Avatars as Information: Perception of Consumers Based on Their Avatars in Virtual Worlds

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ABSTRACT

The presence of consumers and companies in the virtual worlds has increased in recent years. It is predicted that 80% of active Internet consumers and Fortune 500 companies will have an avatar or presence in a virtual community, including social networks, by the end of 2011 (eMarketer, 2007). The increase in the number of consumers with avatars emphasizes the need for a better understanding of who these consumers behind the avatars really are in order to convert these individuals to online and real-world customers. The objective of this paper is to investigate how avatars reflect the personality of their creators (targets) in virtual worlds. Using the Brunswik Lens Model as the theoretical framework, an investigation of real consumers in the virtual world *Second Life* reveals that perceivers who view targets' avatar use particular thin-slices of observations such as avatar cues (e.g., attractiveness, gender, hairstyle) to form accurate personality impressions about targets. The findings support the premise that real-life companies that intend to expand to virtual worlds can use member avatars as a proxy for member personality and lifestyles. As a future research direction, avatars and other consumer-generated media could be used as the basis for targeting and segmentation of online consumers. © 2010 Wiley Periodicals, Inc.

According to Gartner, 80% of active Internet consumers and Fortune 500 companies will have an avatar or presence in a virtual community by the end of 2011 (eMarketer, 2007). Virtual worlds similar to *Second Life* stand out in that they have their own economy in which real-money transactions occurred. *Second Life* has its own money (Linden dollars), which fluctuates like real-world currency and can be exchanged to U.S. dollars and vice versa. The ability to conduct transactions in the *Second Life* economy increases the appeal of this virtual world. Importantly, the membership of *Second Life* has increased more than twentyfold between 2006 and 2009 to reach 15 million (LaVallee, 2006) and many real-world companies (e.g., Adidas, American Apparel, Dell, Disney, IBM, Nike, MTV, Reuters, and Toyota) have appeared in *Second Life*. Using their own Linden dollars, *Second Life* consumers, who are called residents, can buy property, buildings, multiple services, clothing for their avatars (LaVallee, 2006), and even replica cell phones (Joel, 2006). However, limited research has been conducted on these environments even though virtual worlds enable interesting research perspectives (Bainbridge, 2007; Schneiderman, 2008). From a company perspective, the increase in the number of consumers with avatars emphasizes the need for a greater understanding of who these consumers behind the avatars really are in order to improve avatar-based marketing (Hemp, 2006). Doing so would allow companies to adapt their selling approach to these consumers based on their avatar characteristics, with an ultimate goal of converting these individuals to online and real-world customers. In particular, avatars may be more useful resources when direct and voluntary self disclosure of information by consumers online is limited (Lee, Im, & Taylor, 2008).

For the remainder of this paper, "perceiver" is used to refer to the consumer who observes another's avatar and "target" is used to refer to the consumer that has designed and posted the avatar being observed. Although every consumer in a virtual community can be both a target and a perceiver, this research focuses on the one-way relationship between the target and the perceiver. One of the few pieces of information a consumer has about another consumer is what the other's avatar looks like. Each perceiver finds himself in a minimal-information situation where socio-demographics (age, race, gender, social status, ethnicity, or location), as well as the most important aspects of self-concept (Belk, 1988; Prelinger, 1959), such as physical characteristics, are unknown. The authors argue that targets' avatars are used by perceivers as "thin-slices" of observations to understand who these consumers represented by avatars are. Thin-slices of observations refer to brief observations of the target. Past research has shown that perceivers may reach accurate impressions of the targets based on thin-slices of observations (for a review see Ambady & Rosenthal, 1992; Peracchio & Luna, 2006). These thin-slices of observations may force the perceiver to focus on non-verbal cues with little or no influence of the verbal message and without a requirement of personal interactions (Ambady, Krabbenhoft, & Hogan, 2006).

The extant research in social psychology has shown that individuals tend to form impressions of others based on their traits (Fiske & Cox, 1979; Winter & Uleman, 1984). Evaluating the perception process requires an analysis of traits that are stable over time. Evidence suggests that in virtual worlds, consumers will form these impressions of another consumer based on visual cues of the target consumer's avatar (Bessière, Seay, & Kiesler, 2007; Rousseau & Hayes-Roth, 1998). Allport and Odbert (1936, p. 26) define personality traits as "generalized and personalized determining tendencies, consistent and stable modes of an

individual's adjustment to his environment." Personality psychologists such as John (1990) generally assume that personality traits, in addition to being relatively stable over time, differ among individuals and influence behaviors. Therefore, one way to understand how consumers form impressions of others in virtual worlds is to measure perceived personality traits based on the target consumer's avatar. Avatars are one of the few pieces of information (if not the only) that perceivers have access in virtual environments. This paper investigates (a) how well the perceiver personality impression based on an avatar reflects the real personality of the target who created the avatar and (b) the degree to which the discrepancy between the target's personality and the perceiver's impressions of the target's personality result from target's conscious intentions.

In the following sections, the authors explain the central concepts pertaining to avatars, propose a theoretical framework that explains how avatars are used by perceivers, test the proposed model in a field study in *Second Life*, and discuss the theoretical and managerial implications of the findings.

AVATARS IN VIRTUAL WORLDS

As mentioned earlier, in every virtual world consumers interact via avatars. The term "avatar" comes from Sanskrit and refers to "the manifestation of a deity, notably Vishnu, in human, superhuman or animal form" (Collins English Dictionary, 1998, p. 104). This term was popularized in computer science and related disciplines in the 1992 novel *Snow Crash* by Neal Stephenson. In this paper, "avatar" is defined as "general graphic representations that are personified by means of computer technology," as in Holzwarth, Janiszewski, and Neumann (2006, p. 20). According to this definition, both a static picture and a dynamic cartoonish character observed on a computer screen are considered as avatars. Depending on the stream of research, avatars are also labeled as: autonomous agents, animated agents, embodied agents, and virtual agents. Overall, avatars can be used as an endorser or as an interaction tool in virtual communities. More and more companies are using avatars as endorsers (e.g., Ikea with Anna, Microsoft with Ms. Dewey) that serve consumers and simulate an interactive shopping experience (Holzwarth, Janiszewski, & Neumann, 2006; Wang et al., 2007). Companies create avatars to increase consumer interaction, provide entertainment value and ensure more personalized service (Holzwarth, Janiszewski, & Neumann, 2006; Nowak, 2004; Nowak & Biocca, 2003; Redmond, 2002; Wang et al., 2007). Avatars can be found in every category of virtual community, such as newsletters, Web site bulletin boards, real-time chat rooms, multi-user dungeons (MUD), multi-user domains, and virtual worlds (see Kozinets, 1999; Dholakia, Bagozzi, & Pearo, 2004, for a more detailed discussion of types of virtual communities). In this paper, authors focus on avatars in virtual worlds.

Avatar Creation Process

Along with a profile, avatars are the only means by which consumers in virtual worlds present themselves to others and make an identity claim. Identity claims are defined as "symbolic statements made by individuals about how they would like to be regarded; these statements may be directed at the self or to convey

messages to others" (Vazire & Gosling, 2004, p. 124). In real life it is difficult, costly, or impossible to modify one's physical attributes. However, avatars can be instantly redesigned online by means of graphic technology. Consumers have a high degree of control over the avatar creation process. The avatars may reflect signs of the creator's self, deliberately or non-consciously. Avatars are primarily considered as controlled sources of identity claims since consumers can choose and modify physical attributes (hair color, hairstyle, eye color, and tattoos), socio-demographic traits (gender, ethnicity, and age) and clothing style to reflect their personal taste, a process similar to that of the draw-a-person test developed by clinical psychologist Machover (1949). Consumers can decide to either create an avatar that is representative of them or to create one that reflects their fantasies, imagination, or the person they wish to be. In some instances, avatars may be developed professionally by others, yet avatars' characteristics still reflect targets' preferences. These characteristics can have an impact on realism, as well as on the degree of anthropomorphism (Nowak, 2004; Nowak & Biocca, 2003). Although avatars can have non-human characteristics, the focus of this paper is limited to human avatars.

