

## **(Mis-)Perception in Virtual Realities: Distance, Speed and Time**

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Perception in virtual environments is different than in the real world in many aspects. Distances and sizes are underestimated in the most cases, virtual and real speed are not perceived in the same way, and time is variable as well. There are several studies that show how much the perception of these aspects differ in virtual environments, with a head-mounted display as well as in CAVE-like environments. Because an accurate perception is important for many interaction tasks, e.g. walking, grabbing, or navigation, we are examining ways to overcome these misperceptions. On the other hand, it might also be interesting to reproduce a specific misperception, so we can provoke a certain reaction of the user. This could be useful for rehabilitation applications, e.g. in the fields of neuro-science or biomechanics.

In this talk, I want to present some of the research results and ongoing projects of our group regarding distance, speed, and time perception in virtual reality, and give an overview about possibilities and limitations. We conducted experiments about distance and speed perception and tried to improve the perception by manipulating the visual stimulus and introducing different kinds of blur. Since this works for two-dimensional monoscopic images, it seems to be outperformed by the stereoscopic depth cue in head-mounted display environments. Furthermore, we investigated time perception in virtual environments and the effects of external zeitgebers, cognitive load and immersion on time estimation. For example, the virtual sun had a significant effect on time judgments. In another project, we are trying to find possibilities of manipulating the human gait by changes of the visual stimulus. This might lead to new medical methods, especially for rehabilitation.