Context and Motivation + Research Question - daniel

We will present our research project plan that aims to explore how Virtual Reality (VR) can foster empathy and understanding in conflict situations.

Empathy plays a key role in preserving human social relationships, yet, the increasing polarisation, or division of belief, in the world has led to a lack of empathy. This can contribute to conflicts as individuals and groups become more entrenched in their views, unable or unwilling to see things from the perspectives of others.

Previous research has shown that viewing a conflict scenario from an "outgroup" perspective through a medium such as 2D video can help us understand and feel the other's emotions. This suggests we can promote empathy and understanding, however, as most people are unlikely to view explicit empathy media without incentive, scholar have begun to explore how engaging in other activities may improve empathy.

There are studies surrounding empathy-building in VR and it has been proclaimed as "the ultimate empathy machine" for its immersiveness. These studies have explored how VR can effectively enhance empathy using conflict or warfare scenarios or if VR can be more effective than traditional mediums.

However, there are a number of limitations, such as the inclusion of a few studies in their meta-analysis (due to the fact that the field is in its early stages), the absence of any measures of empathy before the use of VR or against a 2D video scenario, and the type of virtual environment used. It is important that we use modern, technologically advanced VR technologies as opposed to auditory-only simulations since cognitive empathy benefits from embodied experiences.

Therefore, the aim of our study is to explore and answer the following research question: Does Virtual Reality induce more of an empathic response than 2D video when experiencing a scenario of conflict?

The Implementation Plan

Now that we've gone over our research question, it's time to go over what we actually plan on implementing to answer it. We plan on creating an immersive VR environment using Unity, which will replicate a controversial conflict scenario - For example, a war. This scenario will be First-Person, thus literally putting the user in the shoes of someone in that environment, in order to invoke as much emotional response from the user as possible. We will then be rendering this scenario as both a 2D video as well as the 3D VR environment. By doing this, we will be able to have as fair of a comparison between 2D video and VR as possible, as the only difference between the 2 will be the environment itself.

Elaborating a bit further on the VR environment, we will not be making it interactive. This is once again, so that the VR environment's scenario will be as similar as the 2D video as possible, thus making the comparison as fair as possible. Additionally, we will be trying to use open-source unity assets where possible to speed up development. Details regarding what sources exist will be discussed later in this video.

Evaluation Study

*Experimental design/physiological (**Troy**)*

After creating our videos, we will undergo an evaluation study to test the hypothesis that participants will have a stronger emotional response when experiencing physical conflict in a VR video compared to a 2D video.(slide) For the study's independent variable, we are using media format: VR Vs 2D. And For the dependent variables, we will compare physiological and emotional measures. We have decided on a within-subject experimental design to account for our small participant size of 4 or 6 people. To minimize carryover effects half the participants will experience VR first, and the other half will watch the 2D video first.

For our physiological measure, we will collect max and average heart rates using wrist monitors to record participants' involuntary reactions to the videos. Which we can then compare using a paired sample t-test.

*Over questionnaires/self reports (**Vinayak**)*

While objective, quantitative measures such as heart rate give us a good understanding of the participants approximate mood during experimentation, it is also important to gain a holistic understanding of their state of mind. We plan on gathering participants thoughts on the scenarios they went through in the form of pre & post questionnaires and self reports where participants can write freely, where we'll ask about their feelings, mood, and attitude.

As questionnaires can be subjective in their assessment, we plan on using reflexive thematic analysis to minimize bias where possible. Thematic analysis will allow us to assess the qualitative data which is the participants responses by focussing on patterns and themes across the data, going beyond simple word or phrase analysis. The general process includes familiarizing ourselves with participants written thoughts, generating initial codes before at last searching for, reviewing, & defining themes. Reflexivity requires the assessor to examine their own biases and take that into account. Reflexive thematic analysis is a really well grounded area of research and should allow us to assess participants in the fairest manner possible.

Feasibility

*Over slides (**Dan**)*

Creating a live conflict that is realistic and detailed will likely be infeasible for a project of this size as it requires advanced animation skills. We hope to show the aftermath of a conflict instead, with minimal animations required.

To run the 2D simulation, we have access to a large monitor suitable for our study, and for our 3D simulation, we will use a Meta Quest Pro that we have tested and is confirmed to work. Both simulations can be run on our laptop devices. As for data collection, we will measure heart rate using an accurate heart rate monitor that the subjects will wear during the study..

For our implementation, we have decided to use Unity for our simulation, from where we can then import public premade assets from the Unity asset store to use in our implementation.

*Over Unity project (**Jeremy**)*

To demonstrate the feasibility of this project, we have created a small Unity demo application. As you can see, we can take terrain from the Unity asset store and populate it. This can then be rendered into a 2D video or viewed on a VR headset (this being a simulation of what will be viewed on the headset). We can also add effects like fire and sounds to further immerse the participant. Since we have a limited selection of assets at our disposal, if the environment we create is not convincing enough, there is also an opportunity for us to use photo scans of real places, though as you can see, these are not very detailed. The whole experience will likely be fairly short, consisting of several scenes to show the participants.

Expected Results and Research Contribution