Variability of approaches to analysing EEG data in practice: a case study of the N400 component

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Abstract

In electroencephalographic (EEG) research, the pipeline from raw recordings to datasets ready for analysis is long and complex, with many options to consider, and the resulting rich datasets with many temporal and spatial data points allow for an almost endless variety of analysis options. As a result, there is potentially large variability between studies in the way data is pre-processed and analysed – variability that could affect comparability of findings and their trustworthiness if it turns out to be able to influence outcomes of EEG studies. This talk discusses results of a systematic review (Šoškić et al., 2021) which has provided insights into this variability in one subfield of EEG research: ERP studies focused on a well-established ERP measure (the N400) in one of its most common modalities (visual images), recorded in the most commonly assessed population (healthy neurotypical adults). The review covers a sample of 132 papers and provides insights into 73 methodological properties from study design to data analysis to availability of supplementary materials. The results have shown that each of these 132 papers presented a unique pipeline from recording to data analysis, with some steps in the preprocessing-analysis pipeline having almost as many distinct options as there were papers, especially in the domain of statistical analysis. These findings speak of the need to examine effects of such variability on study outcomes, which can be done through multi-analyst and other multiverse approaches.