Presence as cognitive process: The link between Self, intention and action

Applied Technology for Neuro-Psychology Lab.

Prof. G. Riva, Ph.D.
Università Cattolica del Sacro Cuore, Milan, Italy

http://www.emergingcommunication.com

http://www.cybertherapy.info
http://www.neurovr.org
http://www.e-psychology.net

Exploring presence...

This presentation will focus on:

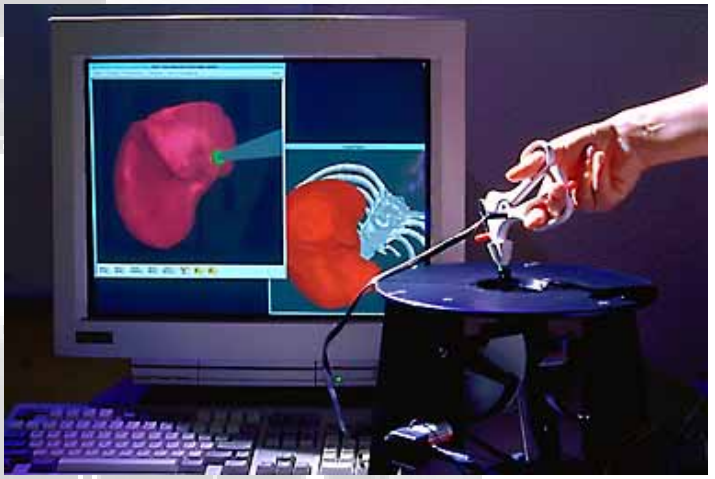
- VR as experiential and cognitive technology
  - There is a transfer from VR to real world (experience)
  - VR modifies the experience of the body (cognition)
- Experience and cognition meet in presence
  - There are different definition of presence
  - There is a strict link between space, place and presence
- Three lessons from cognitive sciences
  - Space is defined by actions
  - Action is defined by intentions
  - Intentions are different and hierarchically ordered
- Final suggestions for VR developers
  - Presence is situated: is related to the actions/intentions of the user
  - Presence is layered: for each intention there is a specific layer

Virtual Reality

- VR can be considered:
  - **An experiential technology: VR allows the reproduction of situations and contexts in a life-like setting**
    => I'm "present" in the simulation
  - **A cognitive technology**: in immersive VR all the body – including the proprioceptive system - is involved in the action
    => The experience of the body is modified by Virtual Reality (Sensory re-integration between the visual and proprioceptive systems, Lambrey et al. 2002, 2003)

Virtual Reality as Experience

- **Is it effective**? There is a transfer of what is learned in VR to the real world?



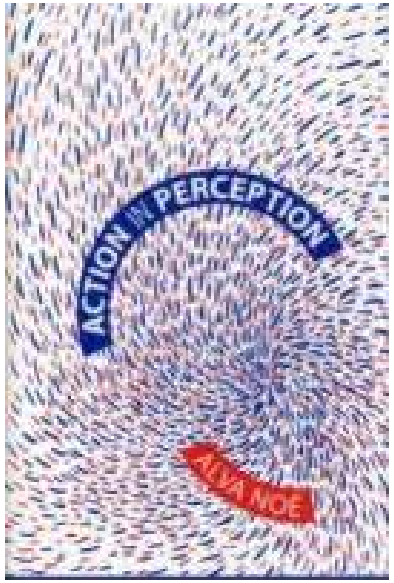
The **success of simulators** in many areas (flight simulators, driving simulators, surgical simulators, etc.) suggests a clear answer: **Yes**, if the user is "present", "engaged", "immersed" in the experience.

VR as Cognitive/Embodied Technology

Different visions from cognitive sciences – *Situated Cognition, Embodied Cognition, Enactive Approach -* suggest that:

Cognition is no more the simple performance of formal operations on abstract symbols, but has instead **deep roots in sensorimotor processing**

Action in Perception
A. Noe
MIT Press
2006



How the body shapes the mind
S. Gallagher
Oxford U Press
2005

Where do cognition and experience meet in VR?

