



LECTURE 2: PRESENCE IN VIRTUAL REALITY

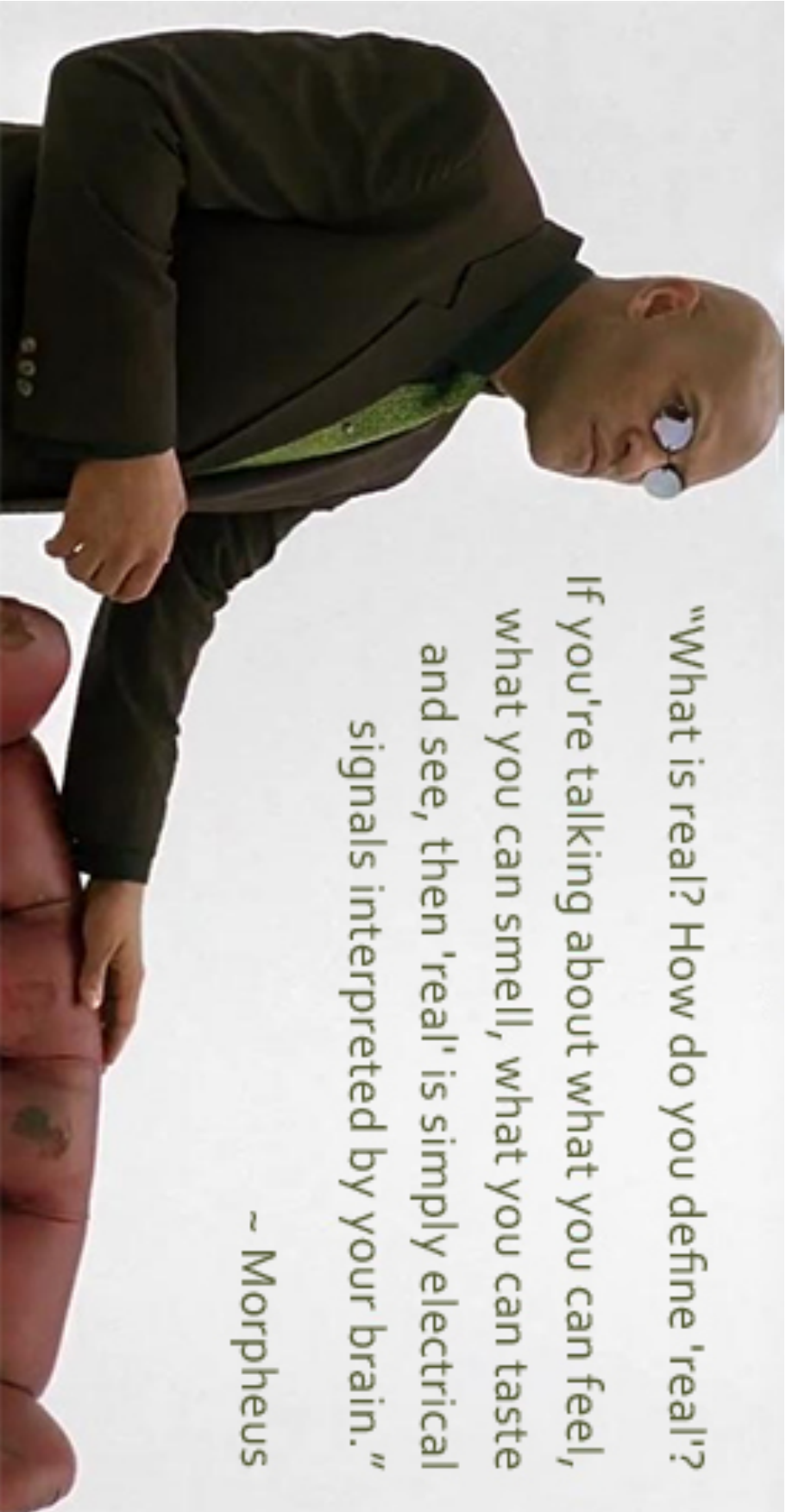
ME/HCI 580



Virtual Reality Applications Center



What is Reality?

