It's Not Easy Trying to be One of the Guys: The Effect of Avatar Attractiveness, Avatar Gender, and Purported User Gender on the Success of Help-Seeking Requests in an Online Game

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Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in

partial fulfillment of the requirements for the degree of

Master of Arts

In

Communication

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April 30, 2012

Blacksburg, VA

Keywords: avatars, virtual worlds, online behavior, gender roles, computers are social actors

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ABSTRACT

Previous research has found that users' interactions with others in online environments are often guided by the same rules and stereotypes we apply in our everyday lives. However, fewer studies have used virtual worlds as an experimental setting for the systematic examination of how avatar appearance and offline identity affect the outcome of users' actual interactions. This online field experiment measured the effect of avatar attractiveness, avatar gender, purported user gender, and favor size on the rate at which users received help across 2,300 separate user interactions. In addition, the main study's avatar gender, purported user gender, and favor size manipulations were replicated with a human avatar condition with 761 participants to examine whether trends for these factors' effects were similar with human avatars. In the main study, attractive avatars generally received more help than less attractive avatars. However, purported female users were helped less frequently than purported male users when represented by avatars that were either male or less attractive. Trends in the human avatar condition were similar to those observed in the main study. Implications for avatar-mediated communication and the persistence of sex roles in virtual environments are discussed.

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Introduction

When people initially meet in an online setting, it is likely they will know relatively little about the offline identity of their interaction partner. As a result, individuals will often form their impressions of others online based on the available information provided in the communication setting. For example, individuals might assume they are communicating with another male player if the user is represented by a masculine symbol or character. Similarly, individuals might perceive their interaction partner as more or less attractive if his or her chosen image is visually appealing. Many of these initial perceptions seem intuitive or automatic. However, their effect on users' subsequent behaviors with others is less clear. Do users of online environments treat others differently based on the attractiveness or gender of their chosen character? If so, how do these responses change if individuals receive additional information about their interaction partner?

While the answers to these questions are unclear, many have argued that virtual worlds are an ideal medium for the study of online behavior (Bainbridge, 2007; Castronova, 2006; Yee, Bailenson, Urbanek, Chang, & Merget, 2007). Specifically, massively multiplayer online games (MMOs) such as *World of Warcraft* and *Second Life* have been proposed as potential field experiment settings for several reasons. First, MMOs are noteworthy for their broad demographic appeal across a wide variety of age groups and occupations. For example, one study found that MMO players range in age from 12 to 65 years old with an average age of 31 (Williams, Yee, & Caplan, 2008). Furthermore, available estimates suggest that over 35% of MMO players are married, 22% have children, and more than half are employed full-time (Yee, 2006). As a result, virtual worlds offer the researcher of avatar-mediated communication with a demographically diverse population of users to study.

Second, virtual worlds are also characterized by the significant commitment and involvement that they evoke from their users. In terms of total use, MMO users play online games an average of 25 hours of a week (Williams et al., 2008), with some individual game play sessions lasting more than 10 hours continuously (Yee, 2006). This extensive use can be partially attributed to the valuable experiences that players reportedly derive during their time in these environments as MMO users describe virtual worlds as rewarding, emotionally stimulating, and conducive to the development of lasting friendships with others (Yee, 2006). Therefore, it is likely that the effects of avatar appearance derived from field-based research in virtual worlds will be based on a series of interactions that are meaningful and important to a large majority of the participants who are sampled.

Finally, it is also important to note that experiments in virtual worlds provide many of the same opportunities to study human behavior traditionally associated with field-based research. For example, consider the hypothetical case of a researcher who wants to study the effect of avatar height in an online setting. In terms of methodological benefits, a researcher could select a set of avatars that varied in height and systematically observe how their appearance affected the outcome of users' natural interactions with others in an unobtrusive way. The researcher would also have unlimited opportunities for the replication of his or her experiment, as many MMOs provide players with multiple copies of the virtual world to choose from (Castronova, 2006). Thus, virtual worlds could allow one to subtly measure the effect of an intended stimulus and replicate its potential effects across a variety of populations. However, if our hypothetical researcher found that tall avatars received more help than short avatars, could the effect of avatar height also be generalized to users' offline interactions? A large body of research suggests yes.

In general, user behaviors in virtual environments are often guided by the same norms we employ in our everyday lives (Eastwick & Gardner; Williams, 2010; Yee et al., 2007). Williams (2010) describes this phenomenon as the mapping principle, specifically stating that some behavior occurs in virtual worlds according to the automatic stereotypes and heuristics users apply in offline settings. For example, participant observations in the virtual world *Second Life* found that users varied their eye contact and interpersonal distance with others based on the gender of their interaction partner (Yee et al., 2007). Social stereotypes related to race have also been replicated as one study found that that light-skinned avatars were more likely to gain help through common compliance techniques than dark-skinned avatars (Eastwick & Gardner, 2008). However, field-based investigations of social behavior in online environments have yet to examine how users' respond to avatars when additional information is available about their interaction partner. In other words, research has yet to consider if users respond differently to certain avatar traits based on the characteristics of the avatar's user.

This thesis presents an initial exploration into the interplay between avatar and user characteristics as cues influencing social behavior online by exploring how online helping behavior is influenced by an avatar's attractiveness and gender, both of which are cues that have been found to influence judgments and responses in real-life settings. (Furnham & Radley, 1989; Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000; Pine, 2001). In addition, the study also examines how the effects of those avatar traits on human behavior may be moderated by the information the avatar's user provides about his or her own gender. In other words, we are interested not only in whether an avatar's attractiveness and gender induce pro-social behavior, but also whether the effects of those avatar traits are influenced by the purported gender of the avatar's user.

Avatars allow users to customize their appearance along a range of potential characteristics including skin tone, hairstyle, and gender (Ivory, 2012). Some users report that they use these customization options to create avatars that represent ideal extensions of their offline appearance and personality (Bessière, Seay, & Kiesler, 2007). However, many MMO players also choose to design avatars with very different traits than themselves (Ducheneaut, Wen, Yee & Wadley, 2009), sometimes even choosing to create an avatar of the opposite gender to "gender bend" (Huh & Williams, 2009; Hussain & Griffiths; Yee, Duchenaut, Yao, & Nelson, 2011). Past studies have begun to illuminate the reasons why individuals choose to employ opposite gendered characters (Ducheneaut et al., 2009; Griffiths, Davies, & Chappell, 2003;Wang & Wang, 2008) but research on how gender bending affects users' subsequent interactions with other players in MMOs has been limited (Huh & Williams; Yee et al., 2011). Similarly, although previous studies have found that attractive avatars can elicit stereotype-consistent responses in controlled experimental settings (Nowak & Rauh, 2006; Yee & Bailenson, 2007), further research is necessary to determine whether avatar attractiveness is a salient cue to identity in online, game-based environments.

To answer these questions, the present study examined how users respond to small and large requests for assistance when the attractiveness and gender of an avatar and the gender of the avatar's purported user varies in an MMO game. Specifically, a virtual field study involving 2,300 MMO users was conducted. The design of the field experiment was a 2 (avatar gender: male avatar vs. female avatar) x 3 (avatar attractiveness: high attractiveness avatar vs. medium attractiveness avatar vs. low attractiveness avatar) x 3 (purported user gender: male purported user vs. female purported user vs. purported gender not specified) x 2 (magnitude of request: small request vs. large request) design. In addition, supplementary data was also collected from

761 MMO users to examine the effect of avatar gender, purported user gender, and favor size with a human avatar group. In the following sections, relevant research on the effect of avatar attractiveness and avatar gender in virtual environments will be summarized and hypotheses will be proposed. After discussing the literature, the design of the study is explained and the results of the experiment are detailed. A discussion of the study's implications and limitations is also provided along with suggestions for future research.

Literature Review

Behavior in Online Environments and the Mapping Principle

When users communicate in online environments, their behaviors often occur in the same way as they would also occur in offline interactions (Eastwick & Gardner, 2009; Kozlov & Johansen, 2010; Williams, 2010; Yee et al., 2007). Williams (2010) describes this phenomenon as the mapping principle. Generally, a behavior is defined as "mapping" to a virtual environment if it follows a pattern predicted by established offline social rules. For example, if an avatar is more likely to gain compliance for a moderate favor when a larger favor precedes the request, it can be concluded that the "door-in-the-face" effect "maps" to user behavior in the examined environment (Eastwick & Gardner, 2007). However, Williams (2010) states that "at this very early stage, mapping is not taken as a given" (p.452). As a result, many phenomena have yet to be systematically investigated in virtual worlds.

Avatars and the Attribution of Attractiveness

One common social response that can influence a variety of users' perceptions and behaviors toward others widely is the cue of physical attractiveness. In terms of perceptions, attractive communicators are often evaluated as friendlier, more trustworthy, and more likely to lead successful lives than less attractive individuals (Dion, Berscheid, & Walster, 1972; Langlois

et a., 2000). Physical attractiveness is also related to a number of intentions and behavioral outcomes including an increased likelihood of being selected for employment (Hosoda Hosoda, Stone-Romero, & Coats, 2003), less frequent attributions of guilt in simulated trials (Mazzela & Feingold, 2006), and a more successful rate of gaining compliance (Chaiken, 1979). As a result, there appear to be many advantages that are traditionally associated with the cue of physical attractiveness. While it is less clear if attractive avatars also gain more compliance in online settings, a number of studies have found that users evaluate physically attractive avatars and the entities they represent in several predictable and consistent ways.

At a basic level, individuals are more attracted to avatars that are anthropomorphic, or similar in form to the shape of a human. Anthropomorphism in avatars can vary from less anthropomorphic objects with limited human features (e.g., Clippy, the Microsoft paper clip) to representations higher in anthropomorphism that possess a collection of familiar human attributes such as clothing or bipedal motion (e,g., Mickey Mouse). Variations in anthropomorphism are important to the person perception process, as one study found that human-like, non-androgynous avatars were rated as more physically attractive, credible, and trustworthy than androgynous avatars low in anthropomorphism (Nowak & Rauh, 2006).

When people form attitudes and judgments about avatars based on their physical traits, the perceptions can also extend to their evaluations of the entities those avatars represent. For example, Holzwarth, Janiszewski, and Neumann (2006) examined the effect of avatar appearance on users' purchase intention and satisfaction with an online retailer. A hypothetical online company was represented by either a "credible" avatar (e.g., an avatar dressed to appear as an aged professional) or an "attractive" avatar (e.g., an avatar dressed to appear young and informal). Participants who interacted with the retailer represented by the attractive avatar had

greater satisfaction with the company and reporter higher intentions to purchase the company's products. By comparison, participants who were solicited by the credible avatar only changed their evaluation of the company if they intended to purchase the advertised product.

In addition to the effects of avatar attractiveness observed with static, two-dimensional characters (Holzwarth et al., 2006; Nowak & Rauh, 2006), physical attractiveness has also been measured with increasingly advanced avatars in three-dimensional simulations. For example, Yee and Bailenson (2007) examined whether users who controlled attractive avatars exhibit more confident, assertive behavior in a virtual reality simulator. To manipulate attractiveness, participants were given an avatar that was either high (e.g., normal face) or low (e.g., a misshaped, distorted face) in facial attractiveness. Then, the researcher measured whether the variations in avatar attractiveness affected the amount of disclosure and interpersonal distance that participants maintained with a confederate in a subsequent interaction. Overall, the results of the study revealed that participants who controlled attractive avatars were more likely to stand closer to others and disclose more information about themselves than participants who controlled less attractive avatars. Similarly, users of the online virtual world *Second Life* report that they feel more confident and outgoing during their online interactions if they control an attractive avatar (Messinger, Ge, Stroulia, Lyons, Smirnov, & Bone, 2008). But, despite the evidence provided by these previous studies, less research has examined whether attractive avatars also elicit stereotype-consistent responses from other users.

The present study attempted to address this gap in research by examining how variations in avatar attractiveness affect the success of users' help-seeking requests in an online game. A number of studies suggest that attractive avatars and the users who they represent are evaluated more favorably (Nowak & Rauh, 2006; Holzwarth et al., 2006). Furthermore, it also appears that

avatars that are attractive elicit stereotype consistent responses from their users (Messinger et al., 2008; Yee & Bailenson, 2007). As a result, it is likely that the behavioral advantages conferred to attractive communicators in the offline world (Chaiken, 1979; Hosoda et al., 2003; Langlois et al., 2000) should also map to users' interactions with others in an online, game-based environment. Therefore, the following hypothesis was predicted:

H_1: Attractive avatars gain more compliance in virtual worlds than less attractive avatars.

Avatars and the Attribution of Gender

Just as users of virtual environments may form attitudes and judgments about other users based on the attractiveness of those users' avatars, research also suggests that individuals respond to avatars, computers, and other media interfaces according to established social norms related to gender. For example, research within the Computers are Social Actors (CASA) paradigm (Nass & Moon, 2010; Nass, Steuer, & Tauber, 1994; Reeves & Nass, 1996) has found that individuals automatically respond to computers that exhibit human-like features with the same social rules they apply in their everyday physical interactions (Yee et al., 2007). The CASA paradigm has tested the persistence of these social responses to computers through applying established rules derived from social science to the context of computer-mediated communications.

In the domain of gender, Nass, Moon, and Green (1997) examined whether individuals would apply gender stereotypes related to criticism and praise when responding to computers who used a synthesized voice. First, participants were asked to listen to a computer that provided a tutoring session on a masculine or feminine topic in either a male or female digitized voice. Following the tutoring session, participants took a test on the topic they were tutored on and then went to a computer that evaluated their performance on the test in either a male or female voice.

The changes in synthesized voice elicited offline stereotypes related to gender, as the male voice was rated as more informative when it tutored the participant on stereotypically male topics, while the female voice was rated more informative when the topic was stereotypically feminine. If gender-neutral interfaces such as computers can elicit automatic social responses from their users, it is also likely that interfaces with more human like-characteristics such as avatars can also evoke similar gender-consistent responses. Subsequent research has supported this assumption across a range of realistic avatars from simple, cartoon-based avatars in controlled, artificial settings (Lee, 2005) to three-dimensional avatars in online social worlds (Yee et al., 2007).

For example, Lee (2005) examined whether individuals discern the gender of communicators online from the appearance of two-dimensional, static avatars. Participants were assigned an opposite gendered avatar and then asked to play a trivia game online with another individual represented by a male or female avatar. Working together as a "team" with the other user, participants were asked a series of stereotypically male and female questions and given the chance to provide either their own answer or conform to the answer of their online partner. Participants were more likely to adapt to the suggestion of male avatars when the topic was masculine while female avatars were more likely to elicit conformity from participants for feminine topics. In addition, participants rated their trivia partner as more masculine or feminine depending on the gender of their partner's avatar despite explicit reminders that their own avatar mismatched their offline gender.

Aside from the replication of gender stereotypes related to criticism and expertise, social rules related to gender have also been observed in virtual worlds. For example, field observations of user behavior in the MMO *Second Life* found that male-male dyads were less likely to

maintain eye contact and stood further apart than female-female or mixed gender dyads (Yee, Bailenson, Urbanek, Chang, & Merget, 2007). In addition, users of MMOs and related textual environments report that players who identify themselves as female receive unsolicited attention and sexual advances from surrounding male players (Bruckman, 1993; Griffiths et al., 2003; Wang & Wang, 2008). Given the consistent influence of avatar appearance to the person perception process in controlled experimental settings (Lee, 2005) and the accompanying behavioral implications associated with the attribution of gender in online environments (Griffiths et al., 2003; Wang & Wang, 2008; Yee et al., 2007), there are multiple reasons to expect that female avatars receive more help than male avatars in online environments. As a result, the following hypothesis was predicted:

H_2: Female avatars will gain more compliance than male avatars.

