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Perceived gender and its effect on attributions toward avatars in the video game Spore

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PERCEIVED GENDER AND ITS EFFECT ON ATTRIBUTIONS TOWARD AVATARS IN THE VIDEO GAME SPORE

by

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ABSTRACT

In this study, 174 undergraduates from the University of Central Florida were asked to rate individual human and animal avatar features from the video game Spore on their level of femininity, masculinity, likability, and how well the feature represented them on a 7 point Likert scale of agreeability. Avatar features were presented on a neutral gray, quadruped body in two different views. It was expected that participants would show higher likability for avatar features that they perceived as corresponding to their Personal Attribute Questionnaire (PAQ) gender. Males liked feminine features approximately the same as females, however, in many categories females liked the most masculine features more than the most feminine features. Males liked the most masculine body detail feature more than females, and females liked the most masculine body detail more than males. It also was anticipated that avatar features rated as having both low femininity and low masculinity would be the features rated lowest in likability overall. These features did not have the lowest likability, but were somewhat close to neutral in likability. These results have implications for likable avatar creation for businesses, the military, and education.

DEDICATION

For Dr. Valerie Sims, a wonderful friend, mentor, and teacher. Thank you for pushing me and giving me the opportunity to see what great things I am capable of.

And especially for my friends and family, in particular Sarah Sweeney – my sister, John Sweeney – my brother, Ariana Stephens, Eric Stinson, Kari Ross, Melissa Craig, and Leah Grace, who have always believed in me and encouraged me in pursuing my passions. And to my mother, Marge Sweeney, who was always my biggest role model, friend, and supporter in life.

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CHAPTER ONE: INTRODUCTION

Prevalence of Avatars in Daily Life

According to Lawrence Lessig (1999), computer avatars are objects that represent a computer user's self or alternate persona. Computer avatars include, but are not limited to: three-dimensional models or characters, two-dimensional icons, or one-dimensional usernames used on internet communities (Fink, 1999). With the advent of computers and the rise of the internet, people have become increasingly exposed to computer avatars on websites and in video games – essentially becoming accustomed to dealing with non-human representations of real people. To understand the importance of this study and studying avatars in general, it is important to explore the many uses of avatars, online versus face to face human interaction, and the attributions people make toward non-human items such as objects, animals, robots, and avatars.

Popularity of Avatars and Implications for Avatar Research

As avatars are becoming increasingly common, it is becoming more and more vital to find out what differences there are between avatar-to-avatar interaction and face-to-face interaction. Humans are at a social impasse; internet users are expected to execute proper social etiquette without the aids of human vocal tone and pitch, and/or with virtual facial and body language cues. Many popular internet websites and forums allow users to create highly customizable 2D or 3D avatars, such as Gaiaonline, Second Life, and Habbo Hotel (Snow, 2007). According to the Sulake Corporation – the corporation that owns Habbo hotel – as of February 2011 there are over 200 million registered accounts on their website ("Habbo Hotel Hits 200 Million Registrations," 2011). There are also online computer games (usually Massively Multiplayer

Online games, or MMOs) in which people are represented by avatars. Some examples of Massively Multiplayer Online games are: World of Warcraft and RuneScape, which, according to a technology blog, collectively had 13.5 million users as of 2007 (Snow, 2007). Computer messenger programs also use avatars, such Skype and AOL Instant Messenger (AIM). Both programs now allow users to choose talking/moving 3D avatars in addition to 2D static/moving avatars, which can be viewed directly on their respective home websites (http://www.skype.com/intl/en-us/home; http://expressions.aim.com/).

While many avatars are used recreationally by internet users via the aforementioned online services and communities; businesses, educators, and the military also are interested in practical uses for avatars. Businesses have started using computer avatars as marketing tools and visual appeals to entice customers, urging them to buy their products (Qiu & Benbasat, 2005). Researchers have investigated many avatar versus face-to-face interaction issues, such as text based versus speech based persuasion, the effects of avatar appearance, types of avatars (3D versus 2D non-human icons, etc.), and the gender of avatars on persuasion and credibility (Zanbaka, Goolkasian, & Hodges, 2006; Nowak, Hamilton, & Hammond, 2009). Zanbaka et al. (2009) found that virtual speakers and avatars are interpreted to be just as persuasive, trustworthy, and credible as real life speakers. They also found that males tended to be more easily persuaded by female speakers, and females tended to be more easily persuaded by male speakers (Zanbaka, Goolkasian, & Hodges, 2009). This study is a valid and recent example of how gender stereotypes are occurring in virtual worlds, as well as the idea that a person's avatar is interpreted as ones' actual self. In another study of avatar appearance, researchers found that

physical features of the avatar – particularly anthropomorphized and masculine features - affect peoples' perceptions of an avatar's realism, homophily (willingness to bond with the avatar), and competence (Nowak, Hamilton, & Hammond, 2009). The more realistic and anthropomorphic an avatar was perceived to be, the more credible, homophilous, and competent the participants perceived it to be. Therefore, by manipulating an avatar's appearance, one is in a sense manipulating one's perceived traits, hence the corporate urge to create a perfect, virtual, online salesman.

Aside from the advertising side of business, online MMOs and MMORPGs (Massively Multi-Player Online Role-Playing Games) such as World of Warcraft and Second Life also are prime subjects of interest in terms of exploring learning and training capabilities for businesses (Fraizer et. al, 2007; O'Connor & Menaker, 2008; Borzo, 2004). Businesses are capable of training more people in more places in a virtual setting - and according to recent studies - the training is just as effective. Big businesses like BP, IBM, and Dell and are reaping the benefits of online training (Gronstedt, 2007).