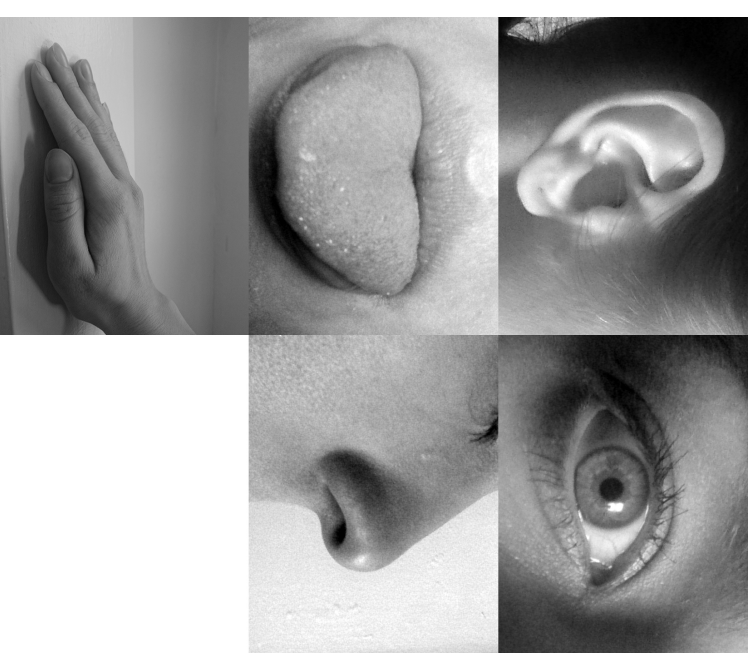
A man in a dark suit and glasses is speaking to a man in a red suit. The man in the red suit is lying down, and the man in the dark suit is leaning over him.

"What is real? How do you define 'real'?
If you're talking about what you can feel,
what you can smell, what you can taste
and see, then 'real' is simply electrical
signals interpreted by your brain."

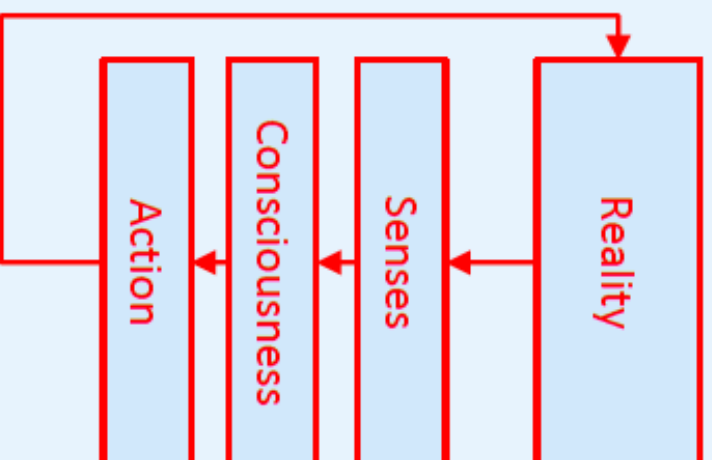
~ Morpheus

How do We Perceive Reality?

- We understand the world through our senses:
 - Sight, Hearing, Touch, Taste, Smell (and others..)
- Two basic processes:
 - Sensation – Gathering information
 - Perception – Interpreting information



Simple Sensing/Perception Model





Presence Definition

“Presence is a **psychological** state .. in which even though part or all of an individual’s current experience is generated by .. technology, part or all of the individual’s **perception** fails to .. acknowledge the role of the technology in the experience.”

International Society for Presence Research, 2016

<https://ispr.info/>

In Simple Terms, Presence is ..

“The subjective experience of being in one place or environment even when physically situated in another”



Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence: Teleoperators and virtual environments*, 7(3), 225-240.

Immersion vs. Presence

- **Immersion**: describes the extent to which technology is capable of delivering a vivid illusion of reality to the senses of a human participant.
- **Presence**: a state of consciousness, the (psychological) sense of being in the virtual environment.
- So **Immersion**, defined in technical terms, is capable of producing a sensation of **Presence**

Slater, M., & Wilbur, S. (1997). A framework for immersive virtual environments (FIVE): Speculations on the role of presence in virtual environments. *Presence: Teleoperators and virtual environments*, 6(6), 603-616.