Interaction Context and the Attribution of Gender

Although avatar appearance represents a frequently salient cue to identity in online communication, the perception process can also be guided by the context of the interaction. Social Information Processing Theory posits that users often develop impressions online based on the available information provided by the medium (Walther, 1993). This process can be guided by differences in the linguistic styles (Savicki, Kelley, & Oesterreich, 1999; Thomson & Murachver, 2001) and selected nicknames (Cornetto & Nowak, 2006; Herring & Martinson, 2004) used by male and female communicators. In addition, the appearance of one's avatar has been shown to influence users' attributions of gender (Lee, 2005; Lee, 2007). However, impressions of others can also be based on the stereotypes associated with the communication setting. For example, Eden, Maloney, and Bowman (2010) examined the effect of video game genre on participants' attributions of avatars' masculinity and femininity. Participants were

shown a short recording of a video game that featured a male or female avatar. Then, they were then asked to evaluate the gender of the user who had controlled the avatar. Participants rated the gender of the player as male regardless of avatar appearance, varying their perceptions instead according to the masculinity of the game genre. In other words, the effect of the interaction context was more salient to users' perceptions of the player when the game genre was already associated with a specific type of user.

Virtual worlds can also be differentiated by the stereotypes associated with their environments. In terms of their users, a socially based virtual world such as *Second Life* may be considered more gender-neutral than an MMO with a primarily male population, such as *World of Warcraft* (Williams, 2010). If the stereotypes associated with certain game genres influence individuals' impressions of others (Eden et al., 2010), it is also likely that users of game-based MMOs may also rely on information about the interaction context. This assumption has important implications for examining user behavior in online worlds, as the effect of avatar gender found in a social-based world may not be salient in a stereotypically male environment.

The present field experiment attempted to address this competing assumption by examining the effect of avatar gender in a game-based MMO. Although previous research suggests that users respond to avatars in different ways according to their gender (Lee, 2005; Yee et al., 2007), contrary findings suggest that the context of the interaction can moderate the effect of avatar appearance (Eden et al., 2010). Given the heavily male population traditionally associated with game-based MMOs, it is likely that avatar gender is less important to the person perception process than research conducted in controlled experimental settings and social based-worlds would suggest. As a result, the following hypothesis and research question were proposed:

H_3: Avatar gender will not affect the rate of compliance between male and female avatars.

RQ_1: Is there an interaction between avatar attractiveness and avatar gender on the rate at which users gain compliance?

Purported Gender and Avatar Gender in Virtual Worlds

Contrary to the adolescent male audience traditionally associated with video games (Williams et al., 2008), females now account for more than 40% of all video game players (Entertainment Software Association, 2011). Involvement in virtual worlds has been no exception as demographic estimates suggest massively multiplayer online games attract more female players than many other comparable offline video game genres (Yee, 2006). Users' experiences in online environments can often vary depending on the gender of the user as female players report that they avoid identifying their offline gender to circumvent the unwanted attention they would otherwise receive from surrounding male users (Hussain & Griffiths, 2008). By comparison, male players report deliberately identifying themselves as female players to obtain in-game items and other forms of preferential assistance (Griffiths et al., 2003).

Given that male and female players perceive the advantages of adopting opposite gendered avatars in online games (Griffiths et al., 2003; Hussain & Griffiths, 2008), some individuals choose to customize avatars in massively multiplayer environments that deviate from their offline identity. Among the forms of identity deception most common to interaction in MMOs is gender bending, or the selection of an online gender that is different from one's offline biological sex (Huh & Williams, 2009). The prevalence of gender bending has been found to vary between online game environments as prior estimations of its occurrence vary from 57% (Hussain & Griffiths, 2008) to 15% of all players (Huh & Williams, 2009). Conclusions

regarding the effects of gender bending have also been equivocal as one study found game players adapted to the stereotypes associated with their avatar's gender (Yee et al., 2011) while similar longitudinal examinations have found no relationship between avatar gender and users' subsequent in-game behaviors (Huh & Williams, 2009). As a result, it appears that purported female users are more likely to gain assistance than male players (Griffiths et al., 2003; Hussain & Griffiths; Wang & Wang, 2008). However, less evidence is available regarding how individuals respond to other players who gender bend. Therefore, the following hypothesis and research questions are proposed:

H_4: Avatars whose purported user gender is female will gain more compliance than avatars whose purported gender is male.

RQ_2: Is there an interaction between avatar attractiveness and users' purported gender on the rate at which users gain compliance?

RQ_3: Is there an interaction between avatar gender and users' purported gender on the rate at which users gain compliance?

RQ_4: Is there an interaction between avatar attractiveness, avatar gender, and purported user gender on the rate at which users gain compliance?

In addition to the limited investigation of gender bending, previous research has also yet to examine whether the effect of avatar gender, avatar attractiveness, and purported gender are moderated by the magnitude of assistance requested by a user. Although a multitude of previous studies suggest that avatar gender (Yee et al., 2007), avatar attractiveness (Yee & Bailenson, 2007), and purported user gender (Wang & Wang, 2008) influence the nature of our interactions with other users, past research has yet to consider if these persuasive advantages extend beyond

measures of intentions and basic changes in users' confidence and assertiveness in controlled settings.

The present research attempted to answer the call to research of multiple studies (Harris et al., 2009; Lee, 2005; Lee, 2007; Wiebel, Wissmath, & Mast, 2010) by measuring whether the effect of avatar gender, avatar attractiveness, and purported gender vary depending on the amount of assistance requested. Based on the previous replication of many different social behaviors in virtual environments (Eastwick & Gardner, 2008; Kozlov & Johansen, 2010; Yee et al., 2007), it is expected that small requests for assistance will gain more consent than large requests. However, it is unclear if the magnitude of assistance requested moderates the effects of avatar gender, avatar attractiveness, or purported gender. As a result, the following hypothesis and research questions are proposed:

H_4: Avatars will gain more compliance for small favors than avatars that request big favors.

RQ_5: Does the amount of assistance requested moderate the main and interaction effects of avatar attractiveness, avatar gender, and purported user gender on the rate of gaining compliance?

Method

The present study was a 2 (avatar gender: male avatar vs. female avatar) x 3 (avatar attractiveness: high avatar attractiveness vs. medium avatar attractiveness vs. low avatar attractiveness) x 3 (purported user gender: male purported user vs. female purported user vs. purported user gender not specified) x 2 (magnitude of request: small request vs. large request) design. A series of pilot studies were conducted to determine how avatar attractiveness, avatar gender, and purported user gender would be manipulated.

Pilot Study 1

The independent variables of avatar attractiveness and avatar gender were determined by the results of a pilot study, in which participants evaluated 12 avatars (a male and female avatar from each species created by the *WoW* avatar creation system, see appendix), along a 7-point Likert-type scale measuring physical attractiveness, sex, masculinity and femininity.

Avatar attractiveness. Paired *t*-tests were conducted to determine which of the twelve avatar species would used for the conditions of high, medium, and low avatar attractiveness. Average scores were compared across avatars overall, then between the male and female avatar of each species. The "Blood Elf" ($M = 4.93$, $SD = 1.27$) was rated as significantly more attractive, all *t*s > 23.10, all *p*s < .011, than the other five avatars. The "Orc" ($M = 1.30$, $SD = .499$) and the "Tauren" ($M = 1.39$, $SD = .696$) were the least attractive characters, but their differences in attractiveness were not significant, $t(69) = 1.31$, $p = .903$. However, additional analyses between the male and female characters of each species revealed that the female Tauren was identified incorrectly as male by 36% of participants. Since the present analysis is concerned with the effect of avatar gender on compliance, the Tauren was eliminated and the Orc was selected as the avatar to be used for the low attractiveness condition.

Following the selection of the avatars to be used for the high and low attractiveness condition, paired *t*-tests were used to determine the avatar to be used for the medium attractiveness condition. A paired *t*-test found a significant difference in attractiveness between the "Night Elf" and the avatars selected for the high and low attractiveness conditions, all *t*s > 13.28, all *p*s < .001, as the Night Elf ($M = 3.14$, $SD = 1.29$) was significantly less attractive the Blood Elf ($M = 4.93$, $SD = 1.27$) and significantly more attractive than the Orc ($M = 1.30$, $SD = .499$). Although the additional character of the "Troll" was significantly less attractive ($M =$

2.29, *SD* = .883) as a species than the Night Elf (*M* = 3.14, *SD* = 1.29), $t(69) = 4.85, p > .001$,

additional paired *t*-tests within avatar gender found no significant differences, $t(69) = .562, p =$

.712, between the male Orc (*M* = 1.19, *SD* = .490) and the male Troll (*M* = 1.24, *SD* = .806).

Thus, the Troll was eliminated and the Night Elf was selected as the character to be used for the

middle attractiveness condition.

In addition to comparing the mean scores for physical attractiveness of each avatar

species overall, paired *t*-tests were also conducted to compare the attractiveness of the male and

female avatars between each species. Evaluations of attractiveness between avatar genders

generally followed the same trends previously observed across species, although two caveats are

noteworthy. First, there was a consistent significant difference in attractiveness between genders,

$t(69) = 14.25, p < .001$, as female avatars were rated as more attractive (*M* = 3.50, *SD* = .71) than

male avatars (*M* = 2.34, *SD* = .67) across the six species evaluated. This pattern is consistent with

previous research regarding evaluations of physical attractiveness across genders (Langlois et al.,

2000).

Second, comparisons between genders also revealed that there was no significant

difference, $t(69) = 0, p = .500$, between the attractiveness of the female Blood Elf (*M* = 5.60, *SD*

= 1.07) and the female Human (*M* = 5.60, *SD* = 1.07). As a result, the decision was made to

exclude the "Human" character from the design. However, since the Human character represents

the only avatar with an offline counterpart, supplementary data were collected replicating the

study's other manipulations (avatar gender, purported user gender, and favor size as described

below) for the Human character to allow supplemental analyses of effects with a human avatar.

Avatar gender. The sex of the six characters selected to manipulate the variable of

avatar attractiveness were identified correctly by more than 98% of all participants. In addition,

paired *t*-tests were conducted to analyze avatar masculinity and femininity across species overall, then between the male and female characters of each species. A significant difference in masculinity was found across species overall, $t(69) = 25.72, p < .001$, as male avatars were significantly more masculine ($M = 5.72, SD = .73$) than female avatars ($M = 2.64, SD = .78$). Evaluations of femininity across species were also significant, $t(69) = 30.04, p < .001$, as female avatars were significantly more feminine ($M = 5.11, SD = .69$) than male avatars ($M = 2.01, SD = .62$).

Aside from overall differences by gender, paired *t*-tests were also conducted by species between male and female avatars. Results again confirmed the intended manipulation of gender as significant differences were found for avatar masculinity, all *t*s > 10.69, all *p*s < .001, and for avatar femininity, all *t*s > 10.29, all *p*s < .001, between each pair of male and female of avatars.

Pilot Study 2

Purported user gender. To determine the most appropriate gender pronoun to use during in-game text dialogue in the main study to manipulate the independent variable of purported user gender (i.e., for the experimenter to claim a gender for the user behind the avatar), a second pilot study was conducted. Six hundred user discussions on the official *WoW* discussion board were examined to determine how frequently six different gender pronouns were used: man/women, guy/gal, and boy/girl. The researcher recorded the total number of forum posts that referenced each gender pronoun through the use a forum search engine. In addition, the first 50 posts collected by each search engine query were reviewed so that the researcher could examine the context of how each gender pronoun was used.

As shown in Table 1, the term "girl" appeared most frequently as a gender pronoun to reference other female characters. Therefore, the gender pronoun "girl" was selected as the term

to be used in the purported female condition. For the male player, an analysis of terms found "man" was used the most frequently. However, as shown in Table 1**,** "man" was primarily used as an adjective to describe the size of a group. As a result, "man" was eliminated and "guy" was selected as the gender pronoun to be used for the purported male condition.

Main Study

Participants. All participants ($N = 2,300$ for the main study; $N = 761$ for supplementary data collected in the human condition; A total of 3,060 participants total participants included in data collection overall) in this study were users of the commercially popular MMO *World of Warcraft (WoW).* Although personally identifying information was not collected from participants during the field experiment, previous studies estimate that the average *WoW* user is 27 years old and that the gender distribution of the game population is 84% male (Yee et al., 2011).

Game players were not aware of their participation in the study and were also not debriefed regarding the experiment's objectives in order to maintain the naturalistic quality of the field setting. The Institutional Review Board at Virginia Tech approved the omission of informed consent for participants because the experimental manipulations were unobtrusive and brief.

Virtual field setting. *World of Warcraft* was selected as the MMO to be used in the present study for its commercial popularity and large overall population of users. *WoW* is the number one MMO for total market share in the North American market (Bayer, 2010) and attracts more than 12 million users a month (MMO Data, 2011)

Independent Variables

  Avatar attractiveness. Avatar attractiveness was manipulated with six different avatars (a male and female avatar from three different species) as determined by the results of pilot study 1. The high attractiveness condition was manipulated with the "Blood Elf" species, the medium attractiveness condition was manipulated with the "Night Elf" species, and the low attractiveness condition was manipulated with the "Orc" species.

  Avatar gender. To manipulate avatar gender, a male and female avatar were created for each of the three avatar species used to manipulate avatar attractiveness.

  Purported user gender. In order to manipulate purported user gender, the researcher's avatar preceded each request for help by asking, "could you help a guy out?" (purported male user), "could you help a girl out?" (purported female user), or "could you help me out?" (purported user gender not specified). The wording of these conditions was based on the prevalence of gendered language observed in the *WoW* discussion forums as previously described in pilot study 2.

  Favor size. The magnitude of the researcher's avatar's request was manipulated by asking users of *WoW* to either provide directions to a nearby location (small favor) or to escort the researcher's avatar to a nearby location (large favor).

Dependent Variables

  Compliance. Compliance was operationalized according to whether the game player assented to the request made by the researcher's avatar. The researcher recorded whether the participant agreed to the request of the researcher's avatar, declined the request of the researcher's avatar, or did not respond to the request of the researcher's avatar.

Supplementary Measures.

Total interaction time. Total interaction time was measured by recording the amount of time that expired between the researcher's initial greeting and the end of the researcher's interaction with the participant (e.g., when the participant finished providing the requested favor or declined to assist the researcher). This measure was used as a manipulation check to examine whether the big favor condition required a greater time commitment than the small favor condition.

Response time. Response time was measured by recording the amount of time that expired between when the researcher requested a specific favor and when participants provided a response to the request. If the participant did not respond once the favor was requested, their response was recorded as "no" at the time that the participant moved away from the researcher's avatar. This measure was used in supplementary analyses to inform any pattern of effects that were found in the main study.

Supplementary Human Avatar Data

Based on the results of pilot study 1, all of the avatars used to manipulate attractiveness were non-human because the human avatars did not significantly differ from the other avatar conditions consistently by attractiveness or gender. Given that many MMOs offer users with an option to either select a human or non-human character, supplementary data were collected to replicate the avatar gender, purported user gender, and favor size manipulations with human avatars to examine whether the trends observed with non-human avatars in the main study were consistent with the trends observed with human avatars.

Procedure

Given that it took substantial time for the game program to load when alternating between avatars, the researcher conducted ten interactions with participants for each avatar condition before alternating between avatar conditions. The game server that the researcher selected for each avatar was randomly chosen from a list of 12 high population game servers.

