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Guest Editors: Mary H. Kosmidis, Athanasia Liozidou, Lambros Messinis, Alexandra Thanellou, Ioannis Zalonis

## Lecture

# Remediation effects on P300 waveform in school aged children with developmental dyslexia

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## Abstract

Dyslexia can be defined as an unexpected difficulty in reading in individuals who otherwise possess the intelligence, motivation and schooling, thus factors considered to be vital and crucial for accurate and fluent reading. This specific learning disability is assumed to be neurobiological in origin and it is related to a variety of impairments in processing sensory information. Due to these neuropsychological deficits, it is *proposed that Event Related Potentials (ERPs) is a scientific tool for the assessment of dyslexic children by providing data about the neuronal activity which is related to cognitive information processing.*

Despite of the delayed brain activity and latency values differences being observed in dyslexic children comparing to typical readers, scientific research data confirm that normalization can be achieved, as changes in brain activation may occur and children's reading ability could be improved, through the implementation of a structured intervention. Indeed, even brief periods of training can evoke changes in the brain's ERPs responses and, actually, with lasting benefits.

The aim of this study was to investigate the effect of a remediation - training program being implemented to dyslexic children, on ERPs esp. P300 waveform latency values. ERPs were obtained from 15 electrode sites (Fp<sub>1</sub>, Fpz, Fp<sub>2</sub>, F<sub>3</sub>, Fz, F<sub>4</sub>, F<sub>7</sub>, F<sub>8</sub>, C<sub>3</sub>, Cz, C<sub>4</sub>, P<sub>3</sub>, Pz, P<sub>4</sub>, Oz) according to the 10 – 20 International System (Jasper, 1958), plus 2 reference electrodes at the mastoids of each ear and one ground electrode at the Nz (nose) site in six Greek right handed children with developmental dyslexia (mean age 9 years and 8 months). Impedances for all electrodes were kept below 5 kohms. Six control children matched on chronological age and IQ level were also tested.

Results from the first assessment confirmed that dyslexic children differed significantly from control group, in presenting a longer P300 latency values and anomalous, thus right *hemispheric, lateralization*. After the initial assessment, children with dyslexia received intensive six-month training program included exercises for enhancing phonological skills (syllable counting, phoneme detection, phoneme blending, rhyme detection) visual and auditory memory (*sounds and pictures matching, picture & word sequencing*), *visual perception and attention (coding, spotting the differences between five similar pictures)*.

Data analysis displayed significant improvement for the dyslexic group after their participation to the reme-

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diation program, as they showed a significant decrease in P300 latency. Actually, children with dyslexia, after training, tend to have similar to controls *P300 wave latency values* and developed a brain activation profile more similar to that of the typically developing control group, showing, *left hemispheric lateralization*.

Key-words: Neuropsychology, Cognitive Evoked Potentials, Dyslexia, Rehabilitation