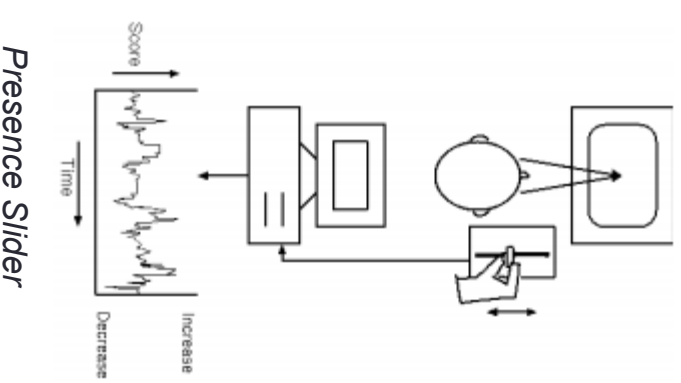
Three Dimensions of Presence

- **Personal Presence**, the extent to which the person feels like he or she is part of the virtual environment;
- **Social Presence**, the extent to which other beings (living or synthetic) also exist in the VE;
- **Environmental Presence**, the extent to which the environment itself acknowledges and reacts to the person in the VE.

Heeter, C. (1992). Being there: The subjective experience of presence. *Presence: Teleoperators & Virtual Environments*, 1(2), 262-271.

Measuring Presence

- Presence is very subjective so there is a lot of debate among researchers about how to measure it
- **Subjective Measures**
 - Self report questionnaire
 - University College London Questionnaire (Slater 1999)
 - Witmer and Singer Presence Questionnaire (Witmer 1998)
 - ITC Sense Of Presence Inventory (Lessiter 2000)
 - Continuous measure
 - Person moves slider bar in VE depending on Presence felt
- **Objective Measures**
 - Behavioural
 - reflex/flinch measure, startle response
 - Physiological measures
 - change in heart rate, skin conductance, skin temperature



Example: Witmer and Singer (1998)

Table 2. Presence Questionnaire Item Stems (Version 2.0)

Item Stems	Factors	Subscale	<i>ITC_{corr}</i>
1. How much were you able to control events?	CF	INV//C	0.43*
2. How responsive was the environment to actions that you initiated (or performed)?	CF	INV//C	0.56*
3. How natural did your interactions with the environment seem?	CF	NATRL	0.61*
4. How completely were <i>all</i> of your senses engaged?	SF		0.39*
5. How much did the visual aspects of the environment involve you?	SF	INV//C	0.48*
6. How much did the auditory aspects of the environment involve you?	SF	AUD ^a	0.32*
7. How natural was the mechanism which controlled movement through the environment?	CF	NATRL	0.62*
8. How aware were you of events occurring in the real world around you?	DF		0.03
9. How aware were you of your display and control devices?	DF		-0.14
10. How compelling was your sense of objects moving through space?	SF	INV//C	0.51*

- 32 questions in 4 categories/factors
 - Control (CF), Sensory (SF), Realism (RF), Distraction factors (DF)
- Answered on Likert scale from 1 to 7 (1 = low, 7 = high)

How to Create Strong Presence?

- Use 3 Dimensions of Presence
 - Create rich multi-sensory VR experiences
 - Include social actors/agents that interact with user
 - Have environment respond to user
- What Influences Presence
 - Vividness – ability to provide rich experience (Steuer 1992)
 - Using Virtual Body – user can see themselves (Slater 1993)
 - Internal factors – individual user differences (Sadowski 2002)
 - Interactivity – how much users can interact (Steuer 1992)
 - Sensory, Realism factors (Witmer 1998)

Relevant Papers

- Slater, M., & Usoh, M. (1993). Representation systems, perceptual positions, and presence in immersive virtual environments. *Presence*, 2:221–233.
- Slater, M. (1999). Measuring presence: A response to the Witmer and Singer Presence Questionnaire. *Presence*, 8:560–565.
- Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication*, 42(4):72–93.
- Sadowski, W. J. and Stanney, K. M. (2002) Measuring and Managing Presence in Virtual Environments. In: *Handbook of Virtual Environments: Design, implementation, and applications*.<http://vehand.engr.ucf.edu/handbook/>
- Schuemie, M. J., Van Der Straaten, P., Krijn, M., & Van Der Mast, C. A. (2001). Research on presence in virtual reality: A survey *CyberPsychology & Behavior*, 4(2), 183-201.
- Lee, K. M. (2004). Presence, explicated. *Communication theory*, 14(1), 27-50.
- Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence: Teleoperators and virtual environments*, 7(3), 225-240.
- Lessiter, J., Freeman, J., Keogh, E., & Davidoff, J. (2000). Development of a new cross-media presence questionnaire: The ITC-Sense of presence. Paper at the *Presence 2000 Workshop*, March 27–28, Delft.