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**PATHS TO PREJUDICE REDUCTION UTILIZING VIRTUAL AVATARS AND  
AGENTS**

A Dissertation in  
Mass Communications

by

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## **ABSTRACT**

This study examines two possible theoretical tools to the reduction of prejudice through the utilization of avatars. First, the Proteus effect and the potential mechanisms to its success are assessed. Two competing models of the Proteus effect are tested, the self-perception route and the priming route. In addition, a virtual intergroup contact theory model of prejudice reduction is tested utilizing the tenants of intergroup contact theory. The study indicates no support for the Proteus effect in the conditions that it was tested. In addition, no support is offered the virtual intergroup contact theory. Implications and future directions are discussed.

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## **Chapter 1**

### **Introduction**

As issues of race and power continue to draw attention in American media, individuals are being made aware of the ongoing problems of racism and sexism, among others. Though Americans began to heed civil rights issues during the 1960s, the associated problems have not disappeared and continue to reemerge as acts of violence toward minority communities have become a regular occurrence. As the lives of minorities continue to be placed in danger, protest movements have resurfaced and gained the media's attention, highlighting various problems encountered by minority groups.

One group that has risen to gain international attention is the Black Lives Matter (BLM) movement. The BLM movement began following the acquittal of George Zimmerman, on trial for the shooting of an African-American teen, Trayvon Martin. The BLM movement argues that black lives are being devalued in American society and that the acquittal of George Zimmerman is evidence of this systemic racism. Though the group began after this event, it is not among the first in the list of evidence in support of the claim that systemic racism exists, but merely the tipping point that drew individuals together to draw further attention to inequalities experienced on a daily basis by minorities in America. Indeed, years earlier in 1992, a similar event sparked outrage and riots after officers, who repeatedly beat Rodney King after he was shot with a Taser gun and knocked to the ground, were also acquitted of charges (Morris, 2012).

The BLM movement continues to draw attention to the ongoing inequalities and racism experienced by minorities in America. For example, in 2014, the organization protested the shooting of Tamir Rice, a 12-year-old African American who was killed by a Cleveland police officer (Shaffer, 2016). In 2015, the BLM movement protested a number of black deaths,

including a racially charged shooting in a historically black church (Darlington, 2016). In 2016, a number of deaths were also protested, including the death of Alton Sterling, a black man who was shot while pinned to the ground by police officers (Shaffer, 2016).

While the BLM movement and other organizations continue to draw attention to these inequalities and injustices, others have sought solutions and attempts to understand why these injustices and racist actions take place in the first place. For example, intergroup conflict has been a hotbed of research, with researchers seeking answers to how individuals across groups can reduce conflict, work together, and understand one another more readily. One line of research simply examines the type of contact we come into with others on a daily basis and might be utilized to design attitude altering interventions with individuals who may have subtle biases that can cause great harm (Allport, 1954). Further, though these types of interventions might be difficult to organize in the real world, virtual opportunities for similar interventions are a useful possibility. If individuals can react to others and reduce negative intergroup attitudes through contact, such as they do in the physical world, it may be possible, under the right circumstances, in the virtual world.

Today, bringing individuals from different backgrounds together remains a difficult feat. Research indicates that individuals tend to stay in homogenous groups and often experience little interaction with those who are different from them. This stems from a host of reasons, including racist policies that continue to affect individuals today. Redlining, or the act of refusing loans based on racial bias for certain neighborhoods continues to impact individuals in various communities and limits the amount of interaction possible within the community. In addition, self-segregation has been a popular topic in the news, especially as it plays out on college campuses where students are intended to be exposed to a diverse group of opinions and

individuals. One article examining this highlights simple reasons for the apparent self-segregation on campus, such as a lack of knowledge of or prior experience with members of other races and cultural groups. Unfortunately, contact can't help reduce issues of racism if students or other individuals are not interacting together. Virtual technologies that are developed to create intergroup contact may intervene in these problem areas, especially when individuals are engaging in social contact through mediated forms more willingly than talking or face-to-face contact (Novak, Sandberg, Jeffrey, Young-Davis, 2016).

Further, other routes to reducing racism and forms of prejudice have been explored and researchers have developed theories of how individuals can be influenced to reduce these negative attitudes through use of virtual technologies. As various media tools have gained popularity, the opportunity for conflict-reducing strategies to be integrated and applied within them has become readily available. For example, extant literature on intergroup conflict reduction focuses on various theoretical approaches including, but not limited to, encouraging empathy, perspective taking, and other effects related to virtual technologies (Batson, 1987; Davis, 1983, Yee & Bailenson, 2007). These efforts have found success in reducing negative intergroup attitudes and indicate that theories of intergroup conflict reduction can find success in the virtual world as well. If individuals are engaging in activities and self-segregating, the virtual world could be an effective environment to allow individuals to virtually interact and gain experience with others of diverse backgrounds. If one reason individuals self-segregate in the physical world is because they have no prior experience interacting with diverse individuals, the virtual world can be a safe place to gain this experience and lead to further contact in the real world. In addition, virtual contact with diverse representations of users may be enough to enact the positive qualities associated with contact in the physical world.

Still, the scientific literature attempting to understand the processes that occur when individuals inhabit a virtual being is not clear when assessing one theoretical tool that may lead to prejudice reduction. The Proteus effect states that an avatar's appearance can have an immediate effect on a user's behavior (Yee & Bailenson, 2007). Yet, the mechanisms leading to this effect have not been successfully distinguished. This dissertation seeks to clarify the possible mechanisms in the Proteus effect by assessing the role of having a sense of embodiment and connection to the virtual body felt by individuals utilizing avatars. Clarification of which mechanism leads to the Proteus effect could lead the theory to be a useful tool in the intervention of negative attitudes when utilizing virtual avatars and games as training tools for individuals that need reduced negative biases.

This research seeks to accomplish several goals in relation to the existing literature. First, this work will examine the research around the Proteus effect and identify which proposed mechanism of the theory is responsible for the effect. Second, the theories of intergroup conflict around prejudice and stigmatization reduction with applications within media will be reviewed, as well as similar theories from media. In doing so, the theoretical underpinnings, support found, and limitations of the theories will be addressed. Third, this paper will address the potential of video games to function as a tool for prejudice reduction based on the research reviewed and the associated contributions and limitations of such a project. In particular, the meanings and uses of embodiment in extant literature and related ideas, such as identification, which is often used interchangeably with embodiment, will be explored. Further, the best practices associated with measurement of embodiment will be assessed to examine the best tools of measurement to utilize in this project and future works.

This research also seeks to put forth an experiment that assesses how avatar use can function as tool to reduce prejudice in conjunction with existing theories of intergroup conflict reduction. Specifically, whether embodiment and contact theory can function together will be assessed, as well as whether customization of an avatar can impact associated outcomes. Further, as will be discussed below, current research emphasizes two potential theories that may act as routes to an effect leading to prejudice reduction when embodying an avatar. This work seeks to clarify which route is at work by assessing both theories and their impact on prejudice reduction as individuals embody avatars.

## **Chapter Two**

### **The Proteus Effect**

If developing technology is going to be utilized to combat negative prejudice and subtle biases, it is essential to understand all of the mechanisms behind theories that may be the most useful to achievement of this goal. The Proteus effect is one theory that may have the greatest utility in this area. The Proteus effect states that an avatar's appearance can greatly influence an individual's behavior (Yee & Bailenson, 2007). If the Proteus effect is correct, avatar use and video games can be utilized to effectively influence individual's attitudes and even subtle biases. For example, since research has indicated that police officers consistently mistook and shot black individuals carrying non-threatening items in a simulated environment (Plant & Peruche, 2005), development of an intervention utilizing avatars in a video game may benefit the officers and public to reduce the biases that might be responsible for these mistakes.

However, the route to the Proteus effect remains unclear. Research suggests there are two possible routes to the Proteus effect. On one hand, research has suggested that priming might be the primary route to the Proteus effect. On the other hand, scholars have also proposed that self-perception theory may be the route to the Proteus effect. A lack of understanding of the mechanisms of the Proteus effect prevents individuals from utilizing this potential tool and employing it successfully in future interventions. Until the mechanisms are understood, this tool cannot be utilized effectively, since priming and self-perception each produce different results. Priming should actually increase stereotype accessibility, whereas self-perception should decrease negative attitudes. Though priming may produce results consistent with the Proteus effect, this should only be seen in situations where the stereotypes associated with the avatar are aligned with a particular behavior. For example, use of an avatar that represents a prisoner might

inspire malicious behavior and dislike of other prisoners through priming. On the other hand, individuals utilizing a prisoner-like avatar might inspire malicious behavior and liking of prisoners through self-perception theory. In order to clarify the mechanism that leads to the Proteus effect the extant literature examining the effect is reviewed below.

### **Proteus Effect Background.**

Existing research on avatars and their users suggests that the avatar a user utilizes is capable of changing that user's behavior (Yee & Bailenson, 2007). Further, the influence of an avatar can be strong enough to change that user's behavior not only during their exposure to it inside of the virtual world, but also generate physical-world effects lasting a few days following exposure. Researchers dubbed this the Proteus effect, "the idea that individuals conform to their self-representation independent of how others perceive them" (Yee & Bailenson, 2007, p. 2).

As Sherrick, Hoewe, and Waddell (2014) note, "the original Proteus effect argument claimed that individuals would behave differently based on the appearance of their controlled avatars. Via self-perception theory, Yee and colleagues argued that the controller of an avatar would examine his or her avatar's appearance from a third-person perspective and subsequently behave in accordance with held expectations about how a person with that particular appearance will act" (p. 1). However, another body of research on the Proteus effect has indicated that the effects found may be from priming, rather than the self-perception approach (Groom, Bailenson, & Nass, 2009; Pena, Hancock, & Merola, 2009). Still, both approaches have yielded results that are consistent with the idea of the Proteus effect.

As noted above, the original work on the Proteus effect posited that the effect occurs via self-perception theory (Yee & Bailenson, 2007). Self-perception theory suggests that individuals will infer their own attitudes and beliefs by examining their own behavior just as they would

observe another individual (Bem, 1972). In Proteus effect research, self-perception theory would predict that individuals consciously recognize their avatar appearance and act in accordance with their stereotypes for that type of appearance, even if they were alone with no others to influence their actions. The individual would embody their self-representation, examine their behavior in the avatar and then infer their attitudes and beliefs based on their observations. In this first work (Yee & Bailenson, 2007), researchers examined how attractive vs. unattractive and taller vs. shorter avatars would influence participant's behavior. In accordance with the idea of the Proteus effect, participants who utilized taller or more attractive avatars displayed greater confidence and friendliness in a subsequent task. According to the self-perception theory approach, this occurs because participants were consciously aware of the stereotypes associated with the appearance of the avatar they were utilizing.

Another approach that may be the cause of the Proteus effect is the process of behavioral confirmation. In this process, the expectations of an individual cause another individual to behave in a manner that confirms the expectations of the first individual. That is, there may be a perceiver, with expectations of how one person should act, and a target who then meets these expectations (Synder, Tanke, & Berscheid, 1997). In Snyder and colleagues' work, undergraduate students interacted over a telephone with an opposite sex target. Male undergraduates who believed that a female target was attractive caused the female target to behave in a friendlier and charming manner, no matter the actual attractiveness of the target. Thus, expectations of an individual can have a clear influence over an individual's behavior.

The original work on the Proteus effect (Yee & Bailenson, 2007) argues that although behavioral confirmation may be a pathway to the Proteus effect, the Proteus effect would occur through self-perception theory in the absence of other individuals. The authors argue that their



experimental study ruled out the presence of behavioral confirmation through the use of a confederate who was blind to the conditions and only saw a blurred avatar in place of the participant's avatar. However, it seems arguable that this method may not have removed the potential for behavioral confirmation to take place. Although the confederate may not have held expectations for the participant due to the blinded conditions, it is possible that the participant could infer expectations that the confederate would hold for their actions and behaved accordingly. This seems different from self-perception theory in that self-perception theory would predict the participant infers their behaviors and beliefs independent of any other. If it is the case the participant was inferring how they should have behaved in order to please the assumed expectations of a confederate, their behaviors and beliefs are not being assumed independently of others and seem to fall more in line with behavioral confirmation rather than self-perception theory.

Finally, as described earlier, another theoretical approach to the Proteus effect stems from literature on priming. Priming is the idea that exposure to a stimulus increases accessibility and salience of the ideas associated with that stimulus. In these studies, the Proteus effect is described as an unconscious and automatic effect. For example, researchers interested in examining priming as a cause of the Proteus effect followed the example of real-world conformity studies that examined behavior as a result of uniformed dress (Pena, Hancock, & Merola, 2009). Prior research had indicated that individuals in black uniforms were more likely to have and act out in a negative and aggressive manner. Following this logic, Pena and colleagues (2009) had participants use robed avatars, the robe being black or white, and examined their behavior after avatar use. Participants who utilized an avatar with a black robe were more likely to propose acting in a negative and aggressive manner toward individuals who

had broken game etiquette than individuals in a white robe, who were more likely to encourage helping and group cohesion. By utilizing subtle manipulations of avatar appearance, Pena and colleagues (2009) suggest that the results are from automatic processes such as priming, rather than conscious processes.

