in his popular 1992 novel, *Snow Crash* (Nowak, Hamilton, Hammond, & Krishnan, 2007), and the root of the word *avatar* comes from the Hindi word for “worldly incarnation of a deity” (Sherman & Craig, 2003, pg. 13). Avatars are a way to embody ourselves and connect with others whom we are not colocated (Bente, Rüggenberg, & Krämer, 2004), where we are able to manage our appearance and identity to fit our needs and desires (Jakala & Pekkola, 2007; Oravec, 1996). In that these are representations of the user, Nowak and Rauh (2008) suggest that people use avatars for source information much like they would use body language offline, and,

their data suggest that the source evaluation sequence is the same for online interactions as it is for offline interactions. These avatars are acting in the users' place during these virtual world interactions, just as their bodies and body language contribute to their everyday conversations with those around them. In addition, Slater, Pertaub, and Steed (1999) conducted an experiment using a virtual audience (avatars) for a person conducting a public speaking engagement and found that the reactions of the avatars (positive and negative) significantly impacted the reactions of the speaker. Seemingly this research supports the notion that avatars are seen as projections of the user within the virtual environment (Grosman, 2010).

Bray and Konsynski (2007), in an article showcasing opportunities for research within virtual worlds, point out that *Second Life* and *Entropia Universe* are the largest online game environments, but, even beyond these two massively multiplayer online virtual worlds, the use of avatars is becoming widely popular. There are massively multiplayer online role-playing games (MMORPG; e.g. *World of Warcraft*) where avatars are used, but they are assigned to ranks according to skill and ability to navigate in the world (Bray & Konsynski, 2007). In addition, Nintendo has started to incorporate low-fidelity avatars in its *Wii* games, where a user can create a "Mii" and then use it in some of the games that he or she plays (Walsh, 2009).

Beyond games, virtual worlds and avatars are being used in training and education as well. For example, in *Second Life*, Wells Fargo has islands where users can learn the value of saving and principles of good credit management (Bray & Konsynski, 2007). In addition, there are several universities including Trinity University in San Antonio, University of Texas at Austin, San Francisco State University, the Rochester Institute of Technology, and Vassar College holding real classes in *Second Life* classrooms (Terdiman, 2004). The military also is

exploring uses of online persistent environments to train Soldiers in military tactics and various maneuvers (“Army taps Forterra”, 2008). Homeland Security even owns an island in *Second Life* to monitor dealings in the online world that may give some information to our intelligence agencies of potential threats to our borders and security (Bray & Konynski, 2007). These virtual worlds and avatars are becoming a real avenue through which we can interact and get to know people that are not geographically close.

For many of the reasons that avatars are popular in social networking, avatars also have become valuable for companies’ online sales and business transactions so that these interactions can be made more personal (Qiu Benbasat, 2005; Riegelsberger, 2005). Riegelsberger (2005), in his review of the business and trust literature, pointed out that as e-commerce was on the rise, there was also a documented rise in distrust with online interactions, and thus avatars were used to try to garner that trust by making a point-and-click purchase more personal. Naturally, much of the research in online sales is focused on how to foster trust in those online sales and customer support by using animated images to assist customers in their transactions (Qiu Benbasat, 2005; Riegelsberger, 2005). The sales industry wants to capitalize on the “personal” feel that avatars may bring to online transactions.

Another area of research with respect to avatars is the concept of Anthropomorphism. Anthropomorphism is the giving of human qualities to non-human entities (Chin et al, 2005), and is directly related to virtual worlds and avatars because of the desire to give human qualities to a virtual object that will represent a human being. People’s perception of avatars and the users’ intentions that are behind the avatars’ actions can be viewed through the lens of anthropomorphism. The anthropomorphic level (or amount of human-likeness, as opposed to

animal- or object-likeness) of the avatars that is required to have people view an avatar as a credible representation of another person has been the focus of much research. In a study looking at how avatars are perceived by others, Nowak and Rauh (2008) paired 230 participants with one of eight avatars (rated as either high or low on anthropomorphism, androgyny, or credibility) to see how the avatar was perceived by the partner during an introduction to a task. They hypothesized that, similar to off-line interactions, visual clues are actively used to form opinions of individuals with whom we interact. The authors did confirm that theory: as the only visual clue available, the participants used the avatars with whom they were interacting for gathering source information (i.e., Who is this person? Are they credible? Are they male or female?). Interestingly, studies have examined the rate of gender tourism (or using an avatar of the opposite sex) and have reported varying rates from very rare to upwards of 60% of virtual world users in one study (low: Huh & Williams, 1999; varied: Grosman, 2010; high: Ducheneaut, Wen, Yee, & Wadley, 2009). Most agree that mostly males are engaging in the behavior (Ducheneaut, Wen, Yee, & Wadley, 2009; Grosman, 2010; Huh & Williams, 1999), and Ducheneaut, Wen, Yee, & Wadley (2009) suggest that it is more prevalent in *Second Life* than other virtual worlds. The creators of *Second Life* in a user's manual, Rymaszewski, et al. (2007) reported that most residents choose to use an avatar of the same sex, but that 14 % of the residents were male users using female avatars, and 4% women using male avatars. Beyond the research that does not agree on the prevalence of gender tourism, it is even more difficult to find research on the impact of gender tourism on the inter-personal relationship and trust. Grosman (2010) shares a list of reactions to gender tourism and found that them to be polarizing: its okay to explore and role-play as the other sex versus it is deceptive and wrong to do so. In addition, she reports that

the research suggests that people are increasing okay with gender tourism if the intentions are honorable and when interactions are shallow and not trying to be deceptive.

In addition, studies have shown that the highly anthropomorphic avatars are rated as more attractive and credible (Kang, 2006; Nowak & Rauh, 2006), just as perceptually human-controlled avatars (as opposed to computer) are preferred (Guadagno, Blascovich, Bailenson, & McCall, 2007). Guadagno et al. (2007), in a study about in-group and out-group differences in perceptions of avatars and agents, also found that while avatars of the same gender were rated as more credible to represent the user (in-group bias), female avatars of others were rated as more likable by both genders (similar findings were also reported by Nowak & Rauh, 2006). In addition, Nowak and Rauh (2008), in the partner study mentioned above, found that experience with online social networking (especially those who used instant messenger programs more often) were more likely to rate their partner as less anthropomorphic, but were more likely to see their partner as credible, regardless of their avatar. They suggest that it is because they are relying on other means to gather information to reduce the uncertainty about the other person, and are more comfortable doing so.

The Internet, virtual worlds, and avatars are being used in many different areas of social interactions, and are taking the place of some interactions that otherwise would have been face-to-face or via the telephone. The thought is that this substitution will lead to less valuable interactions and relationships unless we can capitalize on the human-interaction aspects and personal connection, or “touch” (Handy, 1995). Just as Nowak & Rauh (2006; 2008) found, visual clues offer valuable information about who we are interacting with and begin to set expectations for the interaction. Blodgett, Xu, and Trauth (2007), drawing from a literature

review of both structuration theory (that people are always operating within a set of social rules) and trust, very eloquently call for research in this area:

Identity misrepresentations constrained by the design of avatar characters may threaten trust and undermine the strength of social bonds developed in virtual worlds. Although the importance of trust in online environments has been addressed in prior studies that deal with identifiable parties, the nature and role of trust in anonymous parties (e.g., avatar to avatar) in virtual worlds remains unclear. (p. 98)

As there is an increase in the usage of avatars and virtual worlds to interact, network, and work in teams, there is a need to examine these avatar-mediated relationships that form over the Internet and how trust is developed among the various individuals. This could lead to possible improvements in avatar development, as well as novel ways to incorporate avatars and virtual worlds into ways that people can connect with others and work on projects together without being colocated.

CHAPTER THREE: DEVELOPMENT OF TRUST

According to some experts in developmental psychology, the development of trust begins very early in childhood, more specifically within first year (Gerow, 1997; Rosenthal, Gurney, & Moore, 1981). In Erikson's stages of development, trust is the very basic crisis and task all humans go encounter first—the Trust versus Mistrust conflict (Gerow, 1997; Rosenthal, Gurney, & Moore, 1981; Rotter, 1967).

Later in development, many psychologists agree that a transition occurs from self-centeredness to concern for others, observing those in our surroundings. In his Social Learning Theory, Bandura and others propose that people learn how to act in social situations over time by watching those around them, as well as through rewards and punishments when interacting with others (Franzoi, 2000). It is in the context of the Social Learning Theory that Rotter (1967, 1971) defined trust as a generalized expectancy that is learned over time through personal interactions with others and through observing those closest in proximity to learn their expectancies of others' behaviors. Through experience, observation, and rewards then, Rotter hypothesized that people learn to expect a way of interacting with others, which could account for mistrust of people they have never met but also how trusting in general people are to those around them. He defined interpersonal trust specifically as an expectancy of a person or group that the communications of another can be relied on. This was slightly different from the way trust was defined by others at Rotter's time, who were more focused on the goodness of others or how people would respond to games that seem to elicit more competitive reactions than would be expected within the construct of trust. Rotter's theory and research was a shift in the

paradigm of trust from a more behavioral viewpoint to one that was more psychological, as was true for most of the field of psychology.

In an extensive review of the empirical literature on the development of interpersonal trust, Lewicki, Tomlinson, and Gillespie (2006) confirm these two main approaches to trust in the research: behavioral and psychological (see Table 1). They reported that the behavioral approach was very popular in the very early research on trust and mainly focuses on outward, measurable signs of trust-like behavior, and this was the way of measuring trust that Rotter (1967, 1971, & 1980) was working to change. Most of the research conducted from the behavioral point of view consisted of asking participants to work through the Prisoner's Dilemma game with anonymous partners, and the moves that were non-competitive were rated as "trusting" and competitive moves were considered the opposite (Lewicki, Tomlinson, & Gillespie, 2006; Rotter, 1971; Rotter, 1980).

On the other hand, the psychological approach to trust has three sub-approaches to trust that all focus on the motivations and thoughts behind the behaviors that are exhibited (Lewicki, Tomlinson, & Gillespie, 2006). Those who support the more psychological perspective on trust realize that trust is more than just actions, but rather trust includes the invisible cognitive and affective aspects that drive those actions. The three sub-approaches the authors propose are the uni-dimensional, two-dimensional, and transformational approaches.

Table 1: List of Sub-Approaches to Trust and Related References

Approach	Sub-Approach	References
Behavioral	Early research using Prisoner's Dilemma: can only observe the out-put; the rest is a black box	
Psychological	Uni-dimensional: one continuum from distrust to trust	Rotter (1967)
	Two-dimensional: more than one continuum, based on the situation (trust in X, but distrust when Y)	
	Transformational: trust never comes to an end, but rather changes over time	
Sociological	Interpersonal: construct that spans the relationship, not just one person	Lewis & Weigert (1985)

Rotter (1967) and his colleagues started much of the research on trust as a psychological construct, rather than treating it as a behavioral response. Rotter (1967, 1971) performed studies to better understand the measurement of trust using various validation methods to arrive at the Interpersonal Trust Scale, all the while trying to operationally define the term. Rotter (1971) argued that all of the behavioral studies done before him dealt with experimental conditions and specific situations that could not capture the full understanding of trust or the individual differences that exist for this psychological concept. In response to these experiments and others that tried, but in his opinion, failed at measuring individual differences, Rotter (1967) developed

this scale to measure trust in others by way of a questionnaire that includes many different situations and instances to try to capture the multifaceted concept. To construct the scale he first created a list of questions around trusting others, some about overarching trust, as well as some filler question to disguise the intent of the survey (Rotter, 1967). He administered it to two groups of college students enrolled in courses at a large university (N=547, 248 male, 299 female). Then, Rotter looked at those responses in relation to responses on the Marlowe-Crowne Social Desirability Scale to be sure the items were relatively negatively correlated, as well as other inclusion/exclusion criteria (see Rotter, 1967). In the end, only three items were dropped from the original set based on the exclusion criteria, leaving a survey of 12 questions positively worded to be low in trusting, 13 questions negatively worded to be high in trusting, and 15 filler questions. The highly used scale was created to be additive, so that lower scores mean higher levels of interpersonal trust (Rotter, 1967; Rotter, 1971).

As seen in his additive scale, much of Rotter's work falls under the uni-dimensional notion of trust, that there is one continuum between distrust and trust, with a focus on the psychological aspect of trust. By having the tool to measure a person's expectation of trust in social situations, research can be conducted to then see what factors likely influence that expectation and place along the trust-distrust continuum, rather than just interpreting behavioral responses. In contrast to this uni-dimensional view of trust, the two-dimensional and transformational aspects account for more intricate and evolving aspects of trust and interpersonal relationships. The two-dimensional view is that someone can trust and distrust at the same time: maybe in one case the person can trust another, but for another task they are

distrusting. In the same way, the transformational view is that the development of trust does not end but rather changes with the relationship over time.

Lewis and Weigert (1985), in a review of the literature on trust from a sociological perspective, claimed that Interpersonal Trust is mainly a sociological concept because without the interpersonal relationship, trust is not needed. The argument is that once someone involves the second person it is now about the relationship and not the individual differences in the two players. Lewis and Weigert (1985) define trust as reducing uncertainty about the other, so that it is used to predict or act, without having to analyze all of the options that exist: the other will help, they will only partially help, they will not help, and so on. Distrust, likewise, helps someone act, as well, but in the reverse way of trust: do not act, do not count on the other, do not believe the other will help, and so on. Similar to other perspectives on trust, the authors claim there are three parts to trust: cognitive, emotional, and behavioral. The cognitive aspect of trust is discriminating the other person from others and taking the “leap” to trust when enough information has been gathered about them. Some may decide to trust because others are trusting in them, which is more of a sociological concept. With the change from a “face-to-face society” (p. 972) to a society with more interactions with complete strangers, people are forced to base many decisions on system trust (government will intervene, big corporation with warranty to back up purchase, etc.). Emotional trust is just the feeling that the other can be trusted, and behavioral trust is to act as though it is certain, which helps to shape both cognitive and emotional aspects of the trust relationship and how to act in future. Lewis and Weigert (1985) also argue that psychologists are only able understand parts of trust and that psychologists boil it down to a mental state for that person in a particular situation. They claim that emotion cannot

be taken out of trust decisions, and emotional trust depends on many things: prior experiences, feelings about current situation, feelings about current side situations, and so on. All of these aspects of trust rely on the other in the relationship and on global trust, making it not only a psychological concept that Rotter (1967, 1971, 1980) proposed but a sociological phenomenon as well.

In an effort to consolidate the definitions of trust from various disciplines to formulate one multidisciplinary concept of trust, Rousseau, Sitkin, Burt, and Camerer (1998) wrote an introduction for a special issue on trust published by the Academy of Management Review. In their introductory article, they claim it is hard to compile all the research, but in general it seems that the various disciplines are studying the same major construct of trust, but show differences due to operational definitions and the likelihood that the researchers are studying different stages of trust or points in the trust relationship. As the body of literature is expanding to an interdisciplinary view of trust, it has been the topic of conferences and special publications, as even the referenced article was a precursor to a cross-discipline symposium to discuss trust definitions, research, and theories. This suggests there are opportunities for more research: the many “faces” to the construct of trust. As such, trust must be clearly and operationally defined, and the breadth of literature must be taken into account to determine how research might fit in the broader multi-discipline construct of trust, the continuum(a) of trust and distrust, and the three aspects of trust (emotional, behavioral, and cognitive).

CHAPTER FOUR: INTERPERSONAL TRUST, SELF-DISCLOSURE, AND ONLINE INTERACTIONS

With the invention of the Internet, e-commerce, and online social networking in the mid-to late-90s, it is no surprise that much research on trust has focused on online interactions, including the impact of the, then, new technology on interpersonal relationships (Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, & Scherlis, 1998). The majority of the research on trust and online interactions has focused on how to personalize e-commerce interactions. Researchers have confirmed a desire for a more personal touch that would better mirror off-line interactions when examining trust in e-commerce situations (Bente, Rüggenberg, & Krämer, 2004; Bente, Rüggenberg, Krämer, & Eschenburg, 2008; Qiu & Benbasat, 2005; Riegelsberger, 2005; Riegelsberger, Sasse, & McCarthy, 2005).

Researchers have compared online e-commerce and business interactions using various technologies, including avatars and other audio-visual media, to see if it had a “humanizing” touch to the various types of transactions. They have found that the rich media interactions (e.g., avatars, audio-visual/teleconferencing, audio, etc.) promoted significantly higher trust ratings than text-only conditions, but they were not significantly different from one another (Bente, Rüggenberg, & Krämer, 2004; Bente, Rüggenberg, Krämer, & Eschenburg, 2008; Qiu & Benbasat, 2005; Riegelsberger, 2005; Riegelsberger, Sasse, & McCarthy, 2005).

It is still not clear, however, how trust is developed over the Internet when interacting only via avatars. Riegelsberger (2005), in his extensive literature review of the trust and business literature, points out that much of the research that has been done on the topic of online trust falls short due to its subjectivity (based on self-reports), lack of conceptual basis, and its focus on only one type of trust, cognitive trust, and ignoring affective trust. This issue is not a

recent one as Rotter (1971) pointed out the same pitfall in the behavioral studies of his day. In 2005, along with some of his colleagues, Riegelsberger looked at financial risk as an indicator of trust in a virtual advisor, an attempt at measuring trusting activity to indicate interpersonal trust. One hundred and sixty participants, after consulting with an advisor, were asked to respond to difficult questions, similar to *Who Wants to be a Millionaire*. The difference between groups was how the advisor interacted with the participant: video chat, text-only chat, text chat with a picture, and audio-only conversation. They found that regardless of the outward appearance, those in the avatar condition rarely sought advice as compared to the video and audio conditions; however, the interaction was rated just as enjoyable and friendly as other high tech (rich media) conditions over the text-only condition. In other words, the avatars did not do well in garnering extra trust, and were preferred only more than the text-only condition, as was found for all of the rich media conditions. In addition, the participants felt it was easier to trust in the advice given in the video and audio conditions, where there tends to be the bias to feel more connected, or a greater sense of presence.

Interestingly, this connection between trust and presence has been examined, and supportive evidence has been found for the use of avatars to increase the sense of presence. Bente and his colleagues (2008) conducted a between-subjects study with 75 pairs of strangers and asked them to communicate by either text chat, video chat, audio-only chat, low fidelity avatar, or high fidelity avatar. They found that participants rated their interactions with partners significantly higher on interpersonal trust when they were in the avatar condition than those in the text-only condition. In addition, participants in the avatar conditions had strong correlations between trust and closeness, and with trust and attention, when compared to the text-only

condition. However, just as Riegelsberger, Sasse, and McCarthy (2005) found, there were no significant differences between the avatar condition and video condition (interactions similar to Skype or FaceTime); however, a “positive” finding could be present here: participants are not revealing a decrement in the avatar mode from the video mode, showing some support for the avatar providing a quasi face-to-face interaction.