A FRAMEWORK TO ANALYZE PERCEPTIONS BASED ON AVATAR CUES

The analysis of a target's visual cues dates back to physiognomists (Lavater, 1789). At the beginning of the twentieth century, personality psychologists such as Allport (1937) argued that personality may be expressed through observable cues and that perceivers seem to naturally attribute certain characteristics to targets. In marketing, according to John and Sujan (1990), even four- to five-year-old children use visual cues to classify products in terms of color, size, and packaging. Belk (1988) found that personal possessions, as one form of visual cues, can reflect and be part of the extended self. More recent research has investigated the role of personal possessions in communicating personality. A number of researchers have investigated personality impressions formed on the basis of offices and bedrooms (Gosling et al., 2002), personal Web sites (Vazire & Gosling, 2004; Marcus, Machilek, & Schütz, 2006), and Facebook profiles (Evans, Gosling, & Carroll, 2008; Gosling, Gaddis, & Vazire, 2007; Walther et al., 2008). In line with this stream of research, avatars in virtual worlds are viewed as personal possessions in this paper.

The Brunswik Lens Model

Over the last decade, the Brunswik's lens interpersonal perception model (1956), which is refered to as the Brunswik Lens Model, has been adapted by a number of researchers to analyze the relationship between a target and a perceiver (Gangestad et al., 1992; Gifford, 1994; Gigerenzer & Kurz, 2001; Gosling et al., 2002, Walther et al., 2008). Nevertheless, the Brunswik Lens Model has not been used extensively in marketing (Prabhaker & Sauer, 1994; see Tapp, 1984, for a review about propositions of extensions to the field of marketing). This model includes both cue utilization and cue validity. Cue utilization refers to the extent to which perceivers use visual avatar cues to form an impression regarding the target's personality.

For instance, the perceiver may use the target avatar's stylish hairdo to infer that the target is an extrovert. On the other hand, cue validity refers to the relationship between observable information of avatars and the target individual's actual personality.

The Brunswik Lens Model can represent all combinations of cue utilization and cue validity, revealing sources of good and bad judgments (Funder & Sneed, 1993; Gifford, 1994). In this paper, the Brunswik Lens Model is adapted as a conceptual framework in comparing perceiver's personality impressions and the target's avatar in virtual worlds. Visual avatar cues can serve as the lens through which perceivers indirectly observe underlying target personality traits. For instance, an unconventionally dressed avatar could serve as a lens through which the perceiver would identify the target's high level of extraversion.

The two components of this model can be explained by the Weighted-Average Model (WAM; Kenny, 1994) and the Realistic Accuracy Model (RAM; Funder, 1995, 1999) concepts. The WAM parameter of "similar meaning system" reveals the "agreement between judges within an act" (Kenny, 1994, p. 247) and is related to cue utilization. In other words, this refers to the degree to which perceivers agree on the meaning of analyzed information. Similar meaning systems could be apparent when a perceiver judges an avatar. For instance, the perceiver could, upon noting an avatar's purple hair, interpret this as being a cue that the target is extroverted. If every perceiver makes the same assumption, then consensus should be strong (Hayes & Dunning, 1997). The Realistic Accuracy Model (RAM) is related to cue validity and suggests that target-perceiver agreement will be increased when perceivers use "good information." Impression formation should be accurate when perceivers base their judgments on information related to targets' self-ratings. If the underlying constructs are actually related to visual avatar cues, then this should provide accurate information about the target.

The Perception Process

Cue utilization and cue validity can also be related to face reading. Extant research conducted by Willis and Todorov (2006) found that for judgments of attractiveness, likeability, trustworthiness, competence, and aggressiveness, made after a 100-milisecond exposure correlated highly with judgments made in the absence of time constraints, suggesting that this exposure time was sufficient for participants to form an impression. Furthermore, Gorn, Jiang, and Johar (2008) showed by morphing a chief executive officer (CEO) face in terms of "babyfaceness" (vs. seriousness) that "babyfaceness" is associated with cooperation, while seriousness is associated with achievement. Although avatars are not actual faces of targets, Social Response Theory (SRT), regarding human–computer interactions, suggests that cue utilization and cue validity may be related to impressions based on avatars.

In particular, SRT argues that consumers react to computer technology as if it were a social entity (Moon, 2000, 2003; Reeves & Nass, 1996). Consumers respond to computers as they do to people when computer-related features, such as avatars, possess anthropomorphic attributes (Moon, 2003; Nass & Steuer, 1993). Anthropomorphism is defined as "the tendency to imbue the real or imagined behavior of nonhuman agents with humanlike characteristics, motivations,

intentions, or emotions" (Epley, Waytz, & Cacioppo, 2007, p. 864). Consumers may perceive an avatar cue that represents a target consumer the same way as a visual cue based on the target consumer's actual face and/or body.

The Overall Discrepancy Derived from the Brunswik Lens Model

According to Goffman (1959), Schlenker (1980), and Tedeschi (1981), particular behaviors (and characteristics) can be controlled in public to meet self-presentation objectives in order to convey desired impressions to gain approval and status from perceivers (Hogan, Jones, & Cheek, 1985). During the creation process, the target can choose to design an avatar that represents different selves. Although there are various definitions of self discussed in literature (Reed, 2002), four types of self that are most applicable to this research are used here: (1) the *actual self*, (2) the *possible self*, (3) the *ideal self*, and (4) the *hoped-for possible self*. The *actual self* is defined as a target's representation of his or her current and personal attributes and represents who the person really is. The *possible self* is defined as a target's conception of the person that he or she might become at some point in the future and represents who the person thinks he/she would be (Markus & Nurius, 1986). This type of self may include both positive and negative characteristics. The *ideal self* represents who the target would ideally like to be. In this case, the goal of the avatar creation process by the target is to influence the perceiver's view and ensure it aligns with one's own ideal-self view (Higgins, 1987; Leary et al., 1994; Leary & Kowalski, 1990; Tice et al., 1995). The *hoped-for possible self* is considered as a subcomponent of the *possible self* in which it is generally a middle-point between the *actual self* and the unrealistic or fantasized *ideal self*. The *hoped-for possible self* is a socially desirable self that represents who the target would like to be and believes he/she could be if given the right conditions. For instance, a target may want to look more extroverted but lacks the opportunity to meet new interesting people due to his/her type of job. In this sense, the achievement of the *hoped-for possible self* can also be blocked by the presence of an unattractive appearance, stuttering, or shyness or with high pressure situations.

Avatars are highly controllable information transmitters, well-suited to strategic self-presentation that can be used to communicate any of the selves. These intentional self-presentations can be captured by the discrepancy between the target's actual self and the target's ratings of the avatar. According to the Self-Discrepancy Theory (SDT; Higgins, 1987), these discrepancies can lead to multiple emotions and Higgins (1987) called for further research to understand these discrepancies. Figure 1 is a representation of this discrepancy based on the four types of self, the SDT framework, and the Brunswik Lens Model.

Figure 1 represents the discrepancies among three constructs based on the Brunswik Lens Model: (A) target's self-ratings, (B) target's ratings of the avatar, and (C) perceiver's ratings of the avatar. The overall discrepancy is represented as the distance between the target's self-ratings (A) and the perceiver's ratings of the target's avatar (C). The overall discrepancy (C–A) represents the difference between who the target really is and how the target is perceived based on his/her avatar. Furthermore, this overall discrepancy can be divided into two distinct components: the intended discrepancy (B–A) and the unintended discrepancy
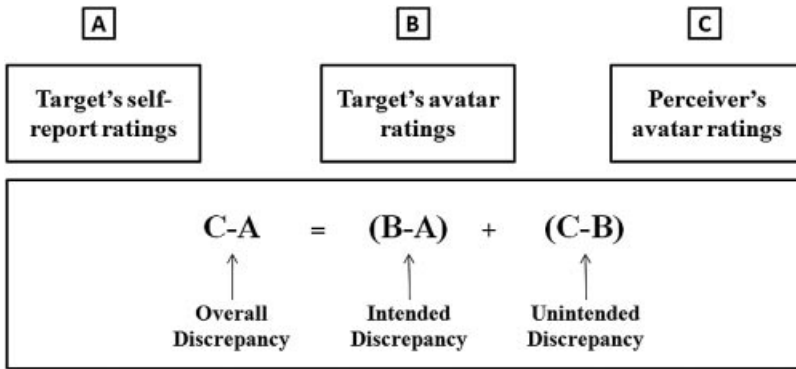
Figure 1. Decomposition of the Brunswik Lens Model overall discrepancy.

