In Their Shoes: Using Virtual Reality to Foster Empathy

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INTRODUCTION & BACKGROUND

As our society is becoming increasingly divided, it is important that people become more empathetic. Empathy allows people to visualize themselves in others' shoes and view the world from their perspective, a vital skill that allows for personal growth and learning and increased trust and resilience, which can greatly benefit modern politics. Psychologists and researchers are experimenting with new tools to develop empathy, and one of the most promising is virtual reality (VR). Using VR simulation, people can become more empathetic towards those who are unlike themselves, or even learn more about different phenomena and their impacts.

A pressing global issue is climate change, and VR can help viewers understand how their community is impacted by climate change because it creates a more personal connection with the viewer. In light of major natural disasters and tragic events, there has been a powerful call to action to help prevent worsening climate change. In my research project, I analyzed VR simulations pertaining to climate change and explored how people's empathy levels change as a result of watching them.

Empathy

Humans are innately inclined to project their own emotional state onto others, so they are unable to see through others' perspectives. The **right supramarginal gyrus** region of the brain (part of the cerebral cortex, located at the junction of the parietal, temporal, and frontal lobe) creates empathy by separating our emotional state from other people. When it is not functioning at full potential, empathy is reduced, according to past research on the neuroscience of empathy. Types of empathy include:

- **Cognitive Empathy** - thinking about someone else's thoughts and feelings without internalization
- **Emotional Empathy** - physically feeling someone else's feelings
- **Compassionate Empathy** - understanding and feeling others' feelings, but also wanting to take action and help

Virtual Reality (VR)

Artificially created 3D environment that allows for the full immersion of the viewer and natural movements/interaction, viewed through special gear (e.g., goggle headset). People can experience being in completely different circumstances, thus helping to foster perspective-taking and empathy.

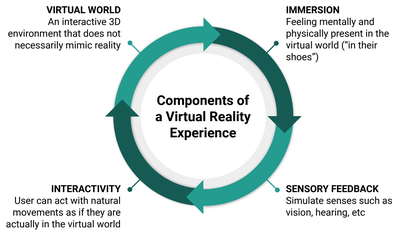

Figure 1: Components of a VR Experience

RESEARCH METHODOLOGIES

Materials

- Pre- & Post-Surveys, Consent Forms
- Google Cardboard VR Goggles
- VR Simulation 1: Global Warming: Signs & Effects by AP News,
- VR Simulation 2: Climate Change in Fiji in VR: 'Our Home, Our People' by World Bank

Research Process

Inquiry Approach - **Correlational Research**

1. Found existing VR simulations for climate change & analyzed aspects of the simulations that create empathy based on preliminary research of key factors for fostering empathy
2. Created surveys based on the content of the simulation with the most potential for generating empathy (**Simulation 1**)
3. Data collection, analysis, and comparisons of empathy change

Data Collection Methodologies

- **Pre-survey** about participants' perspectives/empathy on climate change
- **Post-survey** after the simulation to show how empathy changed
- Quantified survey responses for increased objectivity using the **Likert Scale**
  - Values from range from 1 ("Strongly Disagree") to 5 ("Strongly Agree")
  - Higher value responses indicate more empathy
- Compared empathy change between different age groups and genders
- **Paired Student's T-Test** to determine data's statistical significance
  - Paired pre- and post-survey responses
  - P-value (probability of random data) < 5% indicates statistical significance

VR SIMULATION ANALYSIS BASED ON KEY EMPATHY ATTRIBUTES

Synopsis of Simulation 1 (General Causes & Effects)

- Describes global warming trends and impacts using scientific data, with emphasis on three aspects
  - Glaciers melting - causes, vivid/immersive simulation
  - Flooding - causes, immersive simulation, connection to daily life
  - Wildfires - causes, immersive and vivid simulation/imagery
- Directly connects climate change to human impact

Synopsis of Simulation 2 (Climate Change in Fiji)

- Describes how climate change has affected the lives of Fijians
- Shows personal stories of the Fijians' lives and how they react to the impacts of climate change

Empathy Factors	Simulation 1	Simulation 2
Immersion	Melting glaciers, flooding, wildfire, etc.	Visiting Fiji, affected by climate change
Natural Movements	Head movements	Head movements
Personal Connection	Watching car get washed away by flooding, wildfires engulfing	Seeing the lives of victims of natural disasters
First-person	No first-person experience	Meeting the victims
Informed Awareness	Explaining the science and causes of climate changes	No informed awareness component
Storytelling	No plot-based storytelling, but vivid imagery of climate change impacts	Explaining how Fijians have reacted and adapted to climate change
Direct connection to human actions	Describes what humans have done to contribute to worsening climate change	No explanation of human actions causing the climate change impacts
Storyline interaction	No storyline interaction	No storyline interaction
Motivation to take action or help	Directly motivates through description of what humans can do	Explains what Fijians are doing but does not connect to human actions

Figure 2: Comparison of VR Simulations

Simulation 1 was chosen for the surveys driven by the analysis through preliminary research. It had the most attributes for creating empathy, from immersion to connection to human actions and daily lives. In addition, it had the most potential for compassionate empathy because not only does it show the impacts of climate change, it also shows how humans have contributed to it. People can make small corrections in their daily lives to make an overall impact on the climate. The Fiji simulation, while emotional, does not hold enough potential for compassionate empathy, crucial for making a difference in the world perception and priority of climate change.