Lewis and Weigert (1985), in their article comparing sociological trust to that of psychological trust, describe cognitive trust as the logical reasons why one should trust another, and affective trust as the emotional response to trust (e.g. “it just feels right”). In order to focus more on the emotional trust in online interactions, Feng, Lazar, and Preece (2004) conducted a study with 12 participants using instant messaging to communicate with a partner. Experimental protocol had conditions for the combination of the partner’s responses to be accurate and inaccurate, and supportive and non-supportive. They found that the empathetic accuracy of their response was highly related to ratings of interpersonal trust in their partner, but that did not necessarily map to Rotter’s (1967) Interpersonal Trust Scale scores. They concluded that it is likely the environment and scenarios that dictate the person’s level of trust more so than their overall tendency to trust. It seems that there are other variables to take into account.

Besides avatars and virtual worlds, there are many social networking websites on the Internet, including the vastly popular *Facebook.com* and *MySpace.com*, as well as weblogging (commonly referred to as blogging) websites such as *LiveJournal.com*. Rather than focusing on connecting one-on-one in real time with another via an avatar, these sites rely on blogs (online journals), comments, emails, pictures and status updates to keep members connected. These sites do not capitalize on real-time communication, except for instant messaging tools (or text-

only tools) that are now being incorporated into their sites as an additional feature. With online virtual worlds, users can connect and interact in real-time, and, with the use of avatars, users are able to meet in a simulated face-to-face interaction. However, the two do have one thing in common: self-disclosure. Both are used as a way to share information with others.

As self-disclosure is prevalent in online interactions, the literature suggests that self-disclosure, or sharing of personal information, is related to interpersonal trust. More specifically, it has been hypothesized and found that self-disclosure implies a sense of trust *because* one is willing to share information (Rotter, 1971; Yum & Hara, 2006). While Rotter (1971) did not define trust in terms of self-disclosure, it is easy to see how the two are related. His definition of interpersonal trust was formed out of the social learning theory, where people learn trusting behavior from observing and interacting with those around them. Interpersonal trust was defined by Rotter to mean the expectation that the communication from another person is true, thereby examining the receiving-end of self-disclosure: do I trust in what people are telling me or doing for me? Moreover, according to Rotter (1971), a student of his conducted an unpublished study using the ITS and found that self-disclosure of both personal and uncomplimentary information was significantly and positively related to the participant's trust score, such that those high on interpersonal trust were more likely to self-disclose and those low on trust were less likely to do so.

From a self-disclosure perspective, there has been extensive research conducted on both face-to-face interactions and those that take place via a technological mediator (e.g. phone, internet) examining the patterns of revealing personal information. Barak and Gluck-Ofri (2007) conducted a study to analyze 240 first-conversations in a thread from an online forum for self-

disclosure and reciprocity, judged by a panel of experts. They found that self-disclosure is not only popular with online interactions, but it also is more accelerated. In addition, they found that reciprocity does play a significant role, especially for females, suggesting that as more information is shared to someone they are more likely to share personal information back. While, Barack and Gluck-Ofri do not suggest why there is a gender difference in reciprocity, there is literature to support this idea. A meta-analysis of data showed similar findings, female sharing slightly more than males; however, the interesting finding was moderator variables such as sex of the target (males more likely to self-disclose to males than females) and relationship to the target that would change the level of self-disclosure for the male participants (Dindia & Allen, 1992). In the case of interactions with strangers, Dindia and Allen (1992) found that males reported the same level of self-disclosure as females; however, observational studies were examined as part of the meta-analysis and revealed that males did not disclose as much as the females did. This is similar to the Interpersonal Trust literature that found mediator variables that changes how likely someone is to trust another given the situation (Feng, Lazar, & Preece, 2004; e.g., empathy, accuracy of information, etc.).

Altman and Taylor (1973), in their book entitled *Social Penetration Theory*, proposed that, in new relationships, people (strangers) are most likely to talk about sports, weather and other superficial topics. Then, if these interactions are rewarding, conversation continues to a wider range of topics, including personal, more intimate, information: that disclosure was mediated by time and the level of comfort in the interaction. This was labeled the Social Penetration Theory. On the other hand, Barak and Gluck-Ofri (2007) would argue that perhaps people are faster to reach the more personal, intimate information when there is the anonymity

that online communities afford: disclosure is mediated by anonymity. In terms of blogs, a user's decision to self-disclose personal information and their feelings on a range of situations and topics is related to anonymity, in that those who choose to be anonymous are willing to share more about their situations and lives (Barak & Gluck-Ofri, 2007; Qian & Scott, 2007) and some support for even during one-on-one interactions over the internet (Tidwell & Walther, 2002). Valkenburg and Peter (2009) examined the Computer-Mediated Communication literature and hypothesized that as many have documented, including those above, that self-disclosure is increased in online interactions, which can lead to more quality relationships, which has been shown to improve overall well-being because of a greater sense of connectivity (see Figure 1). Valkenburg and Peter (2009) refer to this as the Internet Enhanced Self-Disclosure Hypothesis, and, while this supports the notion that communication via the Internet is not always harmful or degrading of social interactions, they do call for more research into the type of technology, gender, and social anxiety and how they impact the model.

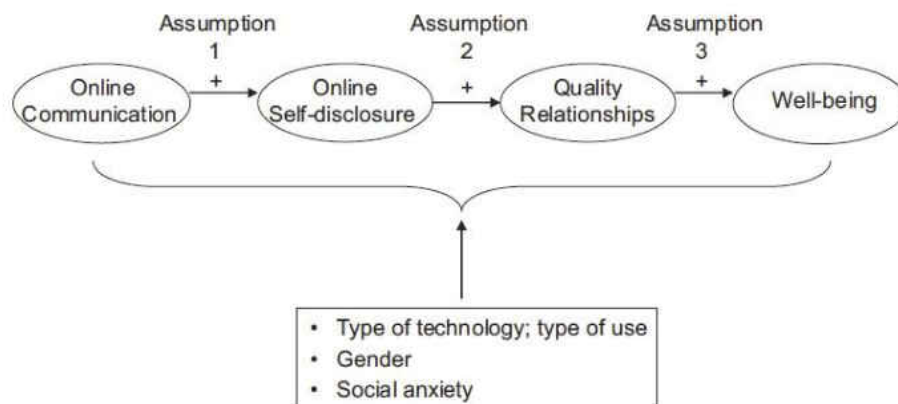


Figure 1: Valkenburg & Peter's (2009; p.2) figure of their Internet Enhanced Self-Disclosure Hypothesis

Cho (2007), after observing the online chatting conversations of 260 high school students, argued that self-disclosure of adolescents of information in computer-mediated communication happens the same way for adolescents as they would choose to self-disclose in face-to-face situations. He describes self-disclosure as “a strategic individual behavior” (p. 339), and found that it is in the motivations behind the self-disclosure in online forums that will dictate the course of self-disclosure. Barak and Gluck-Ofri (2007) found that for online forums, people are more likely to reciprocate self-disclosure with self-disclosure, which supports other research that found that for medium and low levels of intimate details, reciprocity does happen (Cozby, 1972; Miller, Berg, & Archer, 1983).

In these studies, it is plausible that self-disclosure is related to a level of trust in the other and in their actions, as well as dependent on many other variables. This anecdotally validates the findings of the unpublished student work that Rotter (1971) discusses: the Interpersonal Trust Scale was significantly related to self-disclosure. Yum and Hara (2006), in a cross-cultural survey of people who were involved in an online relationship, also found a positive correlation between self-disclosure and subjective levels of trust for the Americans. As trust research still struggles to find objective measures, and support for the connection between self-disclosure and trust grows, attempting to better link between the two constructs can be useful to provide a measure for acts of trust in various interactions, and especially in online interactions between strangers.

CHAPTER FIVE: RESEARCH RATIONALE AND HYPOTHESES

The goal of the current study is to examine the avatar-mediated relationship and the building of trust in social networking, more specifically the openness of the participants to self-disclose personal information with a stranger as an objective measure of their willingness to trust. With the use of avatars and virtual worlds, and the endless opportunities to use them for meeting, training, and interacting, this topic should be explored. As Blodgett, Xu, and Trauth (2007) suggests there is little research to speak to how the look and feel of an avatar affects the interpersonal trust that can form between two people interacting via avatars. In addition, as Rieglesberger (2005) pointed out, much of the trust and online interaction studies have lacked objective measures of trust, and that future research must include an aspect of affective trust and not just cognitive trust.

With the gamer generation now entering the work force, it is plausible that the use of avatars, as a means of interacting with others, will perhaps be more familiar and preferable over video conferencing and other methods currently used in and across businesses today. Handy (1995) wrote an article for the *Harvard Business Review* discussing the impacts of technology-mediated co-worker relationships and how a large concern for these employers is how to build trust among those work on those teams. Among others, he had a section titled “Trust takes Touch” (p. 45), and speculated that the more teams relied on technology to complete various tasks, the more face-to-face time they would need for “process” meetings and trust-building. Seemingly, he would argue that interactions via technology are not conducive to *building* trust, but could be helpful in *maintaining* trusting relationships: the “water cooler” discussions and interactions are still needed.

Keeping these three opportunities for research in mind, the current research was conducted to try to uncover trust building between strangers who interact via avatars in virtual worlds. The research was broken into two pilot studies to help inform an experiment for study three, which looked at self-disclosure behavior of the participant based on the look of his or her partner's avatar and his or her previous experience participating in a virtual world. The first pilot study was a survey of university students to analyze perceived trustworthiness based on the visual appearance of avatars, which was conducted so the most and least trustworthy avatars could be identified for use in the final experiment. The second pilot study was observational in nature to better understand how two strangers self-disclose information via avatars in a virtual world, which helped to practice experimentally controlling a conversation and sufficiently coding the data so analyses could be conducted. Finally, the third study was an experiment, where avatar appearance was changed and participants were recruited based on their experience with interacting with others via avatars to see how these variables might affect the participant's level of self-disclosure when interacting with a stranger via avatars within *Second Life*, a commonly used virtual world.

The following are the research questions and hypotheses of the current set of studies.

Research Question 1

Can self-disclosure of personal information proxy as an objective measure of trust, in that it correlates with the Interpersonal Trust Scale (ITS; Rotter, 1967)?

The level of self-disclosure was measured by the total number of items the participants share in response to three questions: "Where are you from?", "What do you do?", and "What do you look like in real life?", as well as subjective ratings of self-disclosure. It is expected that the amount

and level of self-disclosure will increase as a person's score on the ITS decreases (where low scores indicate trust), similar to the unpublished findings of Gilbert, Rotter's (1971) student.

Hypothesis 1: More specifically, the number of items and level of details a participant self-discloses will both be negatively correlated with his/her score on the ITS (low scores means more trusting), and positively correlated with TiP and SDI scales. In addition, the SDI scales will be negatively correlated with the ITS and positively correlated with TiP. [Studies 1 and 3]

Research Question 2

Can we manipulate the level of trust an avatar affords by changing the level of anthropomorphism of the avatar's appearance?

The perceived trustworthiness of avatars was measured by a survey of ratings and rankings, through which participants were asked to rate each avatar on trustworthiness based on a static image, as well as rank them from least to most trustworthy. It is expected that a high-anthropomorphic avatar will afford more perceived trust from the participant than a low-anthropomorphic avatar (i.e., a horse or dragon). In addition, it is expected that a female avatar will be rated and ranked as the most trustworthy. These predictions are based on the anthropomorphism research that the more anthropomorphic the avatar, the more credible the person believes the avatar is (Kang, 2006; Nowak & Rauh, 2006), and that both males and females find female avatars to be more credible (Nowak & Rauh, 2006).

Hypothesis 2: More specifically, a high-anthropomorphic (human-like) avatar will be ranked and rated as significantly more trustworthy than a low-anthropomorphic avatar (i.e. a low-anthropomorphic avatar), and that a female avatar will be ranked and rated as significantly more trustworthy than a male avatar. [Study 1]

Research Question 3

Can we manipulate the level of trust a person can garner from a stranger by changing the level of anthropomorphism of their avatar?

Subjective ratings by the participants of a stranger's trustworthiness, using a Likert scale of 1, *very untrustworthy*, to 5, *very trustworthy*, was obtained on a post-task survey where the only interactions between the two were online via avatars. It is expected that participants interacting with a human avatar will be rate their partner as more trustworthy than a non-human avatar.

Hypothesis 3: More specifically, those participants interacting with the high-anthropomorphic (human-like) avatar will rate their partner as significantly more trustworthy than those interacting with the low-anthropomorphic avatar. [Study 3]

Research Question 4

How does the appearance of a stranger's avatar change the source information that one can use to assess their trustworthiness, as exhibited by their willingness to self-disclose information?

The level of self-disclosure was measured by the total number of items shared and level of detail the participants share in response to the three questions: "Where are you from?", "What do you do?", and "What do you look like in real life?". The total number of items shared and level of details were both compared by look of the partner's avatar. It is expected, based on research by Nowak and Rauh (2008), that more items and details will be self-disclosed by those participants interacting with the high-anthropomorphic partner than those who will be interacting with the low-anthropomorphic partner.

Hypothesis 4: More specifically, those in the high-anthropomorphic (human-like) avatar condition will self-disclose significantly more total items and greater level of details to the three

questions with less promptings than those in the low-anthropomorphic avatar condition. [Studies 2 and 3]

Research Question 5

Does the pattern of self-disclosure between two strangers, when the only interaction is via avatars, mirror the “off-line” process of guarding information (takes on a face-to-“face” feel) in that the participants will be guarded in their responses? Or does it more closely mirror the online mediated self-disclosure where people are more likely share more information more quickly (anonymous feel)?

The level of self-disclosure was measured by the number of items the participants share in response to three questions: “Where are you from?”, “What do you do?”, and “What do you look like in real life?”. In addition, the conversations was rated by independent coders on the level of willingness to share information both pre-task and post-task. It is expected that, as theorized by the Social Penetration Theory (Altman & Taylor, 1973), more people will be willing to share basic location information than are willing to share about their personal appearance. In addition, it is expected that, for those who shared both pre- and post-task, the openness of the participant to share information during the conversation will be significantly higher post-task than pre-task, indicating a need to warm up to the conversation as found by Altman and Taylor (1973).

Hypothesis 5: More specifically, significantly more participants will self-disclose information for the first question than the last question, and that, of those who shared both pre- and post-task, they will be rated as significantly more open to sharing post-task than pre-task.

[Study 3]

Research Question 6

How do both the ITS scores and the self-disclosure data correlate with additional measures of trust and personality measures?

The data was measured by adding the following scales to the surveys deployed, and as such were all subjective measures of trust or personality: Trust in People Scale (TiP; Survey Research Center, 1969), Self-Disclosure Index (SDI; Miller, Berg, & Archer, 1983), Openness Scale (International Personality Item Pool, ND), and Anthropomorphic Tendencies Scale (ATS; Chin, et al., 2005). It is expected that there will be relationships among the scales used, as well as with trust ratings of the partner's avatar.

Hypothesis 6: More specifically, the two subjective trust measures (ITS and TiP) and other subjective personality measures (ATS, Openness) will be significantly correlated with each other. In addition, the trust measures, as well as the SDI scales, will significantly correlate with trust ratings of the avatars and the number of items self-disclosed in response to the three questions. [Studies 1 and 3]

CHAPTER SIX: STUDY ONE

Rationale

The purpose of this study was to conduct preliminary research via a survey on perceived trustworthiness based on the appearance of avatars, as well as subjective measures of trust and personality. More specifically, the rationale behind the survey was to identify two avatars to use in the final experiment to attempt to affect the self-disclosure of another person: one that is perceived as trustworthy and one that is perceived as not trustworthy. Literature in the area of trust and avatars suggests that the anthropomorphism of avatars does influence judgments of the person behind the avatar (Kang, 2006; Nowak & Rauh, 2006; Nowak & Rauh, 2008). As exploratory research, other measures of trust, self-disclosure, and personality were included to identify potential influences on the participants' judgments of trustworthiness of the avatars.

Method

Participants

Four hundred and ten participants volunteered to complete an online survey, but one participant chose not to complete the entire survey and therefore all his or her responses were deleted. The 409 participants that were retained were all psychology students from the University of Central Florida and received extra credit points for their participation. There were 310 (76%) female respondents and 99 (24%) male. Participants ranged in age from 18 to 52, with an average age of 20 years old ($SD = 3.4$). They reported using a computer for an average of 10.77 years ($SD = 3.67$; $mdn = 10$) and the Internet for an average of 9.21 years ($SD = 2.70$; $mdn = 10$). When asked how comfortable they were using both a computer and the Internet on a 5-point Likert scale (1, *not at all comfortable*, to 5, *very comfortable*), the participant group as a

whole rated themselves as being very comfortable using both (computer: $M = 4.68$, $SD = 0.59$, average use of computer: $M = 4.65$ hours per day, $SD = 2.90$; and Internet: $M = 4.73$, $SD = 0.57$, average use of the Internet: $M = 3.36$ hours per day, $SD = 2.83$). The participants also reported the number of hours spent connecting with friends over the Internet via various social networking sites and tools (e.g., Facebook, MySpace, chat and instant messaging windows), as well as the number of hours spent seeking out strangers on the Internet. While most of the participants used the Internet to connect with friends ($n = 348$, 85%, average time = 2.16 hours a day, $SD = 2.45$, $mdn = 1.5$ hours), only a few did so to interact with those they did not know ($n = 43$, 10.5%, average time = .24 hours a day, $SD = 1.15$, $mdn = 0$ hours).

Materials

Experiment management system. The online program that the University of Central Florida utilizes for their experiment management system was used to recruit and survey the participants. The program, Sona, allowed the researcher to organize, recruit, and survey the Psychology students, as well as award and keep track of extra credit points earned by the participants.

Second Life avatar screen shots. The only manipulation used for this survey was the presentation of various avatars to which the participants were asked to (1) respond to questions on several dimensions (e.g., trustworthiness, attractiveness, approachability, likelihood of talking to the avatar, etc.) and (2) to rank the avatars from 1, *most trustworthy*, to 8, *least trustworthy*. The eight avatars used are pictured below in Figure 2. All of the avatars were created by eight different accounts in *Second Life* (2004), and clothed using clothes, costumes (horse and dragon),

and props (masks) that were either “free” items given at orientation, bought from a store, or given by another *Second Life* user.



Figure 2: The eight avatar screen shots used for the online survey's ratings and ranking questions

Interpersonal Trust Scale. The purpose of this scale is to assess a person's self-reported willingness to trust. Developed by Rotter in 1967, the Interpersonal Trust Scale is presented as a general opinion survey consisting of 40 questions using a 5-point Likert scale (1, *strongly agree*, to 5, *strongly disagree*). Fifteen of the questions are filler questions and are not scored (e.g., “The advice of elders is often poor because the older person doesn't recognize how times have changed”), leaving 25 valid questions in the scale. Of these 25, 12 are positively written (e.g., “Parents usually can be relied upon to keep their promises.”) and so are reverse scored, while the remaining 13 are negatively written (e.g., “Hypocrisy is on the increase in our society.”) and therefore are scored as responded. The range of possible scores is from 25 (most trusting of others) to 125 (least trusting of others). See Appendix A for a complete list of survey items.

