An Initial Investigation into Stereotypical Influences on Implicit Racial Bias and Embodied Avatars

Divine Maloney*
Clemson University

Andrew Robb†
Clemson University

ABSTRACT

In this paper, we present an initial study to investigate the effects stereotypical settings and avatar appearance of embodied avatars on a user's implicit racial bias. Literature demonstrates the effects embodied avatars can have on a users biases, both implicit and explicit. These shifts in bias and behavior could be caused by the avatars appearance or the stereotypical environment. Few studies have investigated the presence of stereotypical triggers and avatar representation in a learning, game-like environment. With virtual reality entertainment and training simulations becoming popular it is necessary to better understand the effects avatars can have on our behavior, perception, and biases. This study will investigate the potential effects of embodied avatars reinforcing a user's implicit racial biases.

Index Terms: embodied virtual avatars, implicit racial bias, social good

1 INTRODUCTION

Embodied virtual avatars have been shown to powerfully affect users behavior. For example, embodying a superhero leads to stronger prosocial behavior [10] and observing your avatar visibly lose weight while exercising increases the amount of time and effort spent exercising [2]. The behavioral effects embodied avatars can elicit demonstrate their ability to alter a users behavior. These behavioral changes may not always be positive. For example, Fox et al found embodying a highly sexualized avatar produced changes in womens behavior online and offline resulting in increased self-objectification; another example is embodying a childlike body in a childlike environment promotes childlike behavior [1]. A hypothesis to explain this are nudges from stereotypical avatar appearance and the environment. These subtle changes can affect behavior which can then alter a users cognitive associations. Previous research suggest that embodied avatars can effect ones implicit racial biases [9] [5]. If embodied avatars can provide such changes that can influence behavior and cognition, this is cause for concern as one of the primary uses of virtual reality (VR) are training applications and entertainment. As VR and embodied avatars are in its predominant stage this is a perfect opportunity to better understand embodied avatars and the subtle influences they can have on our behavior.

2 EMBODIED VIRTUAL AVATARS

Embodied Virtual avatars are defined as a visual representation of your own body seen through an immersive head-mounted display (HMD) that moves in synchrony with your own body motions and appear occupies the same space as your actual body. Many times however the virtual body does not need to resemble your actual body, or body motions to feel ownership over it. Prior research

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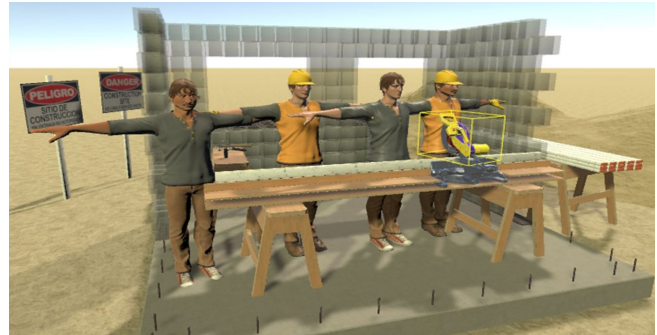*e-mail: divinem@clemson.edu
†e-mail:arobb@clemson.edu

Figure 1: Four Avatars: Two Hispanic/Latinx Male and Two White Males, in worker attire and regular clothing

demonstrates a users virtual limbs being lengthen still produces feelings of body ownership and threat [8]. Body ownership illusion occurs when a user perceives that the virtual avatar is actually their own body, and behaves in ways that indicate this is true.

2.1 Implicit Racial Bias and Embodied Virtual Avatars

Racial bias is commonly expressed internally and externally. Implicit biases are associations that are automatic unconscious attributions towards a social group. Explicit biases are conscious attributions and beliefs towards a particular social group [3]. Many times individuals are not aware of their own biases, which can be inconsistent with a users conscious beliefs [6]. Biases in embodied virtual avatars has yielded conflicting results; one study found that implicit racial bias increased after embodying an avatar of another race [5], while another study found that implicit racial bias decreased [9]. Groom et al. demonstrated that the stereotypical setting could potentially increase a users implicit racial bias due to the stereotype of African-Americans and job interviews. The fact that embodied avatars may promote such shifts in implicit attitudes and behavior is of serious cause for concern because the user is unlikely to recognize these shifts.

3 EXPERIMENT DESIGN

To investigate the area of avatar representation and how it affects implicit racial bias, we are conducting a VR educational experiment, instructing participants on construction basics (laying mortar, cutting wood). This experiment explores the stereotype of Hispanic/Latinx and manual labor, specifically construction work. The avatars, one of each race (Hispanic/Latinx and White) are dressed in different clothing based on condition, two in worker clothing, two in plain clothing (see Figure 1). The two avatars in regular clothing are placed in the stereotypical Lego setting. This condition includes vibrant colors, and play-like environment with tools such as glue, paper cutter, and has LEGO blocks. The other condition is a more realistic setting, it includes mortar, trowel, a saw and cinder blocks. In both conditions participants are tasked with the same objective, finish building the partially built structure.