After the avatar for the assigned condition was randomly selected, the researcher's avatar entered a common, high population area and approached the nearest game player he first encountered. To initiate the interaction, the researcher's avatar offered a greeting to the game player. If the game player responded, the researcher's avatar continued the interaction by asking the game player to assist the researcher's avatar by either providing directions or escorting the researcher's avatar to a nearby location. A randomly generated list was used to determine the purported user gender that the researcher's avatar identified and the magnitude of the researcher's avatar's request.

If the game player declined to help, the researcher's avatar thanked the game player and moved on to the next nearest user. If the game player assented to the request, the researcher's avatar either thanked the game player for directions or followed the game player to the requested location. Following the conclusion of the interaction, the researcher's avatar waited two minutes for the game player to walk away before returning to the same common area to repeat the protocol with the next closest player until ten separate participant observations were completed and a new avatar was selected by random assignment. This procedure was repeated until the researcher had interacted with 2,300 participants. In addition, the researcher also completed the same protocol for the supplementary human avatar data until the researcher had completed 761 interactions. Data collection for all participants took approximately 200-230 hours.

Data were collected sporadically when the researcher's schedule permitted, but effort was taken to vary the days of the week and times of day at which data were collected. Overall, 306 separate data collection sessions were completed across a 49-day period. As shown in Table 2, 12.21% of study data were collected on Mondays, 7.79% of data was collected on Tuesdays, 8.85% of data were collected on Wednesdays, 17.71% of data were collected on Thursdays, 20.57% of data were collected on Fridays, 16.64% of data was collected on Saturdays, and 16.23% of data were collected on Sundays. As shown in Table 3, the time of day that data were collected was as follows: 9.91% of data were collected from 12am-5am, 3.61% of data were collected from 6am-11am; 27.30% of data were collected from 12pm-5pm; and 59.18% of data were collected from 6pm-11pm.

Results

Out of the 2,300 total participants that were approached in the main study, 1,221 (53.09%) responded to the initial greeting of the researcher. It could not be determined whether participants who did not respond deliberately ignored the researcher's greeting or did not reply because of other reasons (e.g., being away from the computer). As a result, only the 1,221 participants who responded to the researcher's initial greeting were included in the analyses.

Data were analyzed using the generalized linear model approach to categorical outcomes, with the Pearson χ^2 test used to determine significance. Results for the omnibus model were significant, $\chi^2 (1, N = 1{,}221) = 87.13, p < .001, w = .267$.

Manipulation Checks

Check for consistency of compliance by day and time.

Day of the week that data were collected did not significantly effect the rate at which users gain compliance, $\chi^2 (6, N = 1{,}221) = 9.73, p = .137, w = .893$. In addition, the time of day

that data were collected did not significantly effect the rate at which users gained compliance, χ^2 $(3, N = 1{,}221) = 6.12, p = .106, w = .071$.

  Favor size. To test the efficacy of the favor size manipulation, a four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and total interaction time as the dependent variable was conducted. The effect of favor size on total interaction time was significant, $F(1, 1{,}081) = 6.334, p < .012, \eta_p^2 = .003$ as the small favor condition took less time to complete ($M = 101.46$ seconds, $SD = 68.56$) than the large favor condition ($M = 116.63$ seconds, $SD = 100.98$).

Main Effect of Avatar Attractiveness on Compliance

  H_1 predicted that attractive avatars would gain more compliance than less attractive avatars. The main effect of avatar attractiveness on compliance was significant, $\chi^2 (1, N = 1{,}221)$ $= 12.92, p < .002, w = .103$. As Figure 1 shows, 77.91% of participants complied in the high attractiveness condition, 71.39% of participants complied in the medium attractiveness condition, and 66.51% of participants complied in the low attractiveness condition. Therefore, H_1 was supported.

Main Effect of Avatar Gender on Compliance

  H_2 predicted that female avatars would gain more compliance than male avatars, while competing hypothesis H_3 predicted that avatar gender would not affect the rate of compliance. The main effect of avatar gender on compliance was not significant, $\chi^2 (1, N = 1{,}221) = .312, p = .577, w = .016$, as 72.44% of participants complied in the female avatar condition and 71.36% of participants complied in the male avatar condition. As a result, H_2 was not supported while H_3 was supported.

Main Effect of Purported User Gender on Compliance

H_4 predicted that avatars whose purported user gender was female would gain more compliance than avatars whose purported gender was male. The main effect of purported user gender on compliance was not significant, $\chi^2 (1, N = 1,221) = .684, p = .710, w = .024$, as 71.39% of participants complied in the unspecified purported gender condition, 70.63% of participants complied in the purported female condition, and 73.85% of participants complied in the purported male condition. Therefore, H_3 was not supported.

Interaction Effect of Avatar Attractiveness and Avatar Gender on Compliance

RQ_1 asked whether there would be an interaction between avatar attractiveness and avatar gender on the rate at which users gain compliance. The two-way interaction between avatar attractiveness and avatar gender on compliance was not significant, $\chi^2 (1, N = 1,221) = 2.53, p = .283, w = .455$. When avatar gender was female, 80.66% of participants complied in the high attractiveness condition, 70.98% of participants complied in the medium attractiveness condition, and 65.75% of participants complied in the low attractiveness condition. By comparison, when avatar gender was male, 75.00% of participants complied in the high attractiveness condition, 71.79% of participants complied in the medium attractiveness condition, and 67.33% of participants complied in the low attractiveness condition.

Interaction Effect of Avatar Attractiveness and Purported User Gender on Compliance

RQ_2 asked whether there would be an interaction between avatar attractiveness and purported user gender on the rate at which users gain compliance. The two-way interaction between avatar attractiveness and purported user gender on compliance was significant, $\chi^2 (1, N = 1,221) = 11.58, p < .021, w = .103$. As shown in figure 2, the pattern of effects was as follows: when purported user gender was not specified, 69.85% of participants complied in the high

attractiveness condition, 73.77% of participants complied in the medium attractiveness

condition, and 70.83% of participants complied in the low attractiveness condition; when

purported gender was female, 82.14% of participants complied in the high attractiveness

condition, 69.01% of participants complied in the medium attractiveness condition, and 61.22%

of participants complied in the low attractiveness condition; and when purported gender was

male, 77.91% of participants complied in the high attractiveness condition, 71.39% of

participants complied in the medium attractiveness condition, and 66.51% of participants

complied in the low attractiveness condition.

Interaction Effect of Avatar Gender and Purported User Gender on Compliance

RQ$_3$ asked whether the interaction between avatar gender and purported user gender

would affect the rate at which users gain compliance. The two-way interaction between avatar

gender and purported user gender was significant, χ^2 (1, $N = 1{,}221$) = 6.95, $p < .031$, $w = .075$.

As shown in figure 3, the following effects were found: when purported user gender was not

specified, 74.75% of participants complied in the male avatar condition and 68.14% of

participants complied in the female avatar condition; when purported gender was female, 65.50%

of participants complied in the male avatar condition and 75.11% of participants complied in the

female avatar condition; and when purported gender was male, 73.83% of participants complied

in the male avatar condition and 73.82% of participants complied in the female avatar condition.

Interaction Effect of Avatar Attractiveness, Avatar Gender, and Purported User Gender
on Compliance

RQ$_4$ asked whether there would be an interaction between avatar attractiveness, avatar

gender, and purported user gender on the rate at which users gain compliance. The three-way

interaction between avatar attractiveness, avatar gender, and purported user gender was not

significant, χ^2 (1, N = 1,221) = 2.32, p = .677, w = .436. When the researcher controlled a female avatar that did not specify its purported user gender, 69.44% of participants complied in the high attractiveness condition, 72.41% of participants complied in the medium attractiveness condition, and 63.51% of participants complied in the low attractiveness condition; when the researcher controlled a female avatar whose purported gender was female, 87.84% of participants complied in the high attractiveness condition, 72.73% of participants complied in the medium attractiveness condition, and 65.39% of participants complied in the low attractiveness condition; and when the researcher controlled a female avatar whose purported gender was male, 84.85% of participants complied in the high attractiveness condition, 67.24% complied in the medium attractiveness condition, and 68.66% complied in the low attractiveness condition.

By comparison, when the researcher controlled a male avatar that did not specify its purported user gender, 70.31% of participants complied in the high attractiveness condition, 75.00% of participants complied in the medium attractiveness condition, and 78.57% of participants complied in the low attractiveness condition; when the researcher controlled a male avatar whose purported user gender was female, 75.76% of participants complied in the high attractiveness condition, 64.62% of participants complied in the medium attractiveness condition, and 56.52% of participants complied in the low attractiveness condition; and when the researcher controlled a male avatar whose purported user gender was male, 78.57% of participants complied in the high attractiveness condition, 75.76% of participants complied in the medium attractiveness condition, and 66.67% of participants complied in the low attractiveness condition.

Main Effect of Favor Size on Compliance

H_5 predicted that requests for small favors would gain more compliance than requests for big favors. The main effect of favor size on compliance was significant, χ^2 $(1, N = 1{,}221) = 40.69, p < .001, w = .183$. As shown in figure 4, 80.26% of participants complied in the small favor condition and 63.62% of participants complied in the big favor condition. Therefore, H_5 was supported.

Interaction Effect of Favor Size and Avatar Attractiveness on Compliance

RQ_5 asked whether the amount of assistance requested would moderate the main effect of avatar attractiveness on compliance. The effect of avatar attractiveness on compliance was not significantly moderated by the amount of assistance requested, χ^2 $(1, N = 1{,}221) = .101, p = .951, w = .009$. When a small favor was requested, 84.06% of participants complied in the high attractiveness condition, 79.90% of participants complied in the middle attractiveness condition, and 76.81% of participants complied in the low attractiveness condition. By comparison, when a big favor was requested, 71.71% of participants complied in the high attractiveness condition, 63.62% of participants complied in the medium attractiveness condition, and 56.54% of participants complied in the low attractiveness condition.

Interaction Effect of Favor Size and Avatar Gender on Compliance

RQ_5 asked whether the amount of assistance requested would moderate the main effect of avatar gender on the rate at which users gain compliance. The two-way interaction between avatar gender and favor size was not significant, χ^2 $(1, N = 1{,}221) = .012, p = .912, w = .003$. When a small favor was requested, 80.57% of participants complied in the female avatar condition and 79.93% of participants complied in the male avatar condition. Alternatively, when

a large favor was requested, 64.19% of participants complied in the female avatar condition and 63.04% of participants complied in the male avatar condition.

Interaction Effect of Favor Size and Purported User Gender on Compliance

RQ$_5$ asked whether the amount of assistance requested would moderate the main effect of purported user gender on the rate at which users gain compliance. The two-way interaction between purported user gender and favor size on compliance was not significant, χ^2 (1, $N =$ 1,221) = 1.13, $p = .569$, $w = .030$. When a small favor was requested, 79.02% of participants complied in the unspecified purported user gender condition, 81.13% of participants complied in the purported female condition, and 80.63% of participants complied in the purported male condition. When a large favor was requested, 63.45% of participants complied in the unspecified purported user gender condition, 60.37% of participants complied in the purported female condition, and 67.34% of participants complied in the purported male condition.

Interaction Effect of Favor Size, Avatar Attractiveness, and Avatar Gender on Compliance

RQ$_5$ asked whether the amount of assistance requested would moderate the interaction between avatar attractiveness and avatar gender on the rate at which users gain compliance. The three-way interaction between favor size, avatar attractiveness, and avatar gender was not significant, χ^2 (4, $N = 1,221$) = 1.22, $p = .873$, $w = .032$. When a small favor was requested and avatar gender was male, 83.00% of participants complied in the high attractiveness condition, 81.72% of participants complied in the medium attractiveness condition, and 75.25% of participants complied in the low attractiveness condition. By comparison, when a small favor was requested and avatar gender was female, 85.05% of participants complied in the high attractiveness condition, 78.22% of participants complied in the medium attractiveness condition, and 78.30% of participants complied in the low attractiveness condition.

When a large favor was requested and avatar gender was male, 67.00% of participants complied in the high attractiveness condition, 62.75% of participants complied in the medium attractiveness condition, and 59.41% of participants complied in the low attractiveness condition. Alternatively, when a large favor was requested and avatar gender was female, 76.19% of participants complied in the high attractiveness condition, 64.19% of participants complied in the medium attractiveness condition, and 53.98% of participants complied in the low attractiveness condition.

Interaction Effect of Favor Size, Avatar Attractiveness, and Purported User Gender on Compliance

RQ_5 asked whether the amount of assistance requested would moderate the interaction between avatar attractiveness and purported user gender on the rate at which users gain compliance. The three-way interaction between favor size, avatar attractiveness, and purported user gender on compliance was not significant, $\chi^2 (2, N = 1,221) = 1.23, p = .873, w = .317$. When a small favor was requested and purported user gender was not specified, 76.06% of participants complied in the high attractiveness condition, 83.61% of participants complied in the medium attractiveness condition, and 78.08% of participants complied in the low attractiveness condition. When a small favor was requested and purported gender was female, 89.55% of participants complied in the high attractiveness condition, 78.38% of participants complied in the medium attractiveness condition, and 76.06% of participants complied in the low attractiveness condition. And when a small favor was requested and purported gender was male, 86.96% of participants complied in the high attractiveness condition, 77.97% of participants complied in the medium attractiveness condition, and 76.19% of participants complied in the low attractiveness condition.

By comparison, when a large favor was requested and purported user gender was not specified, 63.08% of participants complied in the high attractiveness condition, 63.93% of participants complied in the medium attractiveness condition, and 63.38% of participants complied in the low attractiveness condition. When a large favor was requested and purported user gender was female, 75.34% of participants complied in the high attractiveness condition, 58.82% of participants complied in the medium attractiveness condition, and 47.37% of participants complied in the low attractiveness condition. And when a large favor was requested and purported user gender was male, 76.12% of participants complied in the high attractiveness condition, 66.15% of participants complied in the medium attractiveness condition, and 59.70% of participants complied in the low attractiveness condition.

Interaction Effect of Favor Size, Avatar Gender, and Purported User Gender on Compliance

RQ_5 asked whether the amount of assistance requested would moderate the interaction between avatar gender and purported user gender on the rate at which users gain compliance. The three-way interaction between favor size, avatar gender, and purported user gender on compliance was not significant, χ^2 (2, $N = 1,221$) $= .127$, $p = .939$, $w = .010$. When a small favor was requested and avatar gender was male, 82.35% of participants complied in the unspecified purported gender condition, 76.29% of participants complied in the purported female condition, and 81.05% of participants complied in the purported male condition; alternatively, when a small favor was requested and avatar gender was female, 75.73% of participants complied in the unspecified purported gender condition, 85.22% of participants complied in the purported female condition, and 80.21% of participants complied in the purported male condition.

When a large favor was requested and avatar gender was male, 66.67% of participants complied in the unspecified purported gender condition, 55.34% of participants complied in the purported female condition, and 67.31% of participants complied in the purported male condition. By comparison, when a large favor was requested and avatar gender was female, 60.40% of participants complied in the unspecified purported gender condition, 64.91% of participants complied in the purported female condition, and 67.37% of participants complied in the purported male condition.