Another experiment by Pena, Hancock, and Merola (2009) assessed differences between individuals exposed to an avatar utilizing a Ku Klux Klan (KKK) robe in comparison to a control group. This experiment indicated that participants who utilized an avatar that represented a KKK member displayed greater aggression and less cohesion than participants who utilized the control avatars. The authors argue that this result of increased aggression and decreased inhibition demonstrate increased activation of negative thoughts, consistent with the prime, and inhibition of stereotype inconsistent thoughts. However, this study utilized a desktop virtual setting that may lack the presence necessary for greater feelings of embodiment. In addition, this study utilized avatars with priming cues that are hyper-visible and may increase the salience of the prime.

Further work by Pena and colleagues (2012), examined avatar appearance and labels of their roles. In this study, the authors found that participants who utilized an avatar with a specific appearance used more words related to that appearance. In addition, when the avatar was given a label, e.g. professor, the participants' usage of related words increased, as opposed to those that were not given a label. The authors argue that this demonstrates consistency with the priming model. Indeed, the research does fit with the priming model, as increased salience led to increased accessibility of the related thoughts. However, this research was also conducted in a desktop virtual environment, where feelings of embodiment may be lower. In addition, the issue of the hyper-visibility of cues remains in this study.

More recent work citing a priming effect found that participants exercised at greater intensity when utilizing an average weight avatar, as compared to an obese avatar (Pena & Kim, 2014). This research is also consistent with a priming explanation of the Proteus effect. Still, the work here utilized a Wii game that could also vary in levels of embodiment as compared to desktop virtual environments and immersive virtual reality. Without examination of embodiment, it is difficult to ascertain which mechanism is truly at work in the Proteus effect.

Similar work suggesting a priming approach to the Proteus effect examined the influence of racial embodiment on users' racial biases (Groom, Bailenson, & Nass, 2009). In this study, participants who used a Black avatar were more likely to demonstrate greater implicit racial bias outside of the virtual environment than individuals who used a White avatar. The researchers suggest that this indicates a priming perspective rather than self-perception, because the participant's ideas about a particular race were more salient and accessible, whereas self-perception theory would predict decreased implicit racial bias for individuals who employed a Black avatar. However, as mentioned earlier, it appears that this may only be the case because embodiment did not actually take place in this study. If embodiment took place in this study, self-perception may have been the route to the Proteus effect. A high level of embodiment may have led individuals to feel as if the virtual body is their own and therefore could have produced effects consistent with self-perception theory because feelings ownership over a body may enhance feelings of empathy or understanding. It may be the case that high levels of embodiment are a necessity for individuals to experience the Proteus effect, as explained by self-perception theory.

One study by Yee and Bailenson (2009) attempted to parse out the mechanisms at work, examining both priming and self-perception. In order to do so, immersive virtual environment

technology was utilized. The experimenters hypothesized that behavioral changes would be greater when embodiment was involved, as opposed to when a visual stimulus was presented without embodiment. Participants were assigned an attractive or an unattractive avatar and an embodied or non-embodied condition. The study revealed that cues in the embodiment condition led to greater behavioral change than in the non-embodiment condition. The authors argue that this demonstrates support for the self-perception route of the Proteus effect. However, embodiment is only measured as a dichotomous variable, having control over the avatar or not. It is likely that the differences between the embodied and non-embodied condition would produce significant differences in reported feelings of embodiment, but it is also unclear because of the lack of measurement of reported feelings of embodiment. Research examining the Proteus effect should also incorporate measurement of reported feelings of embodiment to further distinguish the mechanisms at work.

### **Explicating Embodiment.**

While embodiment has been considered as a key factor through which an individual might experience the Proteus effect, embodiment remains a largely unclarified concept. Prior research notes the recognition of the importance of embodiment to a host of concepts including sensation, learning, and the sense of self (Longo, Schuur, Kammers, Tsakiris, & Haggard, 2008). However, theoretical definitions of embodiment vary widely from one to discipline to another and there is little consistency amongst the theoretical definitions offered when discussing the importance of embodiment in these various disciplines. As Longo and colleagues note, the confusion and inconsistencies in usage stem from embodiment being “both rich and complete on the one hand, and elusive and hard to describe on the other” (p. 3).

Within the psychological identity literature, embodiment is theoretically defined as having a sense of one's own body that is essential to the sense of self (Cassam, 1997). On the other hand, the operational definition is often depicted as "dissociations between different subcomponents of body representation, such as body image and body schema" (Longo, Schuur, Kammers, Tsakiris, & Haggard, 2008). While the theoretical definition is closely related to the broad definition encountered in most texts, the operational definition is quite specific and reflects an individual's feelings toward their body rather than feelings of control over the body and being able to utilize the body to interact with their environment.

However, research on the psychometric properties of embodiment in immersive virtual reality has provided clearer operational definitions. Researchers in this approach claim embodiment is having a feeling of ownership over a body, even if that body is external to the individual (Longo, Schuur, Kammers, Tsakiris, & Haggard, 2008). Operationally, Longo and colleagues suggest that there are four components essential to virtual embodiment. First, individuals must feel a sense of embodiment toward the virtual body. This sense of embodiment also consists of three subcomponents related to ownership, location, and agency. Second, the individual should experience a loss of their own body. Third, the individual needs to experience movement. Finally, the individual needs to experience affect toward the virtual body. While this study offers concise operational definitions, these are also somewhat limited to experiences in highly immersive virtual environments. Further, the study did not utilize an entire virtual body, but only a virtual arm.

Relatedly, research in immersive virtual environments utilizing a full body avatar has shared similar theoretical definitions, but slightly different operational definitions. Borland, Peck, and Slater (2013) offer a theoretical definition resting largely on the ownership component

of embodiment. Borland and colleagues state that providing a strong ownership illusion over a virtual body produces virtual embodiment. Further, similar to Longo and colleagues (2008), Borland and his colleagues (2013) state that sensation feedback, movement feedback, and real-body mimicking motions, such as eyes moving in the same manner the users' are, should increase feelings of virtual embodiment. Borland and colleagues also operationalize virtual embodiment by asking research participants about their subjective sense of embodiment as it is related to the sensation, movement, and body mimicking behaviors experienced.

Finally, research by Kilteni, Groten, and Slater (2012) suggests that for virtual reality research where individuals are inhabiting an avatar's entire virtual body, there is a need for a conceptual differentiation between embodiment and what they have identified as a sense of embodiment. Kilteni and colleagues argue that Blanke and Metzinger's (2009) definition of embodiment itself should remain defined as the "subjective experience of using and 'having' a body" (p. 7). However, for the purposes of research around the adoption of artificial bodies, Kilteni and colleagues (2012) propose a term, sense of embodiment, which is theoretically defined as "SoE [sense of embodiment] toward a body B is the sense that emerges when B's properties are processed as if they were the properties of one's own biological body" (P. 376). In efforts to operationalize this definition, the underlying structures of embodiment are considered and their relatability to the virtual experience. Based on these structures, the definition is operationalized by including the need for a sense of self-location, a sense of agency, and a sense of body ownership.

Overall, the theoretical definitions of embodiment seem somewhat consistent. At the very least, in order for embodiment to occur, an individual must feel as though they have a body to utilize in the environment that they are inhabiting. While researchers in other traditions have

included a small number of other considerations in their past definitions, the application of embodiment to the virtual experience seems to best be defined by the definition suggested by Kilteni, Groten, and Slater (2012). Therefore, one suggested theoretical definition is simply following the idea put forth by Kilteni and colleagues that embodiment in virtual reality occurs when there is a sense that the use of a virtual body is interpreted as an experience of using and having another body.

However, in regards to the best operational definitions for the idea of embodiment, there is a much wider range of definitions. In the existing operational definitions, a number of similar concepts arise; however, a number of extraneous concepts also appear. The most common concepts associated with the operationalization of embodiment include a sense of ownership, a sense of feedback based on intended actions, and a sense of being within the virtual body. Based on this analysis, it seems that the operational definition described by Kilteni, Groten, and Slater (2012) in their sense of embodiment is again the most suitable. That is, a sense of self-location, sense of agency, and a sense of body ownership appear to be the most commonly appearing concepts in the operationalization of embodiment. According to the authors, sense of self-location describes “a determinate volume in space where one feels to be located” (p. 375). The sense of agency is “refers to the sense of having ‘global motor control, including the subjective experience of action, control, intention, motor selection and the conscious experience of will’” (p. 376). The sense of body ownership refers to “one’s self attribution of a body.” Although other definitions have utilized various other concepts within their operationalization of embodiment, those concepts and ideas seem to fit within or be represented by one of the concepts in the definition provided by Kilteni, Groten, and Slater. Taken together, these three components within

the operational definition offered by Kilteni and colleagues encapsulates the most common components of all previously described operational definitions.

Giving consideration to embodiment in the Proteus effect, Kilteni and colleagues' (2012) theoretical definition of embodiment, simply having a body to experience and use, is particularly useful. If embodiment is part of the mechanism that leads self-perception theory to occur and lead to the Proteus effect, then this definition of embodiment fits well with self-perception theory. That is, it is the experience of observing a body that is now the individual's that should lead to the Proteus effect. If this is the case, feelings of embodiment should be involved in the mechanisms of the Proteus effect.

### **Embodiment and Related Concepts.**

Although a host of virtual embodiment literature focuses exclusively on the concept of embodiment and its measurement and theoretical development, the concept does remain confused and utilized interchangeably with related and proxy concepts. As described above, research into embodiment frequently utilizes concepts such as identification, parasocial relationships, and presence as proxies to measure embodiment. In order to distinguish these concepts, their theoretical and operational definitions will also be explored briefly here.

One frequently used concept that is often utilized interchangeably with embodiment, or in conjunction without a clear separation of effects, is identification. For example, recent research around the effects of embodiment on sexualized avatars that look like the self utilizes tools that may encourage embodiment, such as creating avatars that look like the self, but also cites identification literature as responsible for promoting "stronger effects and behavioral modeling" (Fox, Bailenson, & Tricase, 2013). Identification was first presented by Freud (1938) and examines how personalities can be formed by adopting the role of another. Li, Liao, & Khoo



(2013) extended this concept to examine identification with avatars. Li and colleagues offer a theoretical definition of player-avatar identification as “the status when a player is absorbed in video games with heightened feelings and adopts certain aspects of the in-game identity both emotionally and cognitively” (p. 1). Operationally, Li and colleagues offer four main components that should be present in player-avatar identification. The four components are feelings during game play, absorption during play, positive attitudes toward the avatar, and importance of the avatar to one’s self-identity.

Though identification has clear distinctions from embodiment, it does appear closely related. Components, such as attitudes toward the avatar and absorption during play, are closely related to the operational components of embodiment. Still, there must be a distinction made when observing related ideas. For instance, measurement tools must carefully observe that absorption during play is theoretically distinct from the component of embodiment suggesting that individuals should have a sense of location where the embodied being is located. While a number of studies often attempt to utilize embodiment, or claim to utilize embodiment, there is often inconsistency in the actual variables utilized. As described above, identification and presence are most frequently encountered as concepts that are highly related to embodiment and have been encountered as variables utilized to measure embodiment. However, based on the theoretical definitions of these two concepts, they are clearly distinct from embodiment, although highly related.

Based on the recommended theoretical definition of embodiment above as a sense that the virtual bodies properties are processed as if they were the properties of the individual’s own biological body, and the theoretical definition of identification as “the status when a player is absorbed in video games with heightened feelings and adopts certain aspects of the in-game

identity both emotionally and cognitively” (Li, Liao, & Khoo, 2013, p. 1), it is clear that the concepts are highly related but also distinct. Both definitions incorporate a feeling of absorbing portions of the virtual beings. Within embodiment, the body’s properties are adopted as the individual’s own physical body. Within player-avatar identification, the individual is adopting aspects of the avatar’s identity. The distinction between body and identity is not always clear, as it is likely that our bodies inform our identity. However, the concepts are clearly distinguishable when embodiment is viewed as having the body as the key feature, rather than the emotional and cognitive features of an avatar’s identity, as is the case with identification. Still, the similarities in absorption of some aspect of the avatar clearly causes confusion.

However, one study seeking to distinguish the concepts of identification, presence, and parasocial interaction found that these concepts may function as subcomponents of embodiment (Aviles & Schmierbach, 2016). This study indicated that while each concept measured was found to be distinct from one another, they each fell under a higher-order variable, which might be considered embodiment. Though some of these concepts, in theory, indicate that the user is aware of the avatar as another body, which seems contradictory to embodiment, the study suggests that the highly-related concepts still fall under a higher-order variable which is most likely embodiment. The findings here may be likened to perspective-taking in which there is an overlap of self, rather than completely becoming the other.

Overall, these related concepts are clearly theoretically distinct. However, the operationalization of these concepts calls for some overlap in aspects of measurement that can cause the concepts to be misused. Though past studies of embodiment may have utilized measures that assess the operational definition of a construct related to embodiment correctly, the theoretical concept itself may not have been the appropriate concept to utilize. Research seeking

to test embodiment's involvement in theory cannot rely on measures of operationally related concepts and should utilize measures that are operationally and theoretically aligned with embodiment.