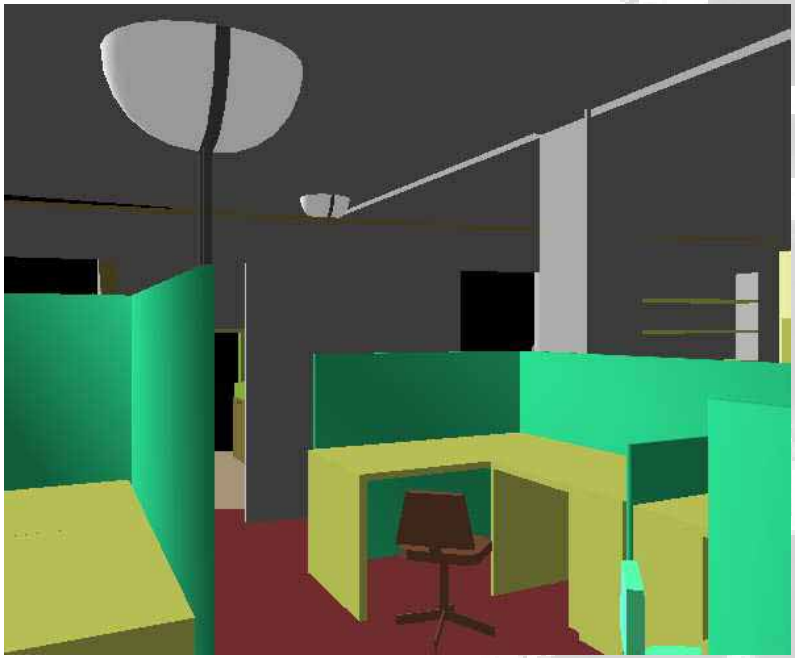
In Presence… But what is presence?

- The sense of 'being there' (Held & Durlach, Sheridan, Zeltzer: premier issue of PRESENCE, 1992)
- 'A perceptual illusion of nonmediation' (Lombard and Ditton, 1997)
- 'A mental state in which a user feels physically present within the computer-mediated environment' (Draper & Kaber, 1998)
- 'Presence is the property of the agent who manifests herself through the constitution of a place during action' (Spagnolli & Gamberini, 2006)

Towards presence

- **First approach**: the **key goal of VR** is to **reproduce real world**: the more is accurate the reproduction, the more you are present
  - => Quality of graphics is a must

Is this true?



What is better? => Static vs dynamic
Stereoscopic vs 2D
Immersive vs non Immersive
Tracking vs Mouse

Let's search for an answer using cognitive sciences…

Lessons from Cognitive Science: 1. Space is defined by action

- As suggested previously by Piaget (*assimilation*) and Gibson (*affordance*), *we **experience/represent** places in terms of the actions we could take towards them*.
- EXAMPLE: Retrieving an occluded object – e.g. when we lift a book to retrieve a pen from under it:
  - To know that the pen exists when it is occluded is a matter of knowing what can be done to make the pen visible.
  - More, if I want to grab the pen, its spatial position will be represented in terms of the movements needed to reach for it.
  - Further, its shape and size will be represented in terms of the type of handgrip it affords.

Lessons from Cognitive Science: 1. Space is defined by action

- *We **experience/represent** places in terms of the actions we could take towards them*.