Interaction Effect of Favor Size, Avatar Attractiveness, Avatar Gender, and Purported User Gender on Compliance

RQ_5 asked whether the interaction between favor size, avatar attractiveness, avatar gender, and purported gender on the rate at which users gain compliance would be moderated by the amount of assistance requested. The four-way interaction between favor size, avatar attractiveness, avatar gender, and purported user gender on compliance was not significant, χ^2 (2, $N = 1{,}221$) = 2.32, $p = .677$, $w = .044$. When a small favor was requested, avatar gender was male, and purported user gender was not specified, 80.00% of participants complied in the high attractiveness condition, 87.10% complied in the medium attractiveness condition, and 80.56% of participants complied in the low attractiveness condition; when purported gender was female, 86.67% of participants complied in the high attractiveness condition, 75.00% of participants complied in the medium attractiveness condition, and 86.57% of participants complied in the low attractiveness condition; and when purported gender was male, 82.86% of participants complied in the high attractiveness condition, 83.33% of participants complied in the medium attractiveness condition, and 76.67% of participants complied in the low attractiveness condition.

Alternatively, when a small favor was requested, avatar gender was female, and purported gender was not specified, 72.22% of participants complied in the high attractiveness condition, 80.00% of participants complied in the medium attractiveness condition, and 75.68% of participants complied in the low attractiveness condition; when purported gender was female, 91.89% of participants complied in the high attractiveness condition, 80.95% of participants complied in the medium attractiveness condition, and 83.33% of participants complied in the low attractiveness condition; and when purported gender was male, 91.18% of participants complied in the high attractiveness condition, 72.41% of participants complied in the medium attractiveness condition, and 75.76% of participants complied in the low attractiveness condition.

When a large favor was requested, avatar gender was male, and purported user gender was not specified, 58.62% of participants complied in the high attractiveness condition, 63.64% of participants complied in the medium attractiveness condition, and 76.47% of participants complied in the low attractiveness condition; when purported user gender was female, 66.67% of participants complied in the high attractiveness condition, 54.55% of participants complied in the medium attractiveness condition, and 44.12% of participants complied in the low attractiveness condition; and when purported user gender was male, 74.29% of participants complied in the high attractiveness condition, 69.44% of participants complied in the medium attractiveness condition, and 57.58% of participants complied in the low attractiveness condition.

If a large favor was requested, avatar gender was female, and purported user gender was not specified, 66.67% of participants complied in the high attractiveness condition, 64.29% of participants complied in the medium attractiveness condition, and 51.35% of participants complied in the low attractiveness condition; when purported gender was female, 83.78% of participants complied in the high attractiveness condition, 62.86% of participants complied in the

medium attractiveness condition, and 50.00% of participants complied in the low attractiveness condition; and when purported gender was male, 78.13% of participants complied in the low attractiveness condition, 62.07% of participants complied in the medium attractiveness condition, and 61.76% of participants complied in the low attractiveness condition.

Supplementary Analyses

Given the large number of participants who did not respond in the main study, supplementary analyses were conducted to examine whether avatar attractiveness or avatar gender affected the rate at which users responded to the researcher's initial request. The effect of purported user gender and favor size on response rate was not analyzed because they were not identified in the researcher's initial greeting.

Data were analyzed using the generalized linear model approach to categorical outcomes, with the Pearson χ^2 test used to determine significance. Results for the omnibus model were significant, χ^2 (5, $N = 2{,}300$) $= 18.06$, $p < .003$, $w = .087$.

Main effect of avatar attractiveness on initial response rate. The effect of avatar attractiveness on the rate at which users responded to the researcher's initial request was significant, χ^2 (2, $N = 2{,}300$) $= 13.59$, $p < .001$, $w = .077$. As shown in figure 5, 53.51% of participants responded in the high attractiveness condition, 48.44% of participants responded in the medium attractiveness condition, and 57.75% of participants responded in the low attractiveness condition.

Main effect of avatar gender on initial response rate. The effect of avatar attractiveness on the rate at which users responded to the researcher's initial request was not significant, χ^2 (2, $N = 2{,}300$) $= 2.77$, $p < .096$, $w = .035$, as 54.74% of participants responded in the female avatar condition and 51.47% of participants responded in the male avatar condition.

Main effect of avatar attractiveness on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and user response time as the dependent variable found that the effect of avatar attractiveness on user response time was not significant, $F(2, 1{,}081) = .790$, $p = .454$, $\eta_p^2 = .001$. The mean for the high attractiveness condition was 32.73 seconds ($SD = 20.64$), the mean for the medium attractiveness condition was 34.34 seconds ($SD = 34.59$), and the mean for the low attractiveness condition was 32.58 seconds ($SD = 20.05$).

Main effect of avatar gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the effect of avatar gender on user response time was not significant, $F(1, 1{,}081) = .596$, $p = .440$, $\eta_p^2 = .001$. The mean for the male avatar condition was 33.70 seconds ($SD = 20.97$) and the mean for the female avatar condition was a 32.74 ($SD = 21.46$).

Main effect of purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the effect of purported user gender on user response time was not significant, $F(2, 1{,}081) = 1.71$, $p = .182$, $\eta_p^2 = .003$. The mean for the purported male condition was 31.69 seconds ($SD = 20.54$), the mean for the purported female condition was 34.49 seconds ($SD = 21.70$), and the mean for the unspecified purported user gender condition was 33.47 seconds ($SD = 21.28$).

Main effect of favor size on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the effect of favor size on user response

time was significant, $F(1, 1{,}081) = 37.92, p < .001, \eta_p^2 = .034$. As shown in figure 6, participants responded faster in the small favor condition ($M = 29.38$ seconds, $SD = 37.07$) than the big favor condition ($M = 37.06$ seconds, $SD = 22.64$).

Interaction effect of avatar attractiveness and avatar gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and user response time as the dependent variable found that the two-way interaction between avatar attractiveness and avatar gender on user response time was not significant, $F(2, 1081) = .030, p = .971, \eta_p^2 < 0.00$. When avatar gender was female, the mean for the high attractiveness condition was 32.43 seconds ($SD = 20.85$), the mean for the medium attractiveness condition was 33.86 seconds ($SD = 23.45$), and the mean for the low attractiveness condition was 31.92 seconds ($SD = 20.33$). When avatar gender was male, the mean in the high attractiveness condition was 33.03 seconds ($SD = 20.44$), the mean for the medium attractiveness condition was 34.82 seconds ($SD = 22.61$), and the mean for the low attractiveness condition was 33.24 seconds ($SD = 19.79$).

Interaction effect of avatar attractiveness and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between avatar attractiveness and purported user gender on user response time was not significant, $F(4, 1{,}081) = 1.65, p = .160, \eta_p^2 = .006$. When purported user gender was not specified, the mean for the high attractiveness condition was 35.11 seconds ($SD = 20.82$), the mean for the medium attractiveness condition was 32.47 seconds ($SD = 22.96$), and the mean for the low attractiveness condition was 32.84 seconds ($SD = 20.29$). When purported gender was female, the mean for the high attractiveness condition was 31.41 seconds

($SD = 18.06$), the mean for the medium attractiveness condition was 38.21 seconds ($SD = 24.52$), and the mean for the low attractiveness condition was 33.86 seconds ($SD = 21.52$). And when purported gender was male, the mean for the high attractiveness condition was 31.67 seconds ($SD = 22.72$), the mean for the medium attractiveness condition was 32.34 seconds ($SD = 20.63$), and the mean for the low attractiveness condition was 31.05 seconds ($SD = 17.10$).

Interaction effect of avatar gender and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between avatar gender and purported user gender on user response time was significant, $F(2, 1,081) = 5.78, p < .003, w = .011$. As shown in figure 7, when avatar gender was female, participants responded faster in the purported male condition ($M = 30.55$ seconds, $SD = 20.07$) than the purported female condition ($M = 31.84$ seconds, $SD = 21.18$) and the unspecified purported user gender condition ($M = 35.82, SD = 22.72$). By comparison, when avatar gender was male, participants responded faster in the unspecified purported user gender condition ($M = 31.12$ seconds, $SD = 19.47$) than the purported male condition ($M = 32.83$ seconds, $SD = 20.97$) and the purported female condition ($M = 37.15$ seconds, $SD = 21.95$).

Interaction effect of avatar attractiveness, avatar gender, and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the three-way interaction between avatar attractiveness, avatar gender, and purported user gender on user response time was not significant, $F(4, 1,081) = 1.25, p = .290, \eta_p^2 = .005$. When the researcher controlled a female avatar whose purported user gender was not specified, the mean for the high attractiveness condition was 36.44 seconds ($SD = 20.64$), the

mean for the medium attractiveness condition was 36.44 seconds ($SD = 20.64$), and the mean for the low attractiveness condition was 33.41 seconds ($SD = 22.37$). When the researcher controlled a female avatar whose purported gender was female, the mean for the high attractiveness condition was 29.26 seconds ($SD = 3.55$), the mean the medium attractiveness condition was 34.52 seconds ($SD = 2.51$), and the mean for the low attractiveness condition was 31.74 seconds ($SD = 2.45$). And when the researcher controlled a female avatar whose purported gender was male, the mean for the high attractiveness condition was 31.59 seconds ($SD = 23.54$), the mean for the medium attractiveness condition was 29.43 seconds ($M = 18.25$), and the mean for the low attractiveness condition was 30.61 seconds ($M = 17.44$).

By comparison, when the researcher controlled a male avatar whose purported user gender was not specified, the mean in the high attractiveness condition was 33.78 seconds ($SD = 21.11$), the mean for the medium attractiveness condition was 27.32 seconds ($SD = 19.15$), and the mean for the low attractiveness condition was 32.26 seconds ($SD = 19.09$). When the researcher controlled a male avatar whose purported gender was female, the mean for the high attractiveness condition was 33.57 seconds ($SD = 18.02$), the mean for the medium attractiveness condition was 41.89 seconds ($SD = 24.12$), and the mean for the low attractiveness condition was 35.98 seconds ($SD = 22.50$). And when the researcher controlled a male avatar whose purported gender was male, the mean for the high attractiveness condition was 31.74 seconds ($SD = 22.05$), the mean for the medium attractiveness condition was 35.26 seconds (SD = 22.00), and the mean for the low attractiveness condition was 31.48 seconds ($SD = 18.66$).

Interaction of favor size and avatar attractiveness on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way

interaction between favor size and avatar attractiveness on user response time was significant, $F(1, 1,081) = 4.07$, p < .017, $\eta_p^2 = .007$. As shown in figure 8, when a small favor was requested, participants responded faster in the high attractiveness condition ($M = 26.45$ seconds, $SD = 15.86$) than the low attractiveness condition ($M = 30.41$ seconds, $SD = 18.14$) and the medium attractiveness condition ($M = 31.27$ seconds, $SD = 22.07$). Alternatively, when a big favor was requested, participants responded fastest in the low attractiveness condition ($M = 34.75$ seconds, $SD = 21.57$) than the medium attractiveness condition ($M = 37.41$ seconds, $SD = 23.41$) and the high attractiveness condition ($M = 39.01$ seconds, $SD = 22.91$).

Interaction of favor size and avatar gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between favor size and avatar gender on user response time was not significant, $F(1, 1,081) = .741$, $p = .390$, $\eta_p^2 = .001$. When a small favor was requested, the mean for the female avatar condition was 28.36 seconds ($SD = 17.86$) and the mean for the male avatar condition was 30.39 seconds ($SD = 19.78$). By comparison, when a large favor was requested, the mean for the female avatar condition was 37.11 seconds ($SD = 23.63$) and the mean for the male avatar condition was 37.00 seconds ($SD = 21.59$).

Interaction of favor size and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between favor size and purported user gender on user response time was not significant, $F(2, 1,081) = .422$, $p = .656$, $\eta_p^2 = .001$. When a small favor was requested, the mean for the purported male condition was 27.41 seconds ($SD = 18.41$), the mean for the purported

female condition was 30.27 seconds ($SD = 17.97$), and the mean for the unspecified purported

user gender condition was 30.44 seconds ($SD = 20.03$). By comparison, when a large favor was

requested, the mean for the purported male condition was 35.96 seconds ($SD = 31.61$), the mean

for the purported female condition was 38.71 seconds ($SD = 23.99$), and the mean for the

unspecified purported user gender condition was 36.50 seconds ($SD = 22.08$).

Interaction effect of favor size, avatar attractiveness, and avatar gender on user

response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user

gender, and favor size as the independent variables and user response time as the dependent

variable found that the three-way interaction between favor size, avatar attractiveness, and avatar

gender on user response time was not significant, $F(2, 1,081) = .025$, $p = .975$, $\eta_p^2 < 0.00$. When a

small favor was requested and avatar gender was male, the mean for the high attractiveness

condition was 27.39 ($SD = 16.88$), the mean for the medium attractiveness condition was 32.08

seconds ($SD = 22.00$), and the mean for the low attractiveness condition was 31.71 seconds (SD

$= 18.97$). By comparison, when a small favor was requested and avatar gender was female, the

mean for the high attractiveness condition was 25.50 seconds ($SD = 14.95$), the mean for the

medium attractiveness condition was 30.45 seconds ($SD = 22.29$), and the mean for the low

attractiveness condition was 29.11 seconds ($SD = 16.10$).

When a large favor was requested and avatar gender was male, the mean for the high

attractiveness condition was 38.67 seconds ($SD = 22.14$), the mean for the medium attractiveness

condition was 37.55 seconds ($SD = 23.00$), and the mean for the low attractiveness condition was

34.78 seconds ($SD = 19.60$). By comparison, when a large favor was requested and avatar gender

was female, the mean for the high attractiveness condition was 39.36 ($SD = 23.67$), the mean for

the medium attractiveness condition was 37.26 seconds ($SD = 24.04$), and the mean for the low

attractiveness condition was 34.72 seconds ($SD = 23.26$).

Interaction of favor size, avatar attractiveness, and purported user gender on user

response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user

gender, and favor size as the independent variables and response time as the dependent variable

found that the three-way interaction between favor size, avatar attractiveness and purported user

gender on response time was significant, $F(4, 1{,}081) = 2.60$, $p < .035$, $\eta_p^2 = .010$. As shown in

figure 9, the pattern of results was as follows: when a small favor was requested and purported

gender was not specified, participants responded faster in in the high attractiveness condition (M

$= 28.85$ seconds, $SD = 17.45$) than the low attractiveness condition ($M = 30.53$ seconds, $SD =$

17.45) and the medium attractiveness condition ($M = 31.94$ seconds, $SD = 25.34$); when a small

favor was requested and purported gender was female, participants responded faster in the high

attractiveness condition ($M = 27.93$ seconds, $SD = 16.55$) than the medium attractiveness

condition ($M = 31.28$ seconds, $SD = 18.53$) and the low attractiveness condition ($M = 31.61$

seconds, $SD = 18.66$); and when a small favor was requested and purported gender was male,

participants responded faster in the high attractiveness condition ($M = 22.56$ seconds, $SD =$

12.97) than the low attractiveness condition ($M = 29.09$ seconds, $SD = 18.60$) and the medium

attractiveness condition ($M = 30.58$ seconds, $SD = 22.97$).

If a large favor was requested, the pattern of effects was as follows: when purported

gender was not specified, participants responded faster in the medium attractiveness condition

($M = 32.99$ seconds, $SD = 20.51$) than the low attractiveness condition ($M = 35.14$ seconds, $SD =$

22.77) and the high attractiveness condition ($M = 41.37$ seconds, $SD = 22.11$); when purported

gender was female, participants responded faster in the high attractiveness condition ($M = 34.89$

seconds, $SD = 18.78$) than the low attractiveness condition ($M = 36.10$ seconds, $SD = 23.78$) and the medium attractiveness condition ($M = 45.12$ seconds, $SD = 27.62$); and when purported gender was male, participants responded faster in the low attractiveness condition ($M = 33.02$ seconds, $SD = 17.39$) than the medium attractiveness condition ($M = 34.10$ seconds, $SD = 18.52$) and the high attractiveness condition ($M = 40.77$ seconds, $SD = 27.45$).