(C–B). The intended discrepancy is the difference between who the target is (A) and how he/she perceives his/her avatar (B) and is a function of the target's conscious motives in self-presentation. The unintended discrepancy is the difference between how the target perceives his/her avatar (B) and how his/her avatar is rated by perceivers (C). The unintended discrepancy is a function of non-conscious motives of the target and cue utilization. In short, the unintended discrepancy suggests that the personality that targets would like to project through their avatars and the personality as perceived by others may not match. One of the purposes of this paper is to use this decomposition of the overall discrepancy to study how targets consciously use avatars to communicate who he/she wants to be perceived as rather than who they actually are.

METHODOLOGY

The field study comprises two phases. For each phase, participants (targets and perceivers) were asked to fill out a questionnaire. Participants were *Second Life* residents older than 18 years (the minimal legal age to participate in *Second Life*). Six individuals filled out the two questionnaires as a pretest to identify problems, which were later resolved.

There are a number of reasons for choosing *Second Life* as the setting for the field study. First, it is the virtual world with the fastest growing membership, having gone from approximately 700,000 members in September 2006 (LaVallee, 2006) to over 15 million members by July 2009. In *Second Life*, each resident must choose a permanent nickname and configure his or her avatar's appearance. Second, all residents can chat with other avatars near them or communicate with other residents anywhere on the *Second Life* map through instant messaging (IM). The resident is notified when the residents on their IM list are online. Any resident can create a group (virtual community) or join an existing one. Finally, *Second Life* residents have at least three areas in which they can increase their social status: group affiliation, wealth, and amount of property owned (McKeon & Wyche, 2006). Residents can create multiple objects, copy the object, modify the object, and transfer the object, which allows creation of an economy and a local currency. All residents can buy and sell property. Residents

can also join different groups, and being a member of some groups can be considered as having attained a higher social rank. Therefore, *Second Life* is an ideal setting to investigate how effective avatars are in communicating personality impressions of consumers possessing them.

Phase 1

In Phase 1, targets filled out an online questionnaire that was divided into multiple sections. In Section 1, targets were asked to send a picture of the avatar they use in *Second Life*. Instructions for doing so were included in the questionnaire. In Section 2, targets answered questions about their level of participation in virtual worlds, especially *Second Life*. In Section 3, they answered questions about their own personality traits and the perceived personality traits of the avatar they owned. In the final section, they were asked questions about their socio-demographic profile.

A five-stage recruitment strategy was adopted for Phase 1. First, the first author contacted an important blogger interested in e-marketing, who agreed to advertise this study on his blog. Second, authors selected a total of 10 traditional discussion boards and posted a message describing the research and soliciting volunteers on each discussion board. Third, authors met residents one-on-one in *Second Life* and asked them to fill out the questionnaire on the study's Web site. Fourth, authors subscribed to a specific discussion board named *SL profiles* and met residents one-on-one to ask them to fill out the questionnaire on the Web site. Finally, participants were encouraged to refer up to five friends in return for a chance to win a grand prize of 500 USD or 135,000 Linden dollars.

Of the 129 targets who agreed to participate in the study, 103 filled out the questionnaire completely. After resizing all avatar pictures to a 240-by-320 pixels format to ensure all avatars appeared in the same level of clarity and position, 75 were usable (see Appendix A for two examples). There were no major differences observed between the sample characteristics and typical consumers of *Second Life*. The median target age was 33.0 ($SD = 10.0$) and 56.3% of the participants were female. Targets were mostly Caucasian (77.7%) and lived in the United States (40.8%), France (19.4%), or Canada (13.6%). Targets spent an average of 42.4 hours on the Internet ($SD = 25.9$), 26.3 hours in virtual worlds ($SD = 22.9$) and 25.9 hours in *Second Life* ($SD = 22.6$) per week. Overall, 45% of targets have a premium account (at a cost of $9.95/month), 93.7% own objects other than clothes, while 27.3% own one property and 21.9% own two properties or more. On average, targets spent $33.92 per month in *Second Life* ($SD = 63.1$).

Phase 2 and Cue Rating Assessment Procedure

For Phase 2, seven participants served as perceivers and filled out the online questionnaire. They were paid for their participation. These perceivers were selected on the basis of their virtual world experience, especially with *Second Life*. Their average age was 32.1 years. They were asked to independently give their initial impressions of the perceived personality traits based on the appearance of the 75 *Second Life* avatars of targets who had filled out the Phase 1 questionnaire. Each perceiver received a different questionnaire generated via a simple random sample without replacement procedure to ensure perceivers saw

each avatar only once. This procedure was used to reduce bias related to order effects and fatigue. Perceivers did not discuss their ratings with one another. To eliminate effects of acquaintance, they were asked to notify the experimenter if they recognized a target's avatar and none of the perceivers did.

To assess cue ratings, two coders independently rated avatars on 145 visual cues (avatar characteristics). These cues were derived from advertising (Belk, 1981; Kolbe & Albanese, 1996, 1997) and personality studies that use static visual cues (Borkenau & Liebler, 1992, 1995), as well as from studies that use specific cues such as color (Gorn et al., 1997) and shoes (Belk, 2003). Other cues were selected based on observation of the *Second Life* environment. Cues were divided by category: (1) general cues, (2) male avatar cues, and (3) female avatar cues. To assess coder agreement, a Perreault and Leigh Index (1989) was computed for each category and categories with coefficients lower than 0.75 were deleted (Crano & Brewer, 2002). Both coders compared their answers to reach consensus. The cues that were not agreed on were coded by a third independent coder to resolve disagreements. A total of 127 avatar cues were retained for analysis.

Instruments

For the Phase 1 questionnaire, targets answered the Big Five Inventory (BFI), a 44-item personality scale developed by John and Srivastava (1999). This scale contains all the dimensions of the Five-Factor Model of personality (FFM: McCrae & Costa, 1999; McCrae & John, 1992). The FFM is a hierarchical model of personality that contains five dimensions at the highest level of abstraction. These five factors are: *Extraversion, Agreeableness*, *Conscientiousness, Neuroticism*, and *Openness to Experience* (referred to as "*Openness*" for the rest of the paper; for more information on the FFM hierarchical structure, see Paunonen, 1998; also for a review of FFM, see Endler & Speer, 1998; McCrae & John, 1992, and John & Srivastava, 1999). The FFM of personality is the most commonly used model in literature, it has the strongest theoretical components, and it contains five orthogonal dimensions that incorporate every single personality trait (McCrae et al., 1996).

After computing all Cronbach alpha reliability coefficients for all five dimensions, four items (Item 3 of *Agreeableness*, item 8 of *Neuroticism* and items 9 and 10 of *Openness*) were deleted because of low inter-item correlations (<0.50). The resulting Cronbach's alpha reliability coefficients (α) for *Extraversion, Agreeableness, Conscientiousness, Neuroticism*, and *Openness* for self-ratings were 0.87, 0.83, 0.86, 0.89, and 0.87, respectively. These values are typical of those reported for the BFI (John & Srivastava, 1999) and are higher than the 0.70 cutoff value suggested by Nunnally (1978). All items were rated on a seven-point Likert-type scale.

For the Phase 2 questionnaire, the seven perceivers answered the Ten Item Personality Inventory (TIPI). The TIPI, developed by Gosling, Rentfrow, and Swann (2003), is a short version of the BFI that includes 10 items (two per dimension) of the 44-item BFI scale. The TIPI scale was used to eliminate the redundancy, fatigue, boredom, and frustration that perceivers would have experienced using the longer BFI scale to rate each of the 75 avatars observed. All items were rated on a seven-point Likert-type scale. Correlations across all perceivers were significant for the FFM dimensions of *Extraversion, Agreeableness,*

Conscientiousness, Neuroticism, and *Openness* (0.53, 0.38, 0.67, 0.54, and 0.61, respectively).

RESULTS

Using the Brunswik Lens Model adapted to the context of avatars in virtual worlds, an analysis of 127 visual avatar cues was conducted to test for cue utilization and cue validity. As noted in the methodology section, cues were divided into three sections: (1) general cues (Table 1), (2) male avatar cues (Table 2), and (3) female avatar cues (Table 3).

