

Event Related Components and lexical decision task in children with and without reading difficulties

Fella, A.¹, Christoforou, C²., & Papadopoulou, T. C³

¹ School of Education, University of Nicosia, Cyprus (fella.a@unic.ac.cy)

² Division of Computer Science, Mathematics & Science, St. John's University, USA

³ Department of Psychology & Centre for Applied Neuroscience, University of Cyprus

Objective: The present study investigated the differences between children with reading difficulties (RD) and their controls (Grades 3 and 6, age range = 7.7–12.08 years, females = 24) on a lexical decision task, using Event-Related Potentials (ERPs).

Method: The ERP data collection was performed using the BioSemi Active-two system (BioSemi, Amsterdam, Netherlands) at a sampling rate of 512 Hz. Participants were fitted with a standard 64-electrode cap following the international 10/20 system. During the lexical decision task, the participants had to identify the real word from a nonword containing similar letters, presented simultaneously on the screen. The word reading task consisted of 120 word pairs, each forming a 2x2x2 factorial design in terms of frequency (high/low), orthographic regularity (regular/irregular), and length (disyllable/polysyllable).

Results: EEG data recording elicited the N200 and N400 components. MANOVA analyses showed that the Grade 3 RD group produced significantly longer N200 than their chronological age-matched controls (CA) controls when length and familiarity were factored into the equation. No differences were observed in the N200 component between the Grade 6 groups. Furthermore, children with RD in both Grades presented reduced N400 amplitudes compared to their counterparts.

Conclusions: The enhanced N200 in the Grade 3 RD group may reflect an increased processing effort in decoding the visual features of presented items at a pre-lexical stage (Kast et al., 2010). Furthermore, the reduced N400 amplitudes in RD children imply less well-defined orthographic representations or difficulties accessing the orthographic lexicon and applying grapheme-phoneme conversion rules (Hasko et al., 2013).