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Investigating the Effect of Animal Avatars on Users' Self-disclosure During Interaction in VR space

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Abstract

In social VR, users can communicate with others by expressing their own appearance by customizing an avatar. Several studies have shown that the appearance of the avatars that users use in social VR affects their self-disclosure. In this study, motivated by the findings of previous studies that interaction with animals has positive effects on humans, we use animal avatars in a VR space. To investigate the effect of the animal avatars' appearance on user's self-disclosure and subjective responses, we propose a one-to-one communication system in which the user and interlocutor use animal avatars. The system converts the user's non-verbal information acquired by the sensors mounted on the head-mounted display (HMD) into the movements of the animal avatar and transmits them to the interlocutor. We also describe the design of an experiment using this system.

CCS Concepts

• ***Human-centered computing*** → ***Virtual reality;***

1. Introduction

The social VR application allows multiple users to interact with each other through a shared virtual space. In recent years, social VR has attracted significant research interest as a remote communication tool and has been used for a wide variety of purposes [Inc22, Sim22, CLI22]. In social VR, users can communicate with others by expressing their own appearance by customizing an avatar. To support rich communication through avatars, several studies have investigated the effect of the avatars' appearance on users' self-disclosure.

Self-disclosure is a process between at least two individuals where one verbally divulges something personal about themselves (e.g., thoughts, feelings, experiences, etc.) to the other [DMPM93]. Self-disclosure plays a central role in building trust, relationships, mental health, and well-being [JMH*22]. Hooi et al. [HC13], through a survey of second-life users, showed that self-disclosure was negatively correlated with similarity in appearance between the user and avatar. Ichino et al. [JMH*22] also showed that avatars without any similarity in appearances to the user encourage greater self-disclosure than avatars with similarity. However, these studies were conducted on humanoid avatars. In fact, the effect of non-humanoid avatars on users' self-disclosure has not been sufficiently researched. (In social VR, users can also use non-humanoid avatars such as animals and robots.) In this study, we choose animal avatars among these non-humanoid avatars and investigate the effect of their appearance on users' self-disclosure.

We chose animal avatars because interaction with animals has been shown to have a positive effect on humans. For example, it has been shown that animal-assisted activities (AAA) and animal-assisted therapy (AAT) have positive psychological effects on humans, such as reducing stress and anxiety and promoting emotional well-being, as well as social effects such as facilitating interpersonal communication [Yok96]. In fact, Marivic [Diz08] showed that interviewees are more likely to self-disclose when rabbits are involved in psychological interviews. Di Natale et al. [DNTS*22] showed that users who interacted with animal characters had more fun than those who interacted with human characters, through an experiment in which users experienced simulated interaction with an animated character by watching a video. Based on these findings, we expected animal avatars to promote user's self disclosure due to their low similarity in appearance to the user and their positive psychological and social effects on users. Furthermore, the use of animal avatars may have a positive effect on the user's subjective responses (e.g., reducing tension and anxiety and increasing the enjoyment of interaction).

In this study, we propose a one-on-one communication system in which the user and the interlocutor use animal avatars in a VR space. The purpose of this study is to investigate the effect of animal avatars on the user's self-disclosure in the VR space. In this paper, we describe the design guideline and implementation of the proposed system and the experiment design of this research.

2. System Overview

We use Meta Quest2 [Met22] as the VR device for the hardware and Unity (version 2021.3.0) [Tec22] for the software. We use dogs as the animal avatars, which are also commonly used in AAA and

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AAT. In the proposed system, the user's non-verbal information (posture, gesture, etc.) is converted into movements of the animal avatar (head, upper body, arm, and mouth movements) and transmitted to the interlocutor, as shown in Figure 1. This non-verbal information of the user is acquired by sensors (acceleration, camera, microphone, etc.) mounted on the head-mounted display (HMD) of Meta Quest2, which is worn by the user. Specifically, information on the user's head and hand motions is acquired by these sensors. The motions of each part of the animal avatar, such as shoulders, elbows and upper body, are controlled using Final IK [Mot22], a posture-control tool using inverse kinematics (IK). In addition, we limit the range of motion of the animal avatar to avoid unnatural motions as a dog. The mouth of the animal avatar opens and closes according to the user's speech based on the voice information acquired from the microphone mounted on the HMD. In addition, a voice call function is implemented for one-on-one interaction using the animal avatar in the VR space, as shown in Figure 2.

3. Experiment Design

In future, we intend to conduct an evaluation experiment to investigate the effect of the appearance of the avatars used by the user and the interlocutor on their self-disclosure and subjective responses. The experiment will consist of two ice-breaker sessions aimed at easing participants' tension and building rapport, and two self-disclosure sessions in which participants will talk about personal topics. Participants will interact in pairs in VR space on the topics defined in these sessions. We will use the following four conditions: (1) the participant and interlocutor both use humanoid avatars, (2) the participant uses an animal avatar and the interlocutor uses a humanoid avatar, (3) the participant uses a humanoid avatar and the interlocutor uses an animal avatar, and (4) the participant and interlocutor both use animal avatars. We will evaluate participants' self-disclosure by analyzing the verbal and paralinguistic behaviors of the participants during the interaction [BGO07, JMH*22]. We will also evaluate participants' subjective responses (e.g., tension and anxiety, enjoyment of interaction, and perception of self-disclosure) by means of the questionnaire to the participants [DSP99, LC17, KSNT90].

Figure 1: *The user wearing an HMD (left) and the dog avatar with movements converted from the user's nonverbal information (right)*

Figure 2: *One-on-one interaction with animal avatars in VR space*

4. Conclusion

In this study, we proposed a one-on-one communication system in which the user and the interlocutor use animal avatars to communicate with each other in a VR space to investigate the effect the animal avatars on the users' self-disclosure and subjective responses. We also described the design guideline and implementation of the proposed system and the experiment design of this research. In the future, we intend to conduct experiments evaluate the performance of the proposed system.

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