

Abstract View

AUTOMATIC REJECTION OF EVENT-RELATED POTENTIAL TRIALS AND COMPONENTS USING INDEPENDENT COMPONENT ANALYSIS

[A. Delorme*](#); [S.- Makeig](#); [T.-Z.- Jung](#); [T.-J.- Sejnowski](#)

Dept Computational Neurobiol, Salk Institute, La Jolla, CA, USA

Independent Component Analysis (ICA) applied to EEG and single trial event-related potentials is an effective way to identify and separate artifacts from brain sources. However, there is yet no automatic method for selecting artifactual components. Here, we describe an algorithm based on ICA for removing artifact trials and components. Trial artifacts are signals that are outliers of the signal distribution. Component artifacts contain signals from defective electrodes or eye and muscle activations with characteristic scalp distributions. High-order statistics (entropy and kurtosis) can help distinguish artifacts from brain related signals. High entropy indicates unexpected signals and high positive kurtosis identifies outliers. We compared the performance of the algorithm with human rejection on recordings from a visual categorization task (32 electrodes montage, ears referenced). In preliminary testing on 3 subjects, the algorithm agreed with the experimenter on about 90% of the rejected components if recalibrated by the experimenter and 85% in full automatic mode assuming 50% of component artifacts. EEG-LAB, a user-friendly graphic interface using Matlab, guides the user through this process (www.cnl.salk.edu/~arno/eeglab.html). The software, based on the ICA toolbox (www.cnl.salk.edu/~scott/ica.html), implements graphic functions to help the user visualize their data and clean them of artifacts.

Supported by: Fondation pour la Recherche Medicale



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