



## Design and Preliminary Study of a Neurofeedback Protocol to reduce Drowsiness

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# DESIGN AND PRELIMINARY STUDY OF A NEUROFEEDBACK PROTOCOL TO REDUCE DROWSINESS

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NeuroFeedback (NF) consists in using electroencephalographic (EEG) measurements to guide users to perform a cognitive learning using information coming from their own brain activity, by means of a real-time sensory feedback (e.g., visual or auditory)[4].

Many NF approaches have been studied to improve attentional abilities, notably for Attention Deficit Hyperactivity Disorder [1, 2]. However, to our knowledge, no NF solution has been proposed to specifically reduce drowsiness.

Thus, we propose a complete EEG-NF solution to train users to self-regulate an EEG marker of drowsiness. This marker is based on a ratio of beta over theta/alpha power in Cz electrode. In addition to this EEG marker of drowsiness, we also carefully selected and designed the duration, the sequencing, the objective evaluation metrics and the visual and audio feedback to use in for each NF session.

Preliminary study with five healthy subjects showed that three of them could learn to self-regulate this EEG marker with a relatively short number of NF sessions (up to 8 sessions of 40 min). Clinical trials with sleep-deprived subjects are expected to begin in 2019 to study possible cognitive and clinical benefits of this self-regulation. The implementation of this NF solution is available for free<sup>1</sup>, with the OpenViBE platform [3], under the AGPL-3.0 license.

## References

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<sup>1</sup><https://github.com/tmonseigne/NEUROPERF>