C.E.N.T. Computer Enabled Neuroplasticity Treatment

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University of Helsinki introduces Neurofeedback to Finland. Finland is heavily invested in cutting-edge brain science, yet it has never before had dealings with neurofeedback (NFB), either in research or clinical practice. However research on ADHD in Finland has developed strongly (e.g. Helenius et al., 2011, Gummenyk et al., 2004) and thus provides a good ground for the introduction of neurofeedback into Finland.

On par with more global estimates (Polanczyk et al., 2007), the prevalence of ADHD in Finnish 8-year-olds is estimated at 4% (DSM-III) (Almqvist, 2004), while among Finnish 16-18 year olds it rises to 8.5% (DSM-IV) (Smalley et al., 2007). Indeed, given that in Finland medication therapy for ADHD is lowest among all Scandinavian countries (Zoega et al., 2011), Finland’s need for other treatments may be substantial.

The CENT project will conduct a study on the effects of NFB on adult ADHD within Finland. Research is being conducted by the Cognitive Science Unit Dining room of Behavioural Sciences, University of Helsinki, with NFB conducted by trained technicians supervised by qualified psychotherapists. Software is custom-built for the project, with games sourced from local companies.

**STUDY DESIGN**

The experiment aims to test the efficacy of neurofeedback for adults with either ADHD or ADD by randomised controlled clinical trial (RCT). The persistence of the treatment effects will also be tested with a follow-up study. Additionally we will study the neurological symptoms of adult ADHD/ADD using laboratory-based neurofeedback (NFB), either in research or clinical practice. However research on ADHD in Finland has developed strongly (e.g. Helenius et al., 2011, Gummenyk et al., 2004) and thus provides a good ground for the introduction of neurofeedback into Finland.

**SOFTWARE**

A new software platform was developed by the Finnish company BlStream for the study, investigating OpenVibe platform’s signal analysis capability with a graphical user interface designed for the project. The platform gives the researcher or clinician the option to use different neurofeedback protocols and activities, for example different games or auditory content. The program records relevant background information on the patient’s state before each session and tracks the patient’s progress as the treatment proceeds.

The program is designed for a dual-monitor setup, with separate monitors for the therapist and the patient. In principle it is possible for the patient and the therapist to be in different locations while training, thus enabling tele-neurofeedback.

The training itself is based on thresholds calculated from baseline measurements. Currently two NFB protocols are supported, theta-beta (the default option) and SMR, one of these is chosen by the trainer at the beginning of a session.

**REFERENCES**


**HARDWARE**

The study is using Neuroelectro’s Enbio system to feedback patient’s EEG signals. Enbio is a wireless 4-channel active-electrode EEG amplifier, which can utilise wet or dry electrodes interchangeably. The program records relevant background information on the patient’s state before each session and tracks the patient’s progress as the treatment proceeds.

**FIG. 1 EEG-BASED BRAIN-COMPUTER INTERFACE**

**FIG. 2 TIMELINE SCHEMATIC OF THE CENT STUDY**

**FIG. 3 SCREENSHOT OF THE SOFTWARE USED IN CENT**

**TABLES AND DIAGRAMS**

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