Electroencephalography (EEG) is an important tool for studying the temporal dynamics of the human brain's large-scale neuronal circuits. However, most EEG applications fail to capitalize on all of the data's available information, particularly that concerning the location of active sources in the brain. Localizing the sources of a given scalp measurement is only achieved by solving the so-called inverse problem. By introducing reasonable a priori constraints, the inverse problem can be solved and the most probable sources in the brain at every moment in time can be accurately localized.

Here, we review the different EEG source localization procedures applied during the last two decades. Additionally, we detail the importance of those procedures preceding and following source estimation that are intimately linked to a successful, reliable result. We discuss (1) the number and positioning of electrodes, (2) the varieties of inverse solution models and algorithms, (3) the integration of EEG source estimations with MRI data, (4) the integration of time and frequency in source imaging, and (5) the statistical analysis of inverse solution results.

We show that modern EEG source imaging simultaneously details the temporal and spatial dimensions of brain activity, making it an important and affordable tool to study the properties of cerebral, neural networks in cognitive and clinical neurosciences [1)].

1)

Michel CM, Murray MM, Lantz G, Gonzalez S, Spinelli L, Grave de Peralta R. EEG source imaging. Clin Neurophysiol. 2004 Oct;115(10):2195-222. Review. PubMed PMID: 15351361.