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Skills training in Virtual Environments: the role of the body experience

Body Awareness (the sense of one's own body) is a fundamental aspect of the enactive experience of both real and virtual worlds.

The enactive knowledge is “knowledge for action”, characterized by the fact of not being propositional (“knowing that”), but rather procedural (“knowing how”);, while conversely, action is always necessary in order to acquire enactive knowledge (Enactive NoE, www.enactivenetwork.org).

Body Awareness implies both the senses of **ownership** and **agency**, the latter being the sensation of intending, executing actions and controlling one's own body movements, as a consequence of the perceived congruence between one's intention and the effect of the corresponding actions.

In Virtual Environments, perception of own body and the consequent experience of embodiment are strictly dependent on the perceived congruency of sensorial afferents at the level of multisensory correlates.

Psychophysiological experiments in VR on the sense of owning and acting in a virtual embodiment confirmed how body awareness is determined by the congruency between the received multisensory stimuli and the perceived capabilities of action in the virtual environment.

This talk will analyze how a multisensorial experience of acting in a Virtual Environment can be designed to create an efficient environment for training and transfer of complex sensorimotor skills.

In particular, this aspect is extremely crucial in training of sport abilities, and this will be examined in the two exemplary cases of virtual juggling and rowing.

Also training of lost sensorimotor abilities, such as in the case of recovery of motor functions after the loss due to a neurological damage, requires the recreation of an ecologically valid and congruent virtual experience.

Results from the robotic assisted neurological rehabilitation conducted in VR with an upper limb exoskeleton will be presented as well.