While companies are looking into the marketing and training uses for avatars, academia is looking into online forums as future classrooms with avatars representing their students. Educators have a vested interest in how avatars and online multiplayer games like Second Life could be used as effective online learning and training platforms (Childress & Braswell, 2006). Online classes have now become very common in academia to accommodate professors' and students' schedules so that they can choose when and where they can work. Full time working

students can find solace in a flexible online schedule where they can complete the work wherever and whenever is convenient for them. In addition to flexibility, Second Life also offers an instructor e-mailing list where instructors can share insight and tips for improving online learning in Second Life (Childress & Braswell, 2006). Online learning environments also help overcrowded college campuses teach more students per class, and generate more free space in real world classrooms, which helps to create a larger variety of lectures and courses on campuses.

The military also is pursuing research on gaming platforms such as MMOs and MMORPGs. In the early 2000s, the literature indicated that this was more for research on transferrable skills and was not widely applicable to the military, as most soldiers' virtual training was done with simulators (Nieborg, 2004). While military simulators are still very common and widely used, the military also has started training soldiers with PC video games because of peoples' familiarity and positivity toward video games, and their lower costs when compared to simulators (Orvis et al., 2010). Video game training in general in the military also has been shown to positively affect the motivation and satisfaction of military trainees (Orvis et al., 2010).

With all of these possible uses for avatars, there is still a lingering question: why do people perceive these non-human avatars to be so much like other human beings?

Attributions toward Non-Human Entities

People make speculations about the traits of people that they encounter and causes of events that they experience (Kiesler, 2008). This phenomenon is known as attribution. Studies show that people make attributions toward non-human objects, animals, robots, and computer avatars, and this is known as anthropomorphism (Kiesler, 2008).

Objects

As quoted from Chartrand, Fitzsimons, and Fitzsimons (2008, p.198), anthropomorphism is "the tendency to attribute human motivation, characteristics, or behavior to nonhuman entities." Objects encompass the subgroups of animals, robots, and avatars; objects represent all that is non-human. Harris and Fiske (2008) state that the motion and behavior of an object are important factors in determining how people will react to an object emotionally and physically. Movement is an important part of understanding avatars, because avatar movement ranges from 2D non-moving pictures, to vivid 3D images that move with life-like precision. According to the theories presented by Harris and Fiske (2008), the more smooth and life-like in movement an object is (in this case an avatar), the more likely a person is to attribute human traits and intentions. Since animals are alive and obviously have more human-like movement, they are a large focus of attribution research.

Animals

Understanding patterns in attributions made towards animals is an important piece of understanding avatars because avatars can be 2D pictures of animals, 3D animals, 2D and/or 3D humans with animal-like features (ex: tails, horns, fur), and/or feature animal-like movements.

Out of a list of random animals, people attributed human characteristics the most to chimps, horses, parakeets and dog; and attributed human characteristics to species of insects and fish the least out of all the animals listed (Hogan, 1980). In accordance with Hogan's findings, Eddy, T.J et al. (2010) also found that there people show a marked affinity for attributing higher order thinking processes to chimps, dogs, and cats. According to these past studies, participants may show a preference for these types of animal features (ex: companion animals), as well as a lack of interest in fish-like or insect-like features.

Since avatars are created via computer programs, they are not nearly as realistic in movement or appearance as real, living animals. Robots are more comparable to avatars in their ways of movement, and so they offer important insights on attributions toward avatars as well.

Robots

Current literature states that both the appearance and movement of robots has a large effect on attribution. Syrdal et al. (2006) found that participants with low emotional stability and extraversion had a preference for robots with a more mechanical appearance as opposed to more anthropomorphic appearance. The preferences that the participants' showed is an example of how personality characteristics of people can alter their perceptions and/or preferences for certain avatars, hence why this study is interested in how a participants' gender as scored on the PAQ will affect the attributions they make, or preferences they show, for certain features (see Hypotheses). Participants also showed differences in personality attributions toward different

looking robots in the areas of extraversion, agreeableness, and intelligence - but not in emotional stability (Syrdal et al., 2006). Because robots are not alive and neither are avatars, similarities may be found in how people rate the traits of both avatars and robots, which is useful for future research (see Future Research). As each avatar's feature varies, so should each rated trait (masculinity, femininity, likability).

After reviewing the current literature on robots that is valid to this study, research on computer avatars will help create additional support for the proposed hypotheses.

Avatars

As previously stated, other studies on computer avatars have shown that people attribute higher levels of trustworthiness, willingness to use the avatar in future interactions, credibility, persuasiveness, and homophily (tendency to bond with the avatar), to an avatar that his highly realistic and anthropomorphic (Zanbaka, Goolkasian, & Hodges, 2006; Nowak, Hamilton, & Hammond, 2009).

Also, there is evidence that gender attribution carries over into the virtual world. Castronova (2003) claims that in MMORPGs like World of Warcraft, female characters still tend to be races that are more aesthetically pleasing. In World of Warcraft, there are no differences in skill or potential between male and female avatars, even though players show these preferences (inherent skills are based on the avatar's class, which can are fighting specializations that do not differ for each race). Female avatars in these games tend to be humans or elf races - and are highly

unlikely to be Ogres or other "ugly" monstrous races. Also, in games like World of Warcraft, players will sell experienced - or "leveled" - characters online. Females of the same skill level and race sell for less than male characters of the same skill level and race even though their abilities and items are exactly the same. However, a character's level is still the most important determining factor in character selling price (Castronova, 2003).

Using attribution literature as a guide for the hypotheses in this study, the following section discusses how this study plans to fill in the gaps in current research.