Being one of the most widely used trust scales, Rotter (1967), with a sample of 547 college students (roughly half men and half women), found the split-half reliability of the ITS to be 0.76 ($p < .001$). He also found the test-retest reliability to be 0.56 ($p < .01$, $n = 24$) with a time of 7 months between the administrations of the test, and 0.68 ($p < .05$; $n = 68$) for 3 months between test administrations. This suggests that the trust being measured is relatively stable over time. He also correlated a random sample of scores with SAT scores to show that ability has no effect on the trust scores. To establish validity of the scale, Rotter (1967) performed a research study with groups of sorority sisters and fraternity brothers, where each group identified the three most trusting individuals in their group and the three least trusting individuals from their group, then the results were then compared to the trust scale scores from that person. The correlation was found to be 0.37 ($p < .05$), which was significantly higher than the control variables that were used. See Rotter (1967; 1971) for more details on these experiments.

Trust in People Scale. This scale, used to measure subjective global trust via three questions, was authored by the Survey Research Center in 1969. It was constructed using items from the Faith in People Scale (Wrightsmann, 1991), and consists of three forced-choice questions with responses that are either trusting or not. For each response that is trusting, the participant gets a score of 1; therefore the total possible score on the scale ranges from 0 (least trusting) to 3 (most trusting). See Appendix B for a complete list of survey items.

Two studies were conducted to obtain reliability estimates, one just after the 1964 election and the other just after the 1968 election, as part of a post-election survey. The moderate inter-item correlations (see Table 2) show that the scale was reliable over time.

Table 2: The inter-item correlations for the Trust in People Scale for both the 1964 and the 1968 surveys

	1964			1968		
	People trusted	People helped	Take advantage	People trusted	People helped	Take advantage
People trusted
People helped	.48	.	.	.52	.	.
Take advantage	.50	.54	.	.48	.54	.

Openness scale. Taken from the International Personality Item Pool (IPIP), a scientific collaboratory for the development of advanced measures of personality traits and other individual differences, the Openness Scale is a free sub-scale of a larger survey, the Multiple Constructs Personality Inventory (MCPI). The MCPI that was validated from five-construct models such as the NEO-PI and Tellegen’s Multidimensional Personality Questionnaire (International Personality Item Pool, ND; Goldberg, 1999; Goldberg, Johnson, Hogan, Ashton, Cloninger, & Gough, 2006). This subscale, and other similar scales on “big five” surveys, has been characterized as Intellect and Openness, using the words such as “Quickness, Ingenuity, and Ideas, on the one hand, and Aesthetics, Imagination, and Fantasy on the other” (DeYoung, Quilty, & Peterson, 2007, p. 883) to describe the construct. The subscale (identified by IPIP as Factor V) consists of 20 questions, 7 that are negatively scored and 13 that are positively scored on a 5-point Likert scale (1, *very inaccurate*, to 5, *very accurate*). The total score can range from 20 (least trusting) to 100 (very trusting). Sample questions include: “Am not interested in

abstract ideas” (negatively scored) and “Have a vivid imagination” (positively scored). See Appendix C for a complete list of survey items.

The MCPI highly correlates with several other five-construct models, including the NEO-PI (overall, $r = .81$; Factor V, $r = .83$), Tellegan’s Multidimensional Personality Questionnaire ($r = .66$), and several others (International Personality Item Pool, ND). In addition, Factor V on the MCPI was found to have strong internal consistency ($\alpha = .90$). Overall, these suggest it is a reliable scale for the measurement of Openness, just as the NEO-PI.

Self-Disclosure Index. The purpose of the SDI is to subjectively measure the likelihood of the respondent to self-disclose information to others. Miller, Berg, and Archer (1983) created the Self-Disclosure Index (SDI) to shorten existing measures, and based theirs on the Jourard Self-Disclosure Questionnaire (JSDQ) that is at least 40 questions long for each relationship type. This modified and validated scale consists of ten questions, scored on a 4-point Likert scale (0, *discuss not at all*, to 4, *discuss fully and completely*). The range of scores for this scale is 0 (low self-disclosure) to 40 (high self-disclosure). See Appendix D for a complete list of survey items.

Miller, Berg, and Archer (1983) sought to test the reliability and validate their scale. They had 487 women and 253 men completed the SDI, and the internal consistency of the questions when asked to about same-sex strangers and same-sex friends were found to be highly reliable (all $\alpha > .85$). In addition, no significant differences were found between the sexes. Finally, they administered their index and the JSDQ to 72 men and 84 women, compared the results of the SDI items to that of the JSDQ as well as a series of other scales (see Miller, Berg, Archer, 1983), and found support for the validity of the revised scale.

For this study, the scale was used to measure self-reported self-disclosure tendencies between strangers, and so only the Same-Sex Stranger question set was used. As this was intended to estimate participants' subjective willingness to share information with strangers, the same-sex friends question set was not used. In hopes to capture additional information, the opposite-sex stranger question set was slightly altered and asked twice to each participant. The only modification was to change "same-sex" to "male" or "female" (e.g., Directions: Please indicate your willingness to disclose the following information to a female stranger on a scale of 0 to 4: 1, *Discuss not at all* to, 4, *Discuss fully and completely*). As the SDI was correlated with the JSDQ (Miller, Berg, & Archer, 1983), and the JSDQ is for any dyad and is not same-sex dependent, logically it would be helpful to correlate opposite-sex to same-sex responses of willingness to self-disclose to strangers, as well as to compare both to other personality measures and another measure of self-reported likelihood to self-disclose asked in the survey.

Anthropomorphic Tendencies Scale. This scale measures the tendency of an individual to perceive non-human entities as having human qualities. Developed by a group at the University of Central Florida (Chin, et al., 2005), this scale consists of 78 items that ask the respondents to rate their agreement with statements about attributing human qualities to non-human objects on a 5-point Likert scale (1, *strongly disagree*, to 5, *strongly agree*). Out of the 78 items, 41 are reverse scored. The scale score can be calculated by adding the item responses together for a total score of 390, higher numbers meaning a greater tendency to anthropomorphize. In addition, the scale can be divided into four sub-scales: Extreme Anthropomorphism, Anthropomorphism of Pets, Anthropomorphism Toward Gods or Deities,

and Negative Anthropomorphism, of which some items are scored on more than one sub-scale. See Appendix E for a complete list of survey items.

Demographics questionnaire. This questionnaire was created for this study and included questions about the participant's computer and Internet usage, and online social networking habits, as well as the usual questions of age and sex. See Appendix F for the complete list of the survey questions.

Procedure

The online questionnaire was developed, brought before and approved by the Institutional Review Board (IRB; see approval letter in Appendix O), and entered into the experiment system's web-survey tool. Timeslots were opened for 400 online-only participants, and the system automatically allowed 10 extra participants as a cushion.

The participants were asked to complete an anonymous survey (from the abstract for the online questionnaire): "You will be given several avatar images and asked to rate them on several dimensions, and then will be given a few short questionnaires." Once the participant decided to participate by agreeing to the informed consent statement, he or she completed 18 sections of questions. Each section was one webpage that allowed the participant to answer a set of questions, save his or her responses, and then move on to the next section. Some of the sections and questions were randomized so they were not presented in the same order each for every participant. The participants were not allowed to go back to any previous section, but were allowed to withdraw from the survey at any time by closing the web browser window.

First, the participant was given the images of the eight avatars presented individually in random order (Sections 1 through 8, randomized). They were asked to rate them using a 7-point

Likert scale (1, *Not at all*, to 7, *Very*) across ten dimensions: attractiveness, trustworthiness, approachability, human-likeness, creepiness, weirdness, animal-likeness, realism, likelihood of talking to the person, and likelihood of telling the person personal information. Immediately following these eight sections, the participant was shown as a group of avatars in random order, and was asked to rank the avatars in order from 1, *least trustworthy*, to 8, *most trustworthy* (Section 9, randomized). Next were the trust scales (Section 10: ITS, Section 11: Trust in People Scale), self-disclosure scales (Section 12: Female Stranger, Section 13: Male Stranger), Openness Scale (Section 14), ATS (Sections 15 through 17 due to limits on number of questions allowed per section), and finally the demographics questions (Section 18). See Appendix G for a list of directions for each section. When the participants were finished, they chose to save and submit their survey. They were then automatically rewarded with extra credit points toward a Psychology course of their choice.

The whole batch of online surveys was then downloaded, and the data were screened, cleaned, and coded: first, the variables were labeled, next the data that were not possible responses were deleted (i.e., 30 hours for “How many hours in a day...”), then open-entry fields with responses like “10+ hours” was changed to “10,” and finally descriptive statistics (e.g., mean, maximum value, minimum value, etc.) were conducted to check for other clues to typos and unrealistic responses. See Table 3 for a list of these changes that were made. After cleaning the data, appropriate items that required it were reverse scored, including questions on the Interpersonal Trust Scale, Openness Scale, and the Self-Disclosure Index. Finally, the transformation of the female self-disclosure and male self-disclosure responses into same-sex

and opposite-sex self-disclosure and other sub-scale scores were calculated and added to the data file.

Table 3: A summary of the data cleaning actions taken before analyses were conducted

Data, as collected	Cleaned Data
10+	10
“a lot,” “idk,” “n/a,” “since came out,” “1000000,” “30 hours per day,” and similar	Deleted
4-5 hours, 8-10 hours, and 3 to 4	4.5, 8.5, and 3.5
24/7	24
Half, 30 minutes, 15 minutes	.5 and .25
112 (years for computer usage)	12
“No” in response to “Connect with friends/strangers” but put a number of hours per day	Number of hours per day were deleted
“Yes” in response to “Connect with friends/strangers” but did not respond to hours per day	“Yes” was deleted
Did not rank the 8 avatars using 1-8, each only once	Responses for the ranking were deleted

Design

Independent Variable. The visual appearance of the avatar, and had eight levels: female, male, female with half mask, female with full mask, male with half mask, male with full mask, horse, and dragon.

Dependent Variables. The dependent measures used in this survey study were ratings of the avatar pictures, ranking of the images from 1, *not trustworthy*, to 5, *very trustworthy*. In

addition, subjective ratings of trust (ITS, TiP), self-disclosure for same-sex strangers and opposite-sex strangers (SDI-SS and SDI-OS), openness (Openness Scale), and anthropomorphic tendencies (ATS) were collected.

Related Hypotheses

Hypothesis 1: More specifically, the number of items a participant self-discloses will be negatively correlated with his/her score on the ITS. In addition, the ITS will be negatively correlated with the SDI scores.

Hypothesis 2: A human-like avatar will be ranked and rated as significantly more trustworthy than a low-anthropomorphic avatar (i.e. a human-like animal avatar), and that a female avatar will be ranked and rated as significantly more trustworthy than a male avatar.

Hypothesis 6: The two subjective trust measures (ITS and TiP) and other subjective personality measures (ATS, Openness) will be significantly correlated with each other. In addition, the trust measures will significantly correlate with trust ratings of the avatars.

Results

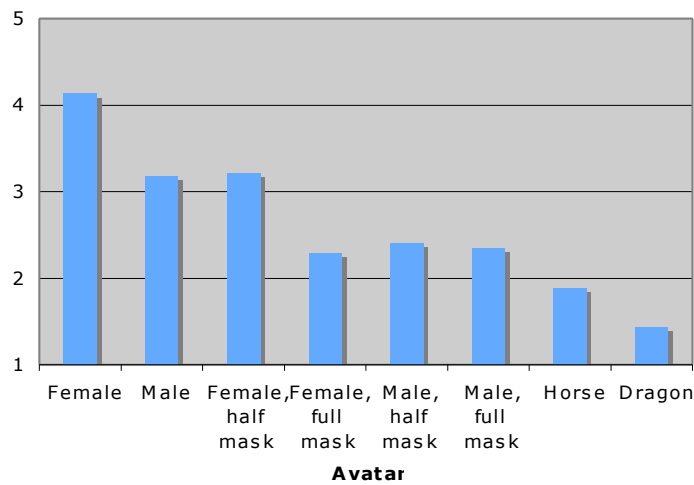
All the data were analyzed using PASW Statistics 17.0 (SPSS Inc., 2009), excluding cases listwise, with the alpha level set to .05 unless otherwise noted. The first analyses conducted were descriptive statistics of each variable to obtain means, standard deviations, modes, minimum and maximum values, as appropriate.

To test Hypothesis 1, correlations were conducted on the SDI scales and ITS. Then to test Hypothesis 2, a one-way repeated measures ANOVA was conducted to see if the participants *rated* the trustworthiness of the eight avatars differently, with post-hoc pairwise comparisons to see where differences lie. A Friedman two-way ANOVA for ranks was conducted to further

investigate Hypothesis 2 to see if there were differences in how the participants *ranked* each avatar in order of trustworthiness. Next, to explore Hypothesis 6, correlation analyses were conducted to see if the subjective trust and personality scores are related to each other and the ratings of trust of the two avatars rated as most and least trustworthy. Finally, exploratory analyses were done with sex and the various subjective trust and personality measures to see if there are differences that might be important to note.

The correlation matrix revealed that the participants' scores on the ITS did not significantly correlate with the SDI subscales: opposite sex ($p = .15$), same sex ($p = .15$); however, the SDI subscales were significantly positively correlated with each other ($r = 0.71$, $p < .01$).

The repeated measures ANOVA revealed that the avatars were *rated* differently in trustworthiness based solely on their appearance, $F(7, 409) = 289.77$, $p < .001$. Post-hoc comparisons reveal that the female avatar without a facemask was rated as significantly more trustworthy ($M = 4.13$, $SD = 1.34$) when compared to all the other avatars ($p < .001$), including the male avatar. Likewise, the dragon avatar was rated as significantly less trustworthy ($M = 1.44$, $SD = 0.89$) when compared to all the other avatars ($p < .001$). The Friedman Test on the rankings of trustworthiness revealed a significant difference in the way the avatars were *ranked*. A look at the rank means and medians suggest that the female avatar was ranked more often as most trustworthy (8 on the ranking scale) and the dragon avatar was ranked more often as the least trustworthy (1 on the ranking scale), $\chi^2(7, 305) = 386.98$, $p < .001$, which corresponds with the rating results above. See Figures 3 and 4 below for the average ratings of the avatars and frequencies of rankings of the avatars.



*Figure 3: A graph of the average ratings for the various avatars**

*Note: the bi-modal distribution of the ranking scores is thought to be an artifact of the question layout in relation to the instructions, in that participants did not always rank the avatars using each number (1-8) once and only once. As such, they might also have reversed the ranking order (1 = most trustworthy versus 8 = most trustworthy) inadvertently, therefore accounting for the extreme ratings at the ends of the spectrum and more normal distributions in the middle of the ranking scale.

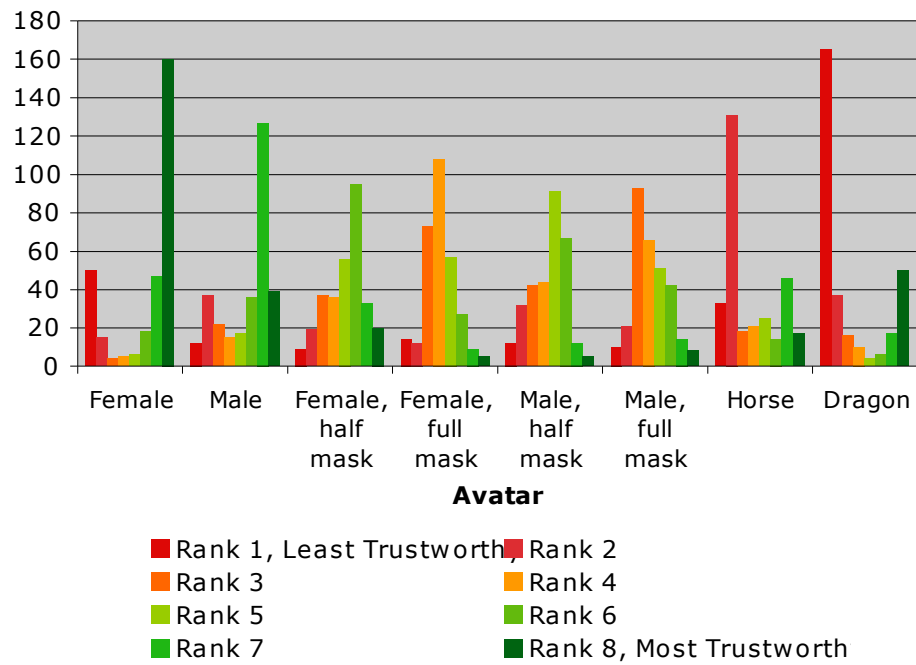


Figure 4: A graph of the frequency of rankings for the various avatars

The correlation matrix of the subjective measures revealed that the participants' scores on the ITS significantly correlated with the TiP scale ($r = -0.44, p < .001$) and the ATS ($r = -0.12, p = .02$). In addition, the ITS did not significantly correlate with the participants' trust ratings of the female avatar ($r = -0.04, p = .41$) and the dragon avatar ($r = -0.05, p = .28$), as well as the Openness scale ($r = 0.06, p = .19$).

The participants' scores on the TiP scale was significantly related to the participants' trust ratings of the dragon avatar ($r = -0.13, p = .01$), but no other scales or ratings. The SDI scales were significantly correlated with each other ($r = -0.71, p < .001$), and the same sex SDI (SDI SS) was significantly correlated with the trust ratings of the female avatar ($r = -0.11, p = .02$).

The exploratory correlation matrix of sex of the participant and the subjective measures and ratings of trustworthiness of the avatars revealed that sex is significantly correlated with the SDI scales (Same Sex: $r = -0.11, p = .02$; Opposite Sex: $r = -0.36, p < .001$) and the TiP scale ($r = -0.138, p = .01$). Further analyses (independent samples t tests) revealed that males would be more likely to self-disclose to another male ($M = 23.09, SD = 8.73$), than a female would with another female ($M = 18.74, SD = 9.03$), $t(407) = 2.32, p = .02$; and that males would also be more likely to self-disclose to a female ($M = 21.16, SD = 9.05$) than a female would self-disclose to a male ($M = 15.36, SD = 8.74$), $t(407) = 7.66, p < .001$. For the TiP scale, an independent samples t test revealed that males are significantly more likely to score higher on the Trust in People scale ($M = 1.34, SD = 0.99$) than females ($M = 1.01, SD = 1.06$), $t(407) = 2.81, p = .01$.

Discussion

The purpose of this study was to conduct preliminary research via a survey on perceived trustworthiness based on the appearance of avatars, as well as subjective measures of trust and personality.

The correlation matrix revealed that the participants' scores on the ITS did not significantly correlate with the SDI subscales, suggesting that the participant did not respond similarly on both. Given that the scales have both been tested for reliability and have been shown to be valid, these results might suggest the two scales are measuring independent constructs, and thus are not related to each other. Another explanation for this finding could be that self-disclosure is not an appropriate objective measure for trust as Rotter (1967) defines trust: as an expectancy of a person or group that the communications of another can be relied.