Interaction of favor size, avatar gender, and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the three-way interaction between favor size, avatar gender, and purported user gender on user response time was not significant, $F(2, 1,081) = .402$, $p = .669$, $\eta_p^2 = .001$. When a small favor was requested and avatar gender was male, the mean for the purported male condition was 29.82 seconds ($SD = 20.71$), the mean for the purported female condition was 32.83 seconds ($SD = 19.20$), and the mean for the unspecified purported user gender condition was 28.53 seconds ($SD = 18.32$). Alternatively, when a small favor was requested and avatar gender was female, the mean for the purported male condition was 25.00 seconds ($SD = 15.06$), the mean for the purported female condition was 27.72 seconds ($SD = 16.58$), and the mean for the unspecified purported user gender condition was 32.34 seconds ($SD = 31.78$).

If a large favor was requested and avatar gender was male, the mean for the purported male condition was 35.84 seconds ($SD = 20.87$), the mean for the purported female condition was 41.46 seconds ($SD = 23.54$), and the mean for the unspecified purported user gender condition was 33.71 seconds ($SD = 18.41$)

Interaction of favor size, avatar attractiveness, avatar gender, and purported user gender on user response time. A four-way ANOVA with avatar attractiveness, avatar gender,

purported user gender, and favor size as the independent variables and response time as the

dependent variable found that the four-way interaction between favor size, avatar attractiveness,

avatar gender, and purported user gender on user response time was not significant, $F(4, 1,081) =$

1.535, $p =.190$, $\eta_p^2 = .006$. When a small favor was requested, avatar gender was male, and

purported user gender was not specified, the mean for the high attractiveness condition was

30.33 seconds ($SD = 20.37$), the mean for the medium attractiveness condition was 24.50

seconds ($SD = 19.42$), and the mean for the low attractiveness condition was 30.77 seconds (SD

$= 18.27$). When purported gender was male, the mean for the high attractiveness condition was

23.00 seconds ($SD = 13.60$), the mean for the medium attractiveness condition was 34.76

seconds ($SD = 24.95$), and the mean for the low attractiveness condition was 31.69 seconds (SD

$= 21.65$). And when purported gender was female, the mean for the high attractiveness condition

was 28.83 seconds ($SD = 15.73$), the mean for the medium attractiveness condition was 37.00

seconds ($SD = 19.82$), and the mean for the low attractiveness condition was 32.66 seconds (SD

$= 20.76$).

If a small favor was requested, avatar gender was female, and purported user gender was

not specified, the mean for the high attractiveness condition was 27.36 seconds ($SD = 14.47$), the

mean for the medium attractiveness condition was 39.38 seconds ($SD = 29.18$), and the mean for

the low attractiveness condition was 30.29 seconds ($SD = 16.86$). When purported gender was

male, the mean for the high attractiveness condition was 22.12 seconds ($SD = 12.47$), the mean

for the medium attractiveness condition was 26.40 seconds ($SD = 19.29$), and the mean for the

low attractiveness condition was 26.48 seconds ($SD = 14.56$). And when purported gender was

female, the mean for the high attractiveness condition was 27.03 seconds ($SD = 17.31$), the mean

for the medium attractiveness condition was 25.57 seconds ($SD = 15.90$), and the mean for the low attractiveness condition was 30.58 seconds ($SD = 17.31$).

When a large favor was requested, avatar gender was male, and purported user gender was not specified, the mean for the high attractiveness condition was 37.23 seconds ($SD = 31.73$), the mean for the medium attractiveness condition was 30.14 seconds ($SD = 18.76$), and the mean for the low attractiveness condition was 33.76 seconds ($SD = 18.04$). When purported gender was male, the mean for the high attractiveness condition was 40.48 seconds ($SD = 26.64$), the mean for the medium attractiveness condition was 35.74 seconds ($SD = 19.50$), and the mean for the low attractiveness condition was 31.29 seconds ($SD = 15.73$). And when purported gender was female, the mean for the high attractiveness condition was 38.30 seconds ($SD = 18.75$), the mean for the medium attractiveness condition was 46.79 seconds ($SD = 26.90$), and the mean for the low attractiveness condition was 39.30 ($SD = 24.10$).

If a large favor was requested, avatar gender was female, and purported user gender was not specified, the mean for the high attractiveness condition was 45.52 seconds, the mean for the medium attractiveness condition was 35.85 seconds ($SD = 22.21$), and the mean for the low attractiveness condition was 36.53 seconds ($SD = 26.79$). When purported gender was male, the mean for the high attractiveness condition was 41.07 seconds, the mean for the medium attractiveness condition was 32.46 seconds ($SD = 17.27$), and the mean for the low attractiveness condition was 34.74 seconds ($SD = 19.00$). And when purported gender was female, the mean for the high attractiveness condition was 31.49 seconds ($SD = 18.46$), the mean for the medium attractiveness condition was 43.47 seconds ($SD = 28.60$), and the mean for the low attractiveness condition was 32.90 seconds ($SD = 23.47$).

Human avatar data.

In addition to the three avatars that were used to test the effect of the four factors examined in main study, data were also collected with a human avatar to conduct supplementary analyses. Out of the 761 participants approached in the human condition, only 53.75% of participants ($N = 409$) responded to the researcher's initial greeting. The participants who did not respond were not examined in supplementary analyses.

Data was analyzed using the generalized linear model approach to categorical outcomes, with the Pearson χ^2 test used to determine significance. Results for the omnibus model were significant, $\chi^2 (1, N = 409) = 21.98, p < .025, w = .232$.

Main effect of avatar gender on compliance. The main effect of avatar gender on compliance was not significant, $\chi^2 (1, N = 409) = .155, p = .694, w = .019$, with 73.30% of participants complying in the female avatar condition and 72.41% of participants complying in the male avatar condition.

Main effect of purported user gender on compliance. The main effect of purported user gender on compliance was not significant, $\chi^2 (2, N = 409) = .989, p = .610, w = .049$ as 69.34% of participants complied in the unspecified purported user gender condition, 73.91% of participants complied in the purported female condition, and 75.37% of participants complied in the purported male condition.

Main effect of favor size on compliance. The main effect of favor size on compliance was significant, $\chi^2 (1, N = 409) = 16.57, p < .001, w = .116$ As shown in figure 10, 81.81% of participants complied in the small favor condition and 64.29% of participants complied in the big favor condition.

Interaction effect of avatar gender and purported user gender on compliance. The two-way interaction between avatar gender and purported user gender was not significant, χ^2 (1, $N = 409$) = 1.29, $p = .526$, $w = .056$. When purported user gender was not specified, 67.65% of participants complied in the female avatar condition and 71.01% of participants complied in the male avatar condition. When purported gender was female, 77.14% of participants complied in the female avatar condition and 70.59% of participants complied in the male avatar condition. And when purported gender was male, 75.00% of participants complied in the female avatar condition and 75.76% of participants complied in the male avatar condition.

Interaction effect of favor size and avatar gender on compliance. The two-way interaction of favor size and avatar gender on compliance was not significant, χ^2 (1, $N = 409$) = .747, $p = .387$, $w = .043$. When a small favor was requested, 84.16% of participants complied in the female avatar condition and 79.59% of participants complied in the male avatar condition. By comparison, when a large favor was requested, 62.86% of participants complied in the female avatar condition and 65.71% of participants complied in the male avatar condition.

Interaction effect of favor size and purported user gender on compliance. The two-way interaction between favor size and purported user gender on compliance was not significant, χ^2 (1, $N = 409$) = 1.00, $p = .606$, $w = .049$. When a small favor was requested, 82.25% of participants complied in the unspecified purported user gender condition, 80.60% of participants complied in the female avatar condition, and 82.81% of participants complied in the male avatar condition. Alternatively, when a large favor was requested, 56.52% of participants complied in the unspecified purported gender condition, 67.61% of participants complied in the female avatar condition, and 68.57% of participants complied in the male avatar condition.

Interaction effect of favor size, avatar gender, and purported user gender on

compliance. The three-way interaction between favor size, avatar, gender, and purported user

gender on compliance was not significant, χ^2 (1, $N = 409$) = 1.17, $p = .557$, $w = .053$. When a

small favor was requested and avatar gender was male, 83.33% of participants complied in the

unspecified purported user gender condition, 72.73% of participants complied in the purported

female condition, and 82.76% of participants complied in the purported male condition. By

comparison, when a small favor was requested and avatar gender was female, 81.25% of

participants complied in the unspecified purported gender condition, 88.24% complied in the

female avatar condition, and 82.86% of participants complied in the male avatar condition.

When a large favor was requested and avatar gender was male, 57.58% of participants

complied in the unspecified purported user gender condition, 68.57% of participants complied in

the purported female condition, and 70.27% of participants complied in the purported female

condition. Alternatively, when a large favor was requested and avatar gender was female,

55.56% of participants complied in the unspecified purported gender condition, 66.67% of

participants complied in the female avatar condition, and 66.67% of participants complied in the

purported male condition.

Main effect of avatar gender on user response time. A three-way ANOVA with avatar

gender, purported user gender, and favor size as the independent variables and response time as

the independent variable found that the effect of avatar gender on user response time was not

significant, $F(1, 357) = .913$, $p = .340$, $\eta_p^2 = .003$. The mean in the male avatar condition was

30.47 seconds ($SD = 20.75$) and the mean in the female avatar condition was 32.71 seconds ($SD = 24.14$).

Main effect of purported user gender on user response time. A three-way ANOVA with avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the effect of purported user gender on user response time was not significant, $F(2, 357) = 1.52, p = .221, \eta_p^2 = .008$. The mean for the purported male condition was 33.02 seconds ($SD = 22.38$), the mean for the purported female condition was 33.01 seconds, and the mean for the unspecified purported user gender condition was 28.73 seconds ($SD = 18.62$).

Main effect of favor size on user response time. A three-way ANOVA with avatar gender, purported user gender, and favor size as the independent variables and user response time as the dependent variable found that the effect of favor size on user response time was significant, $F(1, 357) = 4.22, p = .041, \eta_p^2 = .012$. As shown in figure 11, participants responded faster in the small favor condition ($M = 29.18$ seconds, $SD = 21.80$) than the big favor condition ($M = 34.01$ seconds, $SD = 22.93$).

Interaction effect of avatar gender and purported user gender on user response time. A three-way ANOVA with avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between avatar gender and purported user gender on user response time was not significant, $F(2, 357) = .741, p = .478, \eta_p^2 = .004$. When purported user gender was not specified, the mean was 28.48 seconds ($SD = 19.96$) in the male avatar condition and 29.98 seconds ($SD = 20.04$) in the female avatar condition. When purported gender was male, the mean was 33.04 seconds ($SD = 32.00$) in the male avatar condition and 33.03 seconds ($SD = 21.90$) in the male avatar condition. And when purported gender was female, the mean was 33.03 seconds ($SD = 19.45$) in the male avatar condition and 36.13 seconds ($SD = 30.65$).

Interaction effect of favor size and avatar gender on user response time. A three-way ANOVA with avatar gender, purported user gender, and favor size as the independent variables and response time as the dependent variable found that the two-way interaction between favor size and avatar gender on user response time was not significant, $F(1, 357) = .002, p = .962, \eta_p^2 <$ 0.00. When a small favor was requested, the mean was 28.11 seconds ($SD = 20.05$) in the male avatar condition and 30.25 seconds ($SD = 23.46$) in the female avatar condition. Alternatively, when a large favor was requested, the mean was 32.83 seconds ($SD = 21.21$) in the male avatar condition and 35.18 seconds ($SD = 24.66$) in the female avatar condition.

Interaction effect of favor size and purported user gender on user response time. A three-way ANOVA with avatar gender, purported user gender, and favor size as the independent variable and response time as the dependent variable found that the two-way interaction between favor size and purported user gender was not significant, $F(2, 357) = .178, p = .837, \eta_p^2 = .001$. When a small favor was requested, the mean was 31.62 seconds ($SD = 21.57$) in the purported male condition, 30.24 seconds ($SD = 26.85$) in the purported female condition, and 25.68 seconds ($SD = 16.10$) in the unspecified purported user gender condition. By comparison, when a large favor was requested, the mean was 34.45 seconds ($SD = 23.27$) in the purported male condition, 35.79 seconds ($SD = 24.72$) in the purported female condition, and 31.78 seconds ($SD = 20.63$) in the unspecified purported user gender condition

Interaction effect of favor size, avatar gender, and purported user gender on user response time. A three-way ANOVA with favor size, avatar gender, and purported user gender as the independent variables and response time as the dependent variable found that the three-way interaction between favor size, avatar gender, and purported user gender on user response time was not significant, $F(2, 357) = .276, p = .759, \eta_p^2 = .002$. When a small favor was

requested and purported user gender was not specified, the mean was 24.43 seconds (SD = 16.06) in the male avatar condition and 26.94 seconds (SD = 16.30) in the female avatar condition. When a small favor was requested and purported gender was male, the mean was 31.70 seconds (SD = 25.05 in the male avatar condition and 31.53 seconds (SD = 18.33) in the female avatar condition. And when a small favor was requested and purported gender was female, the mean was 28.21 seconds (SD = 19.16) in the male avatar condition and 32.27 seconds (SD = 32.85) in the female avatar condition.

When a large favor was requested and purported user gender was not specified, the mean was 32.53 seconds (SD = 23.02) in the male avatar condition and 31.03 seconds (SD = 18.10) in the female avatar condition. When purported gender was male, the mean was 21.38 seconds (SD = 23.69) in the male avatar condition and 34.52 seconds (SD = 25.56) in the female avatar condition. And when purported gender was female, the mean was 31.57 seconds (SD = 19.84) in the male avatar condition and 40.00 seconds (SD = 29.58) in the female avatar condition.

Discussion

Main Study

The present study was an online field experiment that examined the effect of avatar attractiveness, avatar gender, and purported user gender on the amount of assistance that users received in order to understand how users respond to multiple indicators of identity in virtual worlds. Unlike a number of previous studies that have measured the effect of attractiveness and gender in laboratory settings (Holzwarth et al., 2006; Lee, 2005) and immersive virtual environments (Yee & Bailenson, 2007) the current investigation examined how avatar attractiveness and avatar gender affect the outcome of users' actual interactions in a naturalistic, game-based environment. In addition, the study measured how game players respond to avatars

when the purported offline gender of their interaction partner is made salient. As a result, this study provides an increased understanding of how users respond to representations of physical attractiveness and gender in an increasingly popular, but under-investigated, form of virtual world.

Generally, this study found that attractive avatars received more help than less attractive avatars for small and large requests for help. This outcome is consistent with a large body of previous research that has found attractive individuals receive more socially desirable evaluations and increased preferential treatment than less attractive individuals in online and offline contexts (Eagley, Ashmore, Makhijani, & Longo, 1991; Holzwarth et al., 2006; Nowak & Rauh, 2006). Based on the results of the present study, it appears that the effect of physical attractiveness also translate to users' natural avatar-mediated communications in one popular exemplar of the massively multiplayer online game genre.