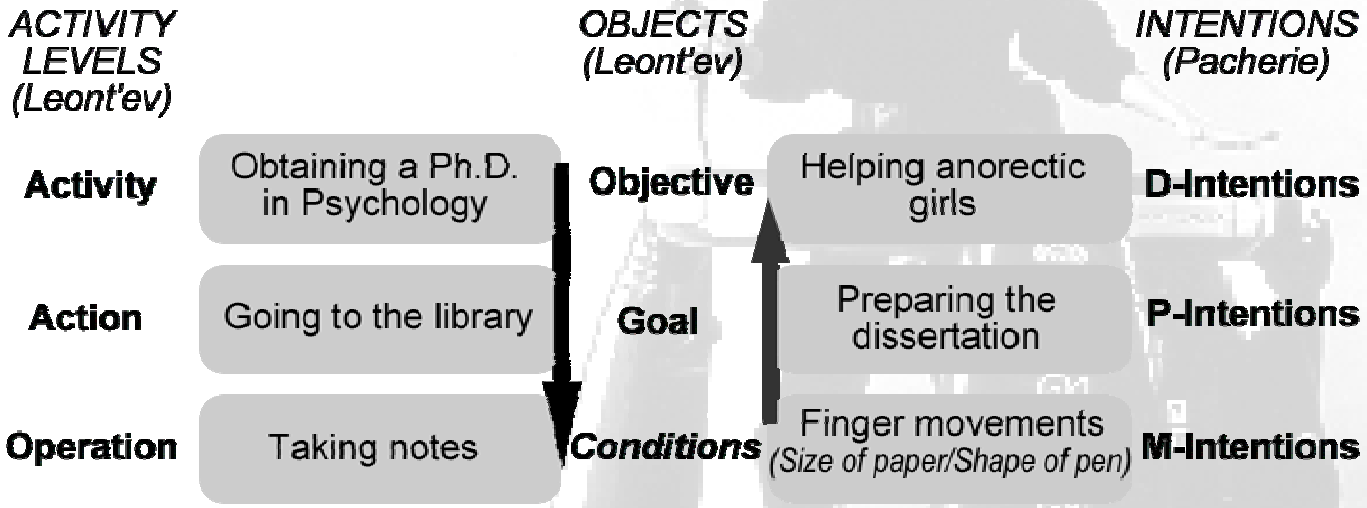
CONCLUSION:

1. The subject is "*present*" in a space if he/she can act in it.
2. More, the subject is "*present*" in the space – real or virtual – where he/she can act in.

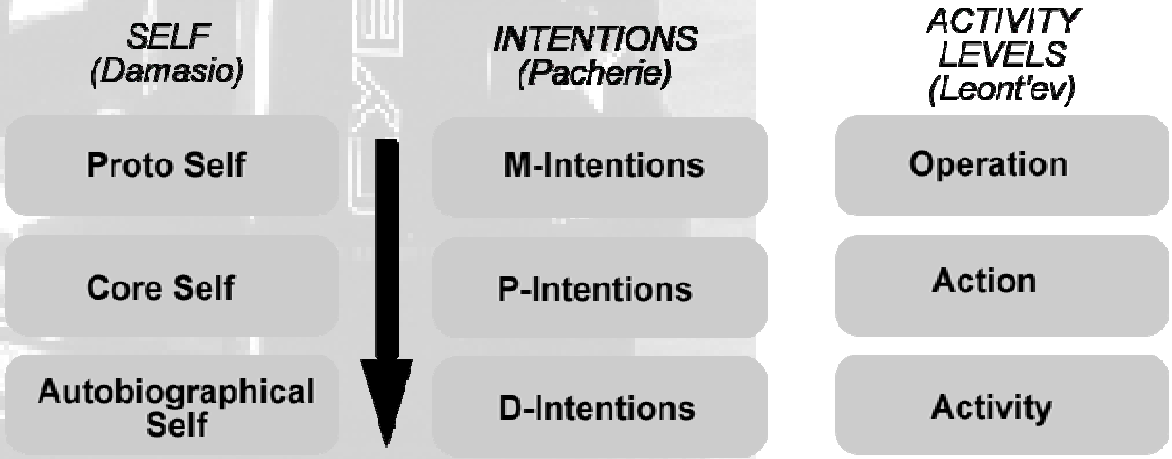
Lessons from Cognitive Science: 2. Action is defined by intentions

- According to James Russell, Agency is "the power to alter at will one's perceptual inputs". But how can we define our **will**? A simple answer to this question is: **through intentions**.
- In general, the intention of an agent performing an action is his/her specific purpose in doing so: the end or goal he/she aims at, or intends to accomplish.
- However not all the intentions are the same:
  - Activity Theory (Acting with technologies, MIT Press, 08)
  - Dynamic Theory of Intentions (Pacherie, Cognition, 08)