### **Competing Mechanisms of Proteus Effect Routes.**

As described earlier, Sherrick, Hoewe, and Waddell (2014) note, "the original Proteus effect argument claimed that individuals would behave differently based on the appearance of their controlled avatars" (p. 1). That is, the first hypothesized route to the Proteus effect occurs through self-perception theory. Through self-perception theory, individuals examine their virtual representation and act in accordance with the expectations held for that particular representation. Still, a competing body of research states that priming may act as another route to the Proteus effect. In this case, the mechanism that leads to the Proteus effect is an increase in accessibility and salience of stereotypical content that is related to the virtual representation being utilized. As noted earlier, research examining both approaches has found evidence that is consistent with the Proteus effect (Groom, Bailenson, & Nass, 2009; Pena, Hancock, & Merola, 2009). This dissertation also seeks to refine the theory of the Proteus effect and establish which mechanisms may be the most effective route to the Proteus effect, particularly in the context of successfully reducing prejudice.

The most obvious difference between these competing mechanisms of the Proteus effect seems to rest on the individual's awareness of the stereotypes associated with the representation they are utilizing. On the one hand, self-perception theory as mechanism for the Proteus effect predicts that individuals who behave in accordance with their avatar's appearance do so because they have a conscious awareness of their avatar's appearance and the stereotypes, or expectations, associated with that particular appearance. On the other hand, priming as

mechanism for the Proteus effect predicts that individuals who behave in accordance with their avatars' appearance do so because they have an unconscious awareness of their avatars' appearance and the stereotypes associated with that particular appearance.

Sherrick and colleagues (2014) attempted to test the self-perception theory perspective. Although this study was an attempt to extend the Proteus effect to a narrative environment outside of a virtual world, this work is the only study thus far to directly measure the explicit conscious awareness of participants and their knowledge of their avatar's appearance. Sherrick and colleagues exposed participants to an interactive narrative and allowed them to make what was identified as a stereotypical masculine or feminine choice. However, contrary to the Proteus effect literature, the results indicated that participants were more likely to select behaviors that were consistent with their own physical characteristics, rather than the characteristics associated with the avatar utilized. It is possible that the participants did not have ample opportunity to reflect on and observe their representation, taking away the opportunity for self-perception theory to take effect. Another possibility may be that the stereotypical choices were not actually fitting and therefore no explicit awareness of a stereotype could be met. Still, the study is useful as it may highlight the possibility of an immersion boundary condition. That is to say, embodiment in a virtual being and feelings of presence or immersion may be a requirement of the Proteus effect. In addition, it highlights the importance of the individual's existing characteristics in the Proteus effect. Participants were more likely to select behaviors consistent with their own characteristics, which might suggest that individual's traits may play a stronger role if they are not immersed sufficiently into the representation.

## **Customization**

One method of testing whether or not individual's traits can play an important role in enhancing the Proteus effect is by allowing the individuals to customize their avatar. Customization has been found to enhance feelings of attachment and satisfaction with one's virtual self (Ducheneaut, Wen, Yee, & Wadley, 2009). Customization through technological tools has received increasing attention and a small group of theoretical perspectives explaining the processes behind the effects associated with customization have emerged. In particular, the agency model of customization (Sundar, 2008) predicts that customization would heighten an individual's sense of control, which may lead to increased feelings of control in the individual's real life. These increased feelings of control could in turn lead to increased feelings and perceptions of self-efficacy.

The agency model of customization (Sundar, 2008) places emphasis on the role of the self in acting as "creator" and "source" for filtering individual needs and connecting technological affordances of the technology in use that underlie the resulting psychological outcomes resulting from customization. Within the agency model of customization, customization is linked with the interaction between the system and user. That is, the system provides a contingent response based on a user's input. The interaction between the system and user creates the opportunity for the user to develop the "'sourceness' of self" (Kim, 2010, p. 22).

Within computer-mediated communication (CMC), the avatar is a persistent, visible, form of "self as a source" (Kim, 2010, p. 22). Further, within the customization process of an avatar, a user may experience greater amounts of identity, control, and involvement. Each of these concepts (identity, control, and involvement) is theorized by the agency model of

customization to oversee an individual's sense of "self as source." Therefore, the customization of an avatar should lead to an increased sense of agency.

Studies examining avatar customization have found a number of effects associated with the customization process. One study examining the effects of avatar customization found that customized avatars influenced "subjective feelings of presence and psychophysiological indicators of emotion during gameplay, which may make the gameplay experience more enjoyable" (Bailey, Wise, & Bolls, 2009). Researchers in this experiment either assigned an avatar, let the participant choose from a set of avatars, or allowed the participant to customize their avatar. The individuals allowed to customize their avatar displayed greater positive indicators of emotion during gameplay. Similarly, another study on avatar customization indicated that individuals who customized an avatar demonstrated greater feelings of immersion satisfaction (Teng, 2010). Further, immersion satisfaction successfully mediated the relationship between avatar customization and game loyalty.

Additional work on customization and embodiment found that the two concepts can have unique influences on users (Ratan & Sah, 2015). This research found that avatar customization and embodiment influenced "the potential for avatar characteristics to influence the player's behavior outside of the avatar use context" (p. 372). In particular, customization was likely to increase the potential influence. The authors argue that customization increases psychological connection with the avatar. However, this study occurred in the context of the effects of avatars associated with the avatar's gender. While customization may increase the relevance of the avatar's gender to themselves, it may not be the case for all other contexts.

Customization has also been found to enhance effects related to game structure and its influence on prosocial and aggressive outcomes. For instance, one study examining the effects of

game structure on helping behavior in the real world found that gameplay in cooperative modes, with a customized avatar, led to increased prosocial helping behavior when compared to individuals playing in cooperative modes without a customized avatar (Dolgov, Graves, Nearents, Schwark & Volkman, 2014). In this experiment, individuals who played a cooperative game of Wii Tennis with a customized avatar were more likely to help the experimenter collect spilled pencils.

Taken together, these studies indicate that customization has a unique influence on users. For example, customization is demonstrated to even hold short-term effects influencing behavior outside of the virtual activity, which could be critical to individuals desiring lasting persuasive message effects. Further, customization is also demonstrated to influence enjoyableness and loyalty, which at face value, seem important to willingness to engage persuasive messages.

### **Empathy**

While past work has failed to identify which mechanism may most consistently lead to the Proteus effect, research around prejudice reduction and embodiment has offered mixed results that are informative. For example, the previously described work in which participants who embodied a Black avatar were more likely to demonstrate greater implicit racial bias, as compared to individuals who embodied a White avatar, contends that this occurred because of priming as the mechanism to the Proteus effect (Groom, Bailenson, & Nass, 2009). Still, research by Peck and colleagues (2013), found that embodiment of a virtual body led to a decrease in prejudicial attitudes. In this study, individuals who felt an increased amount of body ownership over the virtual body that represented a black individual displayed decreased racial bias when compared to those that inhabited a white virtual body. Though the route to decreased prejudice here is predicted to be feelings of ownership over the body, it is possible that this is

just a step in eliciting the conscious awareness of the expectations associated with the virtual body, which would lead to self-perception theory as the mechanism to the Proteus effect.

It is also plausible that embodiment leads to feelings of empathy and this may be responsible, in part, for decreased prejudice. Empathy has been identified as a promising approach to reducing prejudice and stigmatization. Empathy is described as the “ability to understand and vicariously share the feelings and thoughts of other people” (Forgiarini, Gallucci, & Maravita, 2011). While embodiment encourages an individual to feel as if a new virtual body is their own body, empathy allows individuals to understand the intentions, actions, and behaviors of others in social situations. If an individual takes on a new virtual body, it might be the case that they also begin to develop empathy toward the group that body represents.

For example, research has indicated that virtual reality is useful tool in producing empathy among caregivers (as cited by Yellowlees & Cook, 2006). In addition, a qualitative study examining the use of virtual reality simulations found that participants who experienced a simulation of schizophrenia reported improved understanding of auditory and visual hallucinations (Yellowlees & Cook, 2006). The authors of this study utilize empathy as a possible cause for the increased understanding.

Further, research suggests that empathy is associated with pro-social behaviors and that individuals feeling empathetically aroused will help those they are feeling empathetically connected with (Stocks, Lishner, & Decker, 2009). Batson’s (1987) model of empathetically evoked altruistic motivations argues that empathy leads to an adoption of the perspective of the other. In turn, the adoption of perspective leads to vicarious emotional responses of empathy. These responses are believed to then cause an altruistic motivation to have the need of the other reduced. Next, the empathizing individual performs a relative benefit analysis, assessing the cost



of helping or having another help. Finally, the individual will help, have another help, or not act, depending on which decision would produce the greatest positive feeling.

Research around empathy and race also revealed that Caucasian individuals reacted to pain suffered by African individuals significantly less than to pain inflicted to Caucasian individuals (Forgiarini, Galluci, & Maravita, 2011). In addition, these reactions were correlated with the individual's levels of implicit racial bias. Various media technologies have also been found to foster empathy. For example, Belman and Flanagan (2010), have analyzed three games that promote empathy amongst players and reveal several methods that these media develop empathy in players. Belman and Flanagan describe three principles they have identified that can be and have been implemented in virtual games to foster empathy. In particular, one principle suggests that emphasizing similarities between the players and the groups they are intended to empathize with is another tool that can be incorporated in games to successfully induce empathy. If individuals can customize the avatar they are utilizing, they may be acting out a method of emphasizing similarities between the players and group they are empathizing with.

Still, little research has focused on the explicit recognition of stereotypes or expectations of others when testing the Proteus effect in virtual environments, which would help clarify the pathways through which the effect operates. If participants indicate, or experimenters control for, the user's explicit recognition of a stereotype it can be clarified whether priming or self-perception theory has led to the effect, depending on the situation at hand. Although Sherrick and colleagues (2014) attempted this clarification, their lack of an immersive and three-dimensional representation may have inhibited their findings.

## **Proteus Effect Research Hypotheses**

This work seeks to distinguish these competing routes to the Proteus effect by developing two competing models. In figure 1, below, the Proteus effect takes place through self-perception theory. In figure 2, below, the Proteus effect takes place through priming. If the Proteus effect takes place through self-perception theory, embodiment should have a direct effect on attitudes towards African-Americans. If priming is the route to the Proteus effect, stereotype accessibility should have a direct effect on attitudes toward African-Americans.

The self-perception theory model predicts that (H1) customization will have a positive effect on embodiment. The model also predicts, consistent with self-perception theory, that (H2) embodiment will have a direct effect on attitudes toward African-Americans. However, the model does predict (H3) empathy will mediate the relationship between embodiment and attitudes toward African-Americans. Finally, the model also predicts that (H4) avatar race will moderate the relationship between embodiment and attitudes toward African-Americans, as well as embodiment and empathy.

The priming model predicts that (H6B & H7B) stereotype accessibility will positively predict attitudes toward African-Americans. This prediction is consistent with the idea that priming is the cause of the Proteus effect. However, if priming is not the cause of the Proteus effect, it is more likely that this relationship will be negative. The priming model also predicts that (H6A) the player's avatar race will have a positive effect on stereotype accessibility. Finally, it is also predicted that (H7A) the computer agent race will have a positive effect on stereotype accessibility

Figure 1. Proposed Model of Proteus Effect Mechanism Through Self-Perception on Prejudicial Attitudes.

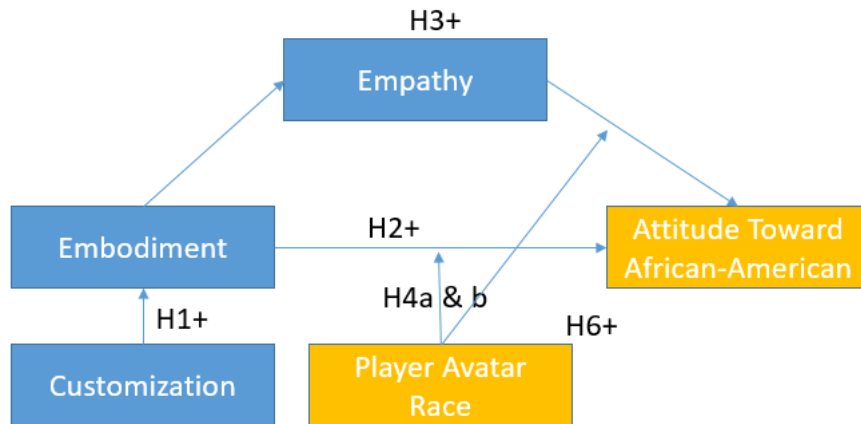
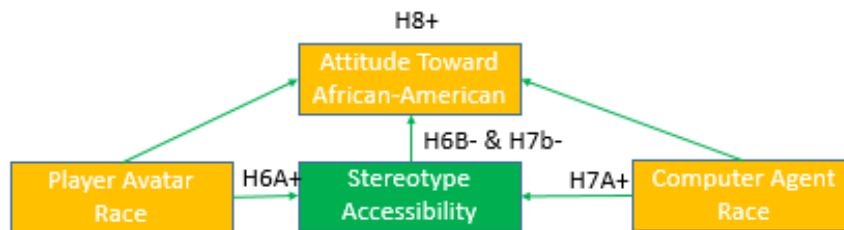


Figure 2. Proposed Model of Proteus Effect Mechanism Through Priming on Prejudicial Attitudes.



Given these competing models, it should be possible to provide evidence in favor of one route to the Proteus effect over the other.