Although attractive avatars generally received more assistance than male avatars, the amount of compliance that less attractive avatars received varied between purported male and female users. Specifically, this study found that while purported male and female users who controlled attractive avatars generally received the same amount of help, purported female users were less likely than purported male users to gain compliance when represented by less attractive avatars. In other words, purported female users only received the same amount of help as male players when they were represented by the most attractive avatars. These results are consistent with the more critical evaluations that less attractive females receive in offline contexts (Furnham & Radley, 1989) and the importance of physical attractiveness to the desired appearance and expected gender roles of female communicators (Bar-Tal & Saxe, 1976; Pine,

2001). Therefore, it appears that attractive avatars in online environments can elicit the offline benefits and the gender-based expectations traditionally associated with physical attractiveness.

The present study also asked whether female avatars and purported female users are more likely to gain compliance than their male counterparts. The results of this study found no main effect of avatar gender or purported user gender on the likelihood of receiving assistance. This null finding directly conflicts with the results of several previous studies that have found individuals respond to male and female avatars differently in virtual environments (Wang & Wang, 2008; Yee et al., 2007). Given that the *World of Warcraft* is a stereotypically male environment, our results are instead consistent with limited previous research that has found avatar gender is a less salient cue to the person-perception process in gender-stereotyped communication settings (Eden et al., 2010). This finding also reinforces the importance of William's (2010) assertion that the effects of avatar appearance derived from one context, such as the laboratory, must also be replicated across other kinds of environments before the persistence of the examined behavior can be established.

While support for the effect for avatar gender and purported gender was not found, the present study did find that users who identified themselves as female and controlled a female avatar received more help than users who identified themselves as male and controlled a female avatar. By comparison, there was no difference in the amount of assistance that purported male users received between male and female avatars. Specifically, it appears that users who control female avatars are expected to use an avatar that is consistent with their purported gender while male avatars are allowed to adopt conflicting cues to identity without penalty. This finding is in the opposite direction of previous research that has found cross-sex behavior in adolescents is more negatively evaluated for young boys rather than young girls (Horn, 2007; Martin, 1990;

Sandnabba, & Ahlberg, 1999). However, it is important to remember that research suggests the average *WoW* user is 27 years old (Yee et al., 2011), so the results of the present study do not directly compare to the adolescent populations studied in previous research (Martin, 1990). As a result, it appears that gender roles for individuals in their late 20s may be more flexible for purported male players and more static for purported female players in the virtual world compared to the offline world.

Alternatively, this difference in treatment between male and female users who gender bend could also be explained by the conclusion that other MMO users assume that the majority of female users do not control male avatars. Available estimates of gender bending support this assumption as previous research has found that only 9% of female *WoW* players control avatars of the opposite gender (Yee et al., 2011). Thus, purported female users who controlled male avatars may have been helped less because the majority of study participants did not believe they were actually assisting a female player.

Finally, it is also noteworthy to highlight that female avatars received less help than male avatars in the unspecified purported gender condition. This finding suggests that participants possibly utilized a similarity heuristic when they did not have explicit information available about the offline gender of their interaction partner. In other words, participants may have helped male avatars more frequently than female avatars when purported user gender was not specified, because male game players likely constituted the majority of participants in the sample. This in-group favoritism explanation is consistent with limited past research that has found individuals are persuaded more by avatars of their own gender when they are unfamiliar with the nature of their interaction partner (Guadagno, Blascovich, Bailenson, & McCall, 2007). Furthermore, these findings provides additional counter-evidence to the speculated benefits that female avatars are

expected to receive in virtual environments (Griffiths et al., 2003; Wang & Wang, 2007). Specifically, it appears that MMO users are more likely to help someone who shares their offline gender unless further identifying information is available.

Supplementary Trends

Response time.

The present investigation also asked whether avatar attractiveness, avatar gender, and purported user gender would affect the rate at which users responded to requests for assistance. Although a number of different significant results were found, it is important to note that 4.6% of the main sample was not coded for response time due to errors encountered during recording (e.g., recording program quitting during an interaction). In addition, the response time measure had difficulty measuring participants who chose not to comply by ignoring the researcher's request (e.g., walking away from the researcher following the request). As a result, the patterns observed for response time are in need of additional replication and more careful operationalization before they can be generalized beyond the scope of the present analysis.

First, this study found that participants took longer to respond to requests for large favors than requests for small favors. One possible explanation for the slower response time in the large favor condition is that participants thought longer about whether to comply when asked for a favor that would require a greater commitment of their time. Although slower response time could also be indicative of differences in accessibility, this interpretation is unlikely given that the accessibility of certain information (e.g., knowledge about the location) was necessary regardless of whether a small favor or large favor was provided.

The current investigation also found a two-way interaction between avatar gender and purported user gender on user response time. Two general patterns are important to highlight:

First, participants responded slower to purported female users when they were represented by male avatars. This finding possibly informs the interaction effect between avatar gender and purported user gender that was found in the main study. Specifically, it appears that participants may have thought longer, and possibly more critically, when a user claimed to be a female user but controlled a male avatar. Thus, users may have helped female users who gender swapped less because they were possibly more suspicious of the user because of the incongruity between their apparent and purported identity.

Second, the pattern of effects also shows that participants responded slower to female avatars when the purported gender of the user was not specified. Based on the interaction between avatar gender and purported user gender found in the main study, this slower response time corresponded to the less frequent rate of compliance that female avatars received. Although multiple interpretations can be proposed, slower response time could be indicative of a processing-based explanation. For example, male avatars may have received faster responses because a heuristic, such as similarity-attraction, was available to expedite participants' decisions. By comparison, participants may have responded slower to female avatars because no established heuristic was available. While these processing-based explanations correspond with the results of the main study, additional replication is necessary given the limited validity of the response time measure.

Aside from the interaction between avatar gender and purported user gender, several interactions between favor size and avatar appearance on the rate of response time were also found. First, the present study observed a two-way interaction between avatar attractiveness and favor size on user response time. Specifically, avatars high in attractiveness received faster responses in the small favor condition while avatars that were low in attractiveness received

faster responses in the big favor condition. To explain this relationship, one must consider that the measurement of response time included participants who complied and participants who did not comply. Therefore, a low score on the response time measure could include a combination of fast responses from participants who either assented or declined the researcher's request.

Based on this distinction, it is possible that attractive avatars had a faster response time in the low attractiveness condition because they received the largest quantity of quick decisions to assent. By comparison, since unattractive avatars received less help in the big favor condition, it is also likely these avatars received the most frequent, and expedient, "no" responses in the large favor condition. As a result, the observed interaction could be an indicator of both a heightened likelihood of complying quickly with attractive avatars in the small favor condition and quickly declining the request of the least attractive avatars in the large favor condition.

Second, a three-way interaction between avatar attractiveness, purported user gender, and favor size on user response time was also found. In the purported male and unspecified gender conditions, attractive avatars received faster responses for small favors while less attractive avatars received faster responses for large favors. However, participants in the purported female condition responded faster to attractive avatars regardless of favor size. In other words, purported female users that controlled attractive avatars elicited faster responses across small and large favors, while attractive avatars controlled by purported male users and those users with an unspecified gender only elicited a faster response time in the small favor condition.

Based on this pattern, one possible explanation is that attractiveness is a more salient heuristic cue to the decision making process when users believe they are communicating with a female rather than a male. If so, a consistently faster response time for attractive avatars controlled by purported female users could indicate that participants based their decisions to

assent primarily on the evaluation of attractiveness if the request was made by a purported female user. Although this explanation is tentative, the pattern would be consistent with the results of the main study that found female avatars were evaluated more critically for their attractiveness than purported male users.

Human data. In addition to the three non-human avatars used to manipulate avatar attractiveness, data were also collected for human avatars to compare the effects found in the main study with characters high in anthropomorphism. Generally, the results of the main study were similar to the pattern of responses found in the human avatar condition. For example, avatar gender and purported user gender both had no significant effect on the amount of compliance that male and female human avatars received. These findings suggest that the null effect of avatar gender and purported gender on compliance found in the main study is common to users' interactions across a range of human and non-human characters rather than an artifact limited to users' responses to less anthropomorphic characters.

The two-way interaction between avatar gender and purported user gender found in the main study was also examined in the human comparison condition. Although the interaction was not statistically significant, the pattern of results was similar to those that were found with the three less anthropomorphic characters. Specifically, purported female users received less assistance when they controlled a male avatar while purported male users received the same amount of help regardless of avatar gender. Therefore, it is highly likely that the heightened expectations for purported female users observed with non-human characters are also applied to more human-like avatars.

Finally, the effect of favor size on compliance and user response time was also replicated in the human comparison condition. Overall, participants were more likely to comply with

human avatars in the small favor condition than the large favor condition, similar to the effects found in the main study with less human-like characters. In addition, a comparison of the mean response time for both small and large favors suggests that participants generally took the same amount of time to respond to small and large requests regardless of avatar anthropomorphism. As a result, these findings provides further evidence that the effect of avatar appearance derived from users' responses to less anthropomorphic avatars found in the main study are likely applicable to users' interactions with more human-like avatars as well.

Implications

Theoretical contribution. Continuous, massively multiplayer online environments have been widely lauded as a promising medium for the conduct of social scientific research (Bainbridge, 2007; Castronova, 2006). However, our understanding of how human behavior occurs in these environments is still developing (Williams, 2010). The present investigation examined how users respond to avatar traits when the offline identity of the avatar's user was made salient. The results of the study found that physically attractive avatars had a greater rate of compliance than their less attractive counterparts. Furthermore, less attractive avatars received less help when purported female users controlled them. Based on these results, it appears that users respond to avatars in MMOs according to two established offline stereotypes: one, that attractive individuals are more likely to gain compliance, (Chaiken, 1979; Hosoda et al., 2003; Mazzela & Feingold, 2006) and two, that females are evaluated more critically for their appearance than males (Bar-Tal & Saxe, 1976; Furnham & Radley, 1989; Pine, 2001). Therefore, this study contributes to our theoretical understanding of the mapping principle, specifically highlighting that physical attractiveness is a salient cue to identity in game-based virtual environments.

The present investigation also found that avatar gender did not affect the rate at which users gained compliance. To explain this finding, it is important to remember that the mapping principle states "we cannot automatically treat virtual worlds as equivalent to one another" (Williams, 2010, p.460). As a result, the effects of avatar gender measured in the laboratory (Lee, 2005) or observed in a socially oriented virtual world (Yee et al., 2007) cannot be generalized to other communication settings without additional replication. In the current study, it is likely that the shift from a gender-neutral communication setting to a game-based virtual world may caused avatar gender to be less salient to the person perception process (Eden et al., 2010). As a result, the effect of certain avatar traits may best be understood in relationship to the communication setting in which they are perceived.

Finally, the current study also highlights the importance of supplementing self-report responses with actual measures of the surveyed behavior. For example, the present study found that female avatars received far fewer benefits than MMO users would traditionally expect (Griffiths et al., 2003; Wang & Wang, 2008). Overall, female avatars were actually helped less frequently than their male counterparts in multiple conditions. Thus, it is important that questionnaire-based studies limit their claims to generalizability until subsequent experimental studies of user behavior in its natural setting have been conducted.

Practical contribution. The results of this study suggest that individuals respond to avatars controlled by male and female users in fundamentally different ways. Purported female users encountered strict standards for their behavior and appearance, some of which were more restrictive than the cultural evaluations that females are expected to meet in offline settings. Furthermore, female avatars received less help than male avatars when their identity was unknown. Given that many female users are reluctant to identify their gender (Bruckman, 1993)

or control a male avatar (Yee et al., 2011), it is likely that a majority of female players are helped less frequently in heavily male virtual environments.

Based on these findings, multiple implications are present for the design of effective online environments. For example, consider if a predominately male company decided to conduct a portion of their everyday business operations in an online environment. If the business decided to mediate their interactions with avatars, male employees might have considerably more advantages in this environment than their female colleagues. Specifically, the results of the current study suggest that while male employees could employ their avatars in a variety of different ways, female associates would have fewer acceptable options for their appearance if they wished to receive the same treatment as their male colleagues. Organizations expanding their operations to online settings should therefore be mindful that the inclusion of avatars can impose, rather than equalize, a range of gender stereotypes that might adversely affect the organizational experience of female employees in a male-dominated industry. However, these potential implications must also be contextualized by the limitations of the present study.

Limitations

Several limitations are important to highlight while interpreting the results of the present analysis. First, close to half of participants included in the study's sample did not respond to the researcher at the start of the interaction. Although it is possible that non-responders did not receive the researcher's initial message, our results found that the most attractive avatars were responded to less frequently than the least attractive avatars. As a result, it is possible that some users chose to ignore the researcher's avatar based on its appearance before the purported gender of the avatar could be identified. Given this study was specifically concerned with understanding the interaction between virtual appearance and offline identity, it is advantageous that our results

were based on those users who were not biased against the appearance of the researcher's avatar prior to the identification of its purported gender and the manipulation of favor size.

Secondly, the present study did not collect any identifying information about the demographic distribution of participants who were included in the sample. This decision was based on the desire to preserve the naturalness of the virtual field setting and to minimize the intrusiveness of the researcher's manipulation. Based on recent estimates that suggest *WoW* is primarily comprised of male players (Yee et al., 2011), it is likely that the majority of the study's participants were also male. As a result, it is important to consider that the results of the present study are primarily characteristic of male users' responses to avatars. Limited research has found that users who adopt female avatars are more likely to perform supportive roles specific to a game objectives (Yee et al., 2011), so it is possible that a sample comprised by a more equal mix of male and female players may have been more altruistic than the users of the present study

Finally, generalizing the effects of avatar appearance derived from this study to other types of online environments should be approached with caution (Williams, 2010). For example, the effect of avatar attractiveness in the present study is largely consistent with research on avatar attractiveness from immersive virtual environments (Yee and Bailenson, 2007), computer-mediated communication mediated by two-dimensional avatars (Holzwarth et al., 2006), and initial ethnographies of user behavior in social worlds (Banakou & Chorianopoulos, 2010). As a result, it appears that the effect of avatar attractiveness is relatively consistent across virtual worlds and controlled experimental settings.

By comparison, the null effect of avatar gender found in the current study should not be generalized to alternatively themed virtual worlds without additional replication. Specifically, game-based virtual worlds are characterized by a different set of objectives and cultural

assumptions than social, non-game-based worlds such as *Second Life* or *There.com*. In addition, available estimates suggest that social virtual worlds are comprised by a more equal distribution of male and female players (Ducheneaut et al., 2009). As a result, avatar gender could be a more salient cue to the person perception process when the objective of the setting is communication, rather than competition, or if the distribution of male and female players is less biased towards one gender. Nevertheless, the results of the present study do complement our understanding of how users respond to male and female avatars in a form of virtual world that accounts for the large majority of MMO use.

Future Research

Future research on the effect of avatar appearance in virtual environments has multiple potential options. For example, previous investigations of users' responses to simple cartoon representations of avatar gender has found that varying the amount cognitive resources available to users determined their propensity to evaluate male and female avatars in gender stereotypical ways (Lee, 2010). The participant observations of the present study were conducted with idle game players in a meeting area commonly used to coordinate multi-person game endeavors with others. As a result, these participants' cognitive resources may have been less engaged than players who were actively completing an alternative task. Therefore, additional research could examine whether players are more likely to respond to female avatars according to their virtual gender when already engaged in a secondary activity.

Aside from the effect of cognitive load on users' reliance on avatar appearance as an indicator of online identity, future investigations could also examine the effect of linguistic style as a cue of offline gender. Past research on computer-mediated communications has found that male and female users have identifiable differences in their language use (Savicki et al., 1999;

Thomson & Murachver, 2001, nicknames (Cornetto & Nowak, 2006; Herring & Martinson, 2004), choice of emoticons (Wolf, 2000), and methods of requesting assistance (Lehdonvirta, Nagashima, Lehdonvirta, & Baba, 2012). Subsequent research could supplement the current analysis by examining whether there is an interaction between the explicit identification of gender, avatar gender, and the gender implicitly suggested by users' linguistic styles. This manipulation would allow for a subtler test of purported offline gender to be conducted. It is important to note, however, that previous research suggests language-based performances of gender are often difficult to consciously manipulate over an extended period of time (Herring & Martinson, 2004).

