

Foundational Immersion Concepts

Developing Immersive Applications

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Learning Objectives:

- explain Milgram and Kishino's Reality-Virtuality Continuum
- appreciate the different interpretations of immersion

Recap

- thinking about the differences between AR, VR, and MR experiences

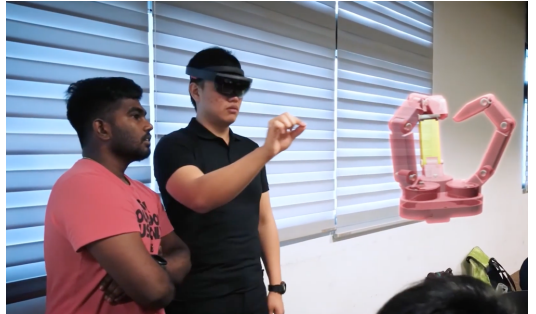
VR vs AR vs MR

Watch:

<https://youtu.be/d3wx3VGtFjo>

Prompt:

What type of experience is this?



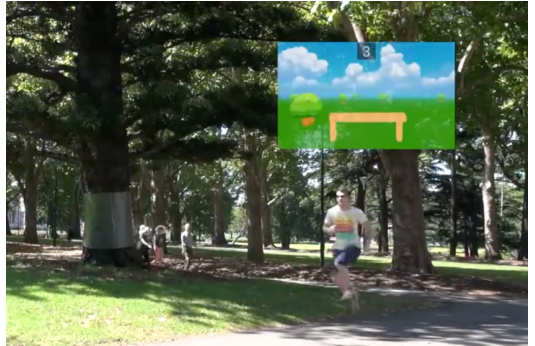
VR vs AR vs MR

Watch:

https://youtu.be/oY_94nGMIXY

Prompt:

What type of experience is this?



VR vs AR vs MR

Watch:

<https://youtu.be/DAOKFVCFrJ4>

Prompt:

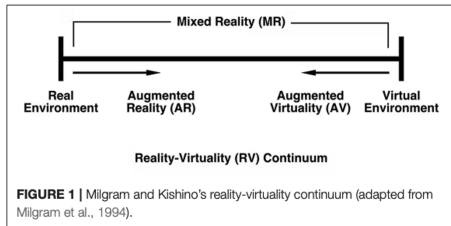
What type of experience is this?



Milgram-Kishino RV Continuum

- not the immersification continuum
- originally meant for display technologies

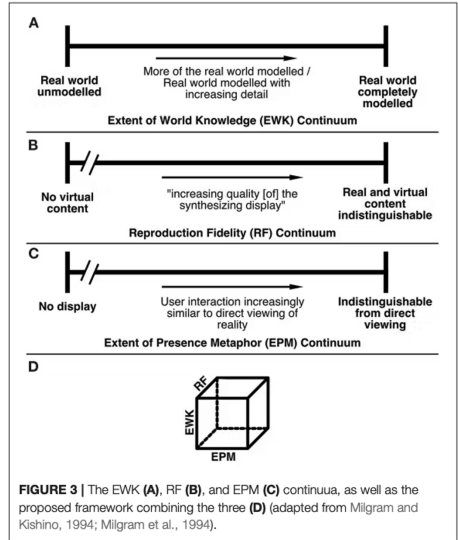
Source: <https://doi.org/10.1117/12.197321>



Dimensions of the RV Continuum

- EWK: how much the system understands the real world
- RF: how realistic the assets are
- EPM: how interaction affords realism

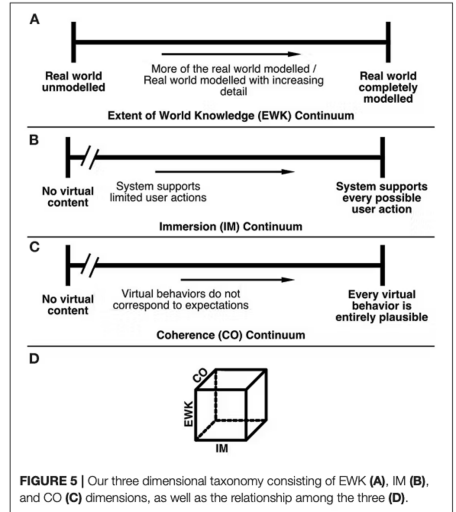
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Revisiting the RV Continuum

- combined RF and EPM into IM
- added CO to represent the user
- common perception of MR is different

Source: <https://doi.org/10.3389/frvir.2021.647997>



Summary

Today we covered:

- RV continuum foundations and dimensions
- classifying experiences along the continuum
- updated RV continuum perspectives

Next: Immersion as system properties and user experiences

Further Reading

Key Research Papers:

- [Revisiting RV Continuum \(2021\)](#)
- [Place illusion and plausibility \(Slater, 2009\)](#)
- [Understanding User Experiences Across VR Walking-in-place Locomotion Methods](#)
- [Combining think-aloud and physiological data \(CHI paper\)](#)

User Study Research:

- [Video presentation of VR locomotion user study](#)
- [Prezi: Cybersickness measurements user study](#)
- [The Conversation article on flow](#)
- [Kitaro's Matsuri video \(flow example\)](#)

Further Reading (cont.)

Questionnaire Instruments:

- Flow scales from Mind Garden
- Igroup Presence Questionnaire (IPQ)
- Simulator Sickness Questionnaire (SSQ)
- Motion Sickness Questionnaire
- Psychometric evaluation of SSQ as measure of cybersickness
- Virtual Reality Sickness Questionnaire (VRSQ)

Further Reading (cont.)

Cybersickness Research:

- [Factors Associated With VR Sickness in HMDs \(Systematic Review\)](#)
- [Don't make me sick: investigating cybersickness in commercial VR](#)
- [Narrative and gaming experience interact to affect presence and cybersickness](#)
- [Presence and Cybersickness in VR Are Negatively Related \(Review\)](#)

Best Practices and Resources:

- [Meta's Best Practices to avoid cybersickness](#)
- [Design of Everyday Things \(book\)](#)