The repeated measures ANOVA and Friedman's two-way ANOVA of ranks results revealed that participants found the female avatar without a mask to be the most trustworthy compared to all the rest, whereas the dragon avatar was rated and ranked as the least trustworthy out of the eight possible avatars based solely on static images of the avatar (see Figure 5 below). These results support Hypothesis 2 in that a high-anthropomorphic avatar (the female) was rated as significantly more trustworthy than a low-anthropomorphic avatar (the dragon). These results were expected as the dragon avatar is the least like the human avatars, and literature on anthropomorphism shows that highly anthropomorphic avatars are rated as more attractive and credible (Kang, 2006; Nowak & Rauh, 2006), and in fact was almost identical to Nowak and Rauh's (2006) results that a human female avatar was rated as most credible and a "green lizard avatar" was rated as least credible (p. 171). In a more general and evolutionary view, these results make sense according to Mori's (1970) explanation of the "uncanny valley" and the relationship between human-likeness and familiarity. He hypothesized, and literature has supported (e.g., Guadagno et al., 2007; Nowak & Rauh, 2006), that as an entity becomes more human-like, familiarity with it will increase, until the point at which there is a dip in familiarity when human-likeness almost reaches human. As the familiarity of an entity increases leading up to that valley, it is likely that emotional and empathic responses also increase, which may be seen through the willingness of people to extend positive attributes onto the other, including trustworthy, credible, and attractive.

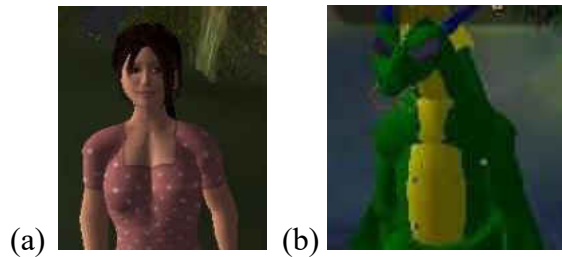


Figure 5: The avatars that were found by the participants to be the most and least trustworthy

In addition, both the repeated measures ANOVA and Friedman's two-way ANOVA of rankings results suggest that the female avatar was evaluated as more trustworthy than the male avatar based solely on a static image, which supports Hypothesis 2. This would have been expected as both males and females find females more likeable than male avatars (Guadagno et al., 2007; Nowak & Rauh, 2006). On a theoretical level, this finding makes sense because women are generally viewed as more nurturing, empathetic, and warm (e.g., Carlo, Raffaelli, Laible, & Meyer, 1999; Guadagno et al., 2007; Rudman & Goodwin, 2004), which from the aspect of emotional trust ("feel like I can trust") makes sense.

The correlation matrix of the subjective measures revealed that the participants' scores on the ITS significantly negatively correlated with the TiP scale and the ATS. The relationship between the ITS and TiP continues to validate the use of the ITS as a trust scale, as when the scores on the ITS decreases to more trusting, the scores on the TiP increases to more trusting of others (see Figure 6).

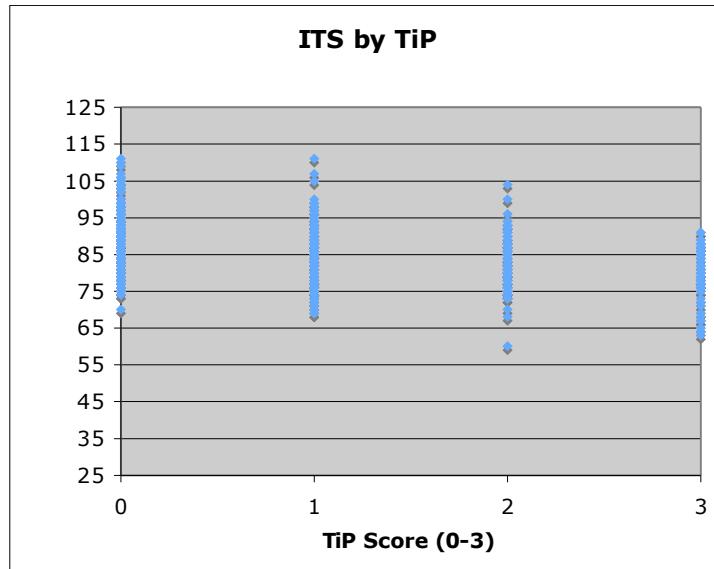


Figure 6: An x,y scatterplot for ITS and TiP scores, depicting the relationship between the two

The finding that the ITS is negatively related to the ATS, again indicates that lower, more trusting scores on the ITS are related to higher scores on the ATS (see Figure 7). This suggests that those who are more trusting of others are also more likely to anthropomorphize, or assign human qualities to non-human entities (Chin et al., 2005). Knowing the degree of relationship was found to be fairly low between the two, this significant correlation seems to speak more about normal ranges of trusting and anthropomorphizing than of any real world implication. Future research could recruit for the extremes of these two continua to examine how the full range of personalities would look like when compared.

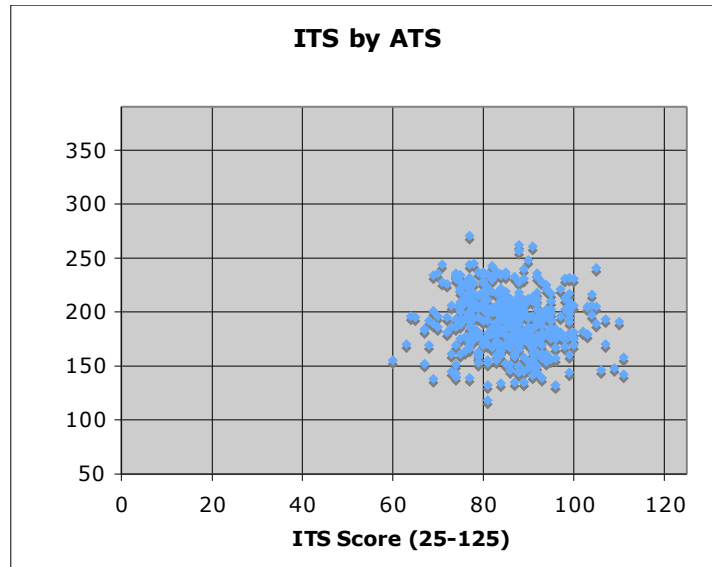


Figure 7: An x,y scatterplot for ITS and ATS scores, depicting the relationship between the two

In addition, the ITS did not significantly the participants' trust ratings of the female avatar, the dragon avatar, as well as the Openness scale. This suggests that trust, as defined by Rotter (1967), does not relate to how a person perceives another as trustworthy or how open they are to new ideas. Rotter's definition of trust is rooted in the Social Learning Theory, and as such is a tendency that is learned through observation on those around. In this survey, the participants were asked to rate the trustworthiness of static images of avatars. Perhaps the misconnection between these two is the lack of observation and interaction, suggesting that perhaps those who are categorized as more trusting (lower scores) on Rotter's ITS, are more observational and in tune with their surroundings than those who are categorized as less trusting. Future research could examine this by having participants engage with various avatars and then examine the relationship between ITS scores and ratings of perceived trustworthiness.

The most surprising relationship was the significant relationship between trust as measured by the Trust in People scale and the perceived trust rating of the dragon avatar. This positive relationship would suggest that those high in trust gave the dragon higher ratings for trustworthiness. While at the surface this is counter-intuitive, a look at the questions clarifies why this is an interesting finding. The three questions that make up the Trust in People scale are finding most others as trustworthy, most of the time people try to be helpful, and that people try to be fair. Agreement with these statements would be a high score on the Trust in People scale and seem to paint the picture of a more open-minded person about the people with whom they are interacting. With this in mind, it makes sense that those high on this scale are related to higher ratings of trustworthiness for the dragon avatar and that those ratings stand out from the others may not be as willing to extend trust to that dramatically different stranger. More research should be done to determine if these relationships are impacted by experience using a virtual environment. This could help to identify key differences in socialization for those who choose to spend time interacting with strangers in a virtual world versus those who do not choose to do so. Can it be attributed to a personality characteristic that makes a person more likely to sign up for a virtual world? Is it that those who are more trusting are more likely to be willing to explore and meet others in a virtual environment? Guadagno et al. (2007) called for more research to be done examining the relationship between expectations of avatars, and experience with avatars and virtual environments.

The SDI scales were significantly correlated with each other, and this speaks to an overall likelihood to self-disclose. However, this scale was modified for this study, and so does lend

support to further exploring research on the reliability of using the scale for both same-sex and opposite-sex interactions.

Finally, the same-sex SDI was also significantly correlated with the trust ratings of the female avatar. This finding is not surprising because of the research that suggests there is a gender-bias in the way credibility is attributed to avatars, and that both genders view female avatars as more likeable than male avatars (Guadagno et al., 2007). In addition, this finding also is supported by the research that those who are generally trusting of others, will be more likely to self-disclose personal information (Rotter, 1971). Finally, it is also supported by in-group bias research, in that both are biased toward their own gender, but women have a stronger bias (Rudman & Goodwin, 2004).

Lastly, the exploratory analyses by sex supports the claim that there are some differences in self-reported self-disclosing tendencies and self-reported trusting behavior, between the sexes; however, the results here are in contradiction to the literature (e.g., Rudman & Goodwin, 2004). Dindia and Allen (1992) investigated self-disclosure and sex differences through a meta-analysis and found that males reported the same level of self-disclosure as females; however, observational studies showed that they did not self-disclose more than females. Future research should examine if this significant finding was because of a self-report bias. In addition, because this research was not recruited based on sex, future research should examine if this finding was an artifact of having a third less males ($N = 99$) than females ($N = 310$) respond to the survey, or actual differences in their self-disclosure or trusting behavior.

CHAPTER SEVEN: STUDY TWO

Rationale

The purpose of this second pilot study was to record the natural responses and behavior of a person-controlled avatar to a stranger avatar just approaching them and asking personal questions. In addition, it was used to gauge how differently people respond to the personal questions given the look of the avatar, using the two extreme avatars from the first study. Literature in the area of trust and avatars suggests that the anthropomorphism of avatars does influence judgments of the person behind the avatar (Kang, 2006; Nowak & Rauh, 2006; Nowak & Rauh, 2008). Finally, this study allowed time to practice using *Second Life* and its record keeping features.

Method

Participants

All participants were approached randomly by the researcher in an area of *Second Life* called Orientation Island Public (98, 163, 33), a public island where many new avatars can be found. In total, 30 participants, who were relatively new to the virtual world based on “born on” dates in their profile, were approached at random as they wandered between the “drop” location of new avatars up to the second instructional board along the path on Orientation Island. New avatars to the virtual world were used, as they were the most likely group to be on Orientation Island, and, in general, would have similar inexperience with the controls and the virtual world itself. The median *Second Life* age was six days, and 60% ($N = 18$) of the participants were less than one month old.

While information about the 30 users behind the avatars was not formally collected, the researcher noted that 13 of the avatars appeared to be masculine, 13 appeared to be feminine, 3 were missing the notation by the research, and 1 was an animal and therefore made it hard to make a determination on gender (a wolf). In addition, as a by-product of the conversation, the researcher was able to note that half of the participants were from the United States ($N = 15$), while 5 were from Europe (1 was from Eastern Europe), 4 were from South American and the Caribbean, 2 were from India, 2 were from Africa, and 2 were not willing to share where they were from. With this in mind, it is important to note that only those who typed in coherent English were included in the study, resulting in three potential participants being excluded.

Materials

Second Life. *Second Life* (2004) is “a 3D online digital world imagined, created, and owned by its residents,” (Rymaszewski, Au, Wallace, Winters, Ondrejka, & Batstone-Cunningham, 2007, p. 4) or an online, persistent, massively multi-player virtual world, where the users create content and socially interact. *Second Life* is free to join for anyone who has an email address and internet connection, but also has paid levels of membership that allow for the building and the owning of land. In 2007 there were almost a million registered users all over the world with active *Second Life* accounts, and who collectively spent approximately 5 million dollars a month buying objects that other users have created, (Rymaszewski, Au, Wallace, Winters, Ondrejka, & Batstone-Cunningham, 2007). As of March 19, 2012 at 12:45pm, there were 28,411,408 registered residents, with 57,812 online at that moment in time (Tyche Shepherd, 2012), and at roughly the time of this study there were 826,214 users that quarter who were logging about 116 million hours in the virtual world (Nino, 2010). From a report in 2007,

Hachmann acknowledged that 54% of the residents were from Europe, which was more residents than reported being from the United States (34.5%). He also reported that nearly 60% of the users self-reported being male, whereas Rymaszewski et al. (2007) reported that same year that only 56% of the residents were male with 14% of them using female avatars (and 4% of the females were using male avatars).

Procedure

The study's protocol was developed, brought before and approved by the Institutional Review Board (IRB; see approval letter in Appendix O).

Two of the eight initial accounts used from Study 1 were used for this study: the female avatar, "Rebecca Sheryffe", and the dragon avatar, "Emma Sockington". The first names were chosen by the researcher while the last names were chosen from a list all at the time of account creation. Full-length images of the avatars can be found in Figure 8.



Figure 8: The two researcher avatars used for Study 2

Next, based on Altman and Taylor's (1973) Social Penetration Theory, a set of three major questions with sub-questions was developed for the researcher to ask of the participants.

By design, the questions start out more general and move to information that is more personal.

See Table 4 for a list of the questions and sub-questions.

Table 4: A list of the questions and sub-questions used by the researcher in Study 2

Question	Sub-Questions
Where are you from?	What country? What state? What city?
What do you do in real life?	What school? What is your major or program? What degree? Do you know what you will do with that? OR What company do you work for? What industry is that? What is your official title there? What is your role?
What do you look like in real life?	What nationality are you? How tall are you? What color hair do you have?

The researcher first logged into *Second Life* as “Rebecca Sheryffe,” the same avatar that was rated and ranked as most trustworthy in Study 1. She approached 15 avatars and asked them via one-on-one text chat the series of personal questions, trying to elicit self-disclosure of personal information. Due to an objective of this pilot to better understand how self-disclosure naturally happens within a virtual world, the nature of the conversations were attempted to be

kept natural, and as such the information shared by the research was not experimentally controlled. The conversations were saved by *Second Life* into a folder on the desktop of the researcher’s computer for analysis. Inclusion criteria were based on those willing to converse and were not tagged as minors in-world. Exclusion criteria included those who ignored the chat, minors tagged by *Second Life*, and non-conversational-English speakers, and numbers of these were tallied on paper and not counted toward the 15 participants (see Table 5 for tallies of excluded conversations). Next, the experimenter logged in as the dragon avatar, “Emma Sockington,” rated and ranked as the least trustworthy in Study 1, and approached 15 more avatars at random and asked the same questions and recorded the same data.

Table 5: Number of conversations excluded from the study based on exclusion criteria

Avatar	No Response	Non-English Speakers	Underage
Female	7	1	0
Dragon	12	2	1

Afterward, all of the data were collected and recorded and the conversations were coded by three advanced researchers. These researchers, two males and one female, all have advanced degrees (Ph.D. in Applied Experimental and Human Factors Psychology, Ph.D. in Human Factors Engineering, and M.A. in Anthropology), and volunteered to meet and discuss the data, code the data, and attend a follow-up meeting about the coding process. After an initial calibration meeting using a fictional data set, they were asked to individually assess the level of detail of response and the number of promptings it took the researcher to get those responses to

the three questions, using a coding sheet that the researcher provided (see Appendix H). These ratings were entered in PASW Statistics (SPSS Inc., 2009) and tested for the inter-rater reliability, using Cronbach's alpha (α). According to the inter-rater reliability scores, the coders could not agree on number of promptings it took to get an answer from the participants ($\alpha = 0.367$), but the internal consistency of the level of details ($\alpha = 0.78$) suggests that the coders were observing similar levels of detail in the participants' responses. After receiving feedback on the coding of the participants, the coders met to come to consensus on the number of promptings for each question asked of the participants, as well as to discuss coding guidelines and suggestions for Study 3. They recommended the following: (1) create a confederate profile with set responses and prompts to limit the variability in the conversations, (2) allow for an overall rating of the conversation that can capture sarcastic responses, as all information (honest or not) shared was counted as a self-disclosure of information, (3) change the levels of the rating of each level of detail obtained for each questions to map to the sub-questions to keep coding consistent both within and between coder(s), (4) average the scores for the number of prompts per question for this study because after investigating the conversations as a group, they felt the perspectives were all valid and consistent within each rater (just not between as shown in the inter-rater reliability results), and (5) to test if the number of promptings can be used as a covariate, as it varied widely by conversation.

Once the data were discussed by the coders, the three sets of scores were added together for each item (e.g., coder 1's rating of question set 1's level of detail plus coder 1's rating of question set 2's level of detail plus coder 1's rating of question set 3's level of detail) for a total score of level of detail of that participant's responses and number of promptings for the full set

of responses by coder. Next, the total level of detail ratings and total number of promptings for each conversation by coder were then averaged for overall detail and overall number of promptings for each conversation across all of the coders.

Design

Independent Variable. One independent variable was used: the outward appearance of the avatar, with two levels, a female avatar and a dragon avatar.

Dependent Variable. The dependent measure used in this experiment was the average of the total level of detail in responses for three questions, as observed by three independent coders rating the previously recorded conversations.

Covariate. The covariate was the average number of total promptings required to get the participant to answer the three questions, also as observed by the coders. As the conversations were natural, the number of promptings that it took to obtain information from the participants varied from one conversation to the next.

Related Hypothesis

Hypothesis 4: Those in the high-anthropomorphic (female) avatar condition will self-disclose significantly more total items and greater level of details to the three questions than those in the low-anthropomorphic avatar (dragon) condition.

Results

All of the data were analyzed using PASW Statistics 17.0 (SPSS Inc., 2009), with the alpha level set to .05 unless otherwise noted. To test Hypothesis 4, the average total scores for level of detail was tested to see if there were significant differences based on the avatar with whom they were interacting. A one-way ANCOVA was conducted on the effect of avatar

appearance on willingness to self-disclose in their responses, controlling for the number of promptings it took to get the responses from the participant, as this varied from conversation to conversation.

First, the assumptions of the ANCOVA were tested and met via three tests: a scatterplot to check for a linear relationship, an independent *t*-test indicating a non-significant relationship between the covariate and the dependent variable ($F = 0.12, p = .74$), and finally, a significant correlation between the covariate and the dependent variable ($r = 0.42, p = .03$).

The ANCOVA revealed no significant difference between the level of detail participants were willing to disclose based on the look of the researcher’s avatar when controlling for the number of prompts, $F(2,28) = 0.00, p = .995$. See Table 6 for a list of the means, standard deviations, adjusted means, standard errors, and *p* values.

Table 6: A list of the means, standard deviations, adjusted means, and standard errors for the variables used in Study 2

DV	Condition	N	M	SD	adj M	SEE
Average Level of Detail	Female	15	8.00*	1.071	8.03	0.64
	Dragon	15	8.07*	0.907	8.04	0.67

* The range of possible scores was 0 (refused to answer all three questions) to 15 (shared beyond the requested information for all three questions), with 9 (shared requested information for all three questions) as the mid-point

Discussion

The purpose of this study was to conduct preliminary research via an observational study on self-disclosure of a stranger based on the appearance of avatars.