Cue Utilization

As defined for the Brunswik Lens Model, cue utilization refers to the extent to which targets use visual avatar cues to judge avatars' personalities. A sample of the cue utilization correlations is presented in the right halves of Table 1, Table 2, and Table 3, and indicates the relationships between perceivers' ratings and visual avatar cues. These cue utilization correlations reveal which avatar cues may have been used as Brunswikian lenses through which perceivers form impressions about targets.

Extraversion is generally associated with traits such as sociability, a high energy level, talkativeness and assertiveness. As noted in Table 1, global cue utilization correlation results suggest that avatars with one or more of the following cues were perceived as more extroverted: attractive (0.12), long hair (0.15), stylish hairdos (0.18). Male avatars perceived as more introverted had at least one of the following cues: jeans (-0.16), gray shirt (-0.11), long-sleeve shirt (-0.16) or black hair (-0.13). Female avatars perceived as more extroverted had at least one of the following cues: large breasts (0.20), fully covered torso (0.27), bathing suit (0.23), pink shirt (0.15), necklace (0.22), or high heels (0.18).

Agreeableness is associated with cooperativeness and being approachable. Perceived *Agreeableness* was generally associated with avatars that had at least one of the following cues: attractive (0.15) and/or friendly (0.14). Male avatars with at least one of the following cues received a low *Agreeableness* rating: army pants (-0.20), black shirt (-0.11), or sunglasses (-0.15). Female avatars with a high *Agreeableness* rating had a dressy top (0.12) and/or blonde hair (0.11).

It is easier to analyze someone's conscientiousness level by examining their personal environment, such as a room or office (Gosling et al., 2002), than by observing an avatar. Consequently, few of the avatar cues were related to perceivers' ratings of *conscientiousness*.

Neuroticism is associated with traits like anger, depression, and vulnerability. Overall, avatars judged to be neurotic were those wearing stylish hairdo (0.11) or who had a grumpy expression (0.14). Female avatars with large breasts (0.13) and/or who wore Gothic clothing (0.10) were perceived as neurotic.

Openness is associated with individuals who tend to be curious, imaginative, and unconventional. Overall, more attractive (0.13) avatars were perceived as being more open. For female avatars, openness was correlated with large breasts (0.18) and high heels (0.13).

Table 1. A Brunswik Lens Model Analysis of Judgments Based on Avatars: Cue Validity and Cue Utilization Correlations.

	Cue Validity					Avatar's Cues (Lens)	Cue Utilization				
	E	A	C	N	O		E	A	C	N	O
Stylish (vs. unstylish) hairdo	0.19*	0.19*	0.28***	−0.08	0.31***		0.18***	−0.05	0.00	0.11**	0.05
Attractive (vs. unattractivxe)	0.18	0.22*	0.23**	−0.08	0.02		0.12***	0.15***	−0.01	0.06	0.13***
Less (vs. more) muscular	0.06	0.35***	0.24**	0.03	0.03		0.01	0.11**	0.01	−0.06	0.07
Masculine (vs. feminine)	−0.15	−0.31**	−0.22*	−0.14	−0.21*		−0.10**	−0.11**	−0.02	0.02	−0.08
Friendly (vs. grumpy) expression	−0.01	−0.01	0.22*	0.06	−0.02		−0.02	0.14***	0.08*	−0.14***	−0.03
Approachable (vs. reserved)	0.06	0.07	0.22*	−0.04	0.09		0.01	0.09*	0.03	−0.08*	−0.07
Fashionably (vs. unfashionably) dressed	0.06	0.06	0.22*	0.00	−0.03		0.03	0.10**	0.05	−0.01	0.07
Light-colored (vs. dark-colored) hair	0.12	0.22*	0.19	−0.17	0.07		0.11**	−0.02	−0.03	0.11**	−0.01
Short (vs. long) hair	−0.05	−0.21*	−0.23**	−0.07	−0.16		−0.15***	−0.06	0.03	−0.01	−0.11**

Notes: A correlation preceded with a minus sign refers to the cue indicated in parentheses. E = Extraversion, A = Agreeableness, C = Conscientiousness, N = Neuroticism, O = Openness.

* Correlation is significant at the 0.10 level (2-tailed), ** Correlation is significant at the 0.05 level (2-tailed), *** Correlation is significant at the 0.01 level (2-tailed). Correlations in boxes reflect an exact match between cue validity and cue utilization.

These cues result in accurate impressions. The initial list includes 22 cues and only cues with significant results for cue validity are included in this table.

Table 2. A Brunswik Lens Model Analysis of Judgments Based on Male Avatars: Cue Validity and Cue Utilization Correlations.

Cue Validity					Avatar's Cues	Cue Utilization				
E	A	C	N	O		E	A	C	N	O
0.02	−0.14	−0.24**	−0.07	0.16	Gray pants	0.01	−0.06	−0.01	0.04	0.00
−0.10	−0.26**	−0.12	−0.03	−0.27**	Red pants	−0.09*	0.03	−0.02	0.01	0.02
−0.07	−0.20*	−0.02	−0.02	0.09	Army pants	0.11**	−0.20***	0.02	0.08	0.02
−0.11	−0.26**	−0.28***	0.09	−0.10	Jeans	−0.16***	0.02	−0.02	−0.08*	−0.11**
0.18	0.04	0.04	−0.21*	−0.06	Dress pants	−0.06	0.02	0.06	0.02	0.05
−0.04	−0.26**	−0.01	−0.02	−0.20**	Black shirt	−0.01	−0.11**	−0.03	0.06	−0.01
−0.06	0.04	−0.07	−0.21*	0.16	Gray shirt	−0.11**	0.04	0.01	−0.05	−0.02
−0.24**	−0.32***	−0.20**	0.18	−0.33***	White shirt	−0.06	0.00	0.03	−0.10**	−0.03
−0.13	−0.22**	−0.14	−0.06	−0.31***	Long-sleeve shirt	−0.16***	−0.01	0.01	−0.04	−0.01
−0.09	−0.22*	−0.17	0.02	−0.06	Downscale clothing	−0.09*	−0.02	−0.07	−0.03	−0.10**
0.04	−0.14	−0.10	−0.23**	−0.06	Upscale clothing	−0.06	0.01	0.04	0.03	0.06
−0.17	−0.29***	−0.25**	−0.09	−0.24**	Full head of hair	−0.16***	−0.03	0.04	−0.05	−0.05
−0.03	0.09	−0.19*	−0.07	0.11	Dreadlocks	0.02	0.00	−0.04	0.00	0.04
−0.19	−0.19	−0.13	0.10	−0.33***	Standard hairdo	−0.23***	0.04	−0.02	−0.08*	−0.10**
−0.16	−0.22**	−0.24	−0.04	0.06	Fluffed hair	0.00	−0.02	0.03	0.00	0.00
−0.03	−0.29***	−0.04	0.06	−0.14	Spiky hair	−0.05	0.06	−0.03	0.02	−0.02
0.04	−0.05	−0.01	−0.22*	−0.05	Wet hair	−0.01	−0.10**	0.11**	0.00	0.01
−0.02	−0.20*	−0.14	−0.13	−0.13	Black hair	−0.13***	−0.01	−0.04	−0.04	−0.01
−0.07	−0.21*	−0.23	0.16	−0.07	Brown hair	−0.07	0.08*	0.01	−0.03	−0.06
−0.04	−0.11	0.04	−0.19*	0.05	Beard	0.02	−0.10**	0.00	0.03	0.02
0.12	−0.01	0.09	−0.17	0.20*	Bracelet	0.09*	−0.11**	0.02	0.12***	−0.07
0.18	0.04	0.04	−0.21**	−0.06	Tie	−0.06	0.02	0.06	0.02	0.05
0.17	0.07	−0.04	−0.24**	0.04	Stylish glasses	−0.06	0.01	0.06	0.00	0.05
0.15	−0.04	0.00	−0.03	0.20**	Sunglasses	0.10**	−0.15***	−0.07	0.10**	−0.03
−0.18	−0.28**	−0.34***	0.04	−0.16	Casual shoes	−0.04	−0.09**	−0.05	0.00	−0.03

Notes: E = Extraversion, A = Agreeableness, C = Conscientiousness, N = Neuroticism, O = Openness.

