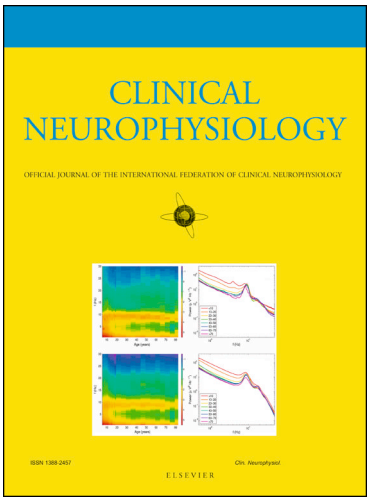

Investigating the Effects of Visual Distractors on the Performance of a Motor Imagery Brain-Computer Interface

Zahra Emami, Tom Chau

PII: S1388-2457(18)30269-4
DOI: https://doi.org/10.1016/j.clinph.2018.03.015
Reference: CLINPH 2008475

To appear in: *Clinical Neurophysiology*

Accepted Date: 11 March 2018

Please cite this article as: Emami, Z., Chau, T., Investigating the Effects of Visual Distractors on the Performance of a Motor Imagery Brain-Computer Interface, *Clinical Neurophysiology* (2018), doi: https://doi.org/10.1016/j.clinph.2018.03.015

Investigating the Effects of Visual Distractors on the Performance of a Motor Imagery Brain-Computer Interface

Zahra Emami[1, *] and Tom Chau[1, 2]

[1] Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital, Toronto, ON, Canada, [2] Institute of Biomaterials and Biomedical Engineering, University of Toronto, Toronto, ON, Canada

* Corresponding author.
E-mail address: zahra.emami@mail.utoronto.ca

Highlights

- Transient, visual distractors have a significant effect on motor imagery-related neural activity.
- For most participants, the BCI performance was robust to these small distractors effects.
- A mean online classification accuracy of 78% was attained for distractor trials across participants.

Abstract

Objectives: Brain-computer interfaces (BCIs) allow users to operate a device or application by means of cognitive activity. This technology will ultimately be used in real-world environments which include the presence of distractors. The purpose of the study was to determine the effect of visual distractors on BCI performance.

Methods: Sixteen able-bodied participants underwent neurofeedback training to achieve motor imagery-guided BCI control in an online paradigm using electroencephalography (EEG) to measure neural signals. Participants then completed two sessions of the motor imagery EEG-BCI protocol in the presence of infrequent, small visual distractors. BCI performance was determined based on classification accuracy.

Results: The presence of distractors was found to affect motor imagery-specific patterns in mu and beta power. However, the distractors did not significantly affect the BCI classification accuracy; across participants, the mean classification accuracy was 81.5 ± 14% for non-distractor trials, and 78.3 ± 17% for distractor trials.