

Visual Field Immersion: The Holodeck Comes Alive (2)

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Virtual Reality, Virtual Rehabilitation, Virtual Presentation?





Virtual Reality - Introduction

- Advances in computing technology
- Human Computer Interactions/interfacing
 - Virtual Reality
 - Augmented Reality
 - Mixed Reality
- Applications to Rehabilitation
- Future Directions



VR and AR Rehabilitation

- Means for understanding mechanisms
- Means for managing health related problems
 - Pain and movement problems across disorders
 - Stroke
 - Cancer
 - Pain, (phantom pain, burn pain)
 - Parkinsons disease
 - Walking, reaching, balance etc etc
 - Fears and phobias
- Educational and training tool



VR

- **VR: Beyond the technology** There are two visions of VR:
- **Simulation technology:** a collection of technologies that allow people to interact efficiently with 3D models in real time using their natural senses and skills
- **Communicative interface:** a advanced form of human-computer interface that allows the user to interact with and become immersed in a computer-generated environment in a naturalistic fashion
- **In synthesis:** a synthetic experience providing the feeling of “**presence**”



Virtual Reality

- **Low Tech vs High Tech**

- Nintendo / Eye toy/ Wii

- **High tech VR Technology**

- VR is usually described as a collection of technological devices:

- a **computer** capable of interactive 3D visualization,

- a **head-mounted display** and **data gloves**,

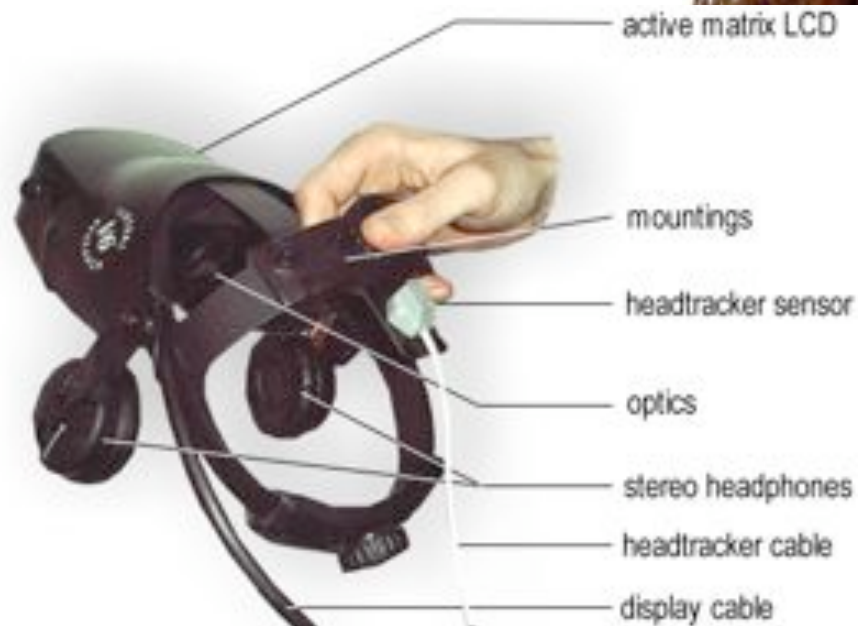
- **Cave system**

- equipped with one or more **position trackers**.

- The trackers sense the position and orientation of the user and report that information to the computer that updates (in real time) the images for display.

Virtual Rehabilitation

- Human Computer Interaction
- High Tech
 - HMD





Head Mounted Display

- A head mounted display (HMD) is a Virtual Reality display system that provides, beside the CAVE system, the greatest amount of immersion in the displayed virtual world possible.
- The aim of the HMD is to provide a strong visual and acoustic impression of the virtual world.



Cave VR Systems \$\$\$\$



Interfaces (beyond the mouse)

I/O Devices

Match physiological & psychological characteristics

Appropriate for task

Suitable for the work & environment

Affordances

System feedback



Virtual Reality



Phantom limb?
Mirror Therapy?



Pain Management

- ❑ Distraction from or
- ❑ Attention to
- ❑ Chronic Pain?
- ❑ Active movement?

Virtual and Augmented Reality

Pain and Anxieties



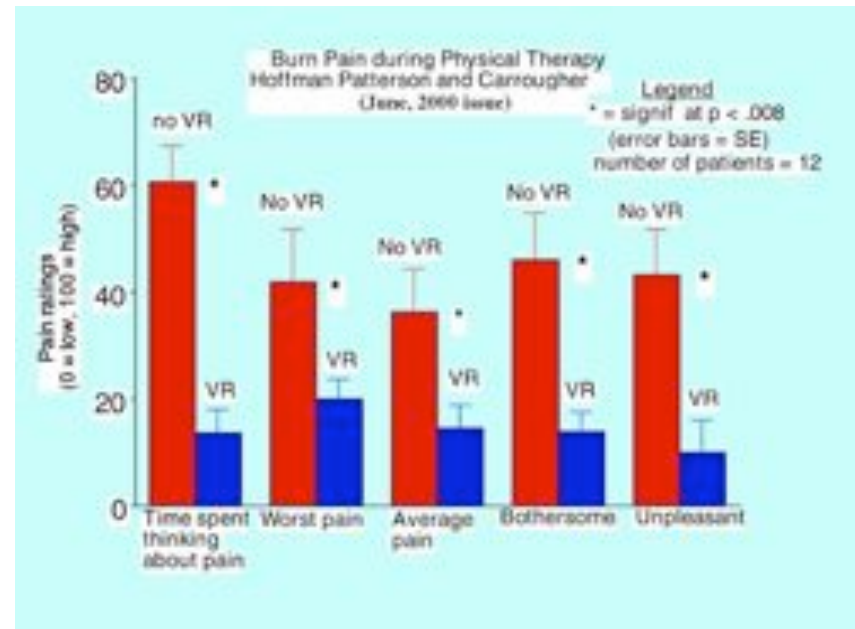
**Distraction from or attention to
Graded Exposure to feared exercise or ????? Spiders, heights, etc., etc**

VR Analgesia for burn and dental pain



Pain management during PT

- Training to control pain
- Effectiveness ends with VR session.
- Mental imagery may last beyond session.
- Immersion is a key element.
- High presence reduces pain.



Free Dive

- ❖ 3D game undersea exploration; swimming with sea turtle and fishes, and hunt for treasure
- ❖ 60 children, 5 -12 yo
- ❖ Arm in cold water:
 - No game: 19s average.
 - Free Dive: 86s average





Presence or Engagement „„„„ or merely distraction?

- ❑ **Presence as neuropsychological process**
- ❑ **Presence** is the key characteristic of VR, differentiating it from other media.
- ❑ It is “sense of being there”, or the “feeling of being in a world that exists outside of the self”

Re-Mission

- ❖ 375 cancer patients between the ages of 13 and 29
- ❖ Took their antibiotics more often
- ❖ Blood levels of an oral chemotherapy medication maintained at a higher rate.