## Chapter Three

### Intergroup Contact Theory

#### Intergroup Contact Theory Background.

While simply utilizing an avatar might have a significant influence over negative intergroup attitudes, it may be possible that even interacting with other virtual avatars can also hold strong influences over an individual's intergroup attitudes. Early work on intergroup contact theory establishes, at its core, a simple premise that merely having contact with individuals from another group can reduce negative attitudes toward all members of the individual's group. Still, Allport (1954) argued that these positive effects require four conditions to take effect. The four conditions described by Allport are a required equal group status within the situation, common goals, intergroup cooperation, and the support of authorities, law, or custom.

The equal status requirement put forth by Allport (1954) contends that in order for the positive effects of contact to take effect, the individuals that are interacting must be on an equal level. While most research has found support for this argument, it has been noted that the idea of an equal status has been employed in varied manners across existing research (Pettigrew, 1998). For instance, some research has employed situations with individuals entering with equal group status, while others utilize groups that only expect and perceive an equal status within the situation. A meta-analysis (Mullen, Brown, & Smith, 1992) revealed that "ingroup bias increased with relative status in laboratory groups but decreased in field research with real groups" (Pettigrew, 1998, p. 2).

Allport (1954) also puts forth a requirement of common goals in order for the positive effects of intergroup contact to occur. Allport suggests that in order for positive outcomes to occur, the interaction between individuals must be active and goal-oriented. Pettigrew (1998)

suggests athletic teams are an excellent example. Interracial athletic teams must necessarily depend upon each other to achieve their goal.

Similarly, Allport (1954) contends that both groups in the interaction must work to achieve the common goals together, without intergroup competition. Pettigrew (1998) argues that “intergroup cooperation in schools provides the strongest evidence” (p. 3). Further, a number of studies have found support for the idea in schools across cultures. Pettigrew writes, “this technique has led to positive results for a variety of children: Australians, Germans, Japanese, and Mexican Americans (p. 3).

The final point that Allport (1954) puts forth is that the interaction must also have the support of authorities, law, or custom. Allport suggests that having an authority support an interaction encourages acceptance of intergroup contact and in turn leads to more positive effects. Pettigrew (1998) highlights that prior field research demonstrates its importance in “military, business, and religious institutions (p. 3).

Together these four requirements were believed to be required in order to support the hypothesized positive effects of intergroup contact. According to these four requirements, virtual environments are suitable candidates to test the intergroup contact hypothesis. In the virtual environment, status can be manipulated easily to allow each individual in the interaction to know that they are on equal settings. Virtual environments and games allow both individuals interacting to work on a common goal together, if desired, meeting the second requirement. Games also allow the success of the interaction to be dependent on both individuals, which can encourage cooperation in interaction, meeting the third requirement. The final requirement of intergroup contact theory can also be manipulated in virtual environments, as any story can be created for the purposes of the virtual interaction.

Still, recent research and meta-analyses have revealed that these four conditions may not be required for the positive effects of intergroup contact (Pettigrew & Tropp, 2006). Though research that utilized Allport's four conditions was revealed to consistently demonstrate a higher mean effect size, research that did not utilize any of Allport's claims still found positive significant relationships between contact and prejudice.

### **Review of Intergroup Contact Theory's Success.**

Pettigrew and Tropp's (2006) meta-analysis revealed that intergroup contact is frequently successful at actually reducing feelings of intergroup prejudice. As noted, the initial four requirements suggested by Allport (1954) do seem to lead to an increase in the positive effects associated with intergroup contact, when compared to those that do not incorporate the four stipulations put forth by Allport. Overall, intergroup contact seems to lead to reduced prejudicial attitudes as long as contact occurs in a favorable manner.

Further, Pettigrew and Tropp's (2006) meta-analysis reveals that intergroup contact effects do have clear utility, often generalizing beyond individuals in the contact situation. As Pettigrew and Tropp note, "the generalization of contact's effects appears to be far broader than what many past commentators have thought" (p. 766). Prior research indicates that positive attitudes toward outgroup members can be extended to the entire outgroup, and outgroup members that are not even involved in the contact situation.

Intergroup contact theory also has found success in reducing prejudice among diverse groups and varied situations (Pettigrew & Tropp, 2006). As research continues to examine the efficiency of intergroup contact theory across age groups, geographic regions, and target groups, it continues to reveal a significant relationship between intergroup contact and prejudice. There

is “substantial evidence that intergroup contact can contribute meaningfully to reductions in prejudice across a broad range of groups and contexts” (p. 766).

### **Imagined & Virtual Contact**

While intergroup contact theory has found success in physical environments, it hasn't yet been as thoroughly examined in virtual environments. Still, research is beginning to delve into the area of intergroup contact theory in other environments. In particular, research is starting to examine a theory of imagined intergroup contact theory. In addition, a small amount of literature has emerged that may function as the beginnings to exploring intergroup contact theory in virtual environments. Though imagined contact rests on the basis of mental imagery and virtual contact provides this imagery, prior research has found success applying theories, that rested on imagined scenarios, within virtual worlds as well (Yee & Bailenson, 2006).

The theory of imagined intergroup contact is based on the mental simulation of a contact experience. The theory predicts that merely imagining intergroup contact with an outgroup member can be enough to cause positive attitudes toward an outgroup member. Past research has demonstrated that imagined experiences can have a significant influence over our attitudes and behaviors in the real world. For example, a study asking participants to imagine a strong female found that these individuals demonstrated less implicit gender stereotyping compared to those that imagined a vacation (Blair, Ma, & Lenton, 2001).

Similarly, imagined intergroup contact involves “mentally stimulating a social interaction between an ingroup member and an outgroup member” (Crisp, Stathi, Turner & Husnu, 2008, p. 4). Imagined intergroup contact theory hypothesizes that imagery leads to an increase in accessibility of abstract concepts associated with a given social context. Imagining intergroup contact is believed to lead to activation of concepts that we would normally associate with

successful interactions with members of outgroups. Further, the theory posits that imagining intergroup contact should also lead individuals to engage in conscious processing that will parallel the processes involved in intergroup contact. For example, the individuals might actively think about what they could learn about the outgroup member, how they would feel while interacting, and how this would influence their perceptions of the outgroup member and whole outgroup. These parallel processes should then lead to a greater positive evaluation of the outgroup.

Imagined intergroup contact has also found considerable success in past research. For example, research has indicated that participants who imagine a positive interaction with elderly or gay individuals demonstrate more positive attitudes and stereotype less than participants who did not (Turner et al., 2007). Thus, imagined intergroup contact theory has provided evidence that it also works effectively across diverse group.

A notable outcome of imagined intergroup contact theory is that it has provided evidence that imagining intergroup contact is effective at increasing positive explicit and implicit attitudes (Crisp, Stathi, Turner & Husnu, 2008). An increase in both explicit and implicit attitudes demonstrates that imagined intergroup contact is not occurring because of demand characteristics. In other words, increases in both explicit and implicit attitudes demonstrate that participants are not simply stating what they believe the experimenter wants to hear. Further, prior research indicates that demand characteristics, or social desirability bias, are not actually a larger concern for imagined intergroup contact theory. Crisp and colleagues argue that participants do not typically “report any awareness of the experimental hypotheses at feedback” (p. 7).



While earlier research in the realm of perspective-taking has found that utilizing virtual avatars produces greater effects than simply imagining a perspective-taking scenario (Yee & Bailenson, 2006), research has yet to make this comparison in regards to imagined intergroup contact theory. Still, research has begun examining the effects of intergroup contact online. For example, one article examining the benefits of online contact instead of real-world contact revealed that the internet and virtual contact could provide a suitable environment for intergroup contact that would help meet Allport's conditions (Amichai-Hamburger & McKenna, 2006).

Research has also examined intergroup contact through video-game use. Adachi, Hodson, & Hoffarth (2015) investigated the literature surrounding intergroup competition and cooperation in online video-games and made suggestions for how it may impact intergroup processes. Overall, the study indicated that playing video-games cooperatively has positive effects on intergroup contact. In particular, one study indicated that playing with a Black avatar, whether competitively or cooperatively, in a non-violent game still led to positive evaluations of Black avatars, as compared to White avatars (Vang & Fox, 2014).

### **Social Presence**

One factor that should influence the effect of social contact in virtual environments is the feeling of being with others. While presence has been identified as the sense of being in a virtual environment, social presence is often discussed as the sense of being together in a virtual environment. Though intergroup contact theory has not yet been examined thoroughly in virtual environments, one factor that might have influence over its success is this concept of social presence and having an increased feeling of being together. In addition, social presence may have an influence over the relationship between an individual and the feeling of social presence with their avatar, or a feeling of co-presence, a subsequent feeling associated with social

presence. Co-presence is frequently defined as the notion of sharing a location or being in the same location (Biocca, Harms, & Burgoon, 2003).

Further work on social presence has argued that social presence and co-presence are also tied to the concept of embodiment. In this work, the embodied social presence theory suggests that “the body is the nexus of communication and that an embodied representation – whether virtual, physical, imaginal, or some combination – combined with goal-directed shared activity...in a shared virtual or real space affects the perceptions of users by drawing them into a higher level of cognitive engagement in their shared activities and communication acts” (Mennecke, Triplett, Hassall, & Conde, 2011, p. 6). In other words, social presence and its subcomponents should work together with embodiment to produce increased engagement. Similarly, it may be the case that simply interacting with other individuals could build feelings of connectedness and feelings of embodiment may be unnecessary. In games, individuals may interact with other avatars and develop a parasocial interaction, or connection, with an avatar. This connection could also function to increase engagement.

While no research, to the author’s awareness, has emerged studying the link between social presence or embodied social presence theory and engagement, a body of research has emerged examining social presence and learning outcomes. This research typically demonstrates a positive effect between social presence and learning outcomes, arguing that social presence may be responsible for increased engagement, leading to these effects (Richardson & Swan, 2003).

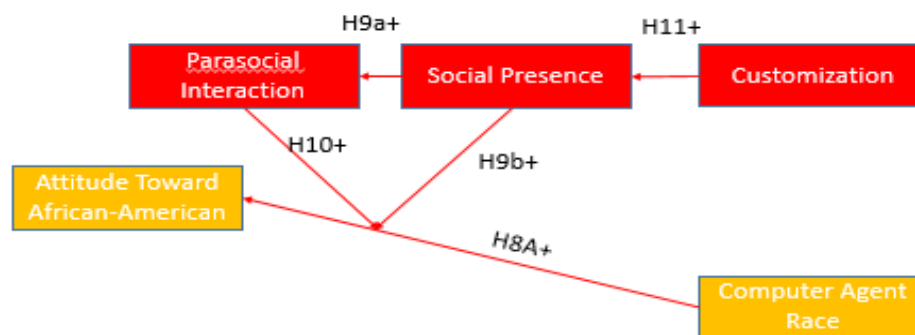
### **Proposed Model of Social Contact Theory on Prejudicial Attitudes.**

A goal of this work is also to examine how social contact in virtual worlds may influence attitudes toward a virtually represented group. Based on the background above, it plausible that

interactions with avatars and one's own virtual representation, as measured by social presence, should have influence over attitudes toward the group being represented. Further, unique effects associated with design of these avatars may influence feelings of contact, as described earlier.

Therefore, model 3 predicts that (H11) customization will positively influence social presence. The (H8b) player's avatar's race is also predicted to have a positive effect on attitudes toward African-Americans. The model also predicts that (H8A) the additional computer avatars' race will have a positive effect on attitudes toward African-Americans. Social presence should also have a positive effect on (H9A) parasocial interaction and a moderating effect on (H9b) attitudes toward African-Americans. Finally, (H11) parasocial interaction is predicted to have a positive moderating effect on attitudes toward African-Americans.

Figure 3. Proposed Model of Social Contact Theory on Prejudicial Attitudes



## Chapter Four

### Summary of Experiment

Taken together, multiple routes to prejudice reduction through the use of avatars exist. However, many of the routes to prejudice reduction and the mechanisms at work lack clarification of which mechanisms function to reach this goal. This experiment seeks to clarify which mechanisms are at play and how prejudice reduction may be optimally reached when utilizing an avatar as a tool to do so. In particular, this experiment has two primary goals.

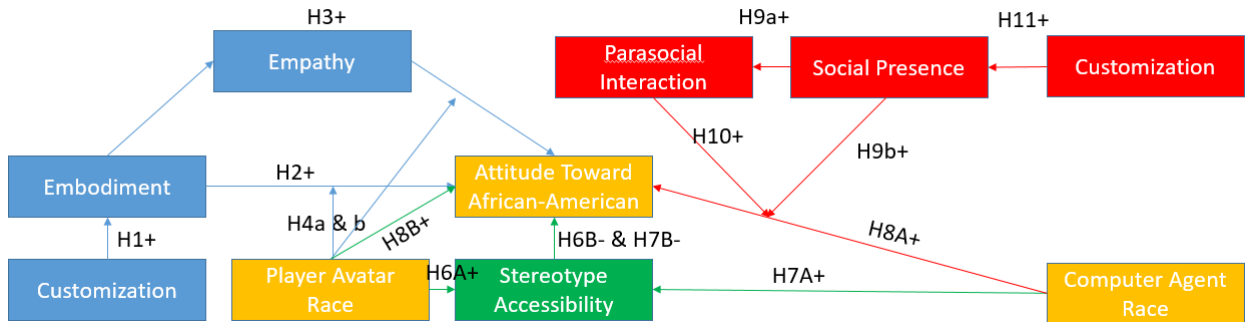
First, we seek to clarify the mechanisms at work in the Proteus effect. As described above, two competing hypotheses are at the forefront of the explanations for the Proteus effect. One body of research provides evidence for self-perception theory, while another suggests that priming may be responsible for the Proteus effect. This experiment seeks to test the mechanism at work when individuals inhabit a virtual body with the goal of a shift in attitude toward the body being represented.