Thesis Overview

This study seeks to gather foundational information about avatar features, and to find if there are any ways to determine what features people will like best. If there are predictable patterns in what features people like, avatar features could be tailored to specific demographics of people, and gaming companies, businesses and educators could create the most liked and relatable avatars for games, marketing or teaching settings.

Gaming companies and businesses could create ideal characters to draw in target groups of consumers if there are relationships between the gender of the consumer and which avatar features they like best. If my hypotheses are correct, in the near future people could manipulate teacher avatar features and/or an avatar's gender to enhance its respect in the classroom, in games, or in the online market. Businesses or teachers could have students fill out simple surveys prior to visiting their site or virtual classroom and create a "custom" avatar that would appeal specifically to them and their personality, which may affect the success of an avatar's usefulness

and/or success at persuasion and teaching. Also, this research could be used for game tutorials or help options for computer programs/websites so that people would be less likely to become frustrated, more likely to interact with, and more willing to trust these personalized avatars.

This study also is testing avatar perceptions using quadruped avatars. Quadruped avatars were chosen instead of bipedal avatars because many previous studies on avatar attribution are about avatars that are human faces, human avatars, household objects, and animals. Spore creates an ambiguous grey-area where people create their own creature, and attribute human qualities to an animal which they have constructed. Spore's avatar bases also are highly malleable – players can even alter to number and thickness of their creature's vertebrae. Very few games express this kind of high appearance variability, but more and more games are taking advantage of highly customizable avatars, whether they are human or animal (ex: Second Life). A quadruped base also should eliminate the labeling of an explicit gender, since many quadrupeds do not have prominent secondary sex characteristics like humans. If a biped template had a feature that was being tested, but also had breasts, the template may skew the participant's interpretation of the gender of the feature itself. There also is limited research on how consumers feel about animal-like or a combination of animal-humanlike avatar features. This game allows us to analyze animal features, not just upright human features.

Currently, there are very few studies using Spore as a medium for avatar creation. The video game Spore is based on the idea of evolution. Players create a species, beginning from the cell stage of their species, continuing through the creature stage, the tribal stage, and the civilization

stage, and on to universal domination. Up until the tribal stage, players can alter their species – that represents themselves – as long as they have found all of the animal parts in-game (recover animal parts from bone piles, etc.) and as long as the complexity meter will allow them to add more parts and alter more physical facets of their species.

Since it is an online game, players can interact with both in-game avatars made by the game creators and also other real players' avatars. Spore is unique in the sense that the species one creates in Spore are a large of a representation of oneself. Players are in a sense "playing God" with their own living creations in a virtual world with the ultimate goal of achieving universal domination. Players have the option of attacking or befriending the species they encounter, and so initial appearance and impressions are in a sense crucial to how the game is played (as well as whether the user's species is carnivorous, omnivorous or herbivorous). Also, the use of animal-like and human-like creatures in both appearance and mannerisms as avatars brings into question issues of anthropomorphism (attributions toward personified animal-like avatars versus completely human avatars).

Spore also boasts high customization features, where players can lengthen spines, thicken limbs, and even create avatars with multiple arms, legs, or heads. The complexity meter and amount of "Sporebucks" used to buy each part are the only limitations on avatar creation for this game, and so a wide range of very different looking avatars can be created. In Spore, no two avatars really look the same, despite the massive number of users and creatures.

CHAPTER TWO: HYPOTHESES

Hypotheses

After addressing the previous literature on avatars and human attributions toward other objects, animals and robots, it is expected that participants' gender role - according to the PAQ - will reflect their gender attributions toward avatar features. Gender roles will be broken down into four categories: androgynous (approximately even scores of masculinity and femininity), high feminine, high masculine, and undifferentiated (low masculinity and femininity). Features that are rated highest in likability are expected to have a rated gender that corresponds with the PAQ gender of the participant. This is expected because an avatar represents oneself online, and so it is predicted that participants will like features based on the perceived gender of the feature. Since salient cues such as color and body type are controlled for, the results should reflect the participant's perception only of the feature itself.

It also is expected that features with both a low masculinity and low femininity rating will have the lowest likability and representation scores. This is expected because gender measures such as the Bem Sex Role Inventory (BSRI) and the PAQ correlate with social desirability (androgynous gender traits are favored over undifferentiated gender role traits) (Lenney, 1991). Therefore, these "gender ambiguous" features should be less liked overall.

CHAPTER THREE: METHOD AND PROCEDURE

Method

Participants

Participants were 220 undergraduate students from the University of Central Florida. Of the original 220 participants, 46 participants were dropped due to insufficient data. Insufficient data included: if more than 10 items were incomplete for the Spore survey, if more than 4 items were incomplete on the PAQ, or if they did not include their biological sex in the demographics section. The remaining participants were 174 college students (136 females and 38 males) between the ages of 18 and 41 of varying ethnicities. Participants were signed up voluntarily via Sona Systems and received extra credit in exchange for their participation in this study.

Materials

The Spore avatar feature survey consisted of two screen captures of every avatar feature; weapons and arms/graspers categories were excluded. A category of weapons could have created a bias towards masculinity, and quadruped bodies do not need arms and hands - only legs and feet. As an example, participants were shown a gray quadruped body on a black background with one type of feature in both profile view and in three quarter aerial view (see Appendix A, Sample Question). Each feature was not resized from its original size when placed on the avatar base. The zoom on the creature creator screen was increased by six (done by clicking the mouse forward six clicks), and each set of avatar screen captures were in the same position and cropped to the same size.