No significant differences were found in the level of self-disclosure by the participants when holding a conversation with either a female avatar or a dragon avatar, which does not support Hypothesis 4 that participants would be more likely to respond with more details to the female avatar than the dragon avatar. One explanation for these results is that these surface-type personal questions that require some level of self-disclosure might be not deep enough in the “onion” of Altman and Taylor’s (1973) Social Penetration Theory. Those who have chosen to be a member of a virtual environment might be more likely to not find these questions out of the ordinary and so are willing to share it, or perhaps as a group they are just more willing to carry on conversations with strangers just for the desire in the conversation with others. This suggests that perhaps the people that choose to interact via *Second Life* are more likely to trust others, regardless of what their avatar looks like, and therefore be more open to conversation and self-disclosure. Future research could take into account prior experience with virtual environments and willingness to connect with strangers over the Internet to further explore this hypothesis.

Another explanation for non-significant differences could be that the visual representation of a person (the avatar) does not affect self-disclosure as it does perceived trustworthiness, as found in Study 1. Interestingly, though, only the participants that did respond to the conversation opener (e.g., “Hi. How are you?”) were included in this experiment. As the female avatar, the researcher had to approach 22 *Second Life* residents to hold the 15 conversations included; however, as the dragon, the researcher had to approach 27 *Second Life* residents to hold 15 conversations. While this could be due to random factors like the user being away from the computer or otherwise distracted, these findings could also suggest that the visual representation of a person does affect self-disclosure (in even just entering into a conversation) in

the same way as perceived trustworthiness was affected by the visual appearance of the avatar in Study 1. In other words, those participants who choose to enter the conversation may have been more willing to overlook the visual appearance of the avatar when sharing only semi-personal responses to questions about where they live, what they do, and what they look like. Perhaps they would be less likely to share details of their finances or family life, questions that are a little deeper and might require more personal history with someone before a person is willing to share (Altman & Taylor, 1973). Future research could examine self-disclosure during a forced interaction, where the participant knows they are to work with the stranger and observe what information that stranger is able to gather about him/her, thus eliminating the question if the person has walked away.

Overall, these findings suggest that while static images of the avatars were found to be significantly different in their perceived trustworthiness, trust, as measured by self-disclosure, does not seem to be impacted by the look of an avatar when engaging strangers in conversation. One reason could be how trust is being operationally defined here. Perhaps, Self-disclosure is not an objective measure of trust, or a way to quantify how much trust one will extend to another person. Another explanation is that online trust, as measured by self-disclosure, could be mediated or moderated by another variable such as experience. Study 3 will examine the effects of prior experience with virtual environments and the appearance of the avatar, as well as the interaction between the two, on self-disclosure. In addition, subjective trust measures will be used to explore if they will match with observed behavior and explain some differences among the groups.

CHAPTER EIGHT: STUDY THREE

Rationale

The purpose of this study was to further explore the relationship between self-disclosure and trust, to examine how self-disclosure takes place in a virtual world between strangers only interacting via avatars, and to see how the self-disclosure behavior was related to subjective measures of trust, such as the Interpersonal Trust Scale and Trust in People Scale.

Study 2 results suggested a lack of a difference in how participants responded to the two different avatars, possibly because all of the participants were recruited from within the virtual world. As they have chosen to be a member of *Second Life*, they might have had a bias in the desire to interact with others they may not know via an avatar and virtual world. In this study, the participants were recruited from a large state university, but were grouped by their virtual environment (VE) experience: those that have chosen to create an account for a VE compared to those that have never had an account on one. By comparing the reactions to those that are choosing or have chosen to participate in a virtual world and those that have not chosen to do this before, online trust relationships mediated by avatars could be further examined.

Method

Participants

Sixty participants were recruited from the Psychology program at the University of Central Florida using their online experiment management system. Sixty-eight percent were female ($N = 41$) while 32% were male ($N = 19$), and overall the participants had an average age of 19.6 years ($SD = 3.6$, $mdn = 18$, $mode = 18$). The participants had owned a computer for an average of 12.2 years ($SD = 2.86$), had used the Internet for 10.5 years ($SD = 2.79$), and felt very

comfortable using both (Computer: $M = 4.8$, $SD = 0.67$; Internet: $M = 4.8$, $SD = 0.49$, on a 5-point Likert scale of 1, “Not at all comfortable” to 5, “Very comfortable”). Eighty-seven percent ($N = 52$) said they used the Internet to connect with friends (average time of 2.8 hours a day, $SD = 4.10$), while only 20% ($N = 12$) said they used the Internet to connect with strangers (average time of 1.2 hours a day, $SD = .75$). Twenty-nine (48%) have had or currently had an account on a VE, and 31 (52%) had never been a member of a virtual world. See Table 7 for a list of virtual environments and frequencies.

Table 7: List of names and frequencies of Virtual Environments that the participants had or have had an account

	# of Participants	% of Experienced Participants
World of Warcraft	8	27.6
Runescape	7	24.1
Second Life	4	13.8
Gaia Online	3	10.3
Guild Wars	2	6.9
Sims Online	2	6.9
Habbo	1	3.4
IMVU	1	3.4
Toon Town	1	3.4

In addition to the participant, a confederate participant (a trained researcher) was used to interact with the participant and engage them in conversation during the supposed experimental

task, which was actually a filler task. The confederate was given a set knowledge base to converse with the participants from, including the questions to ask and reciprocal information that could be shared (see Appendix I).

Materials

Experiment management system.

Second Life.

Online Surveys. Using an online survey method, participants were given a similar set of surveys as participants in Study 1:

1. Interpersonal Trust Scale.
2. Trust in People Scale.
3. Self-Disclosure Index.
4. Demographics questionnaire. This questionnaire was created for this study and included questions about the participant's computer and Internet usage, and online social networking habits, in addition to the usual questions of age and sex (see Appendix J).

Procedure

The experimental protocol and survey were developed, brought before and approved by the Institutional Review Board (IRB; see approval letter in Appendix O), and entered into the experiment system's web-survey tool.

The participants were recruited and screened for virtual world memberships via the experiment management tool. If they qualified (either never had an account for a VE, or they reported that they did have an account for a virtual world and they could list the name), they received an email or phone call to recruit them to the lab for the experiment. The only ones that

were excluded from the invitation were those that said they have or have had an account for a VE but chose not to give the name of the world.

Before the experimental session began two computers (one for the participant and one for the research assistant) in the experimental location (research lab on campus) were turned on, and one was logged onto *Second Life* for the research assistant: “Dessay” (see Figure 9). In addition, in another location the confederate also logged in to *Second Life* using an avatar that until recently was rated the number one androgynous name in America, Jordan (Baby Names Garden, 2009): “Jordan5826.” According to a random number chart to randomly assign the participants to a condition, the confederate dressed the avatar appropriately (female polka dot dress versus dragon costume). Again, to control for the tendency to self-disclose based on the amount of feedback the confederate provided, a list of information and prompts was provided to the confederate to be used in the conversation with the participant during the task (see Appendix I).



Figure 9: The research assistant’s avatar, used to facilitate the experiment in world

The participant was greeted at the University's lab by the research assistant, and brought to a desktop computer set up for the participants. The research assistant first confirmed his/her prior experience with virtual worlds, and then logged the participant into *Second Life* with a same-sex avatar (i.e., males a male avatar named "Baxter Rae", and females a female avatar named "Rebecca Sheryffe"). The first task in was to complete the Informed Consent Form through an online survey tool (see Appendix K for a copy of the consent form). Once the participant consented to participate in the study, the research assistant gave him/her time to practice moving and speaking in world, as well as time to edit the appearance of his/her borrowed avatar if he/she desired to. During the experiment the research assistant communicated with the participant solely through the *Second Life* interface, referring to a script, using chat, notecards, and private one-on-one chat all within the interface (See Appendix L for a copy of the researcher's script).

Once the participant was acclimated to the virtual environment, the research assistant, Dessay, teleported to the experiment location within *Second Life*, to one of two coffee shop locations [(a) StarStruck Coffee - Coffee Shop, Villa Clara (159, 206, 22) – General; (b) TC's Coffee 911, Lionheart Kiara (17, 127, 29) – Moderate; see Figure 10], and offered a teleport link to the participant to join him and the "other participant" for the experiment. Dessay immediately welcomed both participants (participant and confederate) to the experiment and asked them to introduce themselves while he tried to recruit a third participant. This was the start of the first part of the true experiment: a 7-minute block of time for the confederate, Jordan5826, to elicit self-disclosure of personal information. Using similar questions to Study 2, the questions used are shown in Table 8.



*Figure 10: The experimental locations within Second Life**

*There were two experimental locations because after 45 participants, the location was removed from the server and no longer available for our use.

Table 8: The questions and sub-questions used by the confederate to obtain personal information from the participants

Question	Sub-Questions
Where are you from?	What country? What state? What city?
What do you do in real life?	What school? What is your major or program? What degree? Do you know what you will do with that? OR What company do you work for? What industry is that? What is your official title there? What is your role?
What do you look like in real life?	What nationality are you? How tall are you? What color hair do you have?

At the end of the 7 minutes, Dessay announced that he was not able to find a third participant and then started them on the filler tasks. The filler task was taken from a list of classic trust-building exercises, was one that was readily available for download on the Internet: Lost at Sea Activity (See Appendix M). This is an exercise of consensus building where the respondents are first asked to order a list of 15 items from most important to least important, then they are asked to come to a consensus with a group.

Immediately following the consensus-building task, Dessay announced that he needed a few minutes to collate their responses, which triggered the start of an additional 3-minute block of time for Jordan5826 to continue to attempt to obtain answers to any unanswered questions that were left at the start of the first part of the filler task. Next, Dessay sent out the solution to the supposed experimental task, and gave the two participants time to discuss the experts' ratings.

Finally, Dessay sent out a notecard with a link to a survey for the participant to complete (he also sent the link to the confederate, so as to give the impression both were real participants). Once the experimenter received notice via email from the online survey system that the survey was submitted, the participant was given a link to a debrief statement, thanked for his/her participation, and received extra credit for his/her participation in the study. The conversation's chat logs were saved by *Second Life* into a folder on the desktop of the researcher's and confederate's computers.

Afterward, all of the data were collected and recorded and the conversations were coded by three advanced researchers. The researchers, two males and one female, all have advanced degrees (Ph.D. in Applied Experimental and Human Factors Psychology, Ph.D. in Human Factors Engineering, and M.A. in Anthropology), and volunteered to meet and discuss calibration on coding the data and to code the 60 conversations along several dimensions. After an initial calibration meeting using a couple of fictional data sets, they were asked to individually assess the level of detail of response, the number of promptings it took the researcher to get those responses to the three questions, when the response were obtained in relation to the filler-task (pre-task versus post-task), as well as an overall rating of willingness to share information both pre-task and post-task using a coding sheet that the researcher provided (see Appendix N). These ratings were entered in PASW Statistics (SPSS Inc., 2009) and tested for the inter-rater reliability, using Cronbach's alpha (α). According to the inter-rater reliability scores, the coders were observing and rating highly similar levels of detail ($\alpha = 0.94$), number of items pre-task ($\alpha = 0.96$) and post-task ($\alpha = 0.97$), number of promptings ($\alpha = 0.98$), and levels of willingness to share pre-task ($\alpha = 0.86$) and post-task ($\alpha = 0.90$). Next, the three sets of scores were averaged

across coders for a score of level of detail of that participant's responses (LEVEL OF DETAIL), total number of items shared pre-task and post-task (ITEMS SHARED) and number of promptings all by questions (PROMPTS), as well as, pre-task (RATING PRE-TASK) and post-task ratings (RATING POST-TASK) of the willingness to share information.

Next all of the survey data (subjective measures and demographic information) were examined for data cleaning purposes, and text items in the open text fields were omitted as appropriate (i.e., 1 year, was changed to 1) and ranges were changed to averages (i.e., 1-2 hours, was changed to 1.5).

Design

Independent Variables. Two independent variables were included in this study. The first was a subject variable of experience: self-joined members of a VE versus those that have chosen not to be a member of a virtual world. The second independent variable was the outward appearance of the confederate's avatar, with two categories: an avatar dressed as a human-looking female and a dragon avatar, the same two as used in the first two pilot studies (see Figure 11).



Figure 11: The two confederate avatars used for Study 3

Dependent Variables. Five objective measures were used in this experiment: level of details, number of items disclosed, number of promptings required to obtain information from the participant, and the overall rating of openness of the participant to sharing with the confederate before and after the filler task set, which were all determined by a panel of coders based on transcripts of conversations. The other measures were subjective measures of trust from items on a survey: scores of trust from Interpersonal Trust Scale (ITS), Trust in People Scale (TiP), the Self-Disclosure Index for Same-Sex (SDI SS) and Opposite-Sex (SDI OS) interactions. In addition, there were two personality measures on the survey as well: scores on the Anthropomorphic Tendencies Scale (ATS) and the Openness Scale (Openness).

Related Hypotheses

Hypothesis 1: The number of items and level of details a participant self-discloses will both be negatively correlated with his/her score on the ITS (low scores means more trusting), and positively correlated with TiP and SDI scales. In addition, the SDI scales will be negatively correlated with the ITS and positively correlated with TiP.

Hypothesis 3: Those participants interacting with the high-anthropomorphic (human-like) avatar will rate their partner as significantly more trustworthy on the survey at the end of the experiment than those interacting with the low-anthropomorphic avatar. After Study 2, it is also hypothesized that those who are more inexperienced will rate their partner as less trustworthy than experienced participants.

Hypothesis 4: Those in the high-anthropomorphic (human-like) avatar condition will self-disclose significantly more total items and greater level of details to the three questions with less promptings than those in the low-anthropomorphic avatar condition. After Study 2, it is also

hypothesized that those who are more experienced will share more items and details in less promptings than those who are more inexperienced.

Hypothesis 5: Significantly more participants will self-disclose information for the first question than the last question, and that, of those who shared both pre- and post-task, they will be rated as significantly more open to sharing post-task than pre-task (Altman & Taylor, 1973).

Hypothesis 6: The two subjective trust measures (ITS, TiP, SDI) and other subjective personality measures (ATS, Openness) will be significantly correlated with each other.

Results

All the data were analyzed using PASW Statistics 17.0 (SPSS Inc., 2009), with the alpha level set to .05 unless otherwise noted.

First, a correlation matrix was reviewed for the objective task variables to determine the most appropriate analysis of variance to run. Next, to test Hypotheses 3 and 4, an ANOVA and a MANOVA were run on the task variables and survey question of trustworthiness of the partner to identify any differences based on look of the partner's avatar (girl versus dragon) and the participant's experience in virtual worlds. Afterward, to test Hypothesis 1, correlation analyses were conducted on the trust measures (both objective and subjective) and the self-disclosure scales. Next, to test Hypothesis 5, both a chi-square on the percentages of those responding each of the three questions, as well as an independent-samples *t* test was conducted on the pre- and post-task ratings of willingness to share, to better understand the progression of the conversation. Then, to test Hypothesis 6, correlations were conducted between the subjective and objective measures of trust and exploratory analyses were conducted with questions from the

demographics questionnaire. Finally, exploratory correlations were conducted with the objective and subjective measures of self-disclosure to check for sex differences.

A correlation matrix revealed significant relationships among the participant’s level of detail rating (rated by coders), number of items disclosed, and ratings of both pre- and post-task ratings of willingness to share information (See Table 9 for the Correlation Matrix). Number of promptings by the confederate during the conversations was not significantly correlated with any of the other measures.

Table 9: Correlation matrix indicating significant relationships between the DVs

Measure	Statistic	Level of Detail	Items Shared	Number of Prompts	Rating Pre-Task
Items Shared	<i>r</i>	.965**			
	<i>p</i>	0			
Number of Prompts	<i>r</i>	-0.055	-0.072		
	<i>p</i>	0.674	0.586		
Rating Pre-Task	<i>r</i>	.829**	.830**	-0.092	
	<i>p</i>	0	0	0.484	
Rating Post-Task	<i>r</i>	.398**	.433**	0.13	.536**
	<i>p</i>	0.002	0.001	0.323	0

** Correlation is significant, $p < 0.01$

A 2 (condition: female versus dragon avatar) x 2 (experience: inexperienced versus experienced in virtual worlds) Factorial Multivariate Analysis of Variance (MANOVA) was conducted on the created linear combination of the DV (objective measures of trust that were significantly correlated with each other) to test Hypothesis 4. See Table 10 for the means and standard deviations of the dependent variables by condition and experience.

Table 10: Means and Standard Deviations of the DVs by Condition and Experience

	Condition	Experience	<i>M</i>	<i>SD</i>
Level of Detail	Female	Inexperienced	8.98	3.04
		Experienced	11.17	1.10
	Dragon	Inexperienced	10.26	1.92
		Experienced	10.82	1.43
Items Shared	Female	Inexperienced	9.46	3.15
		Experienced	12.19	1.62
	Dragon	Inexperienced	10.87	2.39
		Experienced	11.76	1.86
Pre-Task Rating	Female	Inexperienced	3.00	1.23
		Experienced	4.00	0.59
	Dragon	Inexperienced	3.54	1.06
		Experienced	3.43	0.96
Post-Task Rating	Female	Inexperienced	1.89	1.68
		Experienced	3.06	1.75
	Dragon	Inexperienced	2.79	1.61
		Experienced	2.43	1.67

The MANOVA was not significant for experience: $\lambda = .84$, $F(4, 53) = 2.48$, $p = .06$; condition: $\lambda = .952$, $F(4, 53) = 0.67$, $p = .62$; or the interaction: $\lambda = .92$, $F(4, 53) = 1.23$, $p = .31$. For experience, there were significant between-subjects main effects for the number of items shared, $F(1, 56) = 8.34$, $p = .01$, $\eta^2 = .13$, and level of detail, $F(1, 56) = 6.26$, $p = .02$, $\eta^2 = .10$. Those who were experienced shared significantly more items ($M = 11.94$, $SD = 1.75$) and in greater detail ($M = 10.97$, $SD = 1.3$) than participants who were inexperienced with virtual worlds (items: $M = 10.05$, $SD = 2.90$; detail: $M = 9.52$, $SD = 2.67$). For condition, there were no significant main effects, and there was no significant interaction between condition and experience for any of the objective measures of trust.

To test Hypothesis 3, a 2 (condition) x 2 (experience) Analysis of Variance (ANOVA) was conducted on the trust rating the participant gave their partner. There were no significant differences for condition, $F(1, 56) = 0.14, p = .71$, experience, $F(1, 56) = .24, p = .63$, nor the interaction between the two, $F(1, 56) = 2.24, p = .14$. Means and standard deviations are presented in Table 11.

Table 11: Means and Standard Deviations of Ratings of Trustworthiness by Condition and Experience

Condition	Experience	<i>M</i>	<i>SD</i>
Female	inexperienced	2.89	1.18
	experienced	3.42	1.17
Dragon	inexperienced	3.38	0.77
	experienced	3.12	0.86

Next, a correlation matrix of the objective measures of trust, as well as the subjective measures of trust and self-disclosure was created to test Hypothesis 1. It revealed that the objective measures of trust (items shared and level of detail) are correlated with each other, and the subjective measures of trust (TiP and ITS) are correlated with each other, but the two groups are not correlated with the other, suggesting the measures are not measuring the same constructs. The self-disclosure scales do significantly correlate with the objective measures of trust, suggesting they are measuring the same construct. See Table 12 for the correlation matrix.

