

Design and Creation of a BCI Videogame for Training and Measure of Sustained Attention in Children with ADHD

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Abstract : Attention Deficit Hyperactivity Disorder (ADHD) is a disorder that affects 1 out of 5 Colombian children, converting into a real public health problem in the country. Conventional treatments such as medication and neuropsychological therapy have been proved to be insufficient in order to decrease high incidence levels of ADHD in the principal Colombian cities. This work demonstrates a design and development of a videogame that uses a brain computer interface not only to serve as an input device but also as a tool to monitor neurophysiologic signal. The video game named "The Harvest Challenge" puts a cultural scene of a Colombian coffee grower in its context, where a player can use his/her avatar in three mini games created in order to reinforce four fundamental aspects: i) waiting ability, ii) planning ability, iii) ability to follow instructions and iv) ability to achieve objectives. The details of this collaborative designing process of the multimedia tool according to the exact clinic necessities and the description of interaction proposals are presented through the mental stages of attention and relaxation. The final videogame is presented as a tool for sustained attention training in children with ADHD using as an action mechanism the neuromodulation of Beta and Theta waves through an electrode located in the central part of the front lobe of the brain. The processing of an electroencephalographic signal is produced automatically inside the videogame allowing to generate a report of the theta/beta ratio evolution - a biological marker, which has been demonstrated to be a sufficient measure to discriminate of children with deficit and without.

Keywords : BCI, neuromodulation, ADHD, videogame, neurofeedback, theta/beta ratio

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