To create the pictures used for each feature, we used the video game Spore by EA Games (Electronic Arts, © 2009, http://www.spore.com/). After installing Spore on a computer that met the running requirements, the Creature Creator in Spore was opened, and a generic quadruped body template was created. The template was colored gray using the paint tool at the top right of the Creature Creator tool bar. In the painting mode, there are color and texture options for the base, coat pattern, and coat details of a creature. To ensure that the results would not be affected by the color or texture of the avatar, only the base color option was used in a medium shade of gray. Gray was chosen as a neutral color because using human flesh tones could have skewed our results as human skin tones are highly variable, and it could have created an affect for ethnicity.

After creating the neutral avatar base, it was saved as "Quadruped Body Template." The template was accessed via "My Creations" in the Spore main menu. The templates in "My Creations" can be edited and renamed/resaved, so each avatar feature was placed on exactly the same body template as the original. Each feature was not resized before being placed on the template. To create a set of stimuli, the template was opened, and a feature was placed on the template body. To save the new feature individually, the description tag was changed to reflect the part (ex: Mouth1), and when exiting, the avatar was "saved as new." To avoid an uncanny valley effect, features were kept to the number they usually are in humans/mammals and were placed where they normally are in humans/mammals (ex: all details, such as wings, were placed in the shoulder region; eyes were placed on the front of the head, a mouth was placed on the front of the head etc.). Then, the creature was moved to "test drive" mode via the "test drive"

button on the top tool bar. From there, the bottom toolbar changes, and the "background" can be changed to black. The camera angle was not moved from its original position to create a consistent aerial view for all features; however, the scroll button on the mouse was used to zoom each avatar by six. A screen shot was then taken, and was pasted into the program Paint and saved as a jpg file. To create the profile view of a feature, the resaved feature was opened through "My Creations," sent to test drive, the background was set to black and zoomed by six, and then the mouse was used to rotate the avatar into a profile view where a screen shot was taken. These steps were repeated for every feature except for the feature groups that were not used in this study (weapons, arms and graspers). Each jpg file was cropped to an identical size using Windows Photo Gallery. In total, there were 164 features tested, and 328 pictures total.

Accompanying each of the pairs of pictures were questions about the masculinity, femininity, likability, and self-representation of each feature on a 7 point agree/disagree Likert scale (see Appendix A). After the participants rated each individual feature, they were then asked to complete the Personal Attributes Questionnaire (Spence, Helmreich & Stapp, 1974), or PAQ (see Appendix C), followed by demographics (see Appendix B).

Design

This study utilized a mixed design. The subject variables were the participant's biological sex, as well as their PAQ gender. The independent variable was each individual avatar feature in a category. The dependent variables were the participants' ratings of masculinity, femininity, and likability. Masculinity and femininity were operationally defined as the participants' perception

of what masculinity and femininity are and/or should look like. Likability was operationally defined as the participant's perception of how pleasing a feature is based on appearance.

Procedure

This study was conducted entirely online. Participants signed up through the Sona Systems website, and were then directed to our lab's secure website on limesurvey.org. There, participants completed two surveys – the Spore Questionnaire and the PAQ – and a survey of demographic information. Participants were all 18 years of age or older and needed to have access to the internet in order to sign up for the study via Sona Systems. The only exclusion criteria were those who were younger than 18 and/or could not access Sona Systems or the internet.

Initially, participants were shown an instructions page. The instructions page included the avatar template to eliminate confusion about what features participants were supposed to be rating (ex: the avatar template's tail is not supposed to be rated). The instructions page also explained the non-mutual exclusivity of gender. Participants were explicitly told that just because a feature is high in masculinity does not mean that it can't be high in femininity as well, but they were told to rate based on their perceptions and not necessarily in this non-mutually exclusive fashion. Also, because there were so many images and features, participants were told to spend approximately 5-10 seconds rating each feature since our study is interested in exploring initial perceptions. Participants were told not to linger too long on a single question since there were so many in the surveys presented.

Participants then continued on to the Spore Study. They were shown two pictures of each avatar feature (ex: a type of nose in three-quarter aerial view and profile view on an avatar) - from the video game Spore on a plain black background. Along with two pictures of each feature, the participants were then given a set of questions. Participants were to rate each feature on femininity, masculinity, and likability on a 7 point agree/disagree Likert scale; 1 being strongly agree and 7 being strongly disagree. Afterwards, participants completed demographics (Appendix B), as well as the Personal Attributes Questionnaire (Spence, Helmreich & Stapp, 1974) (see Appendix C). Each feature was grouped into a larger category in the Spore Creature Creator: mouths, eyes and senses, legs, feet, and body details. The eyes and senses category was broken into 3 subcategories: eyes, noses, and ears. The "weapons" and "arms/graspers" categories in the Creature Creator were not used in this study (a category of weapons could create a bias towards masculinity; quadruped bodies do not need arms and graspers/hands, only legs and feet).

CHAPTER FOUR: ANALYSES AND FINDINGS

Results

The mean likability was found for males and females for each of the highest rated masculine and highest rated feminine features for each body feature category (mouths, eyes, noses, ears, legs, feet, and body details). Biological sex was used instead of gender as determined by the PAQ because biological sex was predictive of gender for all participants. There also were not enough males to run the analysis properly (analysis would not be fully crossed).

A 2x2 ANOVA was run for each feature category, comparing the sex of the participant (male/female) to the type of feature in a feature category (most masculine/most feminine).

