Auditory and Visual Word Recognition Memory (WRM) in Schizophrenia: Stimulus- and Response-Locked Neuronal Generator Patterns

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Background: Studying visual WRM with nose-referenced EEGs, we reported a preserved ERP ‘old-new effect’ (enhanced parietal positivity 300-800 ms to correctly recognized repeated items) in schizophrenia (Kayser et al., 1999). However, patients showed reduced early negative potentials (N1, N2) and poorer WRM. Because group differences in neuronal generator patterns (e.g., dipole orientation) may be masked by choice of EEG recording reference and component definition, the current study applied a new methodological approach that combines surface Laplacians and principal components analysis. We investigated stimulus modulation and disentangled stimulus- and response-related contributions to neuronal generators of WRM. Methods: Stimulus- and response-locked 31-channel epochs were recorded from 20 schizophrenic (15 male) and 20 age-, gender-, and handedness-matched healthy adults during parallel visual and auditory continuous WRM tasks (Kayser et al., 2007). To identify and measure neuronal generator patterns underlying ERPs, unrestricted Varimax-PCA was performed on their reference-free current source densities (spherical splines). Results: Poorer (78.2±18.7% vs. 87.8±11.3% correct) and slower (958±226 vs. 773±206 ms) performance in patients was accompanied by reduced stimulus-related left parietal P3 sources and vertex N2 sinks (both overall and old/new effects) but modality-specific N1 sinks were not significantly reduced. A distinct, 50-ms post-response mid-frontal sink (FRN) was markedly attenuated in patients. Reductions were more robust for auditory stimuli. However, patients showed increased lateral-frontotemporal sinks (T7 maximum) concurrent with auditory P3 sources. Conclusions: Electrophysiologic correlates of WRM deficits in schizophrenia suggest functional impairments of posterior cortex (stimulus representation) and anterior cingulate cortex (response monitoring), primarily affecting memory for spoken words.

References