* Correlation is significant at the 0.10 level (2-tailed), ** Correlation is significant at the 0.05 level (2-tailed), *** Correlation is significant at the 0.01 level (2-tailed). Correlations in boxes reflect an exact match between cue validity and cue utilization. These cues result in accurate impressions.

Table 3. A Brunswik Lens Model Analysis of Judgments Based on Female Avatars: Cue Validity and Cue Utilization Correlations.

Avatar's Cues	Cue Validity					Cue Utilization				
	E	A	C	N	O	E	A	C	N	O
Breasts, large (vs. normal) sized	0.08	0.28***	0.02	0.08	−0.06	0.20***	−0.02	−0.08**	0.13***	0.18***
Torso fully covered	0.24**	0.18	0.18	0.14	0.08	0.27***	−0.06	−0.07	0.14***	0.18***
Black pants	0.02	0.05	0.22*	0.10	0.19	0.05	0.04	0.05	0.01	0.06
Red pants	0.21*	0.23**	0.06	−0.09	−0.03	0.07	0.08	0.03	−0.04	0.04
White pants	−0.28**	−0.08	−0.15	0.14	−0.06	−0.02	−0.00	0.00	−0.07	0.00
Casual pants	−0.04	0.11	−0.13	0.29***	0.18	−0.11**	0.12**	0.04	−0.02	−0.13***
Skirt	0.02	0.18	0.32***	−0.08	0.09	0.15***	−0.04	0.01	0.00	0.14***
Legs fully covered	0.14	0.25**	0.32***	−0.17	−0.07	0.25***	−0.07	−0.06	0.11**	0.21***
Legs partly visible	0.07	0.08	−0.04	0.20*	0.21*	0.02	0.05	0.02	0.07	0.00
Pink top	0.08	0.21*	0.11	0.06	0.13	0.15***	−0.01	−0.04	0.04	0.08*
Red top	0.22**	0.11	0.05	−0.17	0.03	0.00	−0.01	−0.04	0.04	−0.01
White top	0.18	0.22**	0.14	−0.04	−0.02	0.14***	0.02	0.01	0.01	0.07
Dressy top	−0.05	0.10	−0.20*	0.33***	0.16	−0.06	0.12***	0.02	0.00	−0.11**
Bathing suit	0.22*	0.18	0.05	−0.04	0.03	0.23***	−0.07	−0.06	0.09**	0.12***
Long sleeves	−0.07	−0.12	0.23**	−0.01	0.09	−0.12***	0.14***	0.05	−0.10**	−0.06
Sleeveless	0.23**	0.36***	0.03	0.14	0.14	0.24***	−0.01	−0.04	0.08*	0.13***
Casual clothing	0.08	0.03	0.19*	−0.04	0.06	−0.10**	0.12***	0.11**	−0.11***	−0.05
Historical clothing	−0.12	0.01	−0.08	0.17	0.24**	−0.06	−0.01	−0.02	−0.03	−0.11**
Downscale clothing	0.06	0.21*	0.20*	−0.05	−0.07	0.08**	0.08**	−0.01	−0.03	0.07
Layered hairdo	0.07	0.20*	0.10	0.16	−0.01	0.10**	0.04	0.04	−0.05	0.12***
Black hair	−0.11	0.02	0.06	0.31***	0.02	0.02	0.00	0.00	−0.01	0.08*
Blonde hair	0.29***	0.28***	0.18	−0.21*	0.02	0.11**	0.11**	−0.01	0.05	0.03
Necklace	0.26**	0.35***	0.14	0.08	0.18	0.22***	−0.07	−0.02	0.14***	0.21***
High heels	0.19*	0.18	0.18	−0.11	−0.01	0.18***	0.02	−0.06	0.07	0.13***
Running shoes	0.20*	0.08	0.12	−0.14	0.15	0.15***	0.00	−0.01	0.04	0.07
Barefoot	−0.19*	0.08	−0.01	0.14	0.16	−0.02	0.05	0.04	−0.05	−0.07

Notes: E = Extraversion, A = Agreeableness, C = Conscientiousness, N = Neuroticism, O = Openness.

* Correlation is significant at the 0.10 level (2-tailed), ** Correlation is significant at the 0.05 level (2-tailed), *** Correlation is significant at the 0.01 level (2-tailed), **** Correlation is significant at the 0.01 level (2-tailed). Correlations in boxes reflect an exact match between cue validity and cue utilization. These cues result in accurate impressions.

According to Funder and Sneed (1993), these cue utilization correlational analyses should be interpreted cautiously until future experimental research can address a particular limitation: Although cue utilization correlations revealed that perceivers' impressions were associated with particular cues, correlations did not indicate if perceivers used these specific cues to form their impressions. This analysis could not assess the extent to which visual avatar cues were used independently by perceivers, though perhaps an experiment using both eye-tracking techniques and protocol analysis could prove useful for doing so. However, these avatar cues can effectively communicate personality impressions because the use of some of the characteristics of the avatar can be part of a non-conscious perception process (Bargh, Chen, & Burrows, 1996).

Cue Validity

As conceptualized in the Brunswik Lens Model, cue validity refers to the degree to which avatar cues are related to the target's actual personality. Cue validity correlations shown in the left halves of Tables 1, 2, and 3 mirrored the relationship between targets' self ratings and avatar cues. These cue validity correlations suggest that there exist some effective cues resulting in accurate impressions, as presented by boxes in Tables 1, 2, and 3, with which perceivers formed their impressions. Overall, avatars with stylish hair (0.19) were used by an extroverted target, while those who were attractive (0.22), less muscular (0.35), and/or female (0.31) were used by an agreeable target.

Male avatars wearing army pants (-0.20), a black shirt (-0.26), and/or casual shoes (-0.28) were used by less agreeable targets, while avatars with dry hair (-0.33) were used by reserved targets. Female avatars with at least one of the following cues were used by extroverted targets: blonde hair (0.29), sleeveless top (0.23), bathing suit (0.22), fully covered torso (0.24), necklace (0.26), high heels (0.19), or running shoes (0.20).

Avatars with blonde hair (0.26) and/or wearing downscale clothing (0.21) were created by agreeable targets, while those wearing casual clothing (0.19) were created by conscientious ones.

The analysis revealed that no avatar cues indicative of *Neuroticism* were used efficiently by perceivers to form their impressions. This can be partly explained by the fact that *Neuroticism* is not socially desirable and that targets may want to disguise their neuroticism in *Second Life*.

Managerially, one of the most relevant pieces of information available for segmenting the members of *Second Life* or similar virtual environments with sizeable economies is avatars. The significant cues explained above can prove useful to segment the virtual world members based on personality communicated by different avatar characteristics. A synthesis of these results is presented in Table 4.

The Brunswik Lens Model and Vector Correlations

To test the extent to which perceivers' cue utilization and cue validity correlations correspond to one another, the vector correlation method proposed by Funder and Sneed (1993) was used. This method can be described as a two-step procedure. First, Fisher's r-to-z transformation ($z = 0.5[\text{Ln}\,(1 + r) - \text{Ln}\,(1 - r)]$, see Cohen & Cohen, 1983) were applied to both cue utilization correlations

Table 4. Avatars Cues Related to Accurate Impressions.

FFM	Overall	Male	Female
Extraversion	Stylish hairdo (+)		Torso fully covered (+)
			Bathing suit (+)
			Sleeveless (+)
			Blonde hair (+)
			Necklace (+)
			High heels (+)
			Running shoes (+)
Agreeableness	Attractive (+)	Army pants (−)	Downscale clothing (+)
	Less muscular (+)	Black shirt (−)	Blonde hair (+)
	Masculine (−)	Brown hair (−)	
		Casual shoes (−)	
Conscientiousness	Friendly (+)		Casual clothing (+)
Openness		Standard hairdo (−)	

Note: No cues were matching for the *Neuroticism* dimension.

Table 5. Avatars' Ratings: Consensus, Self-Perceiver Agreement and Vector Correlations.

Five-Factor Model Dimension	Vector Correlations ($N = 127$)
Extraversion	0.46***
Agreeableness	0.23***
Conscientiousness	0.06
Neuroticism	−0.18
Openness	0.01
Mean	0.11*

Note: * $p < 0.10$, one-tailed. *** $p < 0.01$, one-tailed.