For the ears category, males liked the masculine ear (*M*=3.92) more than the feminine ear (*M*=4.24), and females liked the feminine ear (*M*=4.33) more than the masculine ear (*M*=4.55). There was an interaction effect between biological sex and likability scores of the most masculine and most feminine ear (F (1,172) =3.93, p=.049). Males and females both had approximately the same likability for the feminine ear, but significant differences for likability for the masculine ear (males; *M*= 3.92; females; *M*=4.55).

For the eyes category, males liked the masculine eye (*M*=3.92) more than the feminine eye (*M*=4.24), and females liked the feminine eye (*M*=4.33) more than the masculine eye (*M*=4.55). There was an interaction effect between biological sex and likability scores of the most masculine and most feminine eye (F (1,172) =3.93, p=.049). Males and females both had

approximately the same likability for the feminine eye, but females liked the masculine eye significantly less than males (males; *M*= 3.92; females; *M*=4.55).

For the feet category, males reported liking the masculine feet (*M*=4.55) *less* than the feminine feet (*M*=3.92), and females liked the feminine feet (*M*=4.55) more than the masculine feet (*M*=4.87). There was a main effect for type of feature (F (1, 172) = 7.50, p=.007). In this category, masculine feet (males; *M*=4.55; females; M=3.92) were given less negative ratings overall than feminine feet.

For the legs category, males liked the masculine legs (*M*=3.92) more than the feminine legs (*M*=4.55), but females liked the feminine legs (*M*=5.24) *less* than the masculine legs (*M*=4.34). Overall, males liked both types of legs more than females, and both males and females liked the masculine legs more than the feminine legs**.**

In the mouth category, males liked the masculine mouth (*M*=3.92) more than the feminine mouth (*M*=4.84), but females liked the most masculine mouth (*M*=4.55) more than the most feminine mouth (*M*=4.57). In this category, there was an interaction effect between biological sex and likability scores of the most masculine and most feminine mouth (F (1,172) =6.03, p=.015). The masculine mouth was liked most by both men and women, and women liked the feminine mouth *less* than the masculine mouth.

In the noses category, males liked the masculine nose (*M*=3.92) more than the feminine nose (*M*=5.26), but females liked the most masculine nose (*M*=4.55) more than the most feminine nose (*M*=5.43). In this category, there was a main effect for type ($F(1,172) = 19.44$, $p<.001$). Males and females both disliked the most feminine rated nose more than the most masculine rated nose.

In the body details category, there was a significant interaction ($F(1,171) = 15.84$, $p<.001$). Males preferred the most feminine body detail (*M*=3.66) over the most masculine body detail (*M*=4.5), and females preferred the most masculine body detail (*M*=3.9) over the most feminine body detail (*M*=4.29).

See pictures of the avatars constructed of the most masculine parts, and the most feminine parts (Appendix D).

To see if the likability for the least masculine and least feminine parts was the lowest overall (hypothesis 2), the lowest mean likability scores were compared to the masculinity and femininity means for each feature category. The lowest likability ratings did not correspond to the lowest rated feminine and masculine features. However, the mean of the masculinity averages (*M*=3.52) and the means of the femininity averages (*M*=4.77) for the least liked features were close to neutral in gender perception (3= "slightly agree"; 4 = "neither agree nor disagree"; 5 = "slightly disagree" that feature is masculine/ that feature is feminine).

See pictures of the avatar constructed of the least liked parts (Appendix E).

Discussion

According to the results, the first hypothesis was not completely supported, although the results were very interesting. It was expected that participants would like features the most when they perceived them as being the same as their gender. In the ear and eyes categories, this hypothesis held true. However, this was not the case for all of the other feature categories. The exact opposite was true for the body details in which the males liked the most feminine body detail (a flower, see Appendix D) more than the most masculine detail (a pair of dragon-like wings, see Appendix D), and females liked the most masculine body detail more than the most feminine one. For the legs, feet, mouths, and noses, both men and women preferred the masculine feature more than the feminine feature.

These results could mean that participants are choosing likability based on perceived attractiveness, rather than based on how much the feature represents them. These results appear to contradict the idea that avatars are seen a representation of oneself, rather than as a persona or a representation of attractiveness in the opposite sex. The literature on video game characters can help explain this outcome. According to Reinhard (2009), both men and women were more engaged in video game play with hyper-sexualized female characters, which may have roots in perceived attractiveness rather than the perception that the avatar represents them. However, our results are particularly important because the avatars and features that were used were both animal-like and human-like in appearance, so participants may be using both an animal and a

human schema when dealing with creature avatars in games. Also, participants in this study preferred masculine features overall rather than feminine features, which opposes the results found in Reinhard's study – presumably because of the animalistic element of the Spore avatars.

The facial features tended to be the feature categories on which males' and females' likability corresponded to their gender (except for the mouth and noses category). Again, it could be that participants are switching between animal and human schemas when they are looking at these creatures. When rating some of the facial features (eyes and ears), men and women showed preferences for parts that they perceived as coinciding with their biological sex. Ears on humans are not a very salient facial cue, since they are not really seen from a frontal perspective, and are often obscured by one's hair (this is especially true for women). Perhaps ears become more salient for an animal-like avatar's gender in particular because most mammals ears are quite visible since they do not have the orientation and coverage of human ears.

