



Beyond the Surface: A Multimodal Neurocognitive Inquiry into Hyperlexia

Moones Jedari Mehdipour^{1*} 

1. Shiraz University, Shiraz, Iran

Abstract

Hyperlexia, characterized by precocious word reading alongside deficits in comprehension and social communication, occupies a complex position between autism spectrum disorder (ASD), savant syndrome, and atypical language development. Since its first documentation by Silberberg and Silberberg (1967), its heterogeneous nature and overlap with ASD have complicated classification. Neuroimaging studies reveal heightened activation in the visual word form area (VWFA) and atypical connectivity between temporo-parietal and frontal regions, reflecting bottom-up hyperactivation and top-down hypo-integration. Electrophysiological findings, such as reduced N400 responses, indicate semantic processing abnormalities. Cognitively, hyperlexia involves hyperattention to orthographic details, surface decoding reliance, and poor inferential and pragmatic skills. Despite fluent reading, comprehension deficits contradict the "simple view of reading". Impairments in joint attention, theory of mind, and executive functions suggest broader cognitive involvement. Clinically, it is frequently misdiagnosed as ASD, though subtypes, neurotypical, autistic, and transient, have been proposed. Absence of standardized criteria and longitudinal data impedes targeted interventions. Research gaps include limited longitudinal evidence, unexamined genetic and epigenetic bases, neglect of multilingual contexts, and insufficient focus on executive functions. This study has aimed to integrate multimodal neuroimaging, genomic profiling, and psycholinguistic tracking to refine taxonomy and design individualized interventions. Understanding hyperlexia as a distinct neurocognitive phenotype could reshape current paradigms of reading and language acquisition.

Keywords: Hyperlexia, Multimodal longitudinal design, Autism spectrum co-morbidity, Pragmatic language impairment

Email: Mounesjedari.mjmpshiraz@gmail.com



The Second International Biennial Conference on the Science of Language & the Brain
(SOLAB 2025) 9-10 October