Finally, the current study did not collect information about the extent and duration of participants' previous experience in virtual environments. Differentiating between novice and established MMO players is potentially important, as extended game use could be related to greater knowledge about the characteristics of virtual worlds and their users. For example, a senior user of MMOs may be more aware of the unequal distribution of player gender and the propensity of gender bending in the general game population. Future virtual field experiments could manipulate the variable of game play experience by sampling game users from areas of the virtual world inhabited by less experienced players.

Conclusion

Despite the potential opportunities for additional refinement and verification, the results of the present study nevertheless suggest that avatar appearance can have an important influence on the outcome of a number of users' interactions with others. Increasing customization options appear to provide male users with more and more choices, many of which are accepted or even rewarded by other users. However, it appears that female players may continue to encounter

constraints regarding the virtual presentations they are allowed to adopt. Although it helps to be

attractive, it still isn't easy if you're not one of the guys.

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Appendix A: Figures
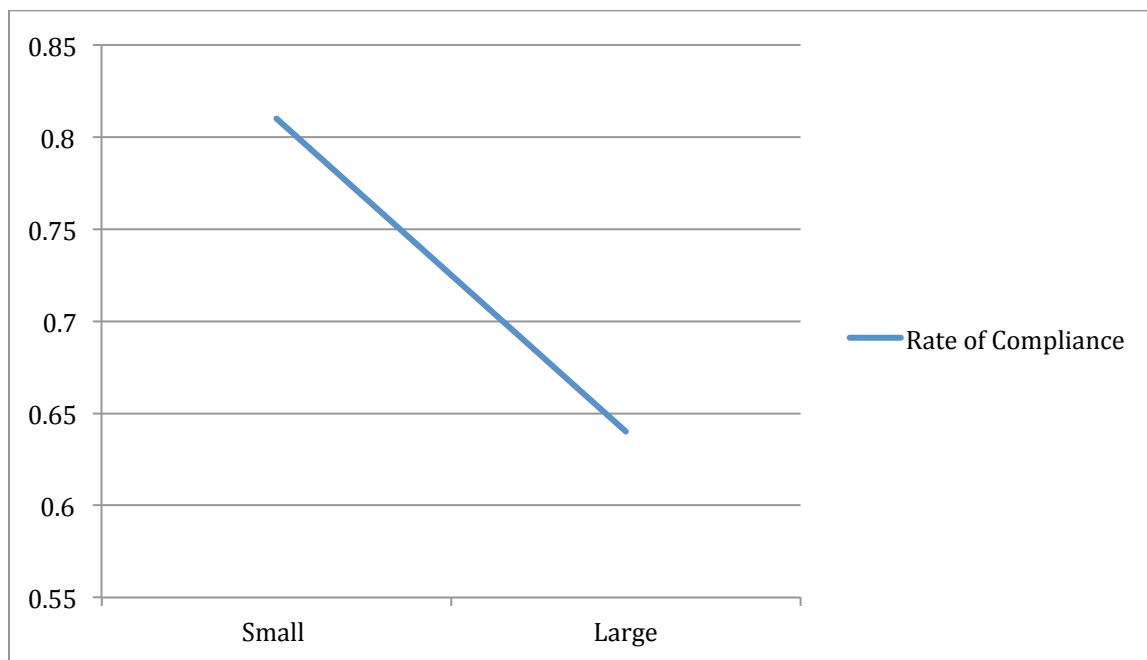
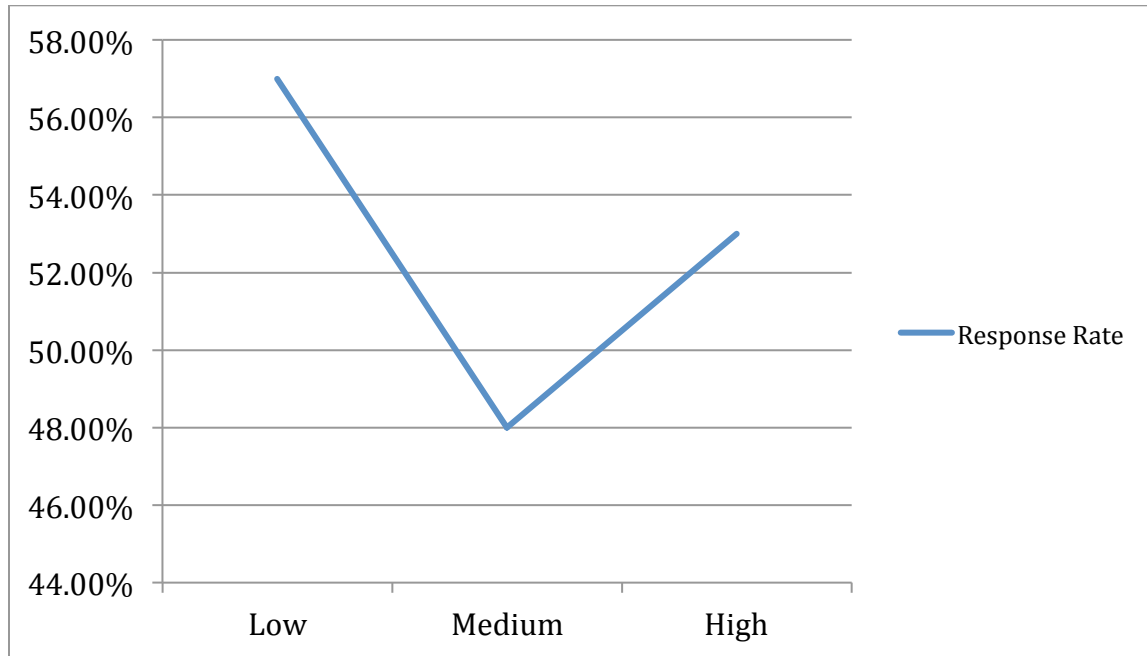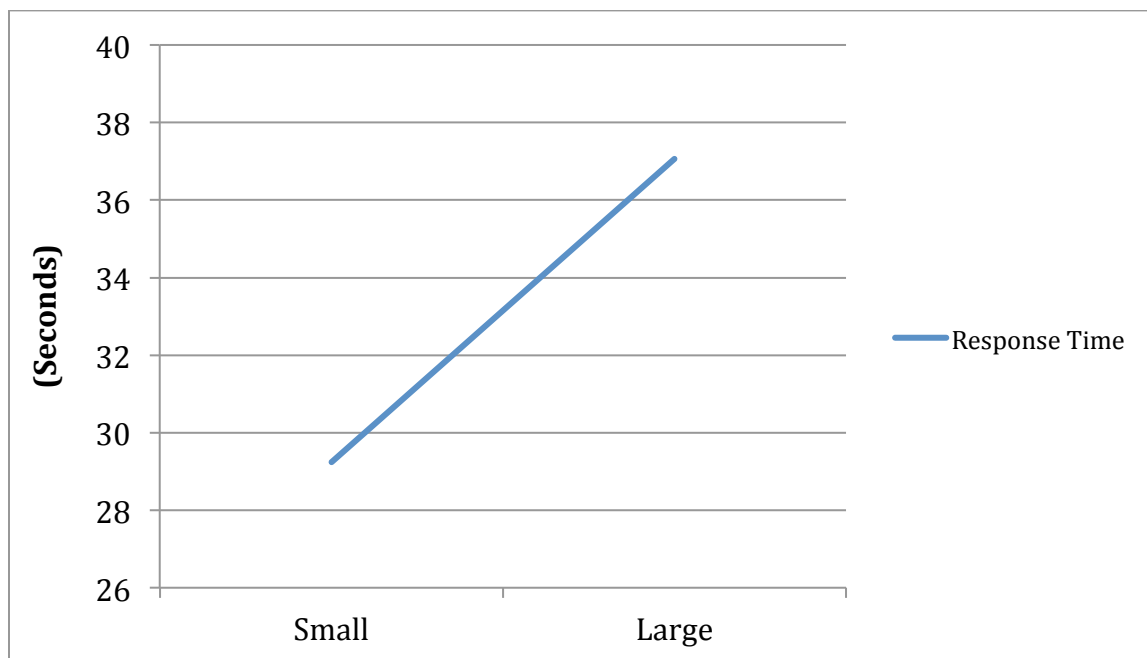**Figure 1. Main Effect of Avatar Attractiveness on Compliance.**
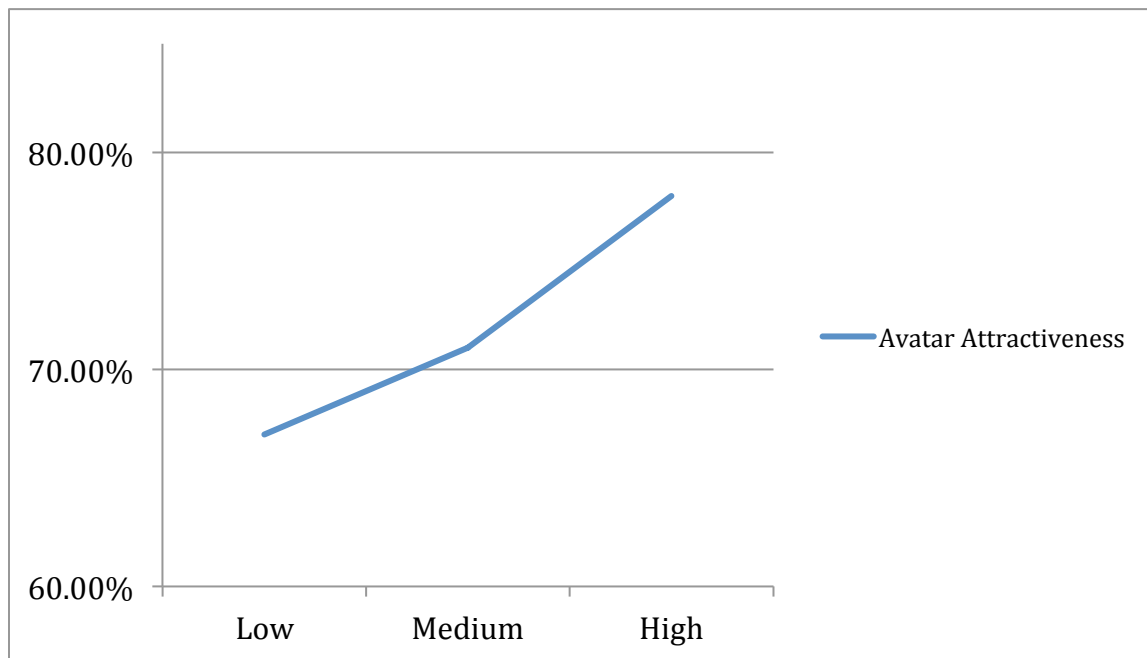
Figure 2. Avatar Attractiveness X Avatar Gender on Compliance.
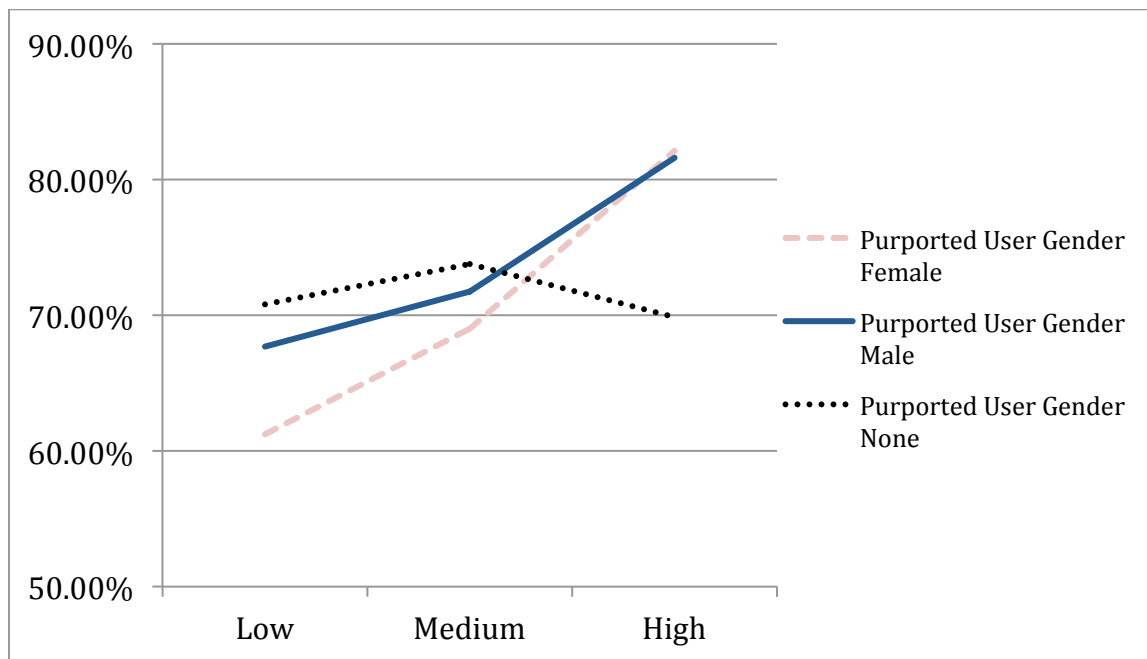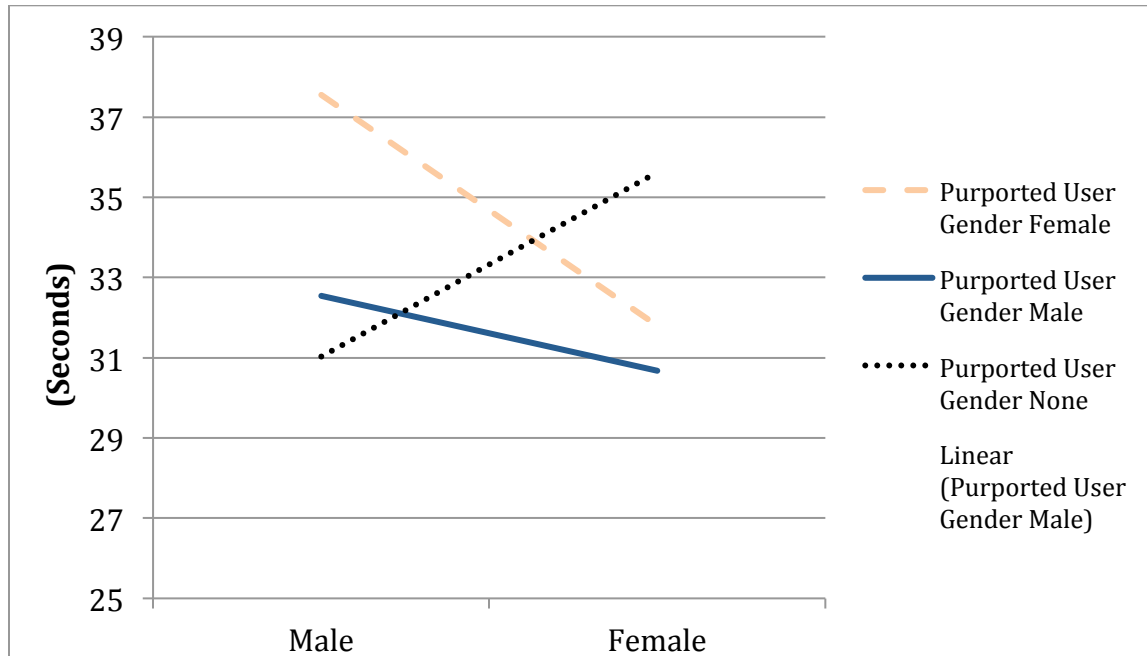
Figure 3. Purported User Gender X Avatar Gender on Compliance.
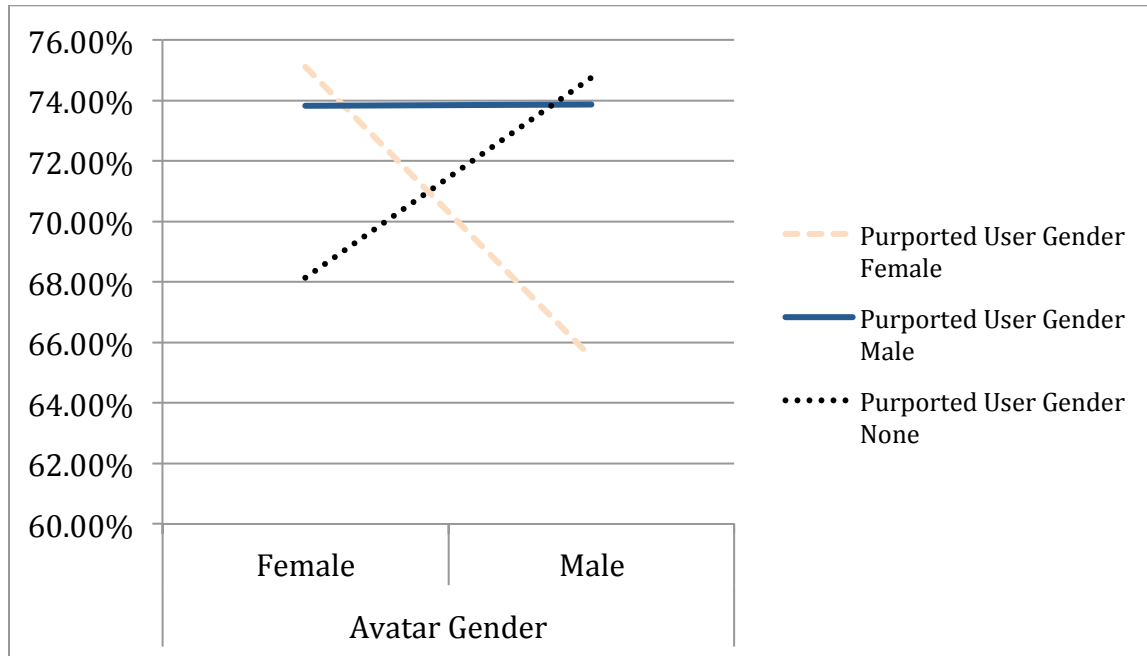
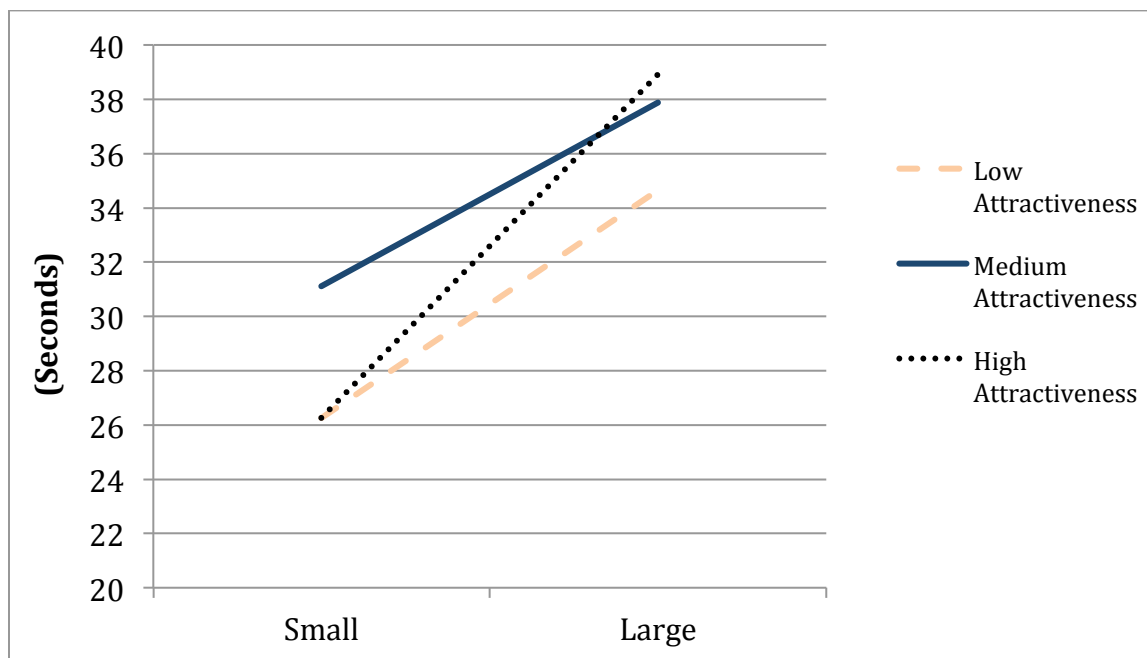**Figure 4. Main Effect of Favor Size on Compliance.**