Also, despite the fact that these features were rated individually, when they were placed on the avatar body template, they created an illusion of human female/male body proportions. The legs of the feminine avatar were gracile, especially when compared to the robust masculine avatar legs. The choice of legs also created the illusion of a slender waist on the feminine avatar, despite the fact that the body templates are exactly the same. The illusion of a feminine figure on a quadruped avatar may mean that participants were rating legs (in particular) based on a human schema on mate attractiveness. Buss (1994) stated in his book, the *Evolution of Desire: Strategies of Human Mating*, waist-hip ratio is strongly correlated with perceived female

attractiveness. A waist-hip ratio of 0.7 (meaning a woman's waist circumference is 70% of her hip circumference), is seen as globally attractive – although some cultures show minor preferences that deviate from this norm (Buss, 1994). This waist-hip ratio in particular (0.7) has been found to be strongly correlated with fertility in human females (Buss, 1994). The fact that participants created an illusion of a feminine figure on the female avatar – despite the fact that features were rated individually - provides support for the classic Gestalt principle: the whole is greater than the sum of its parts. Participants may be rating features holistically based on a schema of human attractiveness without realizing it. The illusion of a feminine figure seen on the "feminine" creature avatar (see Appendix D) also provides support for the idea that males and females could be rating these avatar features based on attractiveness, as opposed to rating features based on how well a feature is liked on their *own* avatar. Even though this experiment was done in piecemeal, the final avatar appears to follow human-like secondary sex characteristics and human body ratios.

Although the lowest mean likability was not indicative of having the lowest masculinity and femininity ratings, participants still rated these parts to be fairly neutral. According to the mean of all the least liked features, it appears that the least liked masculine features are seen as more neutral (4 = "neither agree nor disagree" that feature is masculine; M=3.52), while the least liked feminine features were seen as being slightly less feminine and/or neutral (5 = "slightly disagree" that feature is feminine, M=4.80). These minor differences in gender rating averages between the least liked masculine and feminine features may mean that participants loosely define masculinity to include androgyny, while femininity has a slightly more strict definition.

However, both of the least liked features' masculinity and femininity rating averages are very close to neutral, and did not differ significantly enough to draw any significant conclusions.

Referencing the attributions toward animals section, the avatar consisting of the least liked features appeared to follow the idea that people attribute more human-like characteristics to domestic animals or animals that are more closely related to humans (ex: chimps), rather than fish and insects. The least liked avatar consisted of very insect-like parts. The avatar had insect-like eyes (3 lenses on each eye), exoskeleton feet, and a body detail that looks like a hardened, bony patch on the shoulder area (see Appendix E).

Some possible explanations for why men and women differ in their feature preferences are gender socialization and evolutionary preferences for human body ratios and secondary sex characteristics. Gender socialization is learned behavior and preferences for things in society that fit conventional gender stereotypes. The perceptions of the body details appear to support the idea of gender socialization, since the most feminine rated feature was a flower and the most masculine rated feature was a pair of dragon-like wings. The liking of the body details (males liking feminine more than masculine, and females liking masculine more than feminine) could be explained by gender socialization and/or attributes that the opposite sex finds attractive.

In terms of avatars for online learning, business marketing, the military, and video game/website design, feature selection obviously affects likability ratings (especially concerning the face). Companies should be aware of differences between men and women when designing avatars for

the aforementioned uses, especially when designing extraneous features (like body details) and facial features. When people use feminine features to make avatars that appeal to women, it appears that women do not appear to show a real preference for feminine features when compared to men except for certain facial features (eyes, ears).

CHAPTER FIVE: FUTURE RESEARCH

Future Research

For future research, this study will be redone. More males will be obtained so that a fully-crossed analysis of gender can be performed with the PAQ (androgynous, high masculine, high feminine and undifferentiated groups). Also, likability will be clearly defined by being broken down into 4 questions: "I would like this feature on my own avatar," "I would like this feature on another avatar," "I find this feature attractive on my own avatar," and "I would find this feature attractive on another avatar". According to the results, males and females may be interpreting the definition of likability in many different ways, and so by adding these questions it can be better determined whether they are choosing these features based on representation of themselves, or whether they are choosing them based on the feature's attractiveness on another avatar. Questions will also be added to determine whether there are age related or gender related differences in caring about an avatar's appearance, caring about creating avatars, or caring if they are represented by an avatar that doesn't adequately represent them.

After the completion of the updated study, the rated features from this study will be used to create whole avatars (a masculine avatar, a feminine avatar, a neutral avatar, and a gender hybrid avatar) for participants to rate on various characteristics. As mentioned in the introduction, studies have been conducted on perceived trustworthiness, credibility, and persuasiveness of avatars based on their perceived gender. However, they have not studied these traits with animal-like avatars with human mannerisms as in Spore. The hip/waist ratios and facial feature ratios of the feminine and masculine avatar will also be measured to see if people's rating of these

features fit human facial and body attractiveness ratios. Participants will be asked questions about the traits of each creature avatar, as well as questions about the traits of each avatar's creator, which many studies have not done before. This future study will seek to determine whether participants will see a "gender hybrid" avatar (made of the most feminine *and* most masculine parts) to either be androgynous, or as a kind of "gender confused" avatar. To aid in testing this hypothesis, participants will rate the gender hybrid avatar and its creator on awkwardness as well as other traits that have not been looked at before with creature avatars (strength, respect, etc.). Previous studies have not tested how people react to gender ambiguous avatars or their creators. This research could have implications for marketing, education, creating avatars for games, or finding avatar features that appeal to populations like transgendered or transsexual people that don't readily fit with society's conventional gender stereotypes. It could also provide a window to view how people really perceive avatars that don't have features that show a clearly defined gender.

The results of this study indicate that people use human gender cues when determining the gender of ambiguous creature avatars. Males and females tend to differ on their liking of facial features and body details, which may have roots in perceived attractiveness. They also appear to create the illusion of human sexual dimorphism through their feature choices with quadruped avatars. In the future, more research using concepts from evolutionary theory, Gestalt psychology, and animal/human schemas to generate hypotheses about attribution - toward creature avatars in particular - may uncover reasons for the preferences shown toward these ambiguous, quadruped avatars.