Table 12: Correlation matrix of the objective and subjective measures of trust and self-disclosure

	Statistic	SDI Same-Sex	SDI Opposite-Sex	TiP	ITS	Items Shared
SDI Opposite-Sex	<i>r</i>	.749**				
	<i>p</i>	0				
TiP	<i>r</i>	.310*	0.179			
	<i>p</i>	0.016	0.171			
ITS	<i>r</i>	0.164	-0.053	-0.611**		
	<i>p</i>	0.211	0.687	0		
Items Shared	<i>r</i>	.428**	.317*	-0.118	-0.131	
	<i>p</i>	0.001	0.014	0.368	0.317	
Level of Detail	<i>r</i>	.451**	.338**	-0.099	-0.149	.965**
	<i>p</i>	0	0.008	0.451	0.257	0

**Correlation is significant, $p < 0.01$

*Correlation is significant, $p < 0.05$

A paired-samples *t* test was conducted to compare the openness ratings of the participants by coders pre-task to post-task, and was found to be significantly different, $t(59) = 5.21, p < .001$, in that participants were more likely to be rated as more open pre-task ($M = 3.44, SD = 1.05$) than post-task ($M = 2.47, SD = 1.69$). A Friedman's one-way ANOVA for ranks was conducted to compare the percentage of participants who responded to question 1 versus those who responded to question 2 and question 3. Significant differences, $\chi^2 = 10.33, p = .01$, revealed that more participants responded to question 1 (100%, $N = 60$) than question 3 (90%, $N = 54$). In other words, significantly more participants chose to respond to "Where are you from?" than "What do you look like in real life?"

In addition, to further explore Hypothesis 6, exploratory correlations were conducted between the subjective measures of trust, self-disclosure, and personality. The correlation matrix can be found in Table 13. This shows that the objective trust measures taken from the conversations are not related to the subjective trust measures; however, all of them but post-task ratings are significantly related to the self-disclosure measures. Additionally, the pre-task ratings are significantly related to openness scores. Finally, post-task ratings and the ATS are not significantly related with any of the other objective or subjective measures.

Table 13: Correlation matrix for the Subjective Measures (trust, self-disclosure, and personality)

	Statistic	ITS	TiP	SDI OS	SDI SS	ATS
TiP	<i>r</i>	.611**	1	.310*	0.179	-0.139
	<i>p</i>	0		0.016	0.171	0.345
SDI OS	<i>r</i>	0.164	.310*	1	.749**	0.267
	<i>p</i>	0.211	0.016		0	0.066
SDI SS	<i>r</i>	-0.053	0.179	.749**	1	.332*
	<i>p</i>	0.687	0.171	0		0.021
ATS	<i>r</i>	-0.114	-0.139	0.267	.332*	1
	<i>p</i>	0.441	0.345	0.066	0.021	
Openness	<i>r</i>	0.096	0.253	0.115	0.084	-0.111
	<i>p</i>	0.465	0.051	0.382	0.522	0.452

**Correlation is significant, $p < 0.01$

*Correlation is significant, $p < 0.05$

Finally, exploratory one-way ANOVAs were conducted with the objective and subjective measures of self-disclosure to check for sex differences. See Table 14 for the means, standard deviations, t statistics and significance values. The results indicate that males scored significantly higher on the ITS and SDI OS than females.

Table 14: Means, standard deviations, *t* statistics, and significance values for the DV examined for sex differences

	<i>F</i>	<i>df</i>		<i>p</i>
Trust Ratings of Partner	2.63	Between Groups	1	0.11
		Within Groups	58	
		Total	59	
ITS	4.54	Between Groups	1	0.04
		Within Groups	58	
		Total	59	
TiP	3.70	Between Groups	1	0.06
		Within Groups	58	
		Total	59	
Openness	1.97	Between Groups	1	0.17
		Within Groups	58	
		Total	59	
SDI OS	12.85	Between Groups	1	0.00
		Within Groups	58	
		Total	59	
SDI SS	0.64	Between Groups	1	0.43
		Within Groups	58	
		Total	59	
Items Shared	1.88	Between Groups	1	0.18
		Within Groups	58	
		Total	59	
Number of Prompts	1.78	Between Groups	1	0.19
		Within Groups	58	
		Total	59	
Level of Detail	2.00	Between Groups	1	0.16
		Within Groups	58	
		Total	59	

Discussion

The purpose of this study was to conduct an experiment to manipulate the appearance of a stranger's avatar to observe the effects on trust and self-disclosure.

Hypothesis 1 was not supported by the data. The number of items and level of details a participant self-disclosed was not correlated with either trust measure (TiP or ITS), in other words the participants' self-reported level of trust in others is not related to how much they are willing to share with a stranger via an avatar in a virtual world. In addition, those subjective trust measures were significantly negatively correlated with each other, but not significantly correlated with the participants' self-reported likelihood to self-disclose. Alternatively, the SDI scales were both related to the number of items shared and level of detail, seemingly support SDI's validity: those who said they are likely to share personal information to others did, in fact, share more information and details in a conversation with a stranger via avatars in a virtual world.

In addition, Hypothesis 3 was partially supported by the data, as those participants interacting with the high-anthropomorphic (human-like) avatar did not rate their partner as significantly more trustworthy on the survey at the end of the experiment than those interacting with the low-anthropomorphic avatar. This might suggest that the appearance of the avatar does not influence trustworthiness when there is more context and interaction, then when just with a static image, as was found in Study 1. This supports the research on source information and the Social Penetration Theory, in that perhaps we use the image as a first impression and judgment call whether to enter into an interaction, then as we move further in the interaction we rely more on the interaction itself to extend trust (Altman & Tyalor, 1973). In addition, the data did not support the claim that those who are inexperienced would rate their partner differently than experienced participants. In fact, the differences by experience were found to be around the self-

disclosure in the experiment: experienced participants were rated as being more open to sharing by the coders who were rating the conversations. This finding supports the research that the experienced users are less influenced by the appearance of the avatar of those they are interacting with than those who are less experienced (Nowak & Rauh, 2006). However, one explanation as to why there were not significant differences were found for the appearance of the avatar could be that a few participants did mention they thought the dragon avatar partner was controlled by a male, whereas no one felt the female was controlled by a male (or at least did not voluntarily offer that they felt that way). Another explanation could be part of the experimental design: in order to stay gender-neutral, text was chosen and used over voice-over-IP when interacting, and the supposed experimental task utilized notecards (opened mini windows in *Second Life*). Perhaps, appearance did not have an effect on the sharing behavior of personal information because except for the initial introduction, the participant was unaware (and un-reminded) of how their partner looked. Another explanation could be more of a reaction to a separation when interacting with the dragon avatar because it was not human, therefore providing a slight layer of anonymity between the stranger and themselves. Also related to this, the female participants were able to look like one of the experimental avatars (the female), but none of the participants were able to look like the dragon, or non-human. As this was the case, perhaps the participants felt the dragon was more whimsical or novel and so perhaps they found it easier to share personal information with the dragon. Future research could examine a masked avatar versus a female avatar without a mask to see if just altering the human avatar slightly is enough to recreate this finding for inexperienced users, or perhaps recreating the set of studies to examine an “ugly” female versus “pretty” female avatar and perceived trustworthiness. Finally, while the

content of information offered by the confederate to the participants was held constant, the information was only offered as requested. As the research on reciprocity has suggested, perhaps the inexperienced users were more likely to request information about their partner and therefore felt more willing to share in return (Barak & Gluck-Ofri, 2007; Dindia & Allen, 1992).

Controlling for reciprocity should be a priority in future research, such that all participants receive the same content and amount of information.

It is interesting that for an experienced user, similar results are found from the observational study: they are willing to share information and at a consistent level regardless of avatar appearance. One explanation could be de-sensitization to the look of avatars because of time interacting with others via that medium. Another explanation is that there is a mediating personality variable not accounted for here that influences certain people to join virtual environments to connect with others. Both are worthy of future research studies that can help predict and enhance trust among those who choose to use virtual environments.

The other non-significant findings may suggest that the refusal to self-disclose based solely on the visual appearance of the target avatar (as perceived trustworthiness was found in Study 1) may time out quickly, therefore accounting for the lack of significant findings. A post hoc 2 (avatar condition) x 2 (experience) ANOVA was conducted on question level completed at minute 3, and revealed non-significant differences between the 4 levels in the pace of the conversation: at 3 minutes into the conversation there were no significant differences in the question (see Table 4) the confederate was able to get through with the participant based on avatar, $F(1,56) = 0.52, p = .48$, experience, $F(1,56) = 1.34, p = .25$, nor the interaction between the two, $F(1,56) = 0.09, p = .77$. This data might suggest that the questions were not sensitive

enough to bring out differences quickly enough, or that avatar appearance and experience with virtual worlds do not impact self-disclosure with interacting via avatars online.

The MANOVA revealed that Hypothesis 4 was not fully supported by the data: the avatar appearance did not have an effect on the number or detail of items self-disclosed during the conversations. The lack of a significant difference suggests that self-disclosure is not necessarily impacted by appearance of an avatar as perceived trust did in Study 1. Perhaps this is because self-disclosure is not a good proxy for trust. While a part of self-disclosure may be based in trusting behavior there appears to be several other variables that account for why people choose to share information with others (Valkenburg & Peter, 2009). As expected from the literature (Nowak & Rauh, 2008), experience did account for some of the variance observed, as hypothesized.

The data did support Hypothesis 5, in that significantly more participants self-disclosed information for the first question than the last question; however, those who shared both pre- and post-task were not rated as significantly more open to sharing post-task than pre-task, but rather were significantly different in the opposite direction than expected. Together these two analyses still lend support to Altman and Taylor's (1973) Social Penetration Theory, in that everyone was willing to speak to where they were from, a more common question when first meeting someone. However, by question 3, 10% would not respond to the question "what do you look like in real life?" While the theory would suggest over time this question would likely become an appropriate question to ask, in the 7-minute timeframe of just meeting a stranger it likely was an intimidating question to those refusing to answer.

Hypothesis 6 was supported by the data, in that some of the subjective measures (ITS, TiP, SDI) and other subjective personality measures (ATS, Openness) were significantly correlated with each other. More specifically, the two trust scales were significantly related, but only the Trust in People scale was significantly correlated with the SDI OS (and not the SDI SS). This suggests, that while the ITS is not correlated with any of the self-disclosure measures both objective and subjective, trust could still be related to self-disclosure as Yum and Hara (2006) and Rotter (1971) suggested.

Also, just as in Study 2, the SDI-OS and SDI-SS were significantly correlated, which again gives some support to conducting future research to create the same sex scale based on the Self-Disclosure Index, which was validated with opposite sex dyads.

Exploratory analyses on sex and the objective measures of self-disclosure for the experimental task revealed no significant differences. Some literature on self-disclosure suggests differences in sharing personal information by sex; hence, future research could focus on gender-differences specifically and therefore recruit for each of the two groups equally.

Finally, other limitations of the current set of studies include the lack of observations of the participant's desire to alter the avatar assigned to them for the experiment, and the truthfulness of the information provided by the participant to the confederate in response to the questions asked. The first limitation could reveal some interesting underlying personality or engagement variables that might affect the willingness to self-disclose. The second limitation of this study could easily be corrected in future studies (e.g., including questions in the survey post-experiment and see if the responses match) and could potentially offer another aspect of self-

disclosure: the willingness to share inaccurate information, in addition to the willingness to share accurate information, or reluctance to self-disclose any information.

CHAPTER NINE: CONCLUSION

From comparing ITS scores with SDI and task measures across the studies, it appears that measuring trust with ITS is not similar in what is measured by the SDI (subjective measure) or objective measures of self-disclosure. Correlations in both Study 1 and 3 validate that the SDI is reliable at assessing a person's likelihood to self-disclose information as exhibited in Study 3 with their behavior matching their self-reported level.

Self-disclosure is not correlated with the ITS, but does mildly correlate with the Trust in People Scale. As Rotter (1976, 1971, 1980) hypothesized, it is through experience, observation, and rewards that people learn to expect a way of interacting with others, which could account for mistrust of people we have never met but also how trusting in general people are to those around us. He defined interpersonal trust specifically as an expectancy of a person or group that the communications of another can be relied on, and as such purposefully designed a survey to measure the multi-faceted construct of trust. On the other hand, the Trust in People Scale is very short and it more about how trusting someone is globally toward others, and because of this it might make relate better with self-disclosure over the Internet, where you have limited amounts of source information to determine the security of sharing personal information.

Overall, this set of studies set out to better understand trust relationships that are formed via avatars in virtual environments, and to help understand the connection between self-disclosure behavior and that that means, if anything, about trust. It appears that self-disclosure is at least in part related to trust, but not as Rotter defines it. In addition, perhaps trust only plays a small roll in self-disclosure, especially when interacting via avatars. The virtual environment already gives the user a degree of separation (just as other online forums allow—anonymity), but

it does generally also provide less source information to better determine when to extend trust and when not to. Nowak and Rauh (2008) suggested that avatars could be used for source information much like a use a person's appearance is used in face-to-face interactions. The results from Study 1 seem to point to this need for source information and how automatic this process might be for us. By looking at static images 400 university students were able to attribute a level of trustworthiness to avatars, along with a list of other attributes, and significant differences were found in those perceptions based solely on the look of the avatar pictured. However, both Studies 2 and 3 were not able to replicate those findings, with the main differences of interacting with the avatar and the participant's experience in virtual worlds. Even after recruiting for and comparing results by experience, the trust rating from the participants on the confederate's avatars were not significantly different, but their willingness to share information was significantly different based on their experience. Perhaps this speaks to a two-step (or more) process whereby trustworthiness is assessed and managed when interacting via avatar. At first glance, the look of the avatar is a readily available source of information from which we can make judgments about what we would expect when interacting with the person based on the avatar (Lewis & Weigert, 1985). However, this information is quickly replaced by the interaction itself, which drives the foundation for the trust relationship, but that those who spend more time in virtual worlds might be more willing to look beyond the avatar and its appearance. This would match more closely with the self-disclosure literature, as well as Altman and Taylor's (1973) Social Penetration Theory and the research by Nowak & Rauh (2006).

One main limitation of this research is the lack of clarity if the experimental protocol hindered the formation of trust, by a lack of presence within the virtual environment. By using

text chatting and a task that was not focused in world (but rather on mini screens that pop in front of the world), the participant might not have been focused on the avatar with whom they were interacting. Riegelsberger (2005) found that participants felt it was easier to trust in the advice given in rich media contexts when there tends to be the bias to feel more connected, or a greater sense of presence. More research should be conducted where the tasks and interactions are more focused in the virtual world and interacting with the other person's avatar in that space.

In addition, research should be conducted to further investigate this connection between trust and self-disclosure, particularly at the first point of interaction between strangers. In addition, research could be done with respect to the sense of presence that is felt when interacting in a virtual environment and how that might affect the trust relationship of stranger interacting via avatars.

Finally, additional research should be done to better understand the mediating and moderating variables for trust, specific to interacting via the Internet. Much like self-disclosure has identified situations and moments when self-disclosure is limited, it would be a helpful step in the direction of identifying an objective measure of trust if related and related-predictive variables can be identified.

APPENDIX A: INTERPERSONAL TRUST SCALE

GENERAL OPINION SURVEY

This is a questionnaire to determine the attitudes and beliefs of different people on a variety of statements. Please answer the statements by giving as true a picture of your own beliefs as possible. Be sure to read each item carefully and show your beliefs by marking the appropriate number in the blank.

If you strongly agree with an item fill in the space with a "1". Mark the space with a "2" if you mildly agree with the item. That is, mark number two if you think the item is generally more true than untrue according to your beliefs. Fill in the space with a "3" if you feel the item is about equally true as untrue. Fill in the space with a "4" if you mildly disagree with the item. That is, mark number four if you feel the item is more untrue than true. If you strongly disagree with an item fill in the space numbered five.

1	2	3	4	5
Strongly Agree	Mildly agree	Agree <u>and</u> disagree	Mildly disagree	Strongly disagree

1. _____ Most people would rather live in a climate that is mild all year around than in one in which winters are cold.
2. _____ Hypocrisy is on the increase in our society.
3. _____ In dealing with strangers, one is better off to be cautious until they have provided evidence that they are trustworthy.
4. _____ This country has a dark future unless we can attract better people into politics.
5. _____ Fear of social disgrace or punishment rather than conscience prevents most people from breaking the law.
6. _____ Parents usually can be relied upon to keep their promises.
7. _____ The advice of elders is often poor because the older person doesn't recognize how times have changed.
8. _____ Using the Honor System of not having a teacher present during exams would probably result in increased cheating.
9. _____ The United Nations will never be an effective force in keeping world peace.
10. _____ Parents and teachers are likely to say what they believe themselves and not just what they think is good for the child to hear.
11. _____ Most people can be counted on to do what they say they will do.
12. _____ As evidenced by recent books and movies morality seems on the downgrade in this country.
13. _____ The judiciary is a place where we can all get unbiased treatment.

1 **2** **3** **4** **5**
Strongly Agree Mildly agree Agree and disagree Mildly disagree Strongly disagree

14. ____ It is safe to believe that in spite of what people say most people are primarily interested in their own welfare.
15. ____ The future seems very promising.
16. ____ Most people would be horrified if they knew how much news the public hears and sees is distorted.
17. ____ Seeking advice from several people is more likely to confuse than it is to help one.
18. ____ Most elected public officials are really sincere in their campaign promises.
19. ____ There is no simple way of deciding who is telling the truth.
20. ____ This country has progressed to the point where we can reduce the amount of competitiveness encouraged by schools and parents.
21. ____ Even though we have reports in newspapers, radio and television, it is hard to get objective \ accounts of public events.
22. ____ It is more important that people achieve happiness than that they achieve greatness.
23. ____ Most experts can be relied upon to tell the truth about the limits of their knowledge.
24. ____ Most parents can be relied upon to carry out their threats of punishment.
25. ____ One should not attack the political beliefs of other people.
26. ____ In these competitive times one has to be alert or someone is likely to take advantage of you.
27. ____ Children need to be given more guidance by teachers and parents than they now typically get.
28. ____ Most rumors usually have a strong element of truth.
29. ____ Many major national sport contests are fixed in one way or another.
30. ____ A good leader molds the opinions of the group he is leading rather than merely following the wishes of the majority.
31. ____ Most idealists are sincere and usually practice what they preach.
32. ____ Most salesmen are honest in describing their products.

1 **2** **3** **4** **5**
Strongly Agree Mildly agree Agree and disagree Mildly disagree Strongly disagree

33. _____ Education in this country is not really preparing young men and women to deal with the problems of the future.

34. _____ Most students in school would not cheat even if they were sure of getting away with it.

35. _____ The hordes of students now going to college are going to find it more difficult to find good jobs when they graduate than did the college graduates of the past.

36. _____ Most repairmen will not overcharge even if they think YOU are ignorant of their specialty.

37. _____ A large share of accident claims filed against insurance companies are phony.

38. _____ One should not attack the religious beliefs of other people.

39. _____ Most people answer public opinion polls honestly.

40. _____ If we really knew what was going on in international politics, the public would have reason to be more frightened than now seem to be.

APPENDIX B: TRUST IN PEOPLE SCALE

1. Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?

