Identifying Generators of Visual Recognition Memory (Old/New) Effects in Affective Disorders: A Principal Components Analysis (PCA) of Laplacian Waveforms

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Abstract
Event-related potential (ERP) correlates of mnemonic processes have rarely been assessed in mood disorders, despite considerable behavioral evidence of impairment. The typical ERP finding for healthy adults during explicit memory tasks is the so-called withold effect, an enhanced posterior negativity between 300 and 500 ms for repeated items, which is assumed to index conscious recollection. This study compared ET-channel, reference-free current source densities (CSD) Laplacians derived from surface potentials (EPFs) recorded during a recognition memory task using unknown faces (college students) and pronouncing pseudowords (e.g., ‘restaurant’ vs. ‘restaurants’ from 10 randomized syllabils in major depressive disorder, DSM-IV) and 30 healthy adults, all right-handed. Participants performed more poorly than controls, with both groups having better memory for faces than pseudowords. Univariate principal components (varimax) were derived from CSD wavefields to identify and measure neuronal generator patterns. Two prominent CSD factors, each related to sources at parietal and temporal sites, revealed old/new effects at mid-frontal (422 ms peak latency) and inferior parietal (383 ms) sites. The pseudowords and visual source effects were reduced in patients at parietal and mid-central sites, especially for faces. Task specific CSD topographies <200 ms were comparable across groups, indicating neuronal generators early in vent and face processing. The combination of PCA and CSD methodologies can help to identify neuronal generators underlying memory impairments in depression.

Introduction
- In depression patients in mood, depressed patients often show cognitive deficits, including memory function, which may result from medial-temporal and frontal dysfunction (e.g., Hertel et al., 1991/2011 EJHP)
- Surprisingly, few studies have directly measured neuropsychological function of depressed patients (e.g., Pritzel et al., 1980/91) for the ERP, which shows the effects of task and scalp topography of event-related brain potentials (ERP) reflect the spatiotemporal sequence of cognitive information processing.
- Typical ERP finding during explicit memory retrieval tasks (judging faces as old or new) is the Old/New Effect - latency at 200-400 ms, more prominent in older over younger both groups, up to 350 vs. 250 ms, respectively (e.g., Lewis, 1991) is a clear representation of the old/new effect. The Old/New Effect is a major indicator of the ability to recollect memories.
- In this study, we aimed to investigate the ERP findings during a recognition memory task using unknown faces (college students) and pronouncing pseudowords (e.g., ‘restaurant’ vs. ‘restaurants’ from 10 randomized syllables in major depressive disorder, DSM-IV) and 30 healthy adults, all right-handed. Participants performed more poorly than controls, with both groups having better memory for faces than pseudowords.