The second primary goal of this research is to examine virtual social contact as a route to prejudice reduction. While social contact theory posits that individuals will experience a reduction in prejudicial attitudes through mere contact, research has not examined if social contact in virtual worlds, with avatars representing different groups, is also a suitable route to prejudice reduction. Therefore, this study is also interested in examining the role of virtual contact, with avatars representing minority groups, in reducing racial bias.

To assess these relationships, this paper puts forth several hypotheses, stated above. Figure 4 demonstrates the combined the model with paths in blue demonstrating the predicted self-perception route to the Proteus effect, paths in green demonstrating the predicted priming route to the Proteus effect and paths in red demonstrating the virtual intergroup contact theory

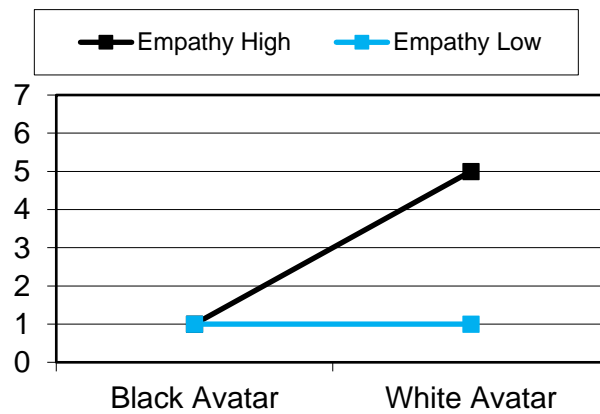
predictions. Figure 5 demonstrates the predicted moderation relationship for the self-perception route to the Proteus effect.

Figure 4. Combined Models Predicting Attitude Change



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

Figure 5. Moderation Relationship of Self-Perception Route to the Proteus Effect



## Chapter Five

### Methods

#### Participants & Procedure

Participants were gathered from classes at a large eastern U.S. university. Participants scheduled a time for a laboratory session and completed a pre-test survey. At the session, participants completed a consent form and were seated at a workstation with a working computer. Participants were given verbal instructions and then were told to put on headphones and play the game. Participants were given 10 to 15 minutes to complete the task described for them in the instructions. Participant condition was randomly assigned, regardless of participant race or gender. Participants were given avatars that matched their gender.

Participants were instructed to play The Sims 4. Participants who were in the customization condition could choose accessories for their characters prior to receiving instructions for the rest of the game. The instructions stated that they were spending time at a party with other virtual characters. The game area was the backyard of a large, fenced in house that participants could not leave. In addition, the game was manipulated to have all displayed character moods be positive.

During their time playing, participants were instructed to attempt to meet all of the other characters at the party and to keep the tone of the party positive. Following 10 to 15 minutes of gameplay the participants were instructed to answer an additional survey. After completion of the final survey, participants were thanked for their time and given the opportunity to ask questions if they desired.

Study 1 consisted of 136 participants. There is no demographic information for Study 1. For cell sizes of Study 1, refer to Table 1.

Study 2 consisted of 115 participants. Eighty-three participants identified themselves as female and the rest indicated they were male. The average age of participants was 20.22 ( $Mdn = 20$ ,  $Min = 18$ ,  $Max = 26$ ). The majority of participants in Study 2 identified as White ( $n = 79$ ). The second largest group identified themselves as Asian or Pacific Islander ( $n = 26$ ), and the remaining participants were split amongst Hispanic or Latino ( $n = 5$ ), Black or African-American ( $n = 3$ ), and Other ( $n = 2$ ). Non-white participants were included in the analysis, as the Proteus effect suggests that effects should be found independent of the individual's actual self. Participants from study two were also asked about their prior experience with The Sims. Roughly half of the participants indicated no experience with The Sims ( $n = 51$ ). Few participants indicated a lot of experience with The Sims ( $n = 10$ ). A similar number of participants indicated either somewhat ( $n = 20$ ) or a little ( $n = 34$ ) experience with The Sims. However, tests controlling for prior experiences did not indicate that prior experience made a difference. For cell sizes of Study 2, refer to Table 2.

Within both studies, only cases that had matched pre- and post-test data were utilized. No cases were removed from the data containing these matched cases.

Table 1. Study 1 Cell Sizes.

|                    |                | Black<br>Avatar | White<br>Avatar |
|--------------------|----------------|-----------------|-----------------|
| Customized         | Black<br>Agent | 18              | 19              |
|                    | White<br>Agent | 18              | 17              |
|                    |                |                 |                 |
| Non-<br>Customized | Black<br>Agent | 16              | 19              |
|                    | White<br>Agent | 19              | 19              |

Table 2. Study 2 Cell Sizes.

|                    |                | Black<br>Avatar | White<br>Avatar |
|--------------------|----------------|-----------------|-----------------|
| Customized         | Black Agent    | 15              | 14              |
|                    | White<br>Agent | 14              | 14              |
|                    |                |                 |                 |
| Non-<br>Customized | Black Agent    | 13              | 15              |
|                    | White<br>Agent | 15              | 15              |



## Measures

### Dependent Variables

*Implicit Attitude.* The implicit association test (IAT) serves as an implicit measure of attitude. A black/white and male/female person IAT was developed to measure implicit association toward these individuals. The test measured the participants' implicit associations between black/white and good/bad or male/female and good/bad. The task utilizes the classification of pre-tested images of black/white and male/female individuals.

The IAT instructs participants to classify individual stimuli that represent either a particular category or attribute. Typically, there are four possible categories. Two categories are likely evaluative (good/bad) and two categories are typically objects (flowers/insects). First participants sort objects with one assigned evaluation (flowers-good/insects-bad). Then the sorting occurs again with the opposite evaluation (flowers-bad/insects-good). The test assumes that the responses that are faster are more closely associated, and therefore more likely to represent the individual's implicit attitude, than those that are slower. The scoring process used for the IAT was obtained from Greenwald, Nosek, and Banaji (2003)

*Explicit Racism.* The Modern Racism Scale measures explicit prejudice and has been shown to be a reliable measure ( $\alpha = .86$ ) (McConahay, 1986). The Modern Racism Scale is a six-item scale, (Example Item: It is easy to understand the anger of Black people in America). Answers are given on a seven-point Likert scale, ranging from Strongly Agree, Somewhat Agree, Neither Disagree nor Agree, Somewhat Disagree, and Strongly Disagree. The higher the sum of the participants score indicates less negative racial attitudes. Assessment of the normality of pre- and post-modern racism scale scores revealed the test did provide results that were

slightly right-skewed. The pre-test data revealed a reliable score of  $\alpha = .86$ . The post-test data also revealed acceptable reliability at  $\alpha = .79$  ( $M = 5.28$ ,  $SD = 1.06$ ).

*Embodiment* – Embodiment in virtual reality is frequently measured through questionnaires. However, the measurement practices for the measurement of embodiment is not always consistent. In some studies, a binary choice (I felt or I did not feel embodiment) is utilized and in others a continuous scale is utilized (Kilteni, Groten, & Slater, 2012). However, based on the recommended theoretical definition and the idea that the three components of the associated operational definition are always felt in the physical body, it is argued that the measure of embodiment should be measured on a continuous scale “from none to a maximum degree” (p. 378). To gauge self-perception theory as route to the Proteus effect, embodiment was assessed through a questionnaire item gauging participants’ feelings of ownership over their virtual body. The item ranged from one (not at all) to seven (completely), as suggested by Kilteni, Groten, and Slater (2012). This scale demonstrated acceptable reliability,  $\alpha = .70$  ( $M = 4.54$ ,  $SD = 1.28$ ).

In addition, the self-presence proto (SPP) scale was employed in the measurement of embodiment. The SPP is another form of presence that is useful to the measurement of embodiment. The SPP scale, in particular, measures the sense of physical being that the participant feels (Ratan & Hasler, 2009) Sample items are, “When using your avatar do you feel physically close to the objects and other avatars in the game” and “When using your avatar, to what extent do you feel like your arm is elongated into the game?” The SPP scale consists of seven items. This scale demonstrated acceptable reliability,  $\alpha = .90$  ( $M = 4.92$ ,  $SD = 1.20$ ).

A combined score was created utilizing the embodiment questionnaire and self-presence proto scale, with acceptable reliability,  $\alpha = .90$  ( $M = 4.80$ ,  $SD = 1.12$ ).

## Mediating Variables

*Stereotype Accessibility.* A word-stem completion task was adopted from Schaller, Park, and Mueller (2003). This task serves as a measure of stereotype accessibility. In theory, the more words that are completed as stereotype relevant, as opposed to non-stereotype relevant, should indicate higher levels of stereotype accessibility. Participants were exposed to ten word stems and asked to complete the words with the first word that came to mind. For example, participants may have been presented with ATH which could be completed as a stereotype relevant word, athlete, or a stereotype non-relevant word, Athens. Intracoder reliability, utilizing Cohen's kappa, was established and found to be reliable,  $(K) = .87, p < .005$ .

*Empathy.* Empathy is believed to be involved in change in attitude when individuals embody a new avatar. The empathy scale, a measurement of state empathy, consists of 12 items and is rated on a 7-point Likert-type rating scale. The scale was adopted from Shen (2010) and modified slightly. This scale had sufficient reliability,  $\alpha = .94 (M = 3.84, SD = 1.08)$ .

## Moderating Variables

*Parasocial relationship (PSR) scale* – Similar to player avatar identification scale, the parasocial relationship scale measures the extent to which individuals feel they are interpersonally involved with their avatar (Auter & Palmgreen, 2000; Jin, S.A., & Park, N., 2009). Sample items are, “I would like to be more like my avatar” and “My avatar reminds me of myself.” The PSR scale consists of 23 items. Seven of the 23 items were adopted for this study. These seven were chosen as they relate directly to the relationship between user and avatar. This scale also demonstrated acceptable reliability,  $\alpha = .90 (M = 3.55, SD = 1.15)$ .

*Social Presence.* Social presence is critical to feelings of being in contact with others in the virtual world and may be integral to changing attitudes through intergroup contact theory.

Social presence was measured from a set of questions developed by Nowak and Biocca (2003). Thirteen items were employed using a Likert-type rating scale. This scale demonstrated near acceptable levels of reliability,  $\alpha = .59$  ( $M = 3.49$ ,  $SD = .76$ ).

### **Demographic and Control Variables**

*Demographic & Additional Control Variables.* In addition to race & ethnicity, gender identity, age, and year in school, several additional control variables were recorded. Whether or not a participant believes they completed the game successfully was measured to gauge potential frustrations.

## Chapter Six

### Results

#### Pre- and Post-Attitude Differences

Two 2 (Avatar Race) x 2 (Agent Race) repeated measures analyses of variance were utilized to assess the differences between implicit and explicit attitudes, both prior to and after the experiment. This analysis utilized data from both study 1 and study 2. Both repeated measures analyses of variance included the study the data came from and whether the avatar was customized as a control variables. Significant avatar or agent race interactions with time would indicate that there were significant changes between pre- and post-test measures.

The repeated measures analyses for implicit attitudes indicated an effect for agent race, with participants who interacted with Black agents reporting more favorable attitudes toward Black individuals ( $M = -.218, SE = .027$ ) than participants who interacted with White agents ( $M = -.293, SE = .027$ )  $F(1, 236) = 3.98, p = .047, \text{partial } \eta^2 = .017$ . No effect was found for avatar race and no significant interactions were found.

The repeated measures analyses for explicit attitudes also revealed a main effect for agent race, such that participants who interacted with Black agents reported more favorable attitudes toward Black individuals ( $M = 5.46, SE = .137$ ) than participants who interacted with White agents ( $M = 5.02, SE = .136$ )  $F(1, 234) = 5.145, p = .026, \text{partial } \eta^2 = .045$ . No significant interactions were found.

The main effects here demonstrate consistent differences in attitude between time points. In other words, the difference was not caused by condition. Based on the main effects, pre-test scores are included as a control variable in all further analyses<sup>1</sup>. The lack of interaction, on the other hand, demonstrates that the Proteus effect didn't take place in here. These findings are contrary to expectations of the Proteus effect through priming and self-perception. Based on the priming model, it would be expected that individuals with a Black avatar would report less favorable attitudes. The self-perception model would predict that individuals utilized a Black avatar would report greater favorable attitudes than individuals that utilized a White avatar.

Though this data makes it apparent that there is a lack of the Proteus effect here, it is still important to assess the models developed. There are potential mechanisms within the models that can continue to be assessed. For example, does embodiment still predict empathy and does player avatar race act as a moderator when empathy is invoked.

### **Proteus Effect Model - Embodiment**

In order to assess the hypothesized model of the Proteus effect that relies on embodiment two analyses were employed, utilizing the data from study 2. First, it was predicted that customization would have a direct, positive effect, on customization. To test the direct effect of customization on embodiment, a one-way analysis of variance was employed. Customization did not have a significant effect on embodiment,  $F(1, 113) = .449, p = .504$ . Therefore, no evidence was provided in support of H1.