(Vector 1) and cue validity correlations (Vector 2) for all FFM dimensions and cues (presented in Tables 1, 2, and 3). In the next step, vector correlations were computed between both transformed correlations (Vector 1 and Vector 2). The dimensions with the highest number of significant cues are the ones with the highest vector correlations. The two FFM dimensions related to the highest number of significant cue utilization, *Extraversion* (81) and *Agreeableness* (84), also emerged as the ones with the highest vector correlations, 0.46 and 0.23 ($p < 0.01$, see Table 5). These results are lower than the ones obtained by Gosling et al. (2002) and Vazire and Gosling (2004). Nevertheless, these results are helpful in explaining who the individual using the avatar is.

The Brunswik Lens Model and Overall Discrepancy

One relevant analysis based on the framework presented in Figure 1 is to identify the characteristics of the targets who have consciously created avatars to represent themselves differently from their actual self. For each FFM dimension, intended discrepancy was calculated between the target's self-reports of her/his personality and the personality of the avatar. Next, separate regression analyses were conducted for intended discrepancy on each FFM dimension using

a number of target characteristics as independent variables. The target characteristics used in the analyses represent three general categories: (1) target's involvement in *Second Life*, (2) target's possessions in *Second Life*, and (3) sociodemographic variables. Descriptions of these variables are presented in Table 6.

The regression results with "intended discrepancy" and "overall discrepancy" are presented in Table 7A and 7B, respectively. A number of interesting findings emerge from this analysis. First, the results related to "intended discrepancy" reveal the characteristics of targets that intentionally presented themselves differently on their avatars from who their actual personalities are on each of the FFM dimensions. For instance, people who hold a premium account, who spend less time in *Second Life*, who have other virtual world memberships, and people who own at least one piece of land in *Second Life* present themselves as more conscientious on their avatars than they actually are. On the other hand, younger targets and male targets present themselves more agreeable on their avatars than they actually are. Second, the target characteristics with significant and same sign coefficients for both "intended discrepancy" and "overall discrepancy" reveal that some targets effectively communicated who they want to be (to the perceivers) through their avatars. These coefficients are presented in boxes in Table 7. For instance, targets who are younger and males (vs. females) not only present themselves as more agreeable on their avatars than they actually are, but they are also perceived as more agreeable by the perceivers. Third, the contrast of the significant coefficients for "intended discrepancy" and "overall discrepancy" reveal that not all targets successfully portray the intended personality to the perceivers through their avatars. For instance, although premium account subscribers intend to portray themselves as more conscientious through their avatars, perceivers do not judge the targets any differently on this dimension.

DISCUSSION

This paper introduces a theoretical framework to understand the link between avatars and their targets. Results of this research can be considered as an initial step for analyzing the interactions between a perceiver and a target in virtual worlds. Implications for marketers and academicians can be divided into three basic categories based on (1) cue utilization, (2) accurate impressions, and (3) intended discrepancy.

First, visual cues that were statistically significant in terms of cue utilization could be used by companies interested in integrating an avatar in their company Web site as their company endorser. For instance, a travel agency focusing on adventure vacations can bolster the company image on its website through creation of an avatar that is perceived as extroverted and open to experiences. However, a pharmaceutical manufacturer may utilize an avatar that portrays a conscientious personality through use of avatar cues. Findings related to cue utilization also have implications for segmentation. Companies are currently using different avatars in serving different segments. For instance, as presented in Appendix B, Ikea's avatar Anna is portrayed as a brown-haired avatar in the U.S. Web site whereas she is portrayed as a blonde avatar in the U.K. Web site. The findings in cue utilization, based on a North American sample, would suggest that a blonde avatar would be perceived as having a more extroverted personality

Table 6. Descriptions of Independent Variables.

Categories	Variable Name	Variable Description	Possible Values
General involvement	Percentage of time in SL	The percentage of the time spent in SL compared to the total time spent on the Internet per week	0 to 100
	Premium account	If the consumer has a premium account or not	(0 = No, 1 = Yes)
	Number of months	The number of months since the SL account creation	0 to 55
	Number of virtual worlds	The number of virtual worlds with membership	0 to 22
	USD spent in SL	The amount of USD spent on average per month in SL	0 to $425
Possessions	Land owning	If the consumer owns no land or at least one land	(0 = No, 1 = Yes)
	Objects owned	If the consumer owns at least one object other than clothes	(0 = No, 1 = Yes)
Socio-demographic	Age	The consumer's age	18 to 60
	Gender	The gender of the consumer	(0 = Male, 1 = Female)

Table 7. Regression Results for Intended Discrepancy and Overall Discrepancy on Personality Dimensions.

Independent Variables	7A: Intended Discrepancy (B–A)					7P · Overall Discrepancy (C–A)				
	E	A	C	N	O	E	A	C	N	O
Constant	1.307	0.917	0.356	−0.768	1.206	0.083	0.037	−1.823*	1.486	−0.758
	(1.44)	(1.13)	(0.33)	(−0.67)	(1.22)	(0.09)	(0.05)	(−1.89)	(1.16)	(−0.824)
Percentage of time in SL	−0.008	−0.003	−0.012*	−0.010	−0.013**	−0.003	−0.006	−0.013**	0.016*	0.002
	(−1.43)	(−0.64)	(−1.71)	(−1.26)	(−2.07)	(−0.48)	(−1.23)	(1.99)	(1.96)	(0.30)
Premium account	−0.544	0.032	1.46***	0.672	−0.585	−0.807*	−0.384	0.738	−0.737	−0.724
	(−1.23)	(0.08)	(2.76)	(1.19)	(−1.22)	(−1.75)	(−1.07)	(1.57)	(−1.17)	(−1.61)
Number of months	−0.006	−0.015	−0.001	0.013	−0.012	−0.038**	−0.012	−0.006	0.005	−0.031*
	(−0.39)	(−1.01)	(0.66)	(0.65)	(−0.69)	(−2.27)	(−0.91)	(−0.33)	(0.24)	(−1.91)
Number of virtual worlds	−0.455	0.256	0.898**	0.726	0.011	−0.207	0.157	1.117***	−0.748	−0.023
	(−1.22)	(0.77)	(2.03)	(1.53)	(0.03)	(−0.54)	(0.52)	(2.82)	(−1.42)	(−0.06)
USD spent in SL	−0.002	0.001	0.001	0.006**	0.001	−0.002	−0.003	0.002	−0.004	0.002
	(−0.86)	(0.65)	(0.22)	(1.93)	(0.25)	(−0.63)	(−1.38)	(0.55)	(−1.17)	(0.75)
Land owning	1.068**	0.238	−1.430***	−0.509	0.556	1.216***	0.518	−1.222***	0.475	0.344
	(2.50)	(0.62)	(−2.80)	(0.93)	(1.20)	(2.73)	(1.49)	(−2.68)	(0.78)	(0.79)
Objects owned	−0.402	−0.777	−0.243	−0.924	0.269	1.307**	0.490	1.147*	−0.855	1.592***
	(−0.66)	(−1.42)	(−0.33)	(−1.19)	(0.41)	(2.07)	(0.99)	(1.77)	(−0.99)	(2.58)
Age	−0.002	−0.036**	−0.002	−0.004	−0.038**	−0.009	−0.028**	0.006	−0.004	−0.039**
	(−0.11)	(−2.35)	(−0.11)	(−0.16)	(−2.04)	(−0.50)	(−2.02)	(0.32)	(−0.18)	(−2.26)
Gender	−0.323	−1.023***	−0.413	0.096	−0.401	−0.283	−1.216***	−0.098	−0.662	−0.338
	(−0.99)	(−3.50)	(−1.06)	(0.23)	(−1.13)	(−0.83)	(−4.61)	(−0.28)	(−1.43)	(−1.02)
R^2	0.17	0.32	0.28	0.18	0.23	0.25	0.41	0.27	0.14	0.24

Notes: The table presents unstandardized regression coefficients with *t*-values in parentheses. The dependent variables are: E = Extraversion, A = Agreeableness, C = Conscientiousness, N = Neuroticism, O = Openness.

*Significant at the 0.10 level (2-tailed), **significant at the 0.05 level (2-tailed), ***significant at the 0.01 level (2-tailed).

compared to a brown-haired avatar. These results can guide choice of visual cues in the design of corporate avatars to match corporate goals and segments served.

