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Developing an Avatar in Virtual Reality for Mental Health Treatment

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I. Introduction

The utilization of avatars in virtual reality (VR) has emerged as a tool for addressing psychological mental disorders, presenting a unique opportunity to enhance therapeutic interventions [1]. This paper focuses on the development of a naturalistic avatar in VR to represent an individual as a "healer" or a "therapist". Leveraging VR and character creation software tools, we have developed the avatar based on the provided image of an Indigenous healer, including intricate facial expressions, synchronized lip movements, and lifelike body gestures.

The primary objective of this work is to develop a naturalistic avatar with the potential for utilization in mental health treatments and replication of real-world therapeutic interactions, building on the success observed in previous research where the usage of avatars contributed to mood change [1], self-compassion [2], and reduction in the severity of depression [3]. Our methodology involves the detailed creation of the avatar, emphasizing the preservation of the individual's unique characteristics and features.

II. Method

The process of avatar creation begins with capturing a high-quality headshot for the avatar's facial features. Character Creator software seamlessly translates this 2D headshot into a realistic 3D face and applies rigging techniques to facilitate realistic movements. The subsequent stage involves animation creation, which may necessitate combining different animations for specific gestures. Next, facial expressions and lip synchronization are added based on specific audios for realism, utilizing iClone's AccuLip tool.

For immersive VR setup, we utilize the Oculus Rift headset to provide users with a fully immersive experience. In the game environment, the avatar is scripted to respond to player input or events, allowing various movements and interactions. Unity animation state machine is utilized to ensure smooth transition between various movements. Unity's game engine facilitates user friendly controls and intuitive interactions that enhance the avatar's integration within the VR environment (Fig.1).

Fig. 1 The avatar of an Indigenous healer based on his picture in VR environment.

III. Conclusions

In this research we have developed a naturalistic avatar of a person based on their headshot in VR. Having successfully passed laboratory tests, it is ready to be used in future studies. In the future, we aim to use the avatar as a digital representation of an Indigenous healer in a virtual farm which is designed based on Indigenous culture to explore the opportunities it may have in helping to address mental health issues of Indigenous youth.

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References

1. Osimo, S., Pizarro, R., Spanlang, B. et al. Conversations between self and self as Sigmund Freud—A virtual body ownership paradigm for self counselling. Sci Rep 5, 13899 (2015). https://doi.org/10.1038/srep13899.
2. Falconer, Caroline J., et al. "Embodying Compassion: A Virtual Reality Paradigm for Overcoming Excessive Self-Criticism." PloS One, vol. 9, no. 11, 2014, pp. e111933–e111933, https://doi.org/10.1371/journal.pone.0111933.
3. Falconer, Caroline J., et al. "Embodying Self-Compassion within Virtual Reality and Its Effects on Patients with Depression." BJPsych Open, vol. 2, no. 1, 2016, pp. 74–80, https://doi.org/10.1192/bjpo.bp.115.002147.