To test the rest of the model, the Hayes (2013) PROCESS macro, model 15, for SPSS was utilized, testing for moderated mediation using 5000 bootstrapped samples at a 95%

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<sup>1</sup> Analyses were also conducted utilizing difference scores, as some research suggests this methodology may be more appropriate (Allison, 1990). However, these analyses did not yield different results than those presented within this dissertation.

confidence interval. This model was run twice, once for explicit attitudes and another for implicit attitudes. Each model utilized attitude as the outcome variable, embodiment as the independent variable, empathy as the mediator, and avatar race as the moderator, and the pre-test attitude score as a control variable. In this portion of the model, it was predicted (H1) that embodiment would significantly predict positive attitude change toward African-Americans and that (H2) player avatar race would moderate this relationship. It was also predicted (H3) that empathy would mediate the relationship between embodiment and positive attitude change toward African-Americans. Finally, it was also predicted that avatar race would moderate the relationship between embodiment and empathy (H4A) and would also moderate the relationship between embodiment and attitude change toward African-Americans (H4B). This portion of the model is consistent with research on the self-perception route of the Proteus effect and would expect positive attitude change toward African-Americans to emerge if the self-perception route to the Proteus effect took place.

In assessing explicit attitudes, embodiment was a significant predictor of empathy,  $b = .70$ ,  $t(114) = 11.36$ ,  $p < .001$ . However, the relationship between embodiment and explicit attitude change was not mediated by empathy, index = .03,  $SE = .08$ , 95%  $CI: [-.14, .20]$ , nor did embodiment significantly predict explicit attitude change,  $b = -.13$ ,  $t(114) = 1.55$ ,  $p = .12$ . Therefore, no evidence was found in support of H2 or H3. Further, no evidence was found in support of player avatar race as a moderator of the relationship between embodiment and attitude change (H4a),  $b = -.14$ ,  $t(114) = -1.13$ ,  $p = .26$ , or empathy and explicit attitudes ( $b = .04$ ,  $t(114) = .31$ ,  $p = .76$ ), H4b.

The model assessing implicit attitudes also demonstrated embodiment as a significant predictor of empathy  $b = .69$ ,  $t(105) = 10.93$ ,  $p < .001$ . The model assessing implicit attitudes

also demonstrated that the relationship between embodiment and implicit attitudes was mediated by empathy, index =  $-.11$ ,  $SE = .05$ , 95%  $CI$ :  $[-.21, -.01]$ . Embodiment did not predict implicit attitude,  $b = -.05$ ,  $t(105) = -.90$ ,  $p = .37$ , providing no evidence in support of H2. This model also provided mixed evidence in support of player avatar race as a moderator of the relationship between embodiment and attitude change ( $b = .14$ ,  $t(105) = 1.96$ ,  $p = .05$ ), H4a, and empathy and implicit attitude change ( $b = -.15$ ,  $t(105) = -2.12$ ,  $p = .04$ ), H4b. The effects suggest that for individuals playing as a Black avatar, feelings of empathy are a significant predictor of implicit attitude change. In addition, the near significant effect suggests that avatar race may moderate the relationship between embodiment and implicit attitude change, such that for Black avatars embodiment was a near significant and positive predictor of implicit attitude change. However, this was not true for White avatars. These effects, however, seem to offset each other. Though there was a positive direct effect, there was also a negative indirect effect of embodiment for individuals that played as a Black avatar. The net effect is not representative of a significant impact from avatar race.

### **Proteus Effect Model – Priming**

The priming route to the Proteus effect predicted that avatar (H6A) and agent (H7A) race would positively impact stereotype accessibility. Exposure to the avatars' skin color should cue stereotype accessibility, if the results are consistent with past research. In addition, it was predicted that stereotype accessibility would mediate the relationship between avatar race and attitude change toward African-Americans (H6B). In addition, the model predicts that the relationship between agent race and attitude change toward African-Americans would also be mediated by stereotype accessibility (H7B). To be consistent with the priming hypothesis,



greater stereotype accessibility should lead to increased negative attitudes toward African-Americans, if we assume that most stereotypes that are held are negative.

To assess the model of the Proteus effect that relied on priming, the Hayes (2013) PROCESS macro, model 4, for SPSS was utilized, testing for mediation using 5000 bootstrapped samples at a 95% confidence interval. First, a model was employed utilizing explicit attitude as the outcome variable, avatar race as the independent variable, stereotype accessibility as the mediator, and the pre-test attitude score as a control variable. Avatar race did not significantly predict explicit attitude change  $b = -.10$ ,  $t(110) = -.1.12$ ,  $p = .26$ . Stereotype accessibility did not mediate the relationship between avatar race and explicit attitude change, index = .0011,  $SE = .0105$ , 95%  $CI$ : [-.0131, .0338].

Next, an additional model 4 test was employed utilizing implicit attitude as the outcome variable, avatar race as the independent variable, stereotype accessibility as the mediator, and the pre-test attitude score as a control variable. Again, avatar race did not predict implicit attitude change,  $b = .08$ ,  $t(110) = 1.51$ ,  $p = .13$ . Stereotype accessibility also did not mediate the relationship between avatar race and implicit attitude change, index =  $-.0016$ ,  $SE = .0093$ , 95%  $CI$ : [-.0334, .0083]. No support was found for H6 or H7 or H8B.

To assess the effect of computer agent race on the priming hypothesis, two additional model 4 macros were employed. In the first model, explicit attitude was employed as the outcome variable, agent race as the independent variable, stereotype accessibility as the mediator, and the pre-test attitude score as a control variable. Agent race was not a significant predictor of explicit attitude change,  $b = .08$ ,  $t(110) = .82$ ,  $p = .41$ . The relationship between agent race and explicit attitude change was also not mediated by stereotype accessibility, index =  $-.0015$ ,  $SE = .0112$ , 95%  $CI$ : [-.0363, .0134].

In the next model, implicit attitude was employed as the outcome variable, agent race as the independent variable, stereotype accessibility as the mediator, and the pre-test attitude score as a control variable. Agent race did not significantly predict implicit attitude change,  $b = -.03$ ,  $t(111) = -.62$ ,  $p = .53$ . In addition, the relationship between agent race and implicit attitude change was not mediated by stereotype accessibility, index =  $-.0017$ ,  $SE = .0083$ , 95%  $CI$ : [ $-.0081, .0319$ ]. No support was found for H6, H7, or H8A.

### **Virtual Intergroup Contact Theory**

To assess the model of virtual intergroup contact theory two analyses were employed. First, a one-way analysis of variance was used to examine the effect of customization on social presence. No significant relationship was found,  $F(1, 113) = .745$ ,  $p = .390$ . No evidence was found to support H11. To assess the rest of the model, the Hayes (2013) PROCESS macro, model 2, for SPSS was utilized, testing for moderation using 5000 bootstrapped samples at a 95% confidence interval. Again, this model was run twice to test the model on both implicit and explicit attitude. Attitudes were the outcome variable, agent race was the independent variable, parasocial interaction was one moderator, social presence was an additional moderator, and the pre-test attitude score was a control variable. Based on the literature from intergroup contact theory it was predicted that positive interactions with raced computer agents should lead to more favorable attitudes toward African-Americans (H8A), and that this relationship should be moderated by feelings of social presence (H9B) and parasocial interaction (H10). It was also predicted that social presence should predict parasocial interaction (H9A).

The model examining explicit attitude indicated that agent race was not a significant predictor of explicit attitude change,  $b = -.63$ ,  $t(114) = -1.42$ ,  $p = .16$ . No evidence was found in support for H8A. In addition, parasocial interaction scores ( $b = -.01$ ,  $t(114) = .09$ ,  $p = .89$ ) and

social presence scores ( $b = .21$ ,  $t(114) = 1.49$ ,  $p = .14$ ) did not moderate this relationship. Thus, no evidence was found in support for H10 or H9B.

The model examining implicit attitude also indicated that agent race was not a significant predictor of implicit attitude change,  $b = -.25$ ,  $t(105) = -.87$ ,  $p = .39$ . Therefore, no evidence was found in favor of H8A. There was also no evidence found for H10, that parasocial interaction scores would moderate this relationship,  $b = -.04$ ,  $t(105) = -.69$ ,  $p = .49$ . Finally, no evidence was found for H9B, that social presence scores would also moderate this relationship,  $b = .09$ ,  $t(105) = 1.11$ ,  $p = .27$ .

## Chapter Seven

### Discussion

The goals of this work were to examine the mechanisms of the Proteus effect and to explore the possibility of a virtual intergroup contact effect. Two models were put forth to explain the potential mechanisms of the Proteus effect. In particular, a self-perception route and priming route were explored. The self-perception route predicted that customization would positively influence embodiment and that the relationship between embodiment and attitudes toward Black individuals would be mediated by empathy. The priming route, on the other hand, predicted that stereotype accessibility would mediate the relationship between both avatar and agent race on attitudes toward Black individuals. Further, it was predicted that priming, as measured by increased stereotype accessibility, would negatively impact attitudes toward Black individuals because stereotypes are largely negative.

The model of virtual intergroup contact theory predicted that agent race would have a positive effect on attitudes toward Black individuals, but this effect would be amplified by feelings of social presence and parasocial interaction. These moderators would, in theory, indicate increased recognition of the agents that were present in the virtual environment. Based on intergroup contact theory, simply increasing interaction with members of a different group should produce greater positive attitudes toward that group, given the right conditions. The game utilized met these conditions and provided positive interactions. Further, it was predicted that customizing an avatar would lead to increased feelings of social presence, as past research has demonstrated that customization impacts feelings of presence (Bailey, Wise, & Bolls, 2009).

Given the competing hypotheses of the mechanisms that lead to the Proteus effect, it was unclear which mechanism would explain the Proteus effect if it took place in this study.

However, this study found no evidence for either model because the Proteus Effect did not seem to take place within this experiment, based on the results obtained. Though there were significant interactions found in the self-perception model assessing implicit attitude change, these results were not indicative of an impact attributable to avatar race. The results indicate that for individuals playing as a Black avatar, embodiment may not affect their implicit attitude change, but they may gain hostility toward Blacks because of embodiment of a Black avatar. However, this hostility is then potentially lost through feelings of empathy. Still, the Proteus Effect would suggest that both routes should lead to reduced negative prejudice and these results are inconsistent with that expectation.

These results suggest that the theoretical models suggested here may still be accurate, but that the experiment itself was not effective at inducing the Proteus Effect. Again, if priming took place individuals utilizing a Black avatar should have displayed less favorable attitudes toward Black people than individuals utilizing a White avatar. If the self-perception route took place, results should have indicated that individuals using Black avatars demonstrated greater favorable attitudes toward Black individuals than individuals utilizing White avatars. Contrary to these mechanisms, the lack of significant interaction effects found indicates that individuals utilizing both White and Black avatars do not experience changes in attitude. These findings are inconsistent with both the priming and self-perception route to the Proteus effect.

The lack of effect in this experiment may be due to several factors. It is plausible that a strong degree of presence is required for the Proteus Effect to take place and that the environment of The Sims 4 does not induce enough presence for users to experience the effect. Much of the research around the Proteus Effect makes use of immersive virtual reality that leads to stronger feelings of presence (Fox; Bailenson, & Binney, 2009; Fox, Bailenson, & Tricase,

2013; Yee & Bailenson, 2007). Still, the Proteus effect has been reported in environments that are like the environment of *The Sims 4* (Yee & Bailenson, 2007). In addition, it should be noted that participants reported a fairly high level of presence in this dissertation. Given the levels of presence found in this dissertation the importance of aspects related to presence may lie elsewhere. For example, the difference between this experiment and others utilizing similar environments is that interactions with other humans took place through computer-mediated communication. In other words, interaction in those experiments took place through avatars, instead of an avatar interacting with agents. Research has suggested that interactions with other individuals, utilizing avatars, can increase feelings of presence (Williams, Ducheneaut, & Xiong, 2006). Therefore, the studies utilizing interactions with avatars in 3-D game-environments may have found effects due to the increased presence that could be attributed to avatar interaction. Further, research has also provided evidence that participants who played a game with avatars experienced greater feelings of presence than players that played with agents (Lim & Reeves, 2007).

Similarly, it is possible that the Proteus effect did not take place due to the mere nature of differences with interactions between computer agents and avatars. While past research that has found the Proteus Effect took place in 3-D game-environments called on participants to interact with individuals also utilizing an avatar, this study called on participants to interact with virtual agents. Though the computers as social actors (CASA) paradigm states that individuals tend to interact with computer agents the same way they would interact with humans (Nass, Steuer, & Tauber, 1994) there is also evidence that contradicts these claims. For example, prior research has indicated that participants who competed against virtual agents reported greater feelings of aggression than participants that competed against avatars (Williams & Clippinger, 2002). One

explanation for the lack of the Proteus Effect in this study is that the interactions with virtual agents were not conducive to both feelings of presence or feelings of having a body that was being utilized to interact with real individuals.