*Most people can be trusted

Can't be too careful

2. Would you say that most of the time, people try to be helpful, or that they are mostly just looking out for themselves?

*Try to be helpful

Look out for themselves

3. Do you think that most people would try to take advantage of you if they got the chance or would they try to be fair?

Take advantage

*Try to be fair

APPENDIX C: OPENNESS SCALE

Below there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, and then fill in the bubble that corresponds to the number on the scale.

Response Options

1: Very Inaccurate 2: Moderately Inaccurate 3: Neither Inaccurate nor Accurate 4: Moderately Accurate 5: Very Accurate (from <http://ipip.ori.org/>)

- 5+ Have a rich vocabulary.
- 5- Have difficulty understanding abstract ideas.
- 5+ Have a vivid imagination.
- 5- Am not interested in abstract ideas.
- 5+ Have excellent ideas.
- 5- Do not have a good imagination.
- 5+ Am quick to understand things.
- 5- Try to avoid complex people.
- 5+ Use difficult words.
- 5- Have difficulty imagining things.
- 5+ Spend time reflecting on things.
- 5- Avoid difficult reading material.
- 5+ Am full of ideas.
- 5- Will not probe deeply into a subject.
- 5+ Carry the conversation to a higher level.
- 5+ Catch on to things quickly.
- 5+ Can handle a lot of information.
- 5+ Am good at many things.
- 5+ Love to read challenging material.
- 5+ Love to think up new ways of doing things.

APPENDIX D: SELF-DISCLOSURE INDEX

Please indicate your willingness to disclose the following information to a female stranger on a scale of 0 to 4: (0) Discuss not at all to (4) Discuss fully and completely:

1. My personal habits
2. Things I have done which I feel guilty about
3. Things I wouldn't do in public
4. My deepest feelings
5. What I like and dislike about myself
6. What is important to me in life
7. What makes me the person I am
8. My worst fears
9. Things I have done which I am proud of
10. My close relationships with other people

Please indicate your willingness to disclose the following information to a male stranger on a scale of 0 to 4: (0) Discuss not at all to (4) Discuss fully and completely:

1. My personal habits
2. Things I have done which I feel guilty about
3. Things I wouldn't do in public
4. My deepest feelings
5. What I like and dislike about myself
6. What is important to me in life
7. What makes me the person I am
8. My worst fears
9. Things I have done which I am proud of
10. My close relationships with other people

APPENDIX E: ANTHROPOMORPHIC TENDANCIES SCALE

Please read each statement carefully. Indicate the strength of your agreement with each statement by filling in the blank using the following 5-point scale. There are no right or wrong answers to any of these statements. We are interested in your honest reactions and opinions.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

- _____ 1. I would yell at a COMPUTER if it did something I did not like.
- _____ 2. I would not praise a GOD OR HIGHER POWER when it does something I like.
- _____ 3. A GOD OR HIGHER POWER does not have a personality like a person has a personality.
- _____ 4. I would hit a CAR if it did something I did not like.
- _____ 5. A GOD OR HIGHER POWER has a spirit or life-force like people do.
- _____ 6. I would hit a BACKPACK if it did something I did not like.
- _____ 7. A GOD OR HIGHER POWER cannot communicate with people.
- _____ 8. I would not praise a PET when it does something I like.
- _____ 9. I would hit a MICROWAVE if it did something I did not like.
- _____ 10. When I am clearly upset, a GOD OR HIGHER POWER does not know.
- _____ 11. A BACKPACK does not have a personality like a person has a personality.
- _____ 12. I do not act as if a GOD OR HIGHER POWER has a spirit or life-force like people do.
- _____ 13. When I talk to a PET, I do not believe it understands me.
- _____ 14. I would yell at a CAR if it did something I did not like.
- _____ 15. When I am clearly upset, an OCEAN does not know.
- _____ 16. A GOD OR HIGHER POWER is intelligent like a human is intelligent.
- _____ 17. If I were to get rid of a BACKPACK, it would feel abandoned.
- _____ 18. When I talk to a GOD OR HIGHER POWER, I do not believe it understands me.
- _____ 19. I would hit a COMPUTER if it did something I did not like.
- _____ 20. A PET has a spirit or life-force like people do.
- _____ 21. I treat a BACKPACK like a human.
- _____ 22. I would apologize to a GOD OR HIGHER POWER for accidentally hurting it.
- _____ 23. I would talk to a CAR.
- _____ 24. A PET does not have a personality like a person has a personality.
- _____ 25. I would talk to a COMPUTER.
- _____ 26. I would apologize to a PET for accidentally hurting it.
- _____ 27. A PET is intelligent like a human is intelligent.
- _____ 28. When I am clearly upset, a CAR does not know.
- _____ 29. A CAR has a spirit or life-force like people do.

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____ 30.	When I am clearly upset, a PET does <u>not</u> know.				
_____ 31.	I do <u>not</u> act as if a STOMACH has a spirit or life-force like people do.				
_____ 32.	A PET likes certain people better than others.				
_____ 33.	A PET <u>cannot</u> communicate with people.				
_____ 34.	I would <u>not</u> buy a present for a PET.				
_____ 35.	I do <u>not</u> act as if a MICROWAVE has a spirit or life-force like people do.				
_____ 36.	A COMPUTER does <u>not</u> do things just to annoy me.				
_____ 37.	I would <u>not</u> apologize to a GOD OR HIGHER POWER for neglecting it.				
_____ 38.	If I were to get rid of a COMPUTER, it would feel abandoned.				
_____ 39.	I would <u>not</u> praise a HOUSE PLANT when it does something I like.				
_____ 40.	A MICROWAVE has a spirit or life-force like people do.				
_____ 41.	A MICROWAVE is intelligent like a human is intelligent.				
_____ 42.	When I am clearly upset, a COMPUTER does <u>not</u> know.				
_____ 43.	If a PET were to be destroyed, I would <u>not</u> mourn it like I would mourn the loss of a human.				
_____ 44.	I do <u>not</u> act as if a COMPUTER has a spirit or life-force like people do.				
_____ 45.	A COMPUTER does <u>not</u> have a personality like a person has a personality.				
_____ 46.	A STUFFED TOY is intelligent like a human is intelligent.				
_____ 47.	I would <u>not</u> buy a present for a HOUSE PLANT.				
_____ 48.	A MICROWAVE likes certain people better than others.				
_____ 49.	LUCK is intelligent like a human is intelligent.				
_____ 50.	I treat an INSECT like a human.				
_____ 51.	A STUFFED TOY does <u>not</u> have a personality like a person has a personality.				
_____ 52.	When I am clearly upset, a MICROWAVE does <u>not</u> know.				
_____ 53.	I would <u>not</u> praise a MICROWAVE when it does something I like.				
_____ 54.	A STUFFED TOY <u>cannot</u> communicate with people.				
_____ 55.	I would talk to a GOD OR HIGHER POWER.				
_____ 56.	I would <u>not</u> apologize to a COMPUTER for neglecting it.				
_____ 57.	An OCEAN does <u>not</u> do things just to annoy me.				
_____ 58.	I do <u>not</u> act as if an OCEAN has a spirit or life-force like people do.				
_____ 59.	A STOMACH does <u>not</u> have a personality like a person has a personality.				
_____ 60.	If I were to get rid of a MICROWAVE, it would feel abandoned.				

	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	61.	A COMPUTER has a spirit or life-force like people do.			
_____	62.	An OCEAN does <u>not</u> have a personality like a person has a personality.			
_____	63.	I would <u>not</u> apologize to a BACKPACK for neglecting it.			
_____	64.	I do <u>not</u> act as if a CAR has a spirit or life-force like people do.			
_____	65.	I treat a PET like a human.			
_____	66.	I do <u>not</u> act as if a PET has a spirit or life-force like people do.			
_____	67.	I would name a PET.			
_____	68.	I treat a COMPUTER like a human.			
_____	69.	I would talk to a PET.			
_____	70.	If I were to get rid of a STUFFED TOY, it would feel abandoned.			
_____	71.	If I were to get rid of a PET, it would feel abandoned.			
_____	72.	I treat a GOD OR HIGHER POWER like a human.			
_____	73.	A MICROWAVE does <u>not</u> do things just to annoy me.			
_____	74.	I do <u>not</u> act as if LUCK has a spirit or life-force like people do.			
_____	75.	I would <u>not</u> buy a present for a BACKPACK.			
_____	76.	If I were to get rid of a HOUSE PLANT, it would feel abandoned.			
_____	77.	When I talk to a CAR, I do <u>not</u> believe it understands me.			
_____	78.	I treat a MICROWAVE like a human.			

APPENDIX F: DEMOGRAPHICS QUESTIONNAIRE STUDY ONE

1. Are you ___ Male or ___ Female?
2. What is your age? _____
3. How many years have you been using a computer? _____
4. How many hours a day do you use a computer? _____
5. How comfortable are you using a computer in general? Very Somewhat Not at all
6. How many years have you been using the internet? _____
7. How many hours a day do you spend browsing the internet? _____
8. How comfortable are you browsing the internet? Very Somewhat Not at all
9. How many weeks have you had a *Second Life* account?
10. How many hours a day do you spend in *Second Life*? _____
11. How comfortable are you with *Second Life*? Very Somewhat Not at all
12. Do you commonly connect with friends via the Internet (e.g. via instant messaging, email, social networking websites, blogs, etc.)? Yes No
13. If you responded yes to number 12, how many hours in a day would you say you are connecting with friends via the Internet? _____
14. Do you commonly seek out others whom you do not know to connect with them via the Internet (e.g. via *Facebook* or *MySpace*, blogs, online forums, online dating websites)?
15. If you responded yes to number 14, how many hours in a day would you say you are connecting with others whom you do not know via the Internet? _____

APPENDIX G: INSTRUCTIONS FOR EACH SECTION OF THE ONLINE SURVEY

Section 1, Rate the Avatar: In the following 8 sections of this survey there will be 1 avatar per section. Please rate the each avatar on all 10 dimensions using the scale below. You will have 10 responses in total for each section/avatar, 1 for each dimension. Please provide a response for every question.

Sections 2-8, Rate the Avatars: Please rate the following avatar on each of the 10 dimensions using the scale below. You will have 10 responses in total, 1 for each dimension. Please provide a response for every question.

Section 9, Rank the Avatars: Please rank the following avatars in order from (1) least trustworthy to (8) most trustworthy. There are 8 avatars and 8 places in the rank, please use each response only once.

Section 10, ITS: This is a questionnaire to determine the attitudes and beliefs of different people on a variety of statements. Please answer the statements by giving as true a picture of your own beliefs as possible. Be sure to read each item carefully and show your beliefs by marking the appropriate number in the blank.

If you strongly agree with an item fill in the bubble corresponding with “1”. Mark the bubble “2” if you mildly agree with the item. That is, mark number two if you think the item is generally more true than untrue according to your beliefs. Mark the bubble “3” if you feel the item is about equally true as untrue. Mark the bubble “4” if you mildly disagree with the item. That is, mark number four if you feel the item is more untrue than true. If you strongly disagree with an item fill in the bubble numbered five.

Section 11, Trust in People Scale: After each of the questions below, select the one response that best describes how you feel.

Section 12, Self-Disclosure Index, part 1: Please indicate your willingness to disclose the following information to a FEMALE stranger on a scale of 0 to 4: (0) Discuss not at all to (4) Discuss fully and completely.

Section 13, Self-Disclosure Index, part 2: Please indicate your willingness to disclose the following information to a MALE stranger on a scale of 0 to 4: (0) Discuss not at all to (4) Discuss fully and completely.

Section 14, Openness Scale: Below there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. Remember that this survey is completely anonymous, so please describe yourself in an honest manner. Please read each statement carefully, and then select the bubble that corresponds to the number on the scale.

Section 15, ATS, part 1: For the next 3 sections, please read each statement carefully. Indicate the strength of your agreement with each statement by choosing your response from the 5-point scale. There are no right or wrong answers to any of these statements. We are interested in your honest reactions and opinions.

Section 16, ATS part 2: Continued... For the next 2 more sections, please read each statement carefully. Indicate the strength of your agreement with each statement by choosing your response from the 5-point scale. There are no right or wrong answers to any of these statements. We are interested in your honest reactions and opinions.

Section 17, ATS, part 3: Continued... For the last of the 3 sections, please read each statement carefully. Indicate the strength of your agreement with each statement by choosing your response from the 5-point scale. There are no right or wrong answers to any of these statements. We are interested in your honest reactions and opinions.

Section 18, Demographics Questionnaire: Please answer the following questions about yourself:

APPENDIX H: STUDY 2 CODING WORKSHEET

Study 2: Coding Instructions

Context:

During conversations the researcher asked three main questions of the participants: “Where are you from?”, “What do you do?” and “What do you look like in real life?” The researcher’s goal was to get to city area level for where they are from, position and company for what they do, and down to hair color, nationality, and height.

Coding Instructions:

You will have 30 conversations to code. You are to code how detailed the participants’ responses were and how many promptings it took to get that level of detail. You will use the following scale to score the quality of the participants’ responses during the conversation:

Detail of Response Scale:

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the request information	Well beyond the requested information
0	1	2	3	4	5

Then for the number of promptings, please count the number of promptings it took by the researcher to get the participant to respond adequately to the question (met the goal) or beyond (if they did so). Keep in mind that even if two questions were asked, they might have been grouped so as to act like one probe.

Coding Sheets:

Participant Number _____

1. ~~Where are you from?~~

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the request information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

2. What do you do?

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the requested information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

3. What do you look like in real life?

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the requested information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

Notes:

Participant Number: 1

1. *Where are you from?*

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the requested information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

2. *What do you do?*

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the requested information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

3. *What do you look like in real life?*

Refused to answer	Very vague and only gave generalities	Somewhat vague, some generalities	The requested (goal) amount of details	Somewhat above the requested information	Well beyond the requested information
0	1	2	3	4	5

Number of promptings: _____

Notes:

APPENDIX I: CONFEDERATE SCRIPT

Second Life Experiment

Confederate Script

Log in to *Second Life* and get in right outfit based on condition: girl (“girl next door” clothing or dragon suit). Then meet the researcher and participant at the experiment site, standing in the coffee shop: {StarStruck Coffee - Coffee Shop, Villa Clara (159, 206, 22) – General} OR {TC's Coffee 911, Lionheart Kiara (17, 127, 29) – Moderate}

Send Emilio the survey code, participant number, and session number.

Wait for the researcher to appear in the experimental location with the participant. Be introduced to the participant by the researcher and begin the experimental protocol when the researcher says:

I'd like to welcome you both here and thank you for agreeing to participate in this study. Let's have a seat over here at this table. I'll give you a few minutes to introduce yourselves, while I try to recruit one more participant.

Want to know where they live down to city, providence/state/region, rural/urban (big city, town, village)

Always ask where cities are

From New York City, NY, USA, don't know anything specific about NYC - just moved here

Want to know what they do down to company or industry/school, and position or title/degree, and role or domain/degree

Student studying B.A. Art at NYU, Art History

P/T server job at a pizza place

Want to know what they look like in real life down to nationality, height, and hair color

Question Prompts (One **main question** every 2 ½ minutes, with *F/U questions* allowed after question acknowledgement) / Filler Responses (As requested/required for conversation): **[7 Minutes Here]**

Hi. How are you?
Doing well, thanks.

So, where are you from?

what country?

what area or region?

what city are you from?

I'm from New York City, NY, USA
I'm not sure. I just moved here.

what do you do in real life, like for a job or school maybe?

what school?

what is your major or program?

what degree?

Do you know what you will do with that?

What company do you work for?

What industry is that?

*What is your official title there?
What is your role?*

I'm a F/T student studying Art at NYU...B.S. degree.
Art History
Not sure what I will do with mine yet.
I'm a P/T server job at a pizza place here

I'm just curious, what do you look like in real life?

What nationality are you?

How tall are you?

What color hair do you have?

I'm all-american, average height, blonde hair and blue eyes.

Acknowledgements (after they share some info about themselves):

fun

very interesting

that's neat

lol

:)

IF THEY SAY THEY DON'T WANT TO SHARE: I understand

Once the researcher says the following, discontinue the experimental protocol:

Okay, I was not successful. We are going to move ahead without a third participant. Are you both ready to begin?

Lost At Sea Activity (filler tasks):

5 minutes on own to complete their rankings.

20 minutes for Consensus building...offer info about why ranked, offer flotation device as first, and water/food next. Then suggest start at bottom of list. Sextant...no clue what it is, so should be last. Maps...useless except for fire starting perhaps. Tarp, rope and net are useful to have: water, tie things together, fishing?. Ask participant to keep the ratings and send to the researcher.

Once consensus is achieved, stay logged in and wait for the participant to be finished with the survey.

APPENDIX J: DEMOGRAPHICS SURVEY STUDY THREE

Demographics

Please answer the following questions about yourself:

[Dem01]Sex: *

Please choose **only one** of the following:

Female

Male

[Dem02]What is your age? *

Please write your answer here:

[Dem03]How many years have you been using a computer? *

Please write your answer here:

[Dem04]How many hours a day do you use a computer? *

Please write your answer here:

[Dem05]How comfortable are you using a computer in general? *

Please choose **only one** of the following:

Very

Somewhat

Not at all

[Dem06]How many years have you been using the internet? *

Please write your answer here:

[Dem07]How many hours a day do you spend browsing the internet? *

Please write your answer here:

[Dem08]How comfortable are you browsing the internet? *

Please choose **only one** of the following:

Very

Somewhat

Not at all

[Dem09]If you currently have a *Second Life* account, how long have you had the account?

Please write your answer here:

[Dem10]How many hours a day do you spend in *Second Life*? *

Please write your answer here:

[Dem11]How comfortable are you with *Second Life*? *

Please choose **only one** of the following:

Very

Somewhat

Not at all

[Dem12]Do you commonly connect with friends via the Internet (e.g. via instant messaging, email, social networking websites, blogs, etc.)? *

Please choose **only one** of the following:

Yes

No

[Dem13]If you responded yes to the last question, how many hours in a day would you say you are connecting with friends via the Internet?

Please write your answer here:

[Dem14]Do you commonly seek out others whom you do not know to connect with them via the Internet (e.g. via *Facebook* or *MySpace*, blogs, online forums, online dating websites)? *

Please choose **only one** of the following:

Yes

No

[Dem15]If you responded yes to the last question, how many hours in a day would you say

you are connecting with others whom you do not know via the Internet?

Please write your answer here:

APPENDIX K: INFORMED CONSENT WEBPAGE CONTENT

Informed Consent Form

Please read the informed consent form below which goes over the research and provides you with information about the researchers. Once you have read through the form (and asked any questions you may have to the researcher in Second Life), and if you agree, select "yes" at the bottom of the page and click on the submit button to continue. Thank you!

Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in an experimental study. You are being invited to take part in a research study that will include about 80 people. You can ask questions about the research. You must be 18 years of age or older and open to downloading *Second Life* to your computer to be included in the research study. You will click on the link below to start the download and will be given an account to log into the system with.

The person conducting this research is Amanda Surprenant, M.S. Because the researcher is a graduate student in psychology she is being guided by Dr. Valerie Sims, a UCF faculty member in Psychology.