Second, it is theoretically and managerially relevant to understand how perceivers form accurate impressions based on visual avatar cues. In this paper, authors present preliminary research on the subject matter. The finding that perceivers use particular avatar cues (e.g., attractiveness, gender, stylish hair, friendly expression) to form accurate impressions about targets and suggests that avatar cues can be used as proxy measures for target personality. For real-life companies that intend to expand to virtual worlds, member avatars can be used as proxy for member personality and lifestyles and can be used as the basis for targeting and segmentation, although further research needs to be conducted to verify the effectiveness of such measures in segmentation.

Third, the findings point to certain target characteristics that identify targets who consciously presented a different personality through their avatars than their actual personality on each of the FFM dimensions. For instance, targets that owned at least one piece of land created more extroverted avatars compared to who they really are and these avatars were also judged as more extroverted by the perceivers. This result emphasizes the importance of consumer (target) motives in the creation of avatars.

Limitations and Future Research

First, the focus of this research was on static avatars. Animated or automatic avatars may provide more cues (i.e., information) to perceivers. Future research can investigate cue utilization and cue validity with animated avatars. Secondly, the results concerning cue utilization can be extended by testing the similarity-attraction hypothesis (Byrne, Clore, & Worchell, 1966; Byrne, 1971). This hypothesis predicts that an avatar with a personality similar to the typical consumer targeted by the company would stimulate higher consumer interest in the company's products and increase the likelihood of patronage intentions and recommending the company to friends. Thirdly, the authors note that the cue list used in this research is based on research in advertising (Kolbe & Albanese, 1996, 1997) and includes mostly lower-level (e.g., more concrete, physical) cues. Further research is needed to identify higher-level information derived from these apparent cues (e.g., intelligence). Fourth, the authors note that coefficients that are significant for only "overall discrepancy" but not for "intended discrepancy" should be interpreted cautiously as the study did not control for the presentation of these target characteristics to the perceivers and the findings may reflect other explanations. Future research should control presentation of avatar related and other target characteristics to investigate this question. For instance, Lee, Im, and Taylor (2008) discuss a number of motivations and consequences of voluntary self-disclosure of information online. Further research can identify how these motivations relate to the size of intended discrepancy using avatars and other online information. Fifth, future research methods may employ "bubbles technique" (Gosselin & Schyns, 2001), which refers to the technique that can assign the credit of human categorization performance to specific visual information or eye-tracking technology to understand particular order of exposure to avatar cues and placement of avatars on corporate or personal Web pages (for more information on the use of visual techniques and tools for marketing and decision-making, see Lurie & Mason, 2007). Finally, one of the

limitations of this study is that it was conducted in English and *Second Life* is an international virtual world with members of varying levels of fluency in English. When navigating in *Second Life*, it is not unusual to encounter avatars whose targets are native speakers of French, German, Spanish, or other languages. Having a questionnaire only in English may have created a barrier for some of *Second Life* residents.

REFERENCES

Allport, G. W. (1937). Personality: A psychological interpretation. New York: Holt.

Allport, G. W., & Odbert, H. S. (1936). Trait names: A psycholexical study. Psychological Monographs, 47, 211.

Ambady, N., Krabbenhoft, M. A., & Hogan, D. (2006). The 30-sec sale: Using thin-slice judgments to evaluate sales effectiveness. Journal of Consumer Psychology, 16, 4–13.

Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. Psychological Bulletin, 111, 256–274.

Bainbridge, W. S. (2007). The scientific research potential of virtual worlds. Science, 317, 472–476.

Bargh, J., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. Journal of Personality and Social Psychology, 71, 230–244.

Belk, R. W. (1981). Determinants of consumption cue utilization in impression formation: An association derivation and experimental verification. In A. Mitchell (Ed.), Advances in consumer research (pp. 170–175). Ann Arbor, MI: Association for Consumer Research.

Belk, R. W. (1988). Possessions and the extended self. Journal of Consumer Research, 15, 139–168.

Belk, R. W. (2003). Shoes and self. In A. K. Punam & D. Rook (Eds.), Advances in consumer research (pp. 27–33). Valdosta, GA: Association for Consumer Research.

Bessière, K., Seay, A. F., & Kiesler, S. (2007). The ideal elf: Identity exploration in World of Warcraft. Cyberpsychology & Behavior, 10, 130–135.

Borkenau, P., & Liebler, A. (1992). Trait inferences: Sources of validity at zero-acquaintance. Journal of Personality and Social Psychology, 62, 645–657.

Borkenau, P., & Liebler, A. (1995). Observable attributes as manifestations and cues of personality and intelligence. Journal of Personality, 63, 1–25.

Brunswik, E. (1956). Perception and the representative design of psychological experiments. Berkeley, CA: University of California Press.

Byrne, D. (1971). The attraction paradigm. New York, NY: Academic Press.

Byrne, D., Clore, G. L., & Worchel, P. (1966). The effect of economic similarity-dissimilarity as determinants of attractions. Journal of Personality and Social Psychology, 4, 220–224.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale: Lawrence Erlbaum.

Collins English Dictionary (4th ed.). (1998). Glasgow, UK: Harper Collins.

Crano, W. D., & Brewer, M. B. (2002). Principles and methods of social research (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Dholakia, U. M., Bagozzi, R. P., & Pearo, L. K. (2004). A social influence model of consumer participation in network- and small-group-based virtual communities. International Journal of Research in Marketing, 21, 241–263.

eMarketer. (2007). 80% of Internet consumers to get Second Life. Retrieved May 13th, 2009, from http://www.emarketer.com/Article.aspx?R=1004856.

Endler, N. S., & Speer, R. L. (1998). Personality psychology: Research trends for 1993–1995. Journal of Personality, 66, 621–669.

Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: A three-factor theory of anthropomorphism. Psychological Review, 114, 864–886.

Evans, D. C., Gosling, S. D., & Carroll, A. (2008). What elements of an online social net-working profile predict target-rater agreement in personality impressions? In Proceedings of the International Conference on Weblogs and Social Media (pp. 1–6), Seattle, WA.

Fiske, S. T., & Cox, M. (1979). Person concepts: The effects of target familiarity and descriptive purpose on the process of describing others. Journal of Personality and Social Psychology, 47, 136–161.

Funder, D. C. (1995). On the accuracy of personality judgment: A realistic approach. Psychological Review, 102, 652–670.

Funder, D. C. (1999). Personality judgment: A realistic approach to person perception. San Diego, CA: Academic Press.

Funder, D. C., & Sneed, C. D. (1993). Behavioral manifestations of personality: An ecological approach to judgmental accuracy. Journal of Personality and Social Psychology, 61, 688–698.

Gangestad, S. W., Simpson, J. A., DiGeronimo, K., & Biek, M. (1992). Differential accuracy in person perception across traits: Examination of a functional hypothesis. Journal of Personality and Social Psychology, 62, 688–698.

Gifford, R. (1994). A lens-mapping framework for understanding the encoding and decoding of interpersonal dispositions in nonverbal behavior. Journal of Personality and Social Psychology, 66, 398–412.

Gigerenzer, G., & Kurz, E. M. (2001). Vicarious functioning reconsidered: A fast and frugal lens model. In K. R. Hammond & T. R. Stewart (Eds.), The essential Brunswik: Beginnings, explications, applications (pp. 342–348). New York, NY: Oxford University Press.

Goffman, E. (1959). The presentation of self in everyday life. Garden City, NY: Doubleday

Gorn, G. J., Amitava, C., Yi, T., & Dahl, D. W. (1997). Effects of color as an executional cue in advertising: They're in the shade. Managerment Science, 43, 1387–1400.

Gorn, G. J., Jiang, Y., & Johar, G. V. (2008). Babyfaces, trait inferences, and company evaluations in a public relations crisis. Journal of Consumer Research, 35, 36–49.

Gosling, S. D., Gaddis, S., & Vazire, S. (2007). Personality impressions based on Facebook profiles. In Proceedings of the International Conference on Weblogs and Social Media (pp. 1–4), Boulder, CO.

Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Personality judgments based on offices and bedrooms. Journal of Personality and Social Psychology, 82, 379–398.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the big five personality domains. Journal of Research in Personality, 37, 504–528.

