Mitigating Implicit Biases with Virtual Avatars and AR

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Problem Statement and Related Work

As we re-acclimate to social interactions following the pandemic and other issues of racial injustices, we must be aware of how our actions may affect those around us. We must do this because there is a growing deficiency in understanding the perspectives of people of different nationalities, ~~weight~~s, ages, genders, sexualities, etc. As users, we need an application that allows us to practice mitigating these implicit biases. Currently, the virtual avatars project just takes a selfie of the user and creates the virtual avatar in a virtual environment that the user can choose through unity. There is not an interactive aspect of the project yet, and we would like to add a feature to the project where a user can experience the virtual environment and interact with other virtual avatars using VR or AR hardware such as HoloLens. Our motivation is to utilize the virtual space to simulate real-world situations that can allow a user to practice how to deal with certain situations that may propel or lessen implicit biases if the user acts in a certain way.

Need Finding

We will be using surveys to identify any current biases that our users may have. We feel that this would be an effective way of capturing the predispositions of people of different nationalities, ages, genders, sexualities, etc. Some survey questions (around 7 to 10 questions total) are the following: Political leanings, state/place of origin, general climate (maybe ask about family or racial, sexual, etc. divides where they grew up), also some questions about what the participants would do in certain scenarios. We will make sure to start with a disclaimer and trigger warning to let the participant know that they will be answering personal and sensitive questions. We will utilize our instructors and mentors as a means for subject-matter expertise. Here is a look into our Participant Recruitment/ Survey Process:

o   Since we will be using between-subjects testing, each participant will have to complete a survey at least once.
o   We will also ask our instructors and mentors for their suggestions in the participant recruitment process since they have more experience in this area

Included is our sample survey protocol:

BIAS QUESTIONS:

Are you aware of the meaning of implicit bias?

- Yes
- No

What biases have you experienced, if any? (select all that apply)

- Discrimination/harrasement in public
- Discrimination/harrasment in the workplace
- Misgendering
- Violence
- Other _____

(OPTIONAL)

If you wish, specify what the bias was

DISCLAIMER: This survey includes questions that ask of your opinions and experiences with race, sex, gender, and nationality. Fill out at your own risk. All responses are anonymous and no data will be shared with anyone other than the professor and the team.

GENERAL:

How would you describe your race?

- White/Caucasian
- Black/African American
- Asian/Pacific Islander
- Hispanic/Latino
- Other _____

Are you an immigrant from somewhere other than the United States?

- Yes
- No

(IF YES)

- Where did you immigrate from? _____

How would you describe your sexual orientation?

- Heterosexual/Straight
- Gay
- Lesbian
- Bisexual
- Pansexual
- Asexual
- Other _____

Fig. 1: A sample screenshot of some of the questions that we are asking participants in the survey/questionnaire form before the study.

Prototyping

For the actual project, we will be creating the virtual avatars and environments using packages in Unity provided by our TA/mentor Qinqi In terms of hardware, we will be using Microsoft HoloLens to put our users in the virtual environments. For the means of prototyping, we will be using storyboarding for potential screens that the user will see. These will most likely be presented electronically on Miro. Our prototyping will not cover all features; however, it will show the user some of the scenarios they will go through. We will be using dynamic pages to represent environments; however, we hope that the process of taking a selfie to be created into a virtual avatar can be done using an actual device (either a webcam or a mobile device).

B. Section Headings

Our list of features includes the ability of a user to take a selfie to create virtual avatar of from their face. We also want a user to use Hololens (AR) to experience a virtual and augmented reality around them. The user can interact with the environment using their hands by performing actions such as clicking on icons or typing. We are using the AR core in Unity Assets for our primary package. One new feature we would like to implement is a user can answer questions about their experiences with implicit biases during the scenarios. We also want a user to be able to customize/choose the virtual environment that they would like to interact in. Also, we would like a user to interact with other avatars in the virtual environment. Some of the technical challenges that will face include getting communication between our unity project and Hololens, creating or coming up with enough virtual environments for the user, creating different scenarios for the user to interact in, establishing communication between the user and another avatar in the program, actually working with the Hololens hardware since it's not completely available to us without scheduling meetings with TA/mentor, working in Unity code (group members do not have much experience with the platform, however, having a package sent to us will be a useful starting point for us). This will not be a mobile app, this will most likely be accessed on a desktop, and we do not have the time or resources to apply this project to a mobile setting so there are no tradeoffs.