APPENDIX A: SAMPLE SURVEY QUESTION (MOUTH 1)

Appendix A: Sample Survey Question (Mouth 1)

1.) This feature is masculine.
1-Strongly Agree **2** –Agree **3** -Agree somewhat **4** –Undecided **5** – Somewhat Disagree **6** – Disagree **7** -Strongly Disagree

2.) This feature is feminine.
1-Strongly Agree **2** –Agree **3** -Agree somewhat **4** –Undecided **5** – Somewhat Disagree **6** – Disagree **7** -Strongly Disagree

3.) I like this feature.
1-Strongly Agree **2** –Agree **3** -Agree somewhat **4** –Undecided **5** – Somewhat Disagree **6** – Disagree **7** -Strongly Disagree

4.) This feature represents me.

1-Strongly Agree **2 –**Agree **3** -Agree somewhat **4** –Undecided **5** – Somewhat Disagree **6** – Disagree **7** -Strongly Disagree

APPENDIX B: DEMOGRAPHICS

Appendix B: Demographics

Demographics

Gender (check one): ☐ male ☐ female

Age _____

Race/Ethnicity (check one):

- ☐ American Indian/ Alaskan Native
- ☐ Asian/ Pacific Islander
- ☐ African American/ Black
- ☐ Caucasian/ White
- ☐ Hispanic/ non-White
- ☐ Other
- ☐ Prefer not to answer

4.) In what type of environment have you spent most of your life?

-Rural

-Urban

-Suburban

5.) Do you consider yourself an artist?

-yes

-no

6.) Have you had any formal art training in drawing/painting?

-yes

-no

7.) If so, how many years of formal training have you had? ____

8.) In your opinion, are you expertly skilled at drawing/painting?

1-Very Strongly Agree, **2**-Strongly Agree, **3**-Agree, **4**-Neutral, **5**-Disagree, **6**-Strongly Disagree, **7**- Very Strongly Disagree

9.) Have you had any formal training in sculpture? (carving, molding, welding, etc.)

-yes

-no

10.) If so, how many years of formal training have you had? ____

11.) In your opinion, are you expertly skilled at sculpting?

1-Very Strongly Agree, **2**-Strongly Agree, **3**-Agree, **4**-Neutral, **5**-Disagree, **6**-Strongly Disagree, **7**- Very Strongly Disagree

11.) Have you had any formal training in photography? (formal photography training with a dark room, formal training in cinematography, etc.)
-yes
-no
12.) If so, how many years of formal training have you had? ____

13.) In your opinion, are you expertly skilled at photography/cinematography?
1-Very Strongly Agree, **2**-Strongly Agree, **3**-Agree, **4**-Neutral, **5**-Disagree, **6**-Strongly Disagree, **7**- Very Strongly Disagree

14.) Do you participate in online activities or games in which you are represented by an avatar? (Ex: Second Life, World of Warcraft, Deviantart, Gaiaonline, or by a non-human icon on websites/programs such as AIM or internet forums)
-yes
-no

15.) How frequently do you participate in online activities or games in which you are represented by an avatar?
- About once a day
- About once a week
- About once a month

16.) Do you have children?
-yes
-no

17.) If so, how many?
-1
-2
-3
-4
-5 or more

18.) Do you have any pets?
-yes
-no

19.) If so, what type(s) of pet(s)?
[ ] Fish
[ ] Reptile
[ ] Bird
[ ] Dog
[ ] Cat
[ ] Horse

[ ] Rodent
Other _____

20.) How many pets do you own?
-1
-2
-3
-4
-5 or more

APPENDIX C: PERSONAL ATTRIBUTES QUESTIONNAIRE

Appendix C: Personal Attributes Questionnaire

Personal Attributes Questionnaire (Spence, Helmreich & Stapp, 1974)

Instructions:

The items below inquire about what kind of person you think you are. Each item consists of a PAIR of characteristics, with the letters A-E in between. For example,

Not at all artistic A.....B.....C.....D.....E Very artistic

Each pair describes contradictory characteristics - that is, you cannot be both at the same time, such as very artistic and not at all artistic.

The letters form a scale between the two extremes. You are to choose a letter which describes where YOU fall on the scale. For example, if you think that you have no artistic ability, you would choose A. If you think that you are pretty good, you might choose D. If you are only medium, you might choose C, and so forth.

M-F	1.	Not at all aggressive	A.....B.....C.....D.....E	Very aggressive*
M	2.	Not at all independent	A.....B.....C.....D.....E	Very independent*
F	3.	Not at all emotional	A.....B.....C.....D.....E	Very emotional*
M-F	4.	Very submissive	A.....B.....C.....D.....E	Very dominant*
M-F	5.	Not at all excitable in a major crisis*	A.....B.....C.....D.....E	Very excitable in a major crisis
M	6.	Very passive	A.....B.....C.....D.....E	Very active*
F	7.	Not at all able to devote self completely to others	A.....B.....C.....D.....E	Able to devote self completely to others*
F	8.	Very rough	A.....B.....C.....D.....E	Very gentle*
F	9.	Not at all helpful to others	A.....B.....C.....D.....E	Very helpful to others*
M	10.	Not at all competitive	A.....B.....C.....D.....E	Very competitive*
M-F	11.	Very home oriented	A.....B.....C.....D.....E	Very worldly*
F	12.	Not at all kind	A.....B.....C.....D.....E	Very kind*
M-F	13.	Indifferent to others= approval*	A.....B.....C.....D.....E	Highly needful of others' approval
M-F	14.	Feelings not easily hurt*	A.....B.....C.....D.....E	Feelings easily hurt
F	15.	Not at all aware of feelings of others	A.....B.....C.....D.....E	Very aware of feelings of others*
M	16.	Can make decisions easily*	A.....B.....C.....D.....E	Has difficulty making decisions
M	17.	Gives up very easily	A.....B.....C.....D.....E	Never gives up easily*
M-F	18.	Never cries*	A.....B.....C.....D.....E	Cries very easily

