

NP-EEG Toolbox: An Open-Source Toolbox for Analyzing Naturalistic EEGs

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Abstract

Compared with traditional event-related paradigms, the naturalistic paradigm (NP) allows researchers to investigate brain dynamics under naturalistic (real-life) scenarios in EEG experiments. However, the analysis of EEG data collected in NPs is challenging; that is, there is no widely-available toolbox dedicated for analyzing real-life and ongoing EEG data. Hence, we developed an open-source MATLAB toolbox (NP-EEG toolbox) that allows researchers to collect naturalistic EEGs. Implemented by the use of EEGLab Toolbox and Signal Processing Toolbox, the functionalities of the NP-EEG toolbox are comprised of four categories: preprocessing, connectivity, statistics, and visualization. The preprocessing module contains pseudo-event creation, band pass filtering, pseudo-epochs extraction, and artifact removal by regression analysis. The connectivity module implements MIPAC and PLV methods. Researchers could conduct statistical analyses on the values of brain connectivity computed using functions in the statistics module. Finally, the visualization module contains functions to plot various graphs, such as comodulograms. This toolbox will be available at www.github.com/np-toolbox.

Keywords: Naturalistic EEGs, cross-frequency coupling, MATLAB, open-source toolbox, real-life paradigms.