
Paper ID: 1570942845

Paper Title: Towards realizing multi-class auditory brain-computer interface paradigm based on stream segregation: a preliminary study

Authors: Simon Kojima and Shin'ichiro Kanoh (Shibaura Institute of Technology, Japan)

Email: nb21106@shibaura-it.ac.jp

Abstract

The performance of current auditory BCIs is lower than other BCIs that use such as visual stimuli. One reason is that the auditory BCI paradigm proposed so far does not take full advantage of human auditory abilities. Humans can direct selective attention to sounds, including the cocktail party effect. The performance of auditory BCI may be improved by using more informative sound stimuli that take advantage of human auditory abilities. Hence, we proposed the BCI paradigm using the auditory illusions called auditory stream segregation, which makes it possible to perceive alternately presented sounds as segregated multiple sound streams. However, increasing the number of auditory streams to be presented is required to achieve multi-class auditory stream segregation-based BCI, which may make perceiving the sequence as segregated streams difficult. This study investigated the feasibility of a four-class auditory stream segregation-based BCI paradigm using four streams as a preliminary study. The experiment with three subjects suggested that users could perceive the sound sequence as four segregated sound streams and pay attention to one. From measured electroencephalogram (EEG) data, it was shown that ERPs, including P300, were elicited by deviant stimuli presented in a low probability contained in each stream, and which stream users paid attention to was detected using a linear discriminant analysis (LDA) with high accuracy.
