PsychTech & Health Journal
2026, vol. 9, n. 2, pp. 1 - 2
doi: 10.26580/PTHJ.ed18-2026

ISSN 2184-1004

IMPLICATIONS OF PERCEIVED REALISM IN IMMERSIVE VIRTUAL REALITY

IMPLICAÇÕES DO REALISMO PERCEBIDO NA REALIDADE VIRTUAL IMERSIVA

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Pursuing realism has been constant and considered computer graphics' "holy grail" (Chalmers and Ferko, 2008). From entertainment to training simulations to research, realism offers a wide range of possibilities. Immersive Virtual Reality came as a technology capable of providing higher levels of immersion by isolating users from real-world stimuli, focusing their attention and senses on the virtual experience (Mel Slater, 2009). This technology unlocked new ways to push the boundaries of realism even further.

However, what is realism? How can one define it? The literature has proposed diverse definitions (Gonçalves et al., 2022). Overall, realism can be divided into subjective realism and objective realism. In other words, subjective realism is what we effectively perceive, and objective realism is defined by how closely the experience replicates the real world. Subjective realism, or perceived realism, is highly dependent on the perceiver. For the same virtual experience, different individuals can perceive realism as being poor or very close to reality. Some factors, such as previous life experiences with the events depicted in the virtual experience, can influence how one perceives the experience as real.

Realistic experiences from an objective standpoint are challenging to create, requiring significant human resources, computing power, and research & development. The closer an experience is to the real world, the greater the likelihood that subjects will perceive it as realistic. Such would open the door for immersive VR training and simulation to be conducted and for knowledge to be adequately translated to real-world conditions (Monteiro et al., 2020).

Not all experiences necessarily require a high level of similarity with the real world, per se. In some situations, what matters most is how users perceive the environment as real, rather than whether it actually replicates reality. Human perception cannot fully grasp the intrinsic details of reality. Researchers are using these human perception flaws to optimise the creation of virtual applications by reducing objective realism at key points without compromising perceived realism. This line of research already existed before Immersive Virtual Reality. By simplifying the calculations underlying formulas that explain the laws of physics, we can increase the ratio of computing power required to the resulting perceptual realism. For example, foveated rendering is a technique that leverages how the human eye processes visual information (Weier et al. 2016). The eye's sharp vision focuses on a small region known as the fovea, while peripheral vision is more sensitive to movement than to details. Foveated rendering uses eye-tracking technology to provide high-resolution

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images in the fovea while reducing detail in the periphery. By sacrificing the periphery, the same perceived visual quality can be achieved at a lower computational workload, or visual quality can be increased in the foveal area.

Much research is still needed to understand what makes us perceive our surroundings as "real", especially when using Immersive Virtual Reality. As these experiences become more complex, integrating multisensory stimulation (Melo et al. 2020), such as force feedback, smells, temperature, wind, touch, and taste, together with audiovisual, quantifying how each component contributes to this sense of realism becomes difficult. Such knowledge would advance Immersive Virtual Reality as a crucial technology in our society, continuing our pursuit of the "holy grail" of realism.

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