An innovative Neurofeedback for children with ADHD using Virtual Reality

Victor Delvigne¹,², Thierry Dutoit¹, Laurence Ris², Hazem Wannous³, Jean-Philippe Vandeborre³

¹ISIA Lab, Faculty of Engineering, University of Mons, Belgium.
²Neuroscience Department, Faculty of Medicine and Pharmacy, University of Mons, Belgium.
³IMT Lille Douai, Villeneuve d’Ascq, France.

Context

Nowadays, ADHD is the most prevalent neurodevelopmental disorder in childhood (around 5% in Europe). The diagnosis is based on questionnaire (DSM-V which presents controversial aspects). The main treatment is medication (methylphenidate intake), however other methods have also been considered and present encouraging results, e.g. behavioural treatments and neurofeedback [1].

Methods

Physiological Signal

Records in the virtual environment
• Electroencephalography (EEG).
• Physiological tests results (Sustained an Selective Attention Tasks).
• Gaze direction (HTC Vive Pro Eye).

Signal Analysis

Signals analysis to assess attention with two methodologies:
• State-of-art methods, e.g. bandwidths analyses, temporal pattern detections [2].
• Machine learning-based methods with different architectures, e.g. convolutional or recurrent neural networks.

Environment Reaction

Environment modification in virtual reality in function of the attentional state. Stimuli vary with environments:
• Animals moving in the forest
• Balloon flying in amusement park
• etc.

Timeline

Links
