Virtual reality and brain-computer interface for joint-attention training in autism

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ABSTRACT

Autism Spectrum Disorders (ASD) are characterized by three core behaviours: deficits in social interactions, in communication and repetitive and restricted behaviours. One of the pivotal skills we acquire for social interaction is joint attention, which has been also related to communication skills. The systemizing theory of Autism suggests that these individuals have a preference for computerized systems because of its structure and deterministic functioning. It is hypothesized that Virtual Reality may play an important role for teaching social skills in these individuals, since it can mimic the real world in a more controlled way. In this paper, we propose the use of VR for the training of joint-attention skills in Autism using a Brain-Computer Interface. We developed environments where a virtual human character directs attention to a virtual object in the environment, which the user is supposed to identify by paying attention to it. The subject's brain activity is monitored in real time by electroencephalogram (EEG) and a classifier tries to identify the target object detecting the P300 wave in the EEG. Preliminary results show a classification accuracy of 90% encouraging the approach.