Neurofeedback: A novel strategy for promoting cognitive reserve in the elderly?

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Introduction: EEG based passive brain computer interfaces (pBCIs) estimate the subjects' mental states in real time, using appropriate biomarkers extracted from the EEG signals (Zander & Kothe, 2011). In particular, pBCIs, when present in a neurofeedback loop, make it possible to apply neurophysiological regulation to foster neural compensation mechanisms by teaching subjects to self-modulate their brain activity, thus promoting neuroplasticity (Duffau, 2006) and therefore cognitive reserve. However, despite evidence of neuroplasticity even at early stages of dementia (Hill et al., 2011), strategies to facilitate neuroplasticity are limited. The specific goal of the present project is to promote the neuroplasticity of elderly people with subjective memory complaints (SMC), through neurofeedback training. Importantly, although the subjective memory decline lies within the normal limits of cognitive ageing, the literature shows that SMC may precede cognitive impairment or dementia.

Methods: Several EEG markers were described in the literature for Alzheimer's disease (AD) detection (Ihl et al., 1996) and their efficiency has been well established over the last decade (Dauwels et al., 2010; Vialatte et al., 2011; Houmani et al., 2015). In this project, we transposed these biomarkers to the framework of our BCI-system and applied them in elderly subjects with SMC.

Results: We expect the development of a pBCI that allows an electrophysiological reorganization of subjects' brain activity, directly correlated with the subjective and objective improvement of subjects' memory and attentional functions.

Conclusion: This project represents an important step on the development of novel therapeutic strategies for the promotion of cognitive reserve in elderly people.

Biography

Katia Andrade is Principal Investigator and Researcher in Dory project and Not-Aware project at Brain Plasticity Laboratory, School of Industrial Physics and Chemistry (ESPCI) of Paris from September 2017. She is Principal Investigator in several clinical trials in Alzheimer's disease (Phase I-IV), as well as in the Insight study at Institute of Memory and Alzheimer's disease (IM2A) from 2011 to present. She was Resident in Neurology from 2000-2007 and Clinical Consultant from 2009-2013. She got her Medical Doctor Degree from University of Coimbra, Portugal in 1999. She has interest in Neurology, Cognitive neuroscience, Alzheimer disease and other.

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