Study title: *Second Life* Experiment

You will be asked to complete a short task with a partner. Immediately following the task, you will be asked to complete a short, completely anonymous survey about yourself. This experiment is being conducted as part of a dissertation for a Ph.D. degree from the University of Central Florida. The whole experiment should not take more than about 1 hour to complete. There are no risks in participating in this study, as your responses will NOT be linked in any way to your name. The benefits include learning more about *Second Life* and how to navigate in world.

What you should know about a research study:

- Someone will explain this research study to you.
- A research study is something you volunteer for.
- Whether or not you take part is up to you.
- You should take part in this study only because you want to.
- You can choose not to take part in the research study.
- You can agree to take part now and later change your mind.
- Whatever you decide it will not be held against you.
- Feel free to ask all the questions you want before you decide.

This study is anonymous, in that we will not ask for any identifying pieces of information. We will only use a number to link your task results with your questionnaire. You do not have to answer every question or complete every task. You will not lose any benefits if you skip questions or tasks. For your participation you will receive SONA credit at the rate of ½ credit per ½ hour of participation.

Study contact for questions about the study or to report a problem: Amanda Surprenant, Graduate Student, UCF Human Factors Psychology PhD Program, College of Sciences, amanda.surprenant@knights.ucf.edu or Dr. Valerie Sims, Faculty Supervisor, Department of Psychology by email at vsims@mail.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

By clicking on the link below you are consenting to participate in this study, which will in no way link the information you provide to your name or any other identifier.

**Thank you for your participation,
Amanda Surprenant
Faculty Advisor: Dr. Valerie Sims**

APPENDIX L: RESEARCHER SCRIPT

Second Life Experiment Researcher Script

Pre-Session Prep:

Have the *Second Life* login screen open on both computers. Have the clock with second hand showing on the researchers' computer.

Session Welcome:

Greet the participant from the hallway and bring them to the lab computer.

Thank you for your participation today. You will be using an online environment to complete a task. Before we begin, I have quick background question to verify with you: Do you have or have you ever had an account for a virtual environment in which you interact with others via an avatar (e.g., World of Warcraft, Second Life, etc)?

If no: *Great. Let's continue.*

If yes: *Thank you for your time, but you do not fit the requirements for the study. You will be given ½ point of extra credit for your time today/tonight.*

Session Introduction:

Have the participant choose an avatar and sign them in (make sure you login for them, and don't give out the password):

Male: Baxter Rae, dissertation

Female: Rebecca Sheryffe, dissertation

Immediately send them the Informed Consent message and notecard:

Private IM to Participant:

First I'll be giving you a note card with a link to the study's informed consent form. To access the link, highlight it, copy and paste it to the Second Life URL bar and hit enter. When prompted to open a browser window, select "Ok." Your participant number is ___ and you will need to enter this on the form.

Notecard:

1. Informed Consent Note Card: { the link to the survey is:

http://www.acatlab.com/ls_survey/index.php?sid=46456&lang=en }

Allow them to go over and sign informed consent form in SL. Answer any questions they may have. Wait for the confirmation email that the IC was submitted before continuing on.

Second Life Introduction:

Next send them the *Second Life* Introduction message:

Private IM to Participant:

Now, I'll give you a few minutes to learn the controls of Second Life. If you have any questions, feel free to ask. Also, if you would like to change the appearance of your avatar, you are welcome to do so. To change your appearance, click on the Shirt tab on the right hand side of the screen. Once you are finished, we will quickly practice using Public chat and Private chat. Allow them 5 minutes to explore the controls and using the various chat options. Try to limit the change of appearance to no more than 5 minutes, and instruct them to use only the shirt icon

from the menu box to the right.

Experiment Location:

Teleport your avatar to experimental site {StarStruck Coffee - Coffee Shop, Villa Clara (159, 206, 22) – General} or {TC's Coffee 911, Lionheart Kiara (17, 127, 29) – Moderate} and offer the participant the Teleport message and teleport from the chat window:

Private IM to Participant:

I am now going to teleport to the site of the experiment. Once I'm there I will send you a teleport request.

Participant Introductions (part one of actual experiment):

Send the Introduction message.

Public Chat to Participants:

I'd like to welcome you both here and thank you for agreeing to participate in this study. I'll give you a few minutes to introduce yourselves, while I try to recruit one more participant.

Allow the confederate exactly 7 minutes to interact with the participant. Make sure to use the computer clock with second hands to control for the amount of time. Once you send a chat/message to the participants, the confederate will cease the experimental protocol. **YOU DO NOT NEED TO RECRUIT ANOTHER PARTICIPANT DURING THIS TIME.**

End the introductions and signal start of “experiment.”

Public Chat to Participants:

I'm going to give you both a note card. On the note card are the specific instructions for the task I would like you to carry out. You will receive the note card in the private chat window. This first task is to be completed on your own. You will have 5 minutes to complete it. When you are finished, please use the private chat to let me know. During the task if you have any questions use the private chat to ask me. Before we begin, are there any questions?

Once you are finished, please save the changes you made to the note card for Task A and “share” it with me.

Have them number their list on this notecard and save it. Then “Share” it with you

Task A Introduction:

Send Task A message and Notecard with the Lost At Sea Activity.

Notecard:

Task A

Be sure to save the participants' ratings as Participant X in your inventory as data.

Then create the Session X notecard by pasting the participant's ratings with the confederate's ratings.

Task A Conclusion/ Task B Introduction:

Send them message to complete Task A and start Task B.

Public Chat to Participants:

Ok, the first task is done. Now, this next task will be cooperative. I'll send you both another note card with instructions on it. This time, I want you both to discuss the task and come to a consensus on your answers. Please use the private chat window with each other for this task, to avoid any confusion with any other public conversations that may take place during the task. In addition to the new Task note card, I'm also sending the answers you provided for Task A to each other so you have a starting point for discussion. You will have 20 minutes for this task. Again, if you have any questions for me during this task please use the private chat to ask.

Notecards:

Task B

Session X notecard

Once consensus is achieved, ask the participant to send back the notecard with the pair's rankings.

Participant Follow-Up Interaction (part two of actual experiment):

Give the confederate exactly 3 more minutes after receiving the final ratings notecard to carry on a conversation with the participant. Following the three minutes, send them the experts' answers notecard, and this will signal to the confederate to stop the experimental protocol.

Public Chat to Participants:

I would like to thank both of you for participating in this study. Please wait for me to collate your responses.

Task Wrap-Up, Share Experts' Ratings:

Public Chat to Participants:

Okay, we are now set to review the experts' ratings. I will send you a note card with their ratings. Feel free to take a minute to look it over and wrap up any discussions with your partner about the ratings.

Notecard:

Expert Ratings

Survey Introduction:

Send the Survey message, token IM, and notecard.

Public Chat to Participants:

Finally, before we conclude, I will be sending you each one more note card with a link to an online survey that I would like you to fill out.

Private IM to Participant: (Amanda will email before the start of the study)

The code you will need to access the survey is _____.

Notecard:

Survey

{http://www.acatlab.com/ls_survey/index.php?sid=94457&lang=en}

Once they have submitted the survey (email notification received), move on to the debrief.

Session Debrief:

Send them the debrief message and notecard.

Private IM to Participant:

Great. Thank you for submitting your survey. Here is one final notecard with a link to a debriefing letter. Please do not hesitate to ask me any questions about the study, as I am happy to answer them for you. And thank you again for your participation. I will now credit your account (SONA). If you have any additional questions for me, feel free to ask.

Notecard:

Debrief

{http://www.acatlab.com/ls_survey/index.php?sid=33493&lang=en}

Answer any questions they may have.

Payment and Wrap-Up:

Pay the participant: ½ point of extra credit for each ½ hour of participation, and that their credits will be posted on the SONA system. Then thank for their time.

After-Session Clean-Up:

Move the participant avatar back to the bridge on Orientation Island.

Clean out their inventory/notecards and put student clothes back on.

Clean out IM chat box history.

Log out.

APPENDIX M: FILLER TASKS

Note card 3 – Task A

Lost At Sea Worksheet

Instructions:

You are adrift on a private yacht in the South Pacific. As a consequence of a fire of unknown origin, much of the yacht and its contents have been destroyed. The yacht is now slowly sinking. Your location is unclear because of the destruction of critical navigational equipment and because you and the crew were distracted trying to bring the fire under control. Your best estimate is that you are approximately one thousand miles south-southwest of the nearest land.

Below is a list of fifteen items that are intact and undamaged after the fire. In addition to these articles, you have a serviceable, rubber life raft with oars large enough to carry yourself, the crew, and all the items listed below. The total contents of all survivors' pockets are a package of cigarettes, several books of matches, and five one-dollar bills. Your task is to, on your own, rank the fifteen items below in terms of their importance to your survival. Place the number 1 by the most important item, the number 2 by the second most important, and so on through number 15, the least important. You will have 5 minutes before we move on to the second part of the task.

Sextant

Shaving Mirror

5 gal can of water

Mosquito netting

One case of US Army C rations

Maps of the Pacific Ocean

Seat cushion (flotation device)

2 gal can of oil-gas mixture

Small transistor radio

Shark repellent

Twenty square feet of opaque plastic

1 qt of 160-proof Puerto Rican Rum

Fifteen feet of nylon rope

Two boxes of chocolate bars

Fishing Kit

Note card 4 – Task B

Please take the next 20 minutes to reach a consensus with the other participant on the order of the supplies. Please mark your group's ranking below, and send this notecard back to the researcher when you are finished.

Group [INSERT GROUP NUMBER HERE]

Jordan5826's Ranking:

- 15 Sextant
- 4-Shaving Mirror
- 2- 5 gal can of water
- 8 Mosquito netting
- 3-One case of US Army C rations
- 12- Maps of the Pacific Ocean
- 1- Seat cushion (flotation device)
- 2 gal can of oil-gas mixture
- 14- Small transistor radio
- 13-Shark repellent
- 7Twenty square feet of opaque plastic
- 5-1 qt of 160-proof Puerto Rican Rum
- 9Fifteen feet of nylon rope
- 6-Two boxes of chocolate bars
- 10- Fishing Kit

[INSERT APPROPRIATE AVATAR NAME]'s Ratings
[COPY LIST FROM TASK A FOR PARTICIPANT]

APPENDIX N: STUDY 3 CODING WORKSHEET

Study 3: Coding Instructions

Context:

During conversations the researcher asked three main questions of the participants: “Where are you from?”, “What do you do?” and “What do you look like in real life?” The researcher’s goal was to get to city area level for where they are from, program/major, degree and school for what they do, and down to hair color, nationality, and height for what they look like.

Coding Instructions:

You will have 59 conversations to code. You are to code:

1. How detailed the participants’ responses were (based on number of sub-questions were answered)
2. How many promptings it took to get that level of detail (including information offered by the confederate)
3. What part of the experiment the sub-questions were answered (Pre-task vs. Post-task)
4. Your assessment on how open to sharing the participant was in the conversation
5. Your assessment on how you felt this openness may or may not have changed after completing the task.

First you will use the following scale to score the quality of the participants’ responses during the conversation, and indicate (i.e., 1-4) if the sub-responses were Pre-task or Post-task (times highlighted in yellow) or some from both (i.e., Pre-Task 2 Post-Task 1). Each number corresponds with the sub-questions, with anchors for “refusing to answer” and “answered with more detail than the requested information” (e.g., eye color, county, year of study, email address, etc.)

The numbers listed are the number of sub-questions they answered:

Question 1: Where are you from:
a. What Country
b. What State
c. What City

Question 2: What do you do:
a. What school (company)
b. What program/major (industry)
c. What degree (position)
d. Future plans (role)

Question 3: What do you look like:
a. What nationality
b. How tall
c. What color hair

Detail of Response Scale:

Refused to answer	Gave 1 piece of information	Gave 2 pieces of information	Gave 3 pieces of information	Gave 4 pieces of information	Gave more than requested information
0	1	2	3	4	5

Pre-Task 2 Post-Task 1

Then for the number of promptings, please count the number of promptings it took by the researcher to get the participant to respond adequately to the question (until the point they first met the goal or went beyond it).

Number of promptings: 3

Then for the openness of the participant in sharing information, please use the following scale for both pre-task conversation and post-task conversation:

Openness to Sharing:

Not at all open to sharing personal info	Sarcastic or very hesitant in sharing info	Somewhat hesitant in sharing info	Matter-of-fact very straightforward in sharing info	Engaged in the conversation and open to sharing	Very open to sharing personal info
0	1	2	3	4	5

Finally, if there is anything you want me to know you can add that in the notes box.

Participant Code: _____

4. *Where are you from? (What Country, State, City?)*

Refused to answer	Gave 1 piece of information	Gave 2 pieces of information	Gave 3 pieces of information	Gave more than requested information
0	1	2	3	4

Pre-Task ____ Post-Task ____

Number of promptings: _____

5. *What do you do? (What School, Major/Program, Degree, Future?)*

Refused to answer	Gave 1 piece of information	Gave 2 pieces of information	Gave 3 pieces of information	Gave 4 pieces of information	Gave more than requested information
0	1	2	3	4	5

Pre-Task ____ Post-Task ____

Number of promptings: _____

6. *What do you look like in real life? (What Nationality, Height, Hair Color?)*

Refused to answer	Gave 1 piece of information	Gave 2 pieces of information	Gave 3 pieces of information	Gave more than requested information
0	1	2	3	4

Pre-Task ____ Post-Task ____

Number of promptings: _____

7. *Openness to Sharing PRE-TASK:*

Not at all open to sharing personal info	Sarcastic or very hesitant in sharing info	Somewhat hesitant in sharing info	Matter-of-fact very straightforward in sharing info	Engaged in the conversation and open to sharing	Very open to sharing personal info
0	1	2	3	4	5

8. *Openness to Sharing POST-TASK:*

Not at all open to sharing personal info	Sarcastic or very hesitant in sharing info	Somewhat hesitant in sharing info	Matter-of-fact very straightforward in sharing info	Engaged in the conversation and open to sharing	Very open to sharing personal info
0	1	2	3	4	5

Notes:

APPENDIX O: IRB APPROVAL DOCUMENTS



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407 825 2901, 407 882 2012 or 407 882 2276
www.research.ucf.edu/compliance/irb.html

Notice of Exempt Review Status

From: UCF Institutional Review Board
FWA00000351, Exp. 10/8/11, IRB00001138

To: Amanda Surprenant

Date: June 30, 2009

IRB Number: SBE-09-06311

Study Title: Subjective Ratings of Trustworthiness of Aviators

Dear Researcher:

Your research protocol was reviewed by the IRB Chair on 6/30/2009. Per federal regulations, 45 CFR 46.101, your study has been determined to be **minimal risk for human subjects and exempt** from 45 CFR 46 federal regulations and further IRB review or renewal unless you later wish to add the use of identifiers or change the protocol procedures in a way that might increase risk to participants. Before making any changes to your study, call the IRB office to discuss the changes. **A change which incorporates the use of identifiers may mean the study is no longer exempt, thus requiring the submission of a new application to change the classification to expedited if the risk is still minimal.** Please submit the Termination/Final Report form when the study has been completed. All forms may be completed and submitted online at <http://irb.research.ucf.edu>.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained.
 - (i) Information obtained is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the subject, **and/or**
 - (ii) Subject's responses, if known outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

The IRB has approved a **waiver of documentation of consent** for all subjects. Participants do not have to sign a consent form, but the IRB requires that you give participants a copy of the IRB approved consent form, letter, information sheet. For online surveys, please advise participants to print out the consent document for their files.

All data, which may include signed consent form documents, must be retained in a locked file cabinet for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password protected computer if electronic information is used. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

On behalf of Tracy Dietz, Ph.D., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 06/30/2009 08:52:16 AM EDT

IRB Coordinator



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice of Exempt Review Status

From: **UCF Institutional Review Board**
FWA00000351, Exp. 10/8/11, IRB00001138

To: **Amanda Surprenant**

Date: **July 13, 2009**

IRB Number: **SRE-09-06310**

Study Title: **Observational Study of Avatar Interactions and Willingness to Self-Disclose**

Dear Researcher:

Your research protocol was reviewed by the IRB Vice chair on 7/10/2009. Per federal regulations, 45 CFR 46.101, your study has been determined to be **minimal risk for human subjects and exempt** from 45 CFR 46 federal regulations and further IRB review or renewal unless you later wish to add the use of identifiers or change the protocol procedures in a way that might increase risk to participants. Before making any changes to your study, call the IRB office to discuss the changes. **A change which incorporates the use of identifiers may mean the study is no longer exempt, thus requiring the submission of a new application to change the classification to expedited if the risk is still minimal.** Please submit the Termination/Final Report form when the study has been completed. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained.
 - (i) Information obtained is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the subject, and/or
 - (ii) Subject's responses, if known outside the research, would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

All data, which may include signed consent form documents, must be retained in a locked file cabinet for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

On behalf of Tracy Dietz, Ph.D., UCF IRB Chair, this letter is signed by:

Signature applied by Janice Turchin on 07/13/2009 10:21:34 AM EDT

IRB Coordinator



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138
To: Amanda Surprenant
Date: May 31, 2011

Dear Researcher:

On 5/31/2011, the IRB approved the following human participant research until 5/30/2012 inclusive:

Type of Review: UCF Initial Review Submission Form
Project Title: Avatar-Mediated Self Disclosure during a Task
Investigator: Amanda Surprenant
IRB Number: SBE-11-07682
Funding Agency:
Grant Title:
Research ID: N/A

The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 5/30/2012, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Kendra Diamond Campbell, MA, JD, UCF IRB Interim Chair, this letter is signed by:

Signature applied by Joanne Muratori on 05/31/2011 11:11:10 AM EDT

A handwritten signature in black ink that reads 'Joanne Muratori'.

IRB Coordinator



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 301
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138
To: Amanda Surprenant
Date: June 15, 2011

Dear Researcher:

On June 15, 2011, the IRB approved the following modifications until 05/30/2012 inclusive:

Type of Review:	IRB Addendum and Modification Request Form
Modification Type:	Revised Debriefing Form
Project Title:	Avatar-Mediated Self-Disclosure during a Task
Investigator:	Amanda Surprenant
IRB Number:	5BE-11-07682
Funding Agency:	N/A

The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form cannot be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 05/30/2012, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in IRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Kendra Diamond Campbell, MA, JD, UCF IRB Interim Chair, this letter is signed by:

Signature applied by Janice Turchin on 06/15/2011 11:19:06 AM EDT

IRB Coordinator



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138

To: Amanda Surprenant

Date: July 15, 2011

Dear Researcher:

On July 15, 2011, the IRB approved the following modifications until 05/30/2012 inclusive:

Type of Review:	IRB Addendum and Modification Request Form
Modification Type:	Revision to recruitment plan
Project Title:	Avatar Mediated Self Disclosure during a Task
Investigator:	Amanda Surprenant
IRB Number:	SBL-11-07682

The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form cannot be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 05/30/2012, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in IRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Kendra Diamond Campbell, MA, JD, UCF IRB Interim Chair, this letter is signed by:

Signature applied by Janice Turchin on 07/15/2011 02:27:15 PM EDT

IRB Coordinator

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