Gosselin, F., & Schyns, P. G. (2001). Bubbles: A technique to reveal the use of information in recognition. Vision Research, 41, 2261–2271.

Hayes, A. F., & Dunning, D. (1997). Construal processes and trait ambiguity: Implications for self-peer agreement in personality judgment. Journal of Personality and Social Psychology, 72, 664–677.

Hemp, P. (2006). Avatar-based marketing. Harvard Business Review, 84, 48–57.

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. Psychological Review, 94, 319–340.

Holzwarth, M., Janiszewski, C., & Neumann, M. M. (2006). The influence of avatars on online consumer shopping behavior. Journal of Marketing, 70, 19–36.

Hogan, R., Jones, W. H., & Cheek, J. M. (1985). Socioanalytic theory: An alternative to armadillo psychology. In B. R. Schlenker (Ed.), The self and social life (pp. 175–198). New York: McGraw-Hill.

Joel, M. (2006). Get a (Second) Life. Marketing, 111, 23.

John, D. R., & Sujan, M. (1990). Children's use of perceptual cues in product categorization. Psychology & Marketing, 7, 277–295.

John, O. P. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and questionnaires. In L. A. Pervin (Ed.), Handbook of personality: Theory and research (pp. 66–100). New York: Guilford Press.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), Handbook of personality theory and research (pp. 102–138). New York, NY: Guilford Press.

Kenny, D. A. (1994). Interpersonal perception: A social relations analysis. New York, NY: Guilford Press.

Kolbe, R. H., & Albanese, P. J. (1996). Man to man: A content analysis of sole-male images in male-audience magazines. Journal of Advertsing, 25, 1–19.

Kolbe, R. H., & Albanese, P. J. (1997). The functional integration of sole-male images into magazine advertisements. Sex Roles, 36, 813–836.

Kozinets, R. V. (1999). E-tribalized marketing? The strategic implications of virtual communities of consumption. European Management Journal, 17, 252–265.

LaVallee, A. (2006). Style & substance: Now, virtual fashion; Second Life designers make real money creating clothes for simulation game's players. Wall Street Journal, Sept. 22, 2006, B1.

Lavater, J. C. (1789). Essays on physiognomy. London: J. Murray.

Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two component model. Psychological Bulletin, 107, 34–47.

Leary, M. R., Nezlek, J. B., Downs, D., Radford-Davenport, J., Martin, J., & McMullen, A. (1994). Self presentation in everyday interactions: Effects of target familiarity and gender composition. Journal of Personality and Social Psychology, 67, 664–673.

Lee, D. H., Im S., & Taylor C. R. (2008). Voluntary self-disclosure of information on the Internet: A multimethod study of the motivations and consequences of disclosing information on blogs. Psychology & Marketing, 25, 692–710.

Lurie, N. H., & Mason, C. H. (2007). Visual representation: Implications for decision making. Journal of Marketing, 71, 160–177.

Machover, K. (1949). Personality projection in the drawing of the human figure: A method of personality investigation. Springfield, IL: C. C. Thomas.

Marcus, B., Machilek, F., & Schütz, A. (2006). Personality in Cyberspace: Personal web sites as media for personality expressions and impressions. Journal of Personality and Social Psychology, 90, 1014–1031.

Markus, H., & Nurius, P. (1986). Possible selves. American Psychologist, 41, 954–969.

McCrae, R. R., & Costa P. T., Jr., (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), Handbook of personality theory and research (pp. 139–153). New York, NY: Guilford Press.

McCrae, R. R., & John, O. P. (1992). An introduction to the Five-Factor Model and its applications. Journal of Personality, 60, 175–215.

McCrae, R. R., Zonderman, A. B., Costa P. T., Jr., Bond, M. B., & Paunonen, S. (1996). Evaluating replicability of factors in the revised NEO personality inventory: Confirmatory factor analysis versus procrustes rotation. Journal of Personality and Social Psychology, 70, 552–566.

McKeon, M., & Wyche, S. (2006). Life across boundaries: Design, identity, and gender in SL (pp. 1–35). Atlanta, GA: Georgia Institute of Technology.

Moon, Y. (2000). Intimate exchanges: Using computers to elicit self-disclosure from consumers. Journal of Consumer Research, 26, 323–339.

Moon, Y. (2003). Don't blame the computer: When self-disclosure moderates the self-serving bias. Journal of Consumer Psychology, 13, 125–137.

Nass, C. I., & Steuer, J. S. (1993). Voices, boxes and sources of messages: Computers and social actors. Human Communication Research, 19, 504–527.

Nowak, K. L. (2004). The influence of anthropomorphism and agency on social judgment in virtual environments. Journal of Computer Mediated Communication, 9. Available at http://jcmc.indiana.edu/vol9/issue2/nowak.html.

Nowak, K. L., & Biocca, F. (2003). The effect of the agency and anthropomorphism on users' sense of telepresence, copresence, and social presence in virtual environments. Presence: Teleoperators and Virtual Environments, 12, 481–494.

Nunnally, J. C. (1978). Psychometric theory. New York, NY: McGraw-Hill.

Paunonen, S. (1998). Hierarchical organization of personality and prediction of behavior. Journal of Personality and Social Psychology, 74, 538–556.

Peracchio, L. A., & Luna, D. (2006). The role of thin-slice judgments. Journal of Consumer Psychology, 16, 25–32.

Perreault, W. D., Jr., & Leigh, L. E. (1989). Reliability of nominal data based on qualitative judgments. Journal of Marketing Research, 26, 135–148.

Prabhaker, P. R., & Sauer, P. (1994). Hierarchical heuristics in evaluation of competitive brands based on multiple cues. Psychology & Marketing, 11, 217–234.

Prelinger, E. (1959). Extension and structure of the self. Journal of Psychology, 47, 13–23.

Redmond, W. H. (2002). The potential impact of artificial shopping agents in e-commerce markets. Journal of Interactive Marketing, 16, 56–66.

Reed, A., II. (2002). Social identity as a useful perspective for self-concept-based consumer research. Psychology & Marketing, 19, 235–266.

Reeves, B., & Nass, C. I. (1996). The media equation: How people treat computers, television and new media like real people and places. Cambridge, MA: Cambridge University Press.

Rousseau, D., & Hayes-Roth, B. (1998). In a social-psychological model for synthetic actors. In K. P. Svcara & M. Wooldridge (Eds.) International Conference on Autonomous Agents (pp. 165–172). Minneapolis, MN: Association for Computing Machinery.

Schlenker, B. R. (1980). Impression management. Monterey, CA: Brooks/Cole.

Schneiderman, B. (2008). Science 2.0. Science, 319, 1349–1350.

Stephenson, N. (1992). Snow crash. New York: Bantam Books.

Tapp, S. (1984). Brunswik's lens model: A review and extension to consumer research. In T. C. Kinnear (Ed.), Advances in consumer research (pp. 103–108). Provo, UT: Association for Consumer Research.

Tedeschi, J. T. (1981). Impression management theory and social psychological research. New York: Academic Press.

Tice, D. M., Butler, J. L., Muraven, M. B., & Stillwell, A. M. (1995). When modesty prevails: Differential favorability of self-presentation to friends and strangers. Journal of Personality and Social Psychology, 69, 1120–1138.

Vazire, S., & Gosling, S. D. (2004). E-personality: Impressions based on personal websites. Journal of Personality and Social Psychology, 87, 123–132.

Walther, J. B., Van Der Heide, B., Kim, S.-Y., Westerman, D., & Tong, S. T. (2008). The role of friends' appearance and behavior on evaluations of individuals on Facebook: Are we known by the company we keep? Human Communication Research, 34, 28–49.

Wang, L. C., Baker, J., Wagner, J. A. & Wakefield, K. (2007). Can a retail web site be social? Journal of Marketing, 71, 143–157.

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-Ms exposure to a face. Psychological Science, 17, 592–598.

Winter, L., & Uleman, J. S. (1984). When are social judgments made? Evidence for the spontaneous of trait inferences. Journal of Personality and Social Psychology, 47, 237–252.

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APPENDIX A

Sample of Second Life Avatars Used.

APPENDIX B

Differences in Ikea Avatar Anna in the US (left) and in the UK (right).