M	19.	Not at all self-confident	A.....B.....C.....D.....E	Very self-confident*
M	20.	Feels very inferior	A.....B.....C.....D.....E	Feels very superior*
F	21.	Not at all understanding of others	A.....B.....C.....D.....E	Very understanding of others*
F	22.	Very cold in relations with others	A.....B.....C.....D.....E	Very warm in relations with others*
M-F	23.	Very little need for security*	A.....B.....C.....D.....E	Very strong need for security
M	24.	Goes to pieces under pressure	A.....B.....C.....D.....E	Stands up well under pressure*

The scale to which each item is assigned is indicated by M (Masculinity), F (Femininity) and M-F (Masculinity-Femininity)

Items with an asterisk indicate the extreme masculine response for the M and M-F scales and the extreme feminine response for the F scale. Each extreme masculine response on the M and M-F scales and the extreme feminine response on the F scale are scored 4, the next most extreme scored 3, etc.

APPENDIX D: MOST FEMININE AND MASCULINE FEATURES

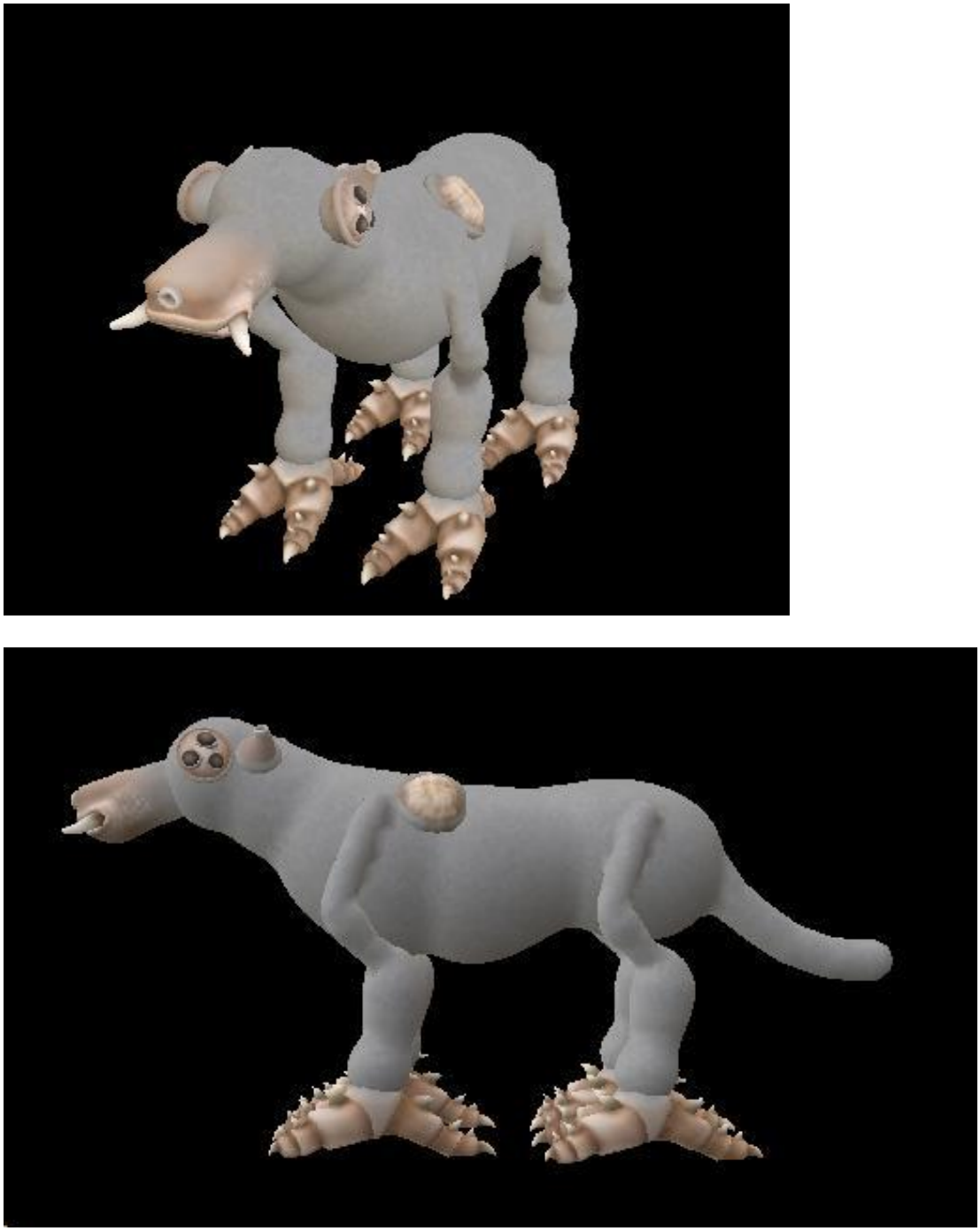
Appendix D: Most Feminine and Masculine Features (Presented on Avatar Template)

Most masculine features – avatar

Most feminine features - avatar

APPENDIX E: LEAST LIKED FEATURES

Appendix E: Least Liked Features (Presented on Avatar Template)



Least Liked Features – avatar

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