Figure 5. Main Effect of Avatar Attractiveness on Response Rate.

Figure 6. Main Effect of Favor Size on User Response Time.

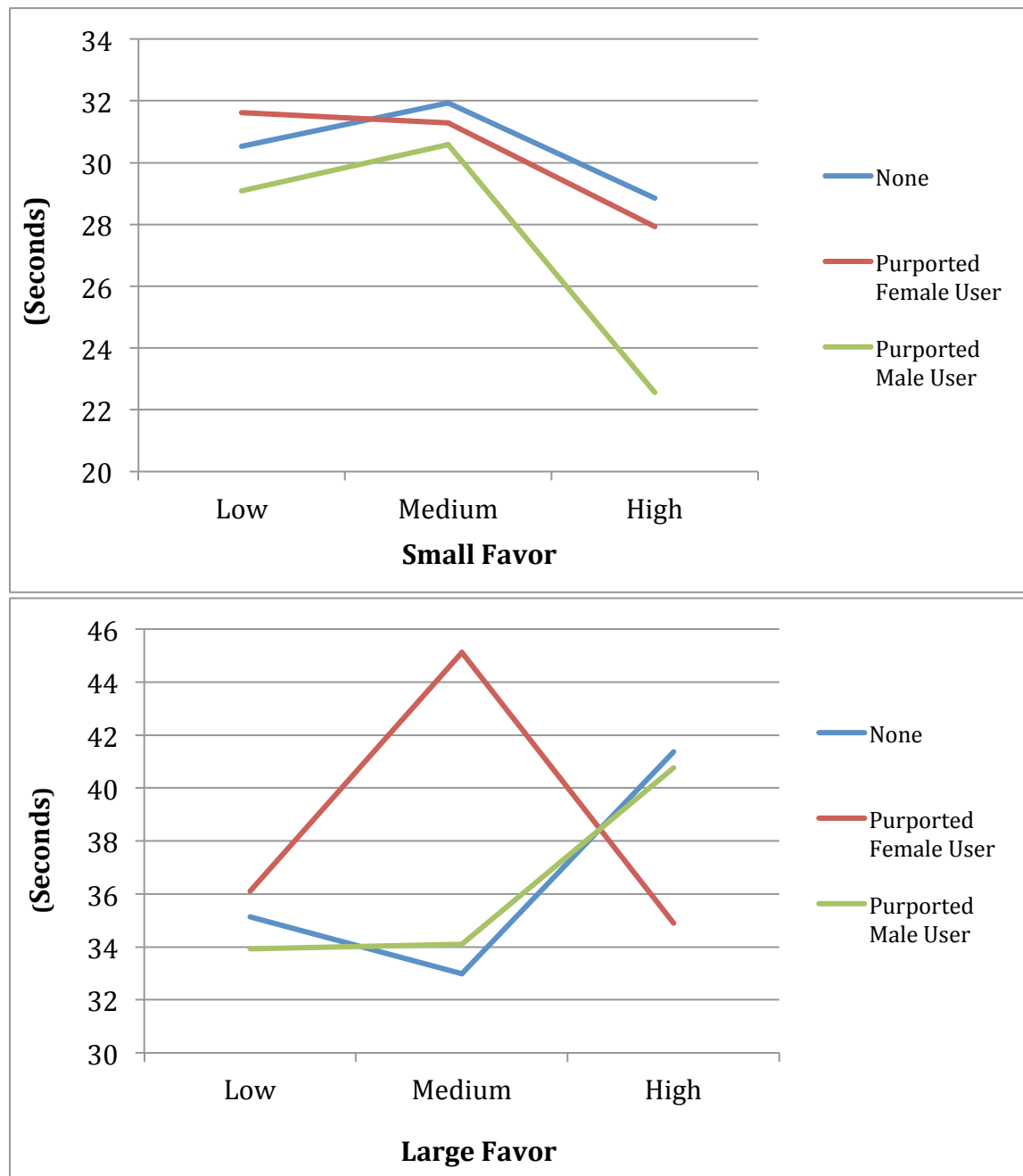**Figure 7. Avatar Gender X Purported User Gender on User Response Time.**

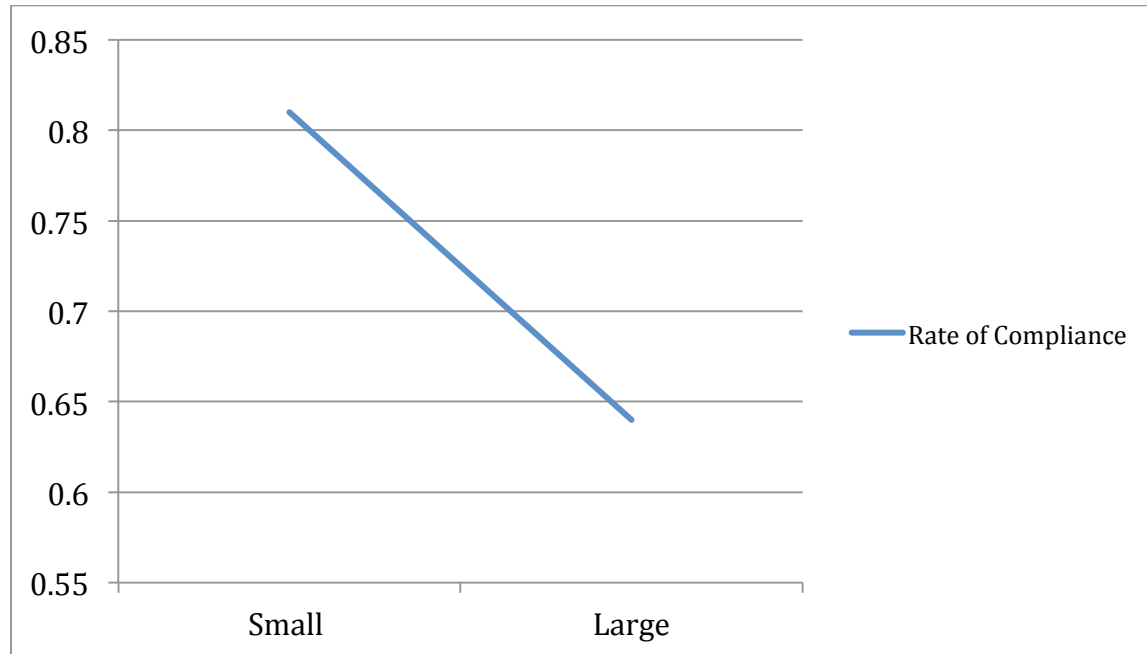**Figure 8. Favor Size X Avatar Attractiveness on User Response Time.**

Figure 9: Avatar Attractiveness X Purported User Gender x Favor Size on User Response Time.
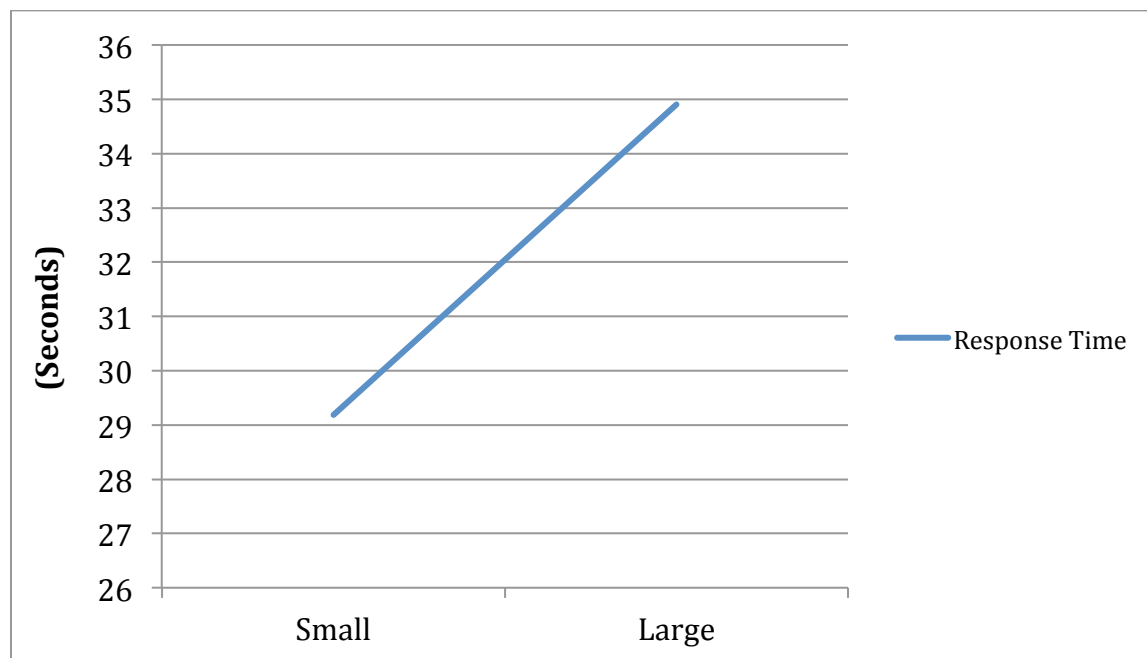
Figure 10. Main effect of favor size on compliance, human condition.

Figure 10. Main effect of favor size on user response time, human comparison condition.

Appendix B: Tables

Table 1. Frequency of Gender Pronouns, Pilot Study #2.

Type	Total Use	Pronoun Use	Other Use
Man	443,410	12.59%	87.41%
Guy	328,212	93.49%	6.51%
Boy	23,983	38.02%	23.96%
Women	27,956	97.52%	2.48%
Gal	3,125	86.27%	13.63%
Girl	36,391	87.98%	12.02%

Table 2. Data Collection by Day.

Day of the Week	Total Data Collected
Monday	12.21%
Tuesday	7.79%
Wednesday	8.85%
Thursday	17.71%
Friday	20.57%
Saturday	16.64%
Sunday	16.23

Table 3. Data Collection by Time of Day.

Time of Day	Total Data Collected
12am-5am	9.91%
6am-11am	3.61%
12pm-5pm	27.30%
6pm-11pm	59.18%

Appendix C: Avatars

High Attractiveness

Medium Attractiveness

Human Condition

Low Attractiveness