Original Article

Post-Attentive Integration and Topographic Map Distribution During Audiovisual Processing in Dyslexia: A P300 Event-Related Component Analysis

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Abstract

Background: **Research on audiovisual post-attentive integration has been carried out using a variety of experimental paradigms and experimental groups but not yet studied in dyslexia. We investigated post-attentive integration and topographic voltage distribution in children with dyslexia by analysing the P300 event-related potential (ERP) component.**

Methods: **We used a 128-child ERP net for the ERP experiment. Two types of stimuli were presented as either congruent or incongruent stimuli. Congruent stimuli included a matching auditory sound with an animal image, whereas incongruent stimuli included unmatched animal sounds. A total of 24 age-matched children were recruited in the control (*n* = 12) and dyslexia (*n* = 12) groups. Children pressed button '1' or '2' when presented with congruent or incongruent stimuli, respectively. The P300 amplitudes and latencies with topographic voltage distribution were analysed for both groups.**

Results: **The dyslexia group evoked significantly higher P300 amplitudes at the T4 area than the control group. No significant differences were found in cases of P300 latency. Moreover, the dyslexia group demonstrated a higher intensity of P300 voltage distribution in the right parietal and left occipital areas than the control group.**

Conclusion: **Post-attentive integration for children with dyslexia is higher and that this integration process implicated the parietal and occipital areas.**

Keywords: *event-related potential, P300 component, post-attentive integration, dyslexia, topographic map*

Introduction

Audiovisual (AV) integration is fundamental for perception and learning in one's natural environment (1). The AV system is integrated with the multisensory system which activates in a manner where one sensory system can enhance the other sensory system. This occurs by altering the different sensory inputs whereby attention is then either allocated to the scene or auditory stimuli (2). This cross-modal relationship provides information about the underlying mechanism of human sensory and cognitive control processing.

Research has been conducted using AV integration during reading and by studying the corresponding event-related potential (ERP) data (3, 4). In spelling, reading and writing the alphabet, children develop their multisensory system during the learning process. Learning disabilities including dyslexia develop when this multisensory system is interrupted (5).

