Literature Review

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1 Key Literature Synopsis

In Wagler and Hanus, "Comparing virtual reality tourism to real-life experience: Effects of presence and engagement on attitude and enjoyment" virtual reality tourism was compared to the real-life experience of tourism. Due to the nature of this paper's research question the authors focused on the similarities of VR and the real-life experience. The explicit differences between these two, however, was not portrayed. Furthermore, this paper did not go into detail about interesting participant behavior and simply concluded that "VR is a strong analogue to the real-world experience".

Armougum et al., "Virtual reality: A new method to investigate cognitive load during navigation" compared the cognitive load during navigation of a subway station in real life and a VR simulation. This paper shows that cognitive load during both VR and real-life task were quite similar. On closer inspection of the NASA-TLX figures, which this paper provides, it is visible that the participants with experience of navigating subway stations were more frustrated in VR than in real life, while inexperienced participants seemed to be very slightly less frustrated in VR than in real life. While interesting, this could be caused by the mismatch between the expectancy of the more seasoned subway user, compared to the accuracy of the VR environment.
While this paper compares navigation within a VR environment with its real life counterpart, the used measures did not show any significant differences in interaction technique or quality from a user perspective.

In Lamb et al., "Comparison of virtual reality and hands on activities in science education via functional near infrared spectroscopy" the differences in engagement between VR, real-life, serious games and video lectures were explored. While this poses a direct comparison between VR and a real-life experience, it focuses on the singular aspect of engagement by measuring the hemodynamic response. This paper provides evidence that VR tasks do not differ from real-world tasks when solely observing the participants' engagement. The quality of interaction and other aspects that would highlight differences between the two interaction instances were not part of this paper.

Petersen, Klingenberg, and Makransky, "Pipetting in virtual reality can predict real-life pipetting performance" explored how well participants learn the interaction of precise pipetting and compared a VR approach to the real-life version of it. While this paper did not focus on the differences between these two interaction types primarily, a few differences were discussed. While learning in VR was similar to real life and the participant's performance in real life did not excessively differ for participants trained in VR and real life. The number of errors due to pipette dexterity that were observed for the group trained in VR mark the most significant difference in performance between both groups. This is also in line with the findings from the VR Lego building pilot study, where a lot of placement mistakes were made in VR, when compared to real-life. Whether or not these observations are caused by the same underlying issue of e.g., missing physical cues or stability, is still unknown.
Due to its precise nature and its focus on the differences between the VR and the real-life group, this paper seems to be the most relevant out of the newly discovered research.

2 Conclusion

Still hardly any research exists which explicitly focuses on the differences between VR and real-life interactions. A VR interaction is usually compared with its real-life counterpart to assess the viability of a VR adaptation in general, mostly to use it for training purposes. Therefore, the discovery and discussion of differences seems to usually play a secondary role in these papers. Further research is necessary to fully understand the differences, challenges, and chances the VR environment imposes on a specific interaction.

Literature

Armougum et al.: Virtual reality: A new method to investigate cognitive load during navigation **armougum2019virtual**

A Armougum et al. "Virtual reality: A new method to investigate cognitive load during navigation". In: *Journal of Environmental Psychology* 65 (2019), p. 101338.

Lamb et al.: Comparison of virtual reality and hands on activities in science education via functional near infrared spectroscopy **lamb2018comparison**

Richard Lamb et al. "Comparison of virtual reality and hands on activities in science education via functional near infrared spectroscopy". In: *Computers & Education* 124 (2018), pp. 14–26.

Petersen et al.: Pipetting in virtual reality can predict real-life pipetting performance **petersen2022pipetting**

Gustav Bøg Petersen, Sara Klingenberg, and Guido Makransky. "Pipetting in virtual reality can predict real-life pipetting performance". In: (2022).

Wagler et al.: Comparing virtual reality tourism to real-life experience: Effects of presence and engagement on attitude and enjoyment **wagler2018comparing**

Adam Wagler and Michael D Hanus. "Comparing virtual reality tourism to real-life experience: Effects of presence and engagement on attitude and enjoyment". In: *Communication Research Reports* 35.5 (2018), pp. 456–464.