Fig. 2: A sample image of the AR hardware we will attempt to use in our project with help from mentors and TAs

User Study / Evaluation

For our evaluation process, we hypothesize that users will show an overall decrease in implicit biases after using our virtual avatar experience. Our baseline will consist of our participants' initial results from the survey they will take prior to using our virtual avatar program. This survey will reveal a measure of the users' initial implicit biases which we can use after our experiment to analyze the effects of our virtual avatar program. To accomplish this, we will be running a between-subjects experiment with approximately 20 participants. To state that our proposed solution is better than what currently exists, we will use the calculated differences in recorded implicit biases (taken from our survey results) before and after participants used our virtual avatar AR experience. Based on the magnitude of this metric, we should be able to make effective comparisons to similar research done on the effects of the use of virtual avatars on users' implicit biases. For our hypothesis for evaluation, we believe that users will show a decrease in implicit biases after using a virtual avatar AR experience. For our control condition, our baseline will consist of the users' initial survey results prior to using our virtual avatar AR experience. We will be running between subjects experiments with participants. To state that our proposed solution is better than what exists today, we will be measuring the difference in recorded implicit biases (measured from survey results) before and after participants use our virtual avatar AR experience.

Of course, with the time that we have left in the semester and the resources that we have at our disposal, not all things will go according to plan. As Murphy's Law states, "Anything that can go wrong will go wrong." Therefore, we have some alternative plans for our project in the likely event that things do not go our way. If we cannot interact with other virtual avatars, we have only one avatar (the user) experience a virtual setting and ask them questions that they can answer using the interactive features of Hololens ("what would you do" style questions). If we cannot allow the user to customize their virtual experience, we can just create a few sample environments that are general and common locations, and have the user interact within them. Starting with one common scenario is a good starting point (an airplane, a cafe, a waiting line at the grocery store, etc.). If we cannot connect the AR to the Unity virtual environment, then we will rely on the building of a virtual avatar to allow a user to at least answer some questions or experience the virtual environment on their desktops where they can answer some questions about implicit bias.

Timeline and Deliverables

- Timeline for our Final Project:
  - -11/19/2020: First proposal drafts due at 11:59 pm
  - -11/29/2020: Final project presentations includes videos and a live Q&A from the class

- -12/1/2020: Final project presentations includes videos and a live Q&A from the class

  -12/8/2020: Working Product Due - Final Demo and Showcase day in HCI Lab

  -12/17/2020: Final Deadline for the completed website and project submission.
- Deliverables:
  - Survey (~ 20 people, different backgrounds if possible)
  - Implemented code in GitHub Classroom
    - Repository: https://github.com/HCI-UD/finalproject-3virtualavatar
  - Second/Final proposal with results integrated
  - Links to surveys you've used, videos, images
  - Team information, including profile, image, roles, and contributions to the project

Team Bios

- Drew Hunt
  - Field of study:
    - Software Engineering and Cognitive Development
  - Role:
    - Team Member
    - Virtual Environment Creation
    - Proposal Writing/Formatting
    - Unity Sampling (Avatar Creation)
  - Skills:
    - Experience in multiple coding languages (Java, C, C++, Python)

- Experience working in Agile Software Development (team projects)
- Skills in communicating effectively with clients or study participants

- Debra Lymon

  - Field of study:
    - Computer Science
  - Role:
    - Team Member
  - Skills:
    - Experience in multiple coding languages (Java, C++, Python, JavaScript)
    - Experience in working on research projects (in an Intro to CS Research class)
    - Experience working in Agile Software Development (in team projects)

- Ben Newlin

  - Field of study:
    - Computer Science and Human Centered Computing
  - Role:
    - Team Member
    - Survey Design, Collection and Need Finding
  - Skills:
    - Experience in multiple coding languages (Java, Python, C, HTML)
    - Experience in hardware troubleshooting, software troubleshooting and computer networking

- - Experience working in Agile Software Development (in team projects)
  - Experience in creating and conducting surveys and podcast-style interviews

- Weitong Sun (Lexi)

  - Field of study:
    - Computer Science and Art
  - Role:
    - Team Member
    - Website Designer

- Skills:
  - Experience in multiple coding languages (Java, C++, Python, JavaScript)
  - Experience working in Agile Software Development (in team projects)
  - Experience in an Information Design Science project using Flutter, firebase, and API.

H.   *References*