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ERP source localisation using eLORETA: Adults vs. children

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Aims: In the current study we were interested in using Exact Low Resolution Brain Electromagnetic Tomography (eLORETA) to investigate the component source localisations of the sequence of event-related potentials (ERPs) elicited in the equiprobable auditory Go/NoGo paradigm. Specifically, we aimed to compare these in adults vs. children. Method: Eighteen adults and 18 children completed an uncued equiprobable auditory Go/NoGo task while continuous EEG was recorded at 19 scalp sites. The data were recorded and quantified separately for each group. Go and NoGo ERP components were identified from an unrestricted Varimax-rotated Principle Components Analysis. The identified components were examined using eLORETA for source localisation. Major cortical generators of each ERP component were derived as the three cortical structures with the greatest absolute current density in eLORETA. Results: Adult/child Go responses, identified by eLORETA, show some similar sources for: N1-1 (Inferior Temporal Gyrus), PN (Postcentral Gyrus), adult P3 when compared with child P3a (Medial Frontal Gyrus) and P3b (Inferior Frontal Gyrus), SW (Medial Frontal Gyrus), and LP (Middle Frontal Gyrus); but not for P1, N1-3, P2, or N2. Comparisons of adult/child NoGo responses found source similarities for: N2 (Postcentral Gyrus), adult P3 when compared with child P3a (Medial Frontal Gyrus), and LP (Superior Frontal Gyrus); but not for P1, N1-3, N1-1, PN, P2, child P3b, or SW. Conclusions: The ERP component sources obtained using eLORETA show some commonalities between Children and Adults. However, ERP component source localisations are largely dissimilar across the groups. These differences are likely attributable to developmental changes. The results may be beneficial to future developmental research. Follow up studies could extend on the results by comparing different maturational stages of development (e.g. young vs. older children).

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