Abstract

With the growing popularity of virtual reality (VR) technologies in fitness applications, such as VR gyms, understanding how virtual social environments influence users' physical and psychological responses during exercise has become increasingly important. This thesis investigates the impact of the visual attributes of surrounding avatars in a VR gym. Specifically, the dynamic features, such as exercise speed, and static features, such as body composition and exercise intensity, of surrounding avatars affect users' time perception, physical activity, and perceived exertion.

Two experimental studies were conducted. The first experiment investigated how the speed of exercise and intensity of surrounding avatars affect users' duration judgments and subjective feelings of time passage. The results indicated that when the surrounding avatars exercised at a faster exercise speed, participants perceived the duration of time as longer and felt that time passed more quickly. Additionally, high-intensity exercise led participants to perceive the passage of time as faster. The second experiment examined the effect of avatar exercise speed and body composition, such as normal and overweight, on users' physical performance and subjective exertion levels. The results show that the surrounding avatars exercised at a faster exercise speed, which can improve users' physical activity. The avatar with an overweight body composition helps people enhance their self-perception of fitness. Meanwhile, the surrounding avatars' exercise speed and body composition also have interaction effects that affect the user's participation in exercise. In conclusion, results from both studies demonstrated that dynamic attributes had a stronger and more consistent impact on users' performance and perception compared to static attributes. Static attributes rely more on people's realization of the static attribute in their experience.

Theoretically, this thesis contributes to the fields of human-computer interaction and social psychology by differentiating the effects of dynamic and static visual attributes in immersive virtual environments. Practically, it offers actionable insights for the design of future VR gyms, suggesting that surrounding avatar design can be strategically manipulated to enhance user engagement and support long-term exercise adherence.

Keywords: VR gym, Surrounding avatar, Avatar design, Time perception, Physical activity.