The Neurocognitive Characteristics of Sublexical Orthographic Processing among Ethnic Minority Children in Southwest China

Shuo Lu
Shenzhen University

China is a multi-ethnic nation, where the development of literacy abilities among ethnic minority children typically faces unique challenges, due to factors such as the mismatch between mother tongue and the language of literacy education, the language status, attitudes, and family support in multilingual communities. The Southwest region is one of the most representative areas in China where ethnic minorities reside. This study utilizes behavioral assessments as well as neurocognitive techniques to investigate the characteristics of literacy ability development and the sublexical orthographic processing of Chinese characters of elementary school children in this region.

The behavioral examination utilized the "The Literacy Development Test Scale for Chinese School-age Children" to comprehensively assess literacy abilities, including overall literacy skill, Chinese character recognition, text reading, Chinese character writing, text writing, and more fine-grained dimensions. The study included a total of 3096 children from grades 1-6 from Liuzhou and Hechi City, Guangxi province. The findings revealed a significant urban-rural gap, with the rural ethnic minority children lagging behind for at least 2 grades in literacy development. Besides, a gap between ethnic majority and minority children were also found, mostly in rural areas. The detailed analyses further indicated that in the lower grades, Chinese character recognition and writing lagged behind for Zhuang children compared to Han children, while in the fourth and sixth grades, sentence reading were behind for Zhuang children.

These results from behavioral examination underscore the importance of focusing on the Chinese character recognition abilities of ethnic minority children in the lower grades. Thus, we further utilized **eye-tracking and HD-EEG to examine the neurocognitive characteristics** of the most fundamental process in Chinese character recognition, i.e., the sublexical orthographic processing in the two groups. Results revealed the following: 1. In typically developing (TD) children, ethnic minority children displayed a noticeable lag in primary visual processing abilities, tending to utilize lower-level processing strategies in simple tasks. 2. Among ethnic minority children, the differences between children with dyslexia and TD children were less pronounced compared to the differences between Han ethnicity children with and without dyslexia. There were no differences in primary visual

processing abilities between minority children with dyslexia and TD children; yet the distinctions were evident in processing strategies. 3. The processing strategies of ethnic minority children with difficulties were less efficient compared to Han ethnicity children with difficulties.

These findings suggest that the reading difficulties of children with challenges are primarily manifested in primary visual processing (basic recognition abilities), indicating a systematic lack of foundational neural sensitivity and less efficient processing strategies. This shed lights on the importance of focusing on the development of basic recognition abilities in minority children in lower grade levels such as understanding character spatial structures, component recognition, component understanding, and character formation principles.