Another aspect of measurement that may have led to different results is in the assessment of stereotype accessibility. The word-stem completion task was coded such that all stereotype relevant words were counted, while non-stereotype relevant words were not. Though this method accounts for a wholistic view of stereotype accessibility, it may be beneficial to assess differences between individuals that had negative stereotypes activated and individuals that had positive stereotypes activated. Assessing negative stereotypes, in particular, could demonstrate larger differences in attitude change based on a priming hypothesis. If priming was effective, and consistent with past research, it should have been the negative stereotypes that became accessible.

In addition, though customization did not predict greater feelings of embodiment as hypothesized, this may be due to the type of customization that was allotted. Participants in this study were only allowed to change the accessories of their assigned avatar. Allowing participants to truly customize their avatar may impact these results and reveal findings consistent with past research that indicates customization does have an impact on feelings of embodiment (Ratan & Sah, 2015).

Similarly, it may be the case that the measurement of embodiment could have been improved. For example, questions assessing whether an individual felt like they were in two places at once might be inconsistent with embodiment. On the one hand, these questions may indicate a slight loss of self. On the other, these questions could indicate that the individual has not completely lost the self, which may be required for effects related to embodiment. Further,

analysis of embodiment items and scores does indicate that there is enough variation in the assessment to function here.

It is also possible that the contradictory effects found here are only indicative of a social desirability bias. It is plausible that the participants understood the intended effects of the experiment after exposure to the pre-test and stimuli and maintained their initial reported values. Participants that utilized White avatars may have been even more susceptible to this because of an associated feeling of “white guilt,” or a collective feeling of guilt for actions perpetrated against ethnic minorities. If this is the case, it is possible that these results are only indicative of the social desirability bias, or a desire to seem good and be viewed favorably by others.

Another consideration for the explanation of the lack of findings consistent with the Proteus effect could be a regression to the mean effect. Participants answers may have been quite high during the pre-test and regressed to the mean during post-test. This regression could explain a lack of findings. If participants scores started at an extreme, it is not possible to see a dramatic increase, or decrease if the experiment was successful. This effect might also be seen in the repeated measures analysis on implicit attitude. In particular, participants in Study 1 were shown the results of their IAT after completion. In other words, they were told whether their associations indicated that they related black with good or bad words more than they associated white with good or bad words. Due to being shown these results, some participants of Study 1 may have sought to correct their extreme scores and taken the process of the IAT slow to ensure proper categorization. This would also result in a regression to the mean effect.

Interestingly, neither player avatar race nor computer agent race had a significant impact on stereotype accessibility. While past research has suggested that priming is a likely route to the Proteus effect (Pena, Hancock, & Merola, 2009), this study did not find stereotype accessibility



to be significantly increased, as hypothesized, after exposure to the stimuli. Though the black and White avatars were selected as the most popular choices from a prior study where participants were instructed to design a black and White avatar, it is possible that the avatars appearance was not stereotypical or exaggerated enough to cause increased stereotype accessibility.

The idea that avatar race cues were not salient enough may also explain the lack of findings within the self-perception model of the Proteus effect. It is clear that embodiment does predict empathy. However, empathy did not predict increased attitudes toward Black individuals. Coupling these findings with the idea that stereotype accessibility did not increase because of avatar appearance, it might be the case that avatar appearance was simply not sufficient enough to cue, or keep the cue, of race salient. If the cue of race was not salient enough, the empathy elicited might not be directed toward the represented group.

Further, though the Proteus effect was not found, the theoretical underpinnings of the model cannot yet be dismissed. If customization ability is increased, this effect may indicate consistency with past research. In addition, if assigned avatars are given features which are exaggerated to indicate stereotypes, stereotype accessibility effects may be present. Without evidence of the Proteus effect taking place, we cannot assess the accuracy of the theoretical model.

In addition, no evidence was found in support for the virtual intergroup contact theory model. Though the main effects of the repeated measure analyses indicate that agent race was significant, these main effects are misleading and only represent differences among conditions. Agent race did not significantly interact with time and therefore does not indicate a significant difference in attitudes between pre- and post-test, or any simple main effects.

Further, the evaluation of the model assessing virtual intergroup contact theory did not reveal a direct effect of computer agent race on explicit and implicit attitudes toward Black individuals, when controlling for pre-test attitude scores. These findings may simply be indicative of a small difference between the attitudes toward Black individuals of participants that interacted with Black agents and those that interacted with White agents, but a larger difference between the pre- and post-test values of individuals that interacted with Black avatars. In addition, though there was no support for parasocial interaction or social presence as moderators of the relationship between agent race and attitudes, it is possible that increasing the customization ability of participants may have led to greater differences which may have revealed moderation effects.

In addition, it may be the case that virtual intergroup contact has demands for new requirements to reach successful reductions in prejudice. Though Allport's four requirements, required equal group status within the situation, common goals, intergroup cooperation, and the support of authorities, law, or custom, were met within this study it may be the case that individuals also need interactions with avatars rather than agents. In addition, interactions might require increased attention to racial cues.

This work does have other limitations which should be addressed. First, there may be methodological problems or problems associated with measurement of some variables utilized. Though most scales demonstrated acceptable reliability, some scales are still highly correlated and may not have functioned as theoretically expected. In addition, social presence demonstrated lower values of reliability and future research should utilize a scale which is more reliable. Further, factor analyses revealed that though 2 distinct factors should have emerged between embodiment questions and player-avatar identification questions, these items all had a tendency

to load on one factor, based on a 60/40 split rule. Though, embodiment questions did load distinctly on two factors, based on a 60/40 split rule.

In addition, the customization ability of participants could be enhanced. Participants customization choices were limited to accessories and they could be expanded to facial features, clothing, hair, and other choices. Increasing feelings of customization could influence both the Proteus effect model and the virtual intergroup contact theory model.

The study could have also benefited from greater and more engaging exposure to the stimuli. On one hand, participants that spend more time in the virtual environment might need more time in the environment for effects to take place. On the other, participants may have quickly become bored and frustrated because of a lack of a more engaging task. Participants that become bored or frustrated could feel like the interactions were negative even though the game deemed them as positive.

The study may also have been limited by the avatar and agent models that were utilized. Though the models were selected as the most popular choice of a prior study that asked individuals to design a Black or White avatar, it is possible that their appearances and racial indicators were not strong enough for participants to notice. A study that utilizes very stereotypical characters may find stronger effects. In addition, The Sims 4 does not utilize understandable language. Instead, the agents in the game utilize a gibberish language, and this may have been detrimental. The lack of understandable language may have made the agents seem less like social actors and more like computer agents that may not encourage any change in attitude toward the represented group. Repeating this study with characters that do speak would provide an interesting result if effects were found. Initially, it was suspected that the lack of language would be beneficial and would remove any extraneous variables. However, as noted

language may be essential to increasing the sociability and perception of agents as social actors that reflect the represented group.

In addition, the sample size utilized is a limitation. The sample that was utilized was made up of college students and could affect external validity of the study. Further, the limited sample size kept the cell sizes for particular conditions relatively small. Future work should extend this work by incorporating greater participants.

Still, this study does inform approach to theory moving forward. First, the Proteus effect needs to be assessed in varied levels of presence. Future work should assess the Proteus effect in immersive virtual reality and desktop games, but also vary these experiences by feelings of social presence. Examining differences in the results around the Proteus effect could determine the role of presence and need for truly social agents.

Overall, the results suggest that there is no evidence for the Proteus effect or virtual intergroup contact theory. That is, simply interacting with Black agents or utilizing Black avatars does not lead to changes in attitudes toward Black individuals. Similar to intergroup contact theory, this study utilized positive interactions and a simple common goal. However, future work should also inspect the other requirements of intergroup contact theory and affordances of virtual environments that may have an impact on attitudes. For example, future work could establish how useful intergroup cooperation is or examine differences in virtual intergroup contact theory with avatars and agents. Future work attempting to distinguish the Proteus effect might examine and utilize these models in more immersive settings.

Though there was no evidence of the Proteus effect taking place through embodiment, it may be the case that there are other factors that are required for the Proteus effect to take place through this route. For example, as described above, it may be the case that interactions with

agents and avatars make a difference in levels of presence or in the way that participants react to the stimuli. Future work should distinguish these effects and examine how they might contribute to the theoretical mechanisms of the Proteus effect, if it takes place through embodiment.

In addition, though there was no evidence of the Proteus effect taking place through the priming hypothesis, future work should examine features that could influence stereotype accessibility. For instance, utilizing avatars or agents that appear as stereotypical may lead to increased stereotype accessibility. Likewise, utilizing textual or language cues may increase stereotype accessibility as well. The Sims 4 does not utilize language or text and this limitation may have reduced the impact on stereotype accessibility. Future work could examine the impact of these cues as well. Still, as it stands in this experiment, priming did not occur through exposure to raced avatars and agents.

In sum, several important theoretical takeaways can be seen through this experiment. Most notably, there is reason to continue to investigate the idea of a virtual intergroup contact theory through simple interaction with virtual agents. Second, there was no evidence of the Proteus effect. This can be interpreted in two ways. On the one hand, this study might not have created conditions suited to the Proteus effect. On the other, the theoretical underpinnings of the Proteus effect may be inaccurate. Future research should continue to explore these issues to clarify and elaborate upon these theories.

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## Appendix A - Measures

### *Embodiment: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. I felt as if the virtual body was my body
2. It seemed as if I might have more than one body.
3. It seemed as though I was in two places at the same time.

### *Self-Presence Proto Scale: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. When using your avatar do you feel physically close to the objects and other avatars in the game/virtual environment?
2. When playing the game/using the virtual environment, how much do you feel like your avatar is an extension of your body within the game/virtual environment?
3. When something happens to your avatar's body, to what extent does it feel like it is happening to any part of your body?
4. When using your avatar, to what extent do you feel like your arm is elongated into the game/virtual environment through your avatar?
5. When using your avatar, to what extent do you feel like you can reach into the game/virtual environment through your avatar?
6. When playing the game/using the virtual environment to what extent do you feel like your hand is inside of the game/virtual environment?
7. When playing the game/using the virtual environment, how much do you feel like your avatar is a part of your body?

### *Parasocial Relationship Scale: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. I have the same qualities as the characters I interacted with.
2. I can imagine myself as the characters I interacted with.
3. I can identify with the characters I interacted with.
4. I hoped the characters I interacted with achieved their goals.
5. I care about what happens to the characters I interacted with.
6. I'd enjoy interacting with the characters in the game and my friends at the same time.

### *Empathy: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. The characters' emotions in the game were genuine
2. I experienced the same emotions as the characters when watching them.
3. I was in a similar emotional state as the characters when watching them.
4. I could feel the characters' emotions.
5. I could see the characters' point of view.
6. I recognized the characters' situation
7. I could understand what the characters were going through in the message.
8. The characters' reactions to the situation were understandable.
9. When watching the characters, I was fully absorbed.
10. I can relate to what the characters were going through in the game.
11. I can identify with the situation of the characters in the game.
12. I can identify with the characters in the game.

*Modern Racism Scale: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. Over the past few years, the government and news media have shown more respect to blacks than they deserve.
2. It is easy to understand the anger of black people in America.\*
3. Discrimination against blacks is no longer a problem in the United States.
4. Over the past few years, blacks have gotten more economically than they deserve
5. Blacks have more influence upon school desegregation plans they ought to have
6. Blacks are getting too demanding in their push for equal rights
7. Blacks should not push themselves where they are not wanted

*Word Stem Completion Task*

1. ATH
2. BR
3. BRO
4. LA
5. LOU
6. MU
7. MUS
8. POO
9. RH
10. STU

*Social Presence: (1 – Strongly Agree to 7 – Strongly Disagree)*

1. I had a feeling of being with others, while playing.
2. I often felt as if I was all alone.\*
3. The interface seemed to vanish, and I felt directly with the characters I was interacting with.
4. I was often aware of others in the environment.
5. I hardly noticed another individual.\*
6. Others were often aware of me in the room.
7. The other characters paid close attention to me.

*Demographic and Control Variables*

1. What is your age?
2. What is your gender?
3. What is your race and/or ethnicity?
4. What is your year in school?
5. I was successful in the game.
6. How often do you play video games?
7. Do you have prior experience with The Sims?

