



Service Priorities and Programmes
Electronic Presentations

Convention ID: 4

Submitting author: Mr Ka Leung CHAN

Post title: Occupational Therapist I, Kowloon Hospital, KCC

From commercial to clinical: application of BCI (brain computer interface) device for neuropsychological rehabilitation in ambulatory setting

Chan, M.K.L., Chan, D.Y.L., Ng, S.S.W.

Occupational Therapy Department, Kowloon Hospital, Hong Kong

Keywords:

brain computer interface

neuropsychological rehabilitation

occupational therapy

neurofeedback

Introduction

EEG is a common investigation in medical field and EEG-based Brain-Computer Interface (BCI) systems have been widely studied in research labs. Brain-computer interface (BCI) technology has been studied with the fundamental goal of helping disabled people communicate with the outside world using brain signals (Hwang et al., 2013). Nowadays, researchers want to consider out-of-the-lab applications and make this technology cheaper and become more accessible by public. Therefore, several low-cost products have appeared in the market and Emotiv and Neurosky headset are common examples. Although they are designed for gaming and entertainment purpose, some clinical trial showed these devices could suit the customer's needs in terms of performance. There is also study which supports the application of the "Emotiv EEG Neuroheadset" as a user-friendly input interface (Boutani & Ohsuga, 2013). It could be an alternative input device for the clients without consistent head movement as the subjects achieved accuracy rates greater than chance after one week training (Lievesley, Wozencroft & Ewins, 2007).

Objectives

A case study was done in the out-patient Occupational Therapy Department to explore the feasibility to use the technology for people with brain injury.

Methodology

A 14 years old girl who sustained severe head injury after road traffic accident was recruited for case study. She showed poor bilateral upper limb control (FTHUE-HK: level 2-3/7) and ataxic movement. Besides she showed poor head control and trunk balance. Both physical (upper limb and balance training) and cognitive training were provided. Two BCI devices were adopted for her training. Emotiv EPOC (14 wet electrodes) was used for typing training and Neurosky Mindwave (single dry electrode) was adopted for attention training. She would attend 1.5 hours cognitive training in each session. Typing performance and user feedback was reviewed after training sessions.

Result

The subject attended 12 weeks training and nil contraindications found. She reported higher ease of use and comfort for the Mindwave headset as the setup time was shorter. She could maintain attentive which reflect by increase beta wave in the sensor on FP1 (prefrontal cortex) for an hour. Fair control in typing by BCI was found as her accuracy was fair (~30-40%) although she could initiate to choose the letters.