Test-retest reliability of an ERP study on children with ADHD during a visual Go/NoGo task

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Event-related potentials components (ERPs) have been widely used, in research settings and as a clinical diagnostic tool as well, to identify aspects of brain functioning in children with attention-deficit hyperactivity disorder (ADHD). Several studies have addressed the issue of test-retest reliability of ERPs on neurotypical population. In order to ensure the efficiency of ERP technique in disease identification and longitudinal studies, where personalized treatment procedures are investigated, the test-retest reliability of the affected population needs also to be explored. In this line, the present study examines the assessment of short-term test-retest reliability of a number of ERP correlates relevant to ADHD, through the Intraclass Correlation Coefficient (ICC). More specifically, ERPs from 22 young children with ADHD are recorded by a 21-channel EEG during a cued visual Go/NoGo paradigm. The exact measurement is repeated with 30 minutes time interval in between each session. The retest reliability assessment concerns the early sensory components P1, N1 at occipital electrode and later cognitive ERP components namely, N2 (NoGo condition) and P3 (P3 Go, P3 NoGo conditions). Furthermore, the reliability of independent components (ICs) decomposed from the abovementioned ERPs, i.e., IC P3 Go, IC P3 NoGo early, IC P3 NoGo late, with a parietal, a central and a fronto-central distribution respectively, are examined. Amplitudes and latencies are calculated by the 'peak amplitude' method. Concerning the amplitudes, the reliability results lie mostly within the 'good' and 'excellent' range, while ICC for latencies was lower varying from 'poor' to 'good' results. Crucially, the ICs, which are associated with distinct functionally independent processes of the executive attention system, have shown a comparable test-retest reliability with the raw ERPs.