Note: \* denotes item was reverse coded



## Appendix B - Summary of Means and Standard Deviations, and Correlations for Relevant Variables

*Summary of Means and Standard Deviations, and Correlations for Relevant Variables*

|    |                              | <i>N</i> | <i>M</i> | <i>SD</i> | 1      | 2     | 3      | 4     | 5      | 6      | 7      | 8    | 9      | 10 |
|----|------------------------------|----------|----------|-----------|--------|-------|--------|-------|--------|--------|--------|------|--------|----|
| 1  | Pre-Test D Score (IAT)       | 242      | -0.32    | 0.35      | --     |       |        |       |        |        |        |      |        |    |
| 2  | Post-Test D Score (IAT)      | 242      | -0.19    | 0.34      | .448** | --    |        |       |        |        |        |      |        |    |
| 3  | Pre-Test Explicit Attitude   | 115      | 5.19     | 1.10      | 0.09   | 0.06  | --     |       |        |        |        |      |        |    |
| 4  | Post-Test Explicit Attitude  | 115      | 5.28     | 1.06      | 0.12   | 0.08  | .891** | --    |        |        |        |      |        |    |
| 5  | Embodiment                   | 115      | 4.54     | 1.28      | 0.03   | 0.04  | 0.08   | 0.08  | --     |        |        |      |        |    |
| 6  | Player Avatar Identification | 115      | 3.69     | 0.94      | 0.10   | 0.03  | -0.04  | -0.07 | .715** | --     |        |      |        |    |
| 7  | Parasocial Relationship      | 115      | 3.55     | 1.15      | 0.10   | -0.01 | -0.02  | -0.02 | .609** | .802** | --     |      |        |    |
| 8  | Word-Stem Completion Task    | 115      | 1.21     | 0.99      | -0.06  | 0.06  | -0.13  | -0.13 | 0.11   | 0.18   | 0.03   | --   |        |    |
| 9  | Social Presence              | 115      | 3.51     | 0.76      | -0.02  | -0.07 | -0.15  | -0.06 | .380** | .420** | .515** | 0.03 | --     |    |
| 11 | Empathy                      | 115      | 3.84     | 1.08      | 0.02   | -0.02 | 0.08   | 0.05  | .733** | .798** | .708** | 0.12 | .451** | -- |

Note . Values are Pearson's *r* correlation coefficients. \* denotes  $p = .005$ , \*\* denotes  $p = .01$

## Appendix C – Summary of Means and Standard Deviations for Relevant Variables by Condition

*Summary of Means and Standard Deviations for Relevant Variables By Condition*

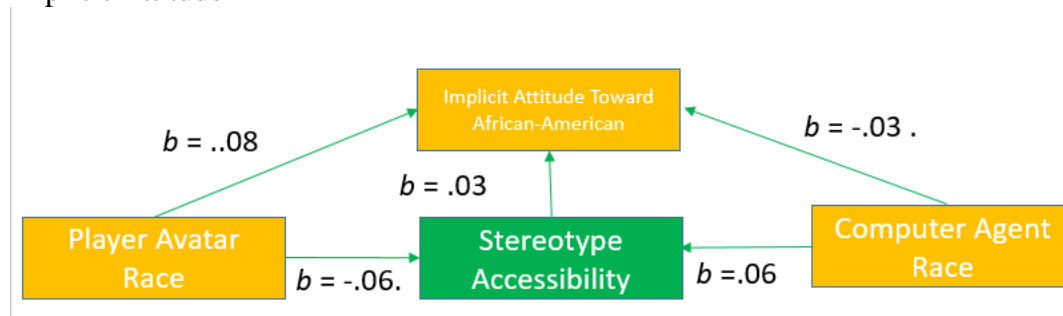
|    | Condition                         | Pre-IAT   | Post-IAT  | Pre-Exp.   | Post-Exp.  | Emb.       | PAI        | PSR        | Word Comp. | SP         | Emp.       |
|----|-----------------------------------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|
| 1  | Black Avatar, Black Agents        | -.25(.33) | -.12(.33) | 5.55(1.22) | 5.60(1.09) | 4.90(1)    | 3.76(.59)  | 3.52(.59)  | 1.50(1.38) | 3.48(.72)  | 3.77(.77)  |
| 2  | Custom Black Avatar, Black Agents | -.29(.34) | -.15(.35) | 5.46(.96)  | 5.48(.98)  | 4.56(1.07) | 3.57(.84)  | 3.50(.84)  | 1.15(.80)  | 3.49(.92)  | 3.74(1.16) |
| 3  | White Avatar, White Agents        | -.32(.35) | -.30(.36) | 5.1(.88)   | 5.22(.96)  | 5.04(1.31) | 4.12(1.01) | 4.16(1.21) | 1.20(.94)  | 3.79(.73)  | 4.09(1.37) |
| 4  | Custom White Avatar, White Agents | -.32(.34) | -.27(.34) | 4.72(.96)  | 4.98(1.08) | 4.96(.79)  | 3.90(.77)  | 3.51(.99)  | 1.5(.76)   | 3.58(.68)  | 3.96(.94)  |
| 5  | White Avatar, Black Agents        | -.24(.35) | -.19(.31) | 5.03(1.20) | 5.31(.96)  | 4.5(1.4)   | 3.33(1.11) | 3.47(1.36) | 1.07(.88)  | 3.36(1.02) | 3.54(1.13) |
| 6  | Custom White Avatar, Black Agents | -.29(.33) | -.16(.35) | 5.64(.79)  | 5.65(1.02) | 5.07(.89)  | 3.8(.86)   | 3.58(1.25) | 1.29(1.07) | 3.40(.86)  | 4.05(1.06) |
| 7  | Black Avatar, White Agents        | -.37(.38) | -.21(.39) | 4.8(1.07)  | 4.92(1.02) | 4.51(1.45) | 3.32(1.17) | 3.35(1.12) | 1.21(1.19) | 3.55(.62)  | 3.61(1.20) |
| 10 | Custom Black Avatar, White Agents | -.30(.34) | -.14(.29) | 5.21(1.44) | 5.15(1.32) | 4.93(.91)  | 3.77(.94)  | 3.32(1.15) | .79(.89)   | 3.23(.45)  | 4(.94)     |

*Note: Cells Contain Means and Standard Deviations - M(SD)*

*Pre-IAT = Pre-Test D Score (IAT); Post-IAT = Post-Test D Score (IAT); Pre-Exp = Pre-Test Explicit Attitude; Post-Exp = Post-Test Explicit Attitude; Emb. = Embodiment; PAI = Player Avatar Identification; PSR = Parasocial Relationship; Word Comp. = Word-Stem Completion Task; SP = Social Presence; Emp. = Empathy.*

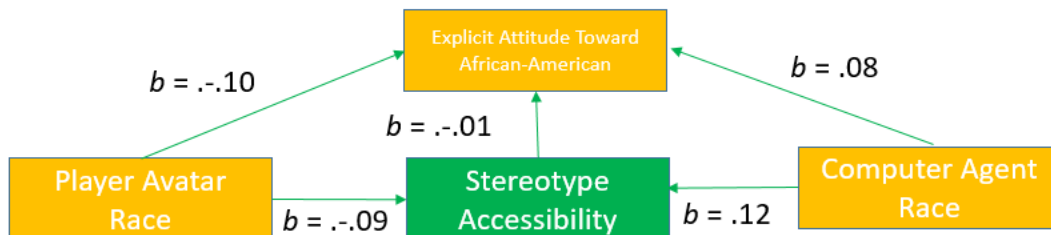
## Appendix D – Path Coefficients of the Priming Model of The Proteus Effect

Figure 6. Mediation Models Utilized in the Priming Model of the Proteus Effect on Implicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

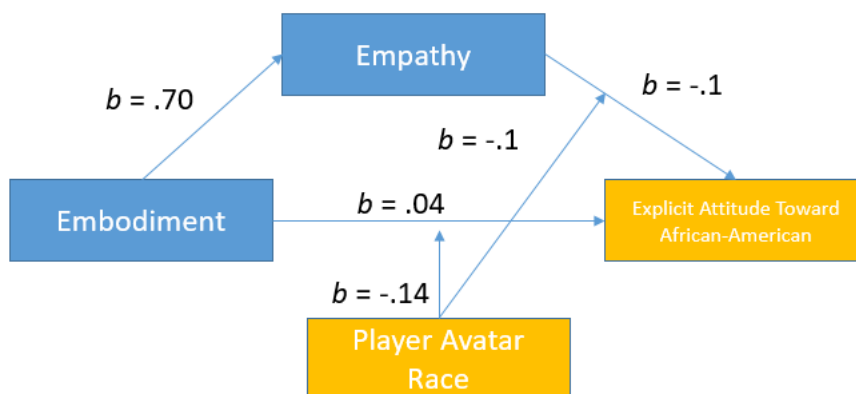
Figure 7. Mediation Models Utilized in the Priming Model of the Proteus Effect on Explicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

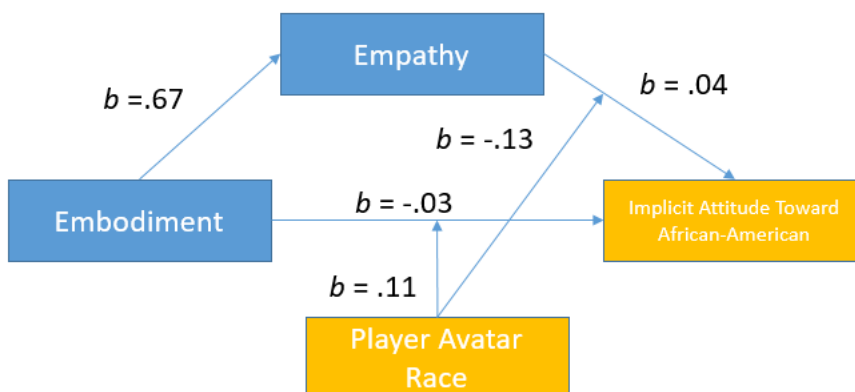
## Appendix E – Path Coefficients in the Self-Perception Model of the Proteus Effect

Figure 8. Moderated Mediation Models Utilized in the Self-Perception Model of the Proteus Effect on Explicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

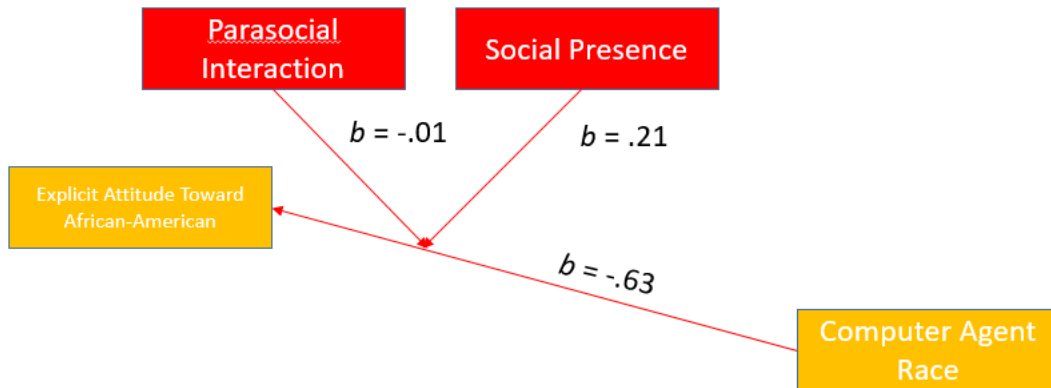
Figure 9. Moderated Mediation Models Utilized in the Self-Perception Model of the Proteus Effect on Implicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

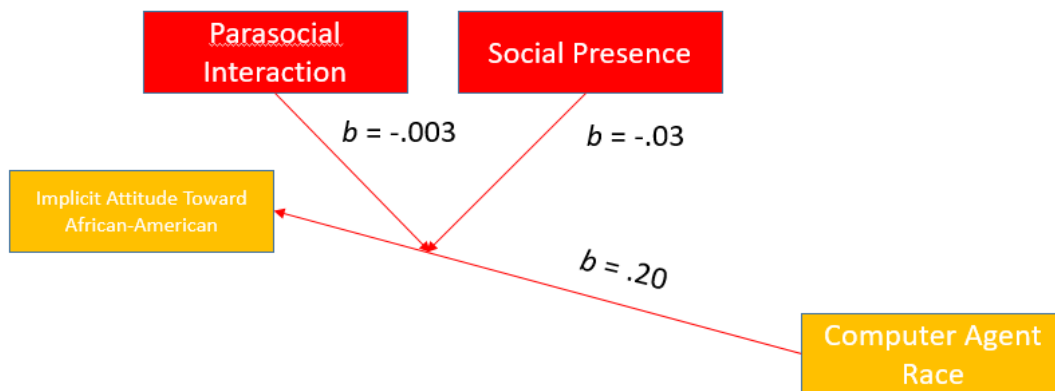
## Appendix F – Path Coefficients in the Virtual Intergroup Contact Theory Model

Figure 10. Moderation Models Utilized in the Virtual Intergroup Contact Theory on Explicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

Figure 11. Moderation Models Utilized in the Virtual Intergroup Contact Theory on Implicit Attitude



*Note: Attitude within model represents attitude change between pre- and post-test as pre-test scores were included as a control variable in all analyses including attitudes. Black Agent & Avatar race was coded as 1 and White Agent & Avatar race was coded as 0.*

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COMM 100: Mass Media and Society

Fall 2016                             Instructor  
Pennsylvania State University – State College, PA  
COMM 205 / WMST 205: Gender, Diversity, and the  
Media

Summer 2016                        Instructor  
Pennsylvania State University – State College, PA  
COMM 110: Media and Democracy

## **JOURNAL MANUSCRIPTS & RECENT RESEARCH PRESENTATIONS**

Dardis, F., Schmierbach, M., Sherrick, B., Waddell, F., **Aviles, J.**, Kumble, S., Bailey, E. (Forthcoming). Adver-Where? Comparing the Effectiveness of banner ads and Video Ads in Online Video Games. *Journal of Interactive Advertising*.

**Aviles, J.**, Schmierbach, M. (2017, June). Assessing avatar preferences: Do differences or similarities of user race and gender influence avatar evaluations?. International Communication Association, San Diego, CA.

**Aviles, J.**, Kumble, S., Schmierbach, M., Bailey, E., Waddell, F., Dardis, F., Huang, Y., Orne, S., Seeber, K., Wu, M. (2016, August). Effects of music pacing in a nutrition game on flow, and explicit and implicit attitudes. Association for Education in Journalism and Mass, Minneapolis, MN.