OVERALL DATA ANALYSIS SUMMARY

Survey Questions	Pre-Survey Mean*	Post-Survey Mean*	Mean Difference	Empathy Increase (%)	p-value	Statistical Significance**
How familiar are you with the term 'climate change'?	3.8	4.4	0.5	14%	0.00114	YES
How big of a priority is climate change to you?	3.3	4.3	1.1	33%	0.00011	YES
Climate change is a real problem	4.4	4.9	0.5	11%	0.00114	YES
Weather in your area is generally changing from what it used to be (ex: changing frequency of rainfall, wildfires, etc.)	4.0	4.1	0.1	2%	0.53853	NO
Climate change is directly affecting/will directly affect my generation	3.8	4.7	0.9	24%	0.00007	YES
Climate change is not solely worsened by nature itself	3.5	4.2	0.8	22%	0.00639	YES
I want to actively take steps to reduce my negative impact on the environment and climate (ex: reducing energy consumption, recycling, etc.)	4.2	4.7	0.5	12%	0.00038	YES
Collective human actions to protect the climate will have a positive impact on climate change	4.1	4.8	0.7	16%	0.00011	YES
Actions of industries and government policies can impact climate change	4.1	4.7	0.5	13%	0.00634	YES
Protecting the climate is more important than protecting jobs in industries that harm the environment	3.9	4.3	0.5	12%	0.03099	YES

** Likert Scale (1=Strongly Disagree to 5=Strongly Agree)*

*** Statistically Significant (Yes, if p-value in Student's T-Test is < 0.05)*

Figure 3: Overall Data Analysis per Survey Question

EMPATHY CHANGE BY AGE & GENDER

AGE

Survey Questions	Pre-Survey*	Post-Survey*	Empathy Increase (%)	p-value	Statistical Significance**
	Age (<= 24)				
How familiar are you with the term 'climate change'?	4.3	4.3	2%	0.5863	NO
How big of a priority is climate change to you?	2.8	4.2	52%	0.0015	YES
Climate change is a real problem	4.4	4.8	9%	0.0172	YES
	Age (> 24)				
How familiar are you with the term 'climate change'?	3.3	4.4	33%	0.0002	YES
How big of a priority is climate change to you?	3.8	4.5	20%	0.0316	YES
Climate change is a real problem	4.3	4.9	13%	0.0271	YES

GENDER

Survey Questions	Pre-Survey*	Post-Survey*	Empathy Increase (%)	p-value	Statistically Significant**
	Male				
How familiar are you with the term 'climate change'?	3.8	4.5	17%	0.04554	YES
How big of a priority is climate change to you?	3.5	4.3	21%	0.05375	NO
Climate change is a real problem	4.4	4.8	9%	0.02511	YES
	Female				
How familiar are you with the term 'climate change'?	3.8	4.3	12%	0.02688	YES
How big of a priority is climate change to you?	3.0	4.4	46%	0.00079	YES
Climate change is a real problem	4.5	4.9	10%	0.02688	YES

* Likert Scale (1=Strongly Disagree to 5=Strongly Agree)

** Statistically Significant (Yes, if p-value in Student's T-Test is < 0.05)

RESULTS & CONCLUSION

Compassionate empathy, crucial for making a difference in climate change, increased by a statistically significant amount among participants in terms of recognizing climate change as a real problem, understanding its causes and impact and making it a priority to take positive actions and improve the situation.

Familiarity of climate change as a real problem and acknowledgement that human actions, governmental policies, and industrial impact have contributed to the worsening climate change significantly increased across the board among survey participants.

Post VR simulation, individuals regardless of age and gender seemed significantly more motivated to make climate change initiatives as a priority to save the planet earth.

Results varied for different age groups and genders:

- Younger people were more aware of climate change prior to the survey, but older people learned more about it due to the simulation.
- The priority for climate change in younger population increased more than that of the older population, which may relate to increased social activism trends in youth about about social, political, and environmental issues.
- Climate change became a higher priority for females, but factors such as awareness and understanding the climate change impact increased by approx. the same amount. This may corroborate the research finding that females' empathy level is more likely to be influenced compared to males'.

NEXT STEPS

- Compare empathy change, not only right after VR simulation experience, but also at a later time period to analyze both its short-term and long-term impact.
- Explore social activism using VR by developing and testing various immersive VR simulations to increase awareness and develop positive empathy to address a variety of social issues e.g., homelessness, racial injustice, refugee crisis, immigration issues, etc.
- Explore combination of VR experience (using widely available gadgets) and social-emotional learning techniques to impact various societal, cultural, educational, and environmental issues.

ACKNOWLEDGEMENTS & REFERENCES

Acknowledgements

Special thanks to Kathryn Shugart, Ms. Tarn Wilson, and PAUSD AAR for helping make this project possible.

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