

Virtual bodies, real empathy: Behavioural, bodily, and neural reactivity to the observation of pain and pleasure on self and others in immersive virtual reality

ABSTRACT:

Empathy is the social ability that allows one to share the emotions and feelings of other individuals. It consists in a variety of components ranging from the self-centred reactivity that maps on the self what we see in others to the other-oriented stance that allows us to understand others through cognition or emotion. Here we performed a series of studies in which we capitalize on the power of Virtual Reality (VR) to make a specific empathogenic scenario to compare the behavioural (VAS ratings), physiological (SCR) and sensorimotor (MEP) reactivity of participants who observed pain and pleasure stimuli delivered on a virtual body seen from first person perspective (1PP) or to another person, seen from third person perspective (3PP). In all the studies we found consistent results about the subjective ratings during the experience in VR. First, the observation of a virtual body in 1PP always induced a strong illusory sensation that the virtual body belongs to the observer. Second, the observation of virtual stimuli representing Pain and Pleasure induced unpleasant and pleasant sensations, respectively, that parallel with stronger sensation's intensity respect to neutral stimuli. Moreover, while a complete knowledge about the processing of Pleasant stimuli is still far, the observation of Pain resulted in increased physiological reactivity and wider amplitude of motor evoked potentials compared to Neutral in both perspectives, suggesting that similar neural networks are involved in 1PP and 3PP. Overall, this paradigm opens novel ways to investigate the vicarious experience of virtual stimuli and the obtained findings get new light about the body and brain reactivity to the empathy for pain and pleasure.

Keywords

Virtual reality, Empathy for pain and pleasure, Transcranial magnetic stimulation (TMS), Illusory body ownership

Published Work:

Fossataro, C., Tieri, G., Grollero, D., Bruno, V., & Garbarini, F. (2020). Hand blink reflex in virtual reality: the role of vision and proprioception in modulating defensive responses. *European Journal of Neuroscience*, 51(3), 937-951. doi: 10.1111/ejn.14601

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