After informed consent was obtained, participants completed a

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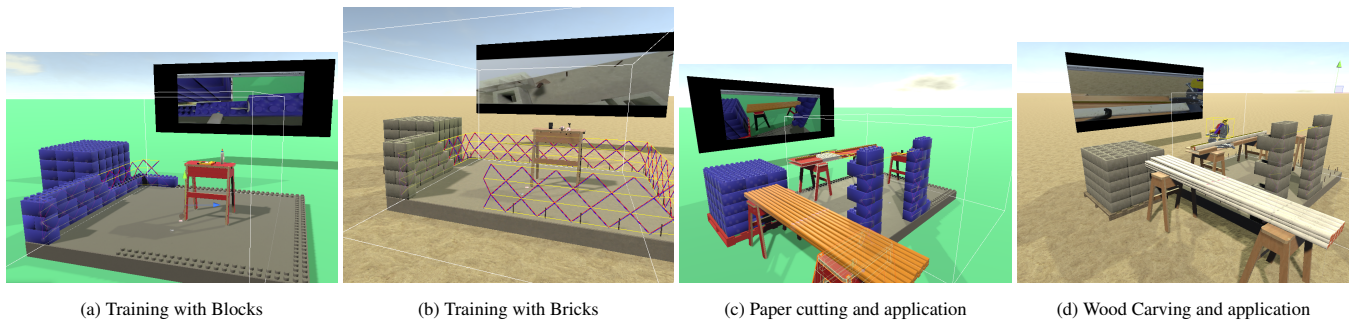| (a) Training with Blocks | (b) Training with Bricks | (c) Paper cutting and application | (d) Wood Carving and application |

Figure 2: Lego Environment and Real Environment

demographics questionnaire and Implicit Association Test (IAT)[4] on a desktop computer. After at least three days participants returned to the lab and were randomly assigned to either condition (Hispanic/Latinx Worker Avatar, Hispanic/Latinx Regular Avatar, White Worker Avatar, White Regular Avatar). After being fitted with the proper equipment (Vive) trackers, and Head mounted display, participants were asked to stand in the T-pose to calibrate the device. participants are first placed in front of a mirror and asked to do a manipulation task and acquaint themselves with the virtual body. Following the calibration, there is an orientation phase (reinforcing body ownership illusion), the experimenter instructs participants to conduct a series of self-presence gestures, such as touching their toes, squatting, etc in the virtual mirror.

Next participants watch a short video on how to use the equipment and tools. In the first learning environment participants must correctly place the bricks or lego blocks to complete the basis of the structure. In the following scene participants are instructed on the basics of wood cutting from a video. They are then tasked to measure, cut, and correctly assemble a door frame. After placing the doorframe correctly they must place bricks/blocks on top of the doorframe to complete the doorway. Following both applied learning sessions, participants must then verbally describe what they did to two idle virtual humans. The virtual humans are both races of Hispanic/Latinx and White. After the dialogue with the virtual human participants are removed from the environment and complete post questionnaires.

3.1 Metrics

We used the following metrics.

Implicit Association Test: Before and directly following the VR experiment participants take the Implicit Association Test (IAT, commonly used to measure implicit racial bias), to measure the degree of change based on the race and representation of the avatar; similar to Groom et al.

Interpersonal Measures: participants are measured on the interaction of a virtual human of both races. We measure gaze behavior, distance stood near the virtual human, and amount of time spent speaking to the virtual human.

Other questionnaires that we include are Presence Questionnaire, Simulator Sickness, Task Load Cognition, and Construction experience survey.

3.2 Discussion

Participants will be recruited from the university population and from surrounding area. Of the 80 participants we plan to recruit, so far only 12 have completed both parts of the experiment, another 18 have completed the first session. Of those who have completed the total experiment their data has not yet been analyzed. The total experience last between 20-60minutes. This experiment is different from past experiments that have explored the area of racial bias and

stereotypes due to the learning task, game like environment, and stereotypical representation of the avatar.

4 CONCLUSION

This proposed study will explore the effect of implicit racial associations specifically in stereotyped scenarios. Many studies have explored this area but with mundane activities such as walking[9], or drumming[7], our study explores the area of implicit racial bias in learning and game scenario. The results of this research will suggest insight on implicit racial associations in virtual reality.

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