**Title**: **The Predictive Role of Neural Index of Executive Functioning and Elementary School Children’s Reading Comprehension**

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**Introduction**: The protective role of executive functioning (EF) in reading comprehension is well documented (Follmer, 2018). Poor inhibitory control, a core EF skill, is a potential risk factor for reading difficulties (RD) (Willcutt et al., 2005). Behavioral studies assessing inhibitory control consistently find differences between individuals with and without RD (Chiappe et al., 2000). Investigating neural indices of inhibitory control can supplement behavioral findings. This study examines the neural index of inhibitory control (i.e., the N2 component) to understand its association with RD. The N2, an event-related potential (ERP) elicited during tasks requiring inhibition (Grammer, 2014), is a negative-going waveform peaking 200-400ms after stimulus onset. Prior research identifies N2 as a neural marker of inhibitory control at psychological and behavioral levels. Given its role in disorders with inhibitory components, we explore how N2 relates to reading comprehension and RD.

**Method**: Fifty-two children participated, with 32 in the typically developing (TD) group (female = 15, male = 17; *M*age = 8.90 years, SD = 1.38) and 20 in the RD group (female = 7, male = 13; *M*age = 9.46 years, SD = 1.28). RD grouping was based on parent reports and child scores on various reading tests. Reading comprehension was measured by the Woodcock Reading Mastery Test-III (Woodcock, 2001). The Go/No-Go task used animal pictures to represent Go and No-go conditions, with Emotional and Neutral conditions in a 2x2 design (Lamm et al., 2014). Children acted as zookeepers, pressing a button quickly to capture escaping animals (go trials), but not for monkeys, their helpers (no-go trials). There were 280 pictures across four blocks: Neutral (non-threatening) and Emotional (threatening and non-threatening). EEG was recorded continuously using a 128-electrode Geodesic Sensor net (EGI-Magstim) and processed offline with EEGLAB and ERPLAB.

**Results**: A significant correlation between reading comprehension and the N2 difference wave (nogo minus go; delta N2) in the Emotional condition led to a hierarchical regression to assess whether N2 predicted unique variance in reading comprehension. Age was first added as a control, followed by working memory, receptive vocabulary, and word reading efficiency. Delta N2 was added last. Including delta N2 significantly increased the predicted variance, R² = 0.047, F(1, 42) = 6.85, p = .012. Delta N2 uniquely predicted variance in reading comprehension, B = -0.85, SE = 0.32, t(42) = -2.62, p = .012, while receptive vocabulary, B = 0.610, SE = 0.148, t(42) = 4.11, p < .001, and word reading efficiency, B = 0.552, SE = 0.111, t(42) = 4.96, p < .001, remained significant. The model explained 71.2% of the variance in reading comprehension, R² = .712, adjusted R² = .677.

**Discussion:** These findings highlight N2’s significance as a neural index of inhibitory control in understanding RD. Results show delta N2 uniquely predicts reading comprehension variance even after controlling for traditional cognitive and linguistic factors. The findings highlight (a) the crucial role of inhibitory control and the interaction between emotion and inhibitory processes in successful reading comprehension; (b) the importance of considering emotional factors when examining the neural mechanisms of executive functioning for children with reading difficulties.

**References:**

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