

## Perception-Action Loop in Virtual Environments

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**Context:** In most successful form of Virtual Reality, multi-user video games have begun to provide possibilities for socializing and communal action in virtual worlds for entertainment purposes. From an architectural point of view, extending that capability to include other types of activities pertain to the possibility of engendering a 'sense of place' in users who interact and socialize with others in virtual environments, as a legitimate extension of physical environments.

**Problem:** Scholars have pointed out that 'telepresence', the nature of virtual environments, have limitations - the absence of physical embodiment (i.e. we lose the possibility of bodily movement so as to get a better grip on the world) as well as the absence of a sense of context. The agency of avatars has been suggested as a solution to the problem of mediating between the physical body of the users and their representation in the virtual environment. But it has raised further questions concerning the connection between the direct perception of action by the user (through the screen) and the indirect motor-intentional reaction of the avatar representing him/her in the virtual environment (through the mouse).

**Approach:** The premise of my research is that habitation and presence (in any environment) are based on a continuous process of perception and action between a person and his/her surroundings. It will question what happens when perception and action are separated into two different 'worlds'—a physical one (for perception) and a virtual one (for action)? Such separation caused by immersion in a physical world and action in a virtual world creates an incompatibility between the perception of the environment and reaction to it—a disconnection in the perception-action loop. My research will try to bridge this gap, and provide a natural connection between the two worlds.

**Plan:** In order to examine and analyze this problem, I will begin with a simple case – directing the avatar to point at some object in the virtual environment. Phenomenologically, pointing (as opposed to reaching) has been shown to be a rather complex cognitive-motor combination (Kelly 2002): a person must perceive the environment, analyze his/her location and orientation in it, and make a conscious act of directing his/her body in relation to the environment without actually reaching the point of reference. Furthermore, since the motion of the avatar is meant to be visible by other users (given that the type of environment I am interested in is a social environment), it will evoke other users' attention, perceived through their own computer interfaces, and may cause them to react by moving their gaze to the point of reference—the inverse of 'pointing.'

By providing a seamless interface between the two 'worlds' I hope to make presence and inhabitation of virtual environments more natural, and allow for the emergence of a sense of place in virtual worlds. The research will include both theoretical investigation and the development of a prototypical user interface(s).