Lessons from Cognitive Science: 2. Action is defined by intentions



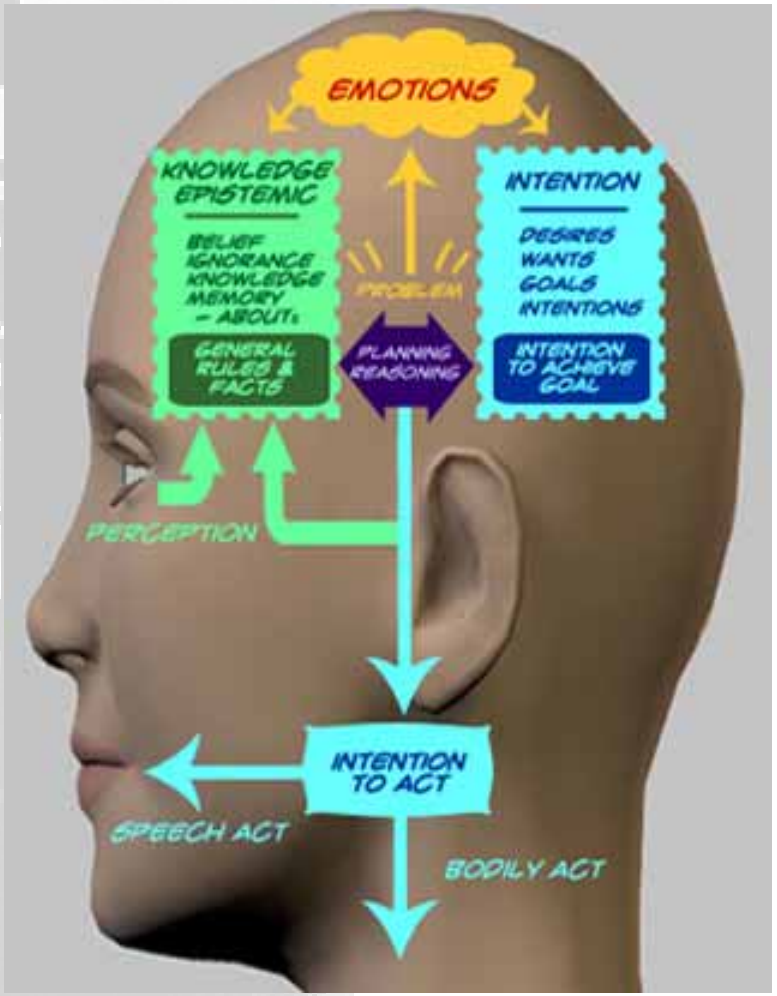
Intentions are different…



…and hierarchically ordered.

Lessons from Cognitive Science: 2. Action is defined by intentions

- *We **experience/represent** actions in terms of the intentions we could enact through them*.



CONCLUSION:

1. Presence is the perception of successfully transforming an intention in action
2. More, the highest is the intention, the highest is the level of presence

Presence is composed by layers

To know more:

Being There (Riva et al, 2005)

From Communication to Presence (Riva et al, 2006)

Enacting Intersubjectivity (Morganti et al., 2008)

http://www.emergingcommunication.com

- Proto Presence => *perception-action coupling* (Motor intention: tracking/interface system)
- Core Presence => *vividness and immersion* (Present Intention: quality of virtual experience)
- Extended Presence => *meaning* (Distal intention: relevance of the experience for the goals of the subject)

The influence of presence layers on media

- A media may influence only some layers:
  - In a compelling book reading only extended consciousness is involved,
  - and with a movie experience we can modify both core presence and extended presence but not proto presence.
  - Only in immersive virtual reality all the three layers of presence are modified by the media experience.
- We suggest that this gives immersive VR a privileged status as a medium for meaningful experiences.

Layers and intentions

- The importance of a layer is related to the intention of the VR experience:
  - Seeing: core presence is critical (vividness and immersiveness);
  - Navigation/Exploration: both proto presence (perception/action coupling) and core presence;
  - Interaction: core presence and extended presence (meaning) are critical;
  - Communication: extended presence is the most relevant.

Thank you
For your attention

Applied Technology for
Neuro-Psychology Lab.

Prof. G. Riva, Ph.D.
Università Cattolica del Sacro
Cuore, Milan, Italy

http://www.neurovr.org

http://www.cybertherapy.info
http://www.emergingcommunication.com
http://www.e-psychology.net