A generic error potential detector based on single trial analysis of source data

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Résumé

A common type of passive BCI system are error potential detectors. These systems detect single trial feedback related negativity, an electroencephalography component commonly associated with erroneous feedback. In real world use, error potential detection systems typically have to be trained on individual subjects before use. One alternative to this training is to develop methods which learn underlying properties of EEG components from multiple subjects and generalise to new ones. In this work, we present a generic error potential detection system which uses a prior knowledge of neurophysiology for EEG processing. Assumptions derived from reinforcement learning theory are used for classification. Time series are obtained from source space activity with a signal to noise ratio adequate for single trial analysis. This work demonstrates that a subset of error potentials may be discriminated on a single trial basis with a high level of precision for previously unknown subjects. All methods used work in real time and therefore may be used in EEG guided experimentation.

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