Cross-Linguistic Perspectives on Dyslexia: Exploring Chinese-English Differences and the Implications for Mainland China

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Abstract. Dyslexia is a disorder/condition characterised by challenges in learning to read. It is usually considered to have a universal biological basis. However, this view was challenged by comparing areas of brain activity in Chinese and English dyslexia through functional magnetic resonance imaging (fMRI) (Siok et al. 2004, 71). This paper explores the differences in dyslexia performance between different language systems. The findings suggest that, in addition to biological factors, sociocultural and economic factors significantly influence dyslexia. Furthermore, this paper reviews the current methods used to identify dyslexia and the interventions being implemented across different regions of China. At present, research in Mainland China remains in the developmental stage. Hence, this paper offers some recommendations for language policy and educational practice with the aim of creating a more inclusive education system that can effectively support every learner.

Keywords: dyslexia, cross-linguistic differences, neurocognitive disorder, inclusive education, special educational needs

1. Introduction

Reading is an essential part of modern life. However, there are some people who have difficulties in reading with conventional education, average intelligence and sociocultural circumstances (Chan 2002, 3). This is because they suffer from a disorder called *dyslexia*, which was defined by the World Federation of Neurology in 1968 (Chan 2002, 3). Although definitions of the disease have varied among researchers and organisations, there is general agreement that

dyslexia has a universal biological basis. However, this idea has been challenged, as new research continues to emerge. A study conducted by Siok's group indicates that dyslexia in Chinese and dyslexia in English have different origins (Siok et al. 2004, 71). As a result, this paper proposes to examine the following research questions. Firstly, what is the biological basis of the difference between Chinese and English dyslexia? In addition, does dyslexia reflect a biological deficit, a cultural difference in the respective language system, or an interaction of both?

Although significant progress has been made in current research on dyslexia, most of this is based entirely on the investigation of the English language system. This may well limit understanding and intervention in the case of non-English contexts. A comparative cross-linguistic study of two different language systems, Chinese (a logographic system) and English (an alphabetic system), indicates that the biological deficits of dyslexia differ markedly between the two language systems. This paper suggests that dyslexia should be acknowledged as a neurocognitive disorder influenced by culture and dependent on language, rather than being regarded solely as a 'disease' with origins in a universal biological basis. Moreover, when compared to Taiwan and Hong Kong, there is a lack of systematic awareness and understanding of dyslexia in Mainland China (Cai 2018). For this reason, the third research question has been raised: Is it possible to propose more effective intervention strategies for Mainland Chinese dyslexia based on current research? This report aims to develop a Chinese model of linguistic and cultural adaptation to fill the gap in the early identification and intervention of dyslexia in Mainland China.

2. Literature Review

Dyslexia is closely related to the written language and is especially tied to the language's writing system. Therefore, this paper will start from the two different writing systems corresponding to English

and Chinese. Chinese adopts a logographic system, where the fundamental unit of script is the character. At the same time, based on the work of Li and Kang, about eighty per cent of Chinese characters are composite characters, in which different parts provide semantic and phonological cues to the whole (Han and Bi 2009, 24). Current research has shown that Chinese dyslexia is related to functional deficits in the left middle frontal gyrus (LMFG), because the LMFG mediates the conversion of graphic form (orthography) to syllable and orthography-to-semantics mapping (Siok et al. 2004, 71).

In contrast, English is part of the alphabetic system. In the alphabetic system, people need to relate speech to writing, which is based on the phonemic analysis of the word (Carraher and Rego 1983, 163). It means that grapheme-to-phoneme conversion is usually involved in the reading process. For this reason, English dyslexia is associated with dysfunction in left temporoparietal regions, as these regions are responsible for phonemic analysis and conversion of written symbols to phonological units of speech (Siok et al. 2004, 71).

The above findings suggest that the characteristics of different languages should correspond to the involvement of different functional areas in the human brain. Therefore, the research of Siok's group challenges the traditional view that dyslexia has a universal biological basis and suggests that dyslexia is culture-dependent (Siok et al. 2004, 71). Additionally, Chinese dyslexia is characterised by the coexistence of visuospatial and phonological disorders, but these two disorders are independent of each other (Siok et al. 2009, R890). This further explains the lower rate of dyslexia in China when compared to native English-speaking countries.

In recent years, research on Chinese has started to progress, but a comprehensive survey is still lacking (Sun et al. 2013, 9). By contrast, research on dyslexia in general remains English-centred. It thus leads to both dyslexia identification and intervention, but chiefly in the realm of English language studies. Moreover, there is

a shortage of standardised and accessible tools for diagnosing dyslexia among the Chinese population, and many existing tests are inconsistent with contemporary research theories (Hou et al. 2018, 1-2). From both theoretical and practical perspectives, dyslexia is still not widely understood in Mainland Chinese society. Therefore, the level of detection and intervention for dyslexia lags significantly behind Western countries.

3. A Cross-Linguistic and Sociocultural Perspective on Dyslexia

The difference in language systems can lead to differences in varying cognitive demands for reading in Chinese compared to English. English is considered a deep orthography that requires readers to have good phonological awareness and processing skills because the spelling of words does not consistently correspond to their pronunciation, necessitating strong phonological awareness and processing skills for effective reading (Schmalz et al. 2015, 1614-1615). However, Chinese, as a robust ideographic language system, leads readers to depend more on visualisation for semantic mapping and character recognition. These differences are reflected in the brain variations observed in dyslexics across different languages. Therefore, it is essential to study dyslexia from a cross-linguistic perspective. Because of social and cultural factors, different language systems correspond to different reading styles and learning processes. As a result, various regions of the brain are activated depending on the language. Therefore, research based on dyslexia in English cannot be directly applied to an understanding of dyslexia in Chinese. This is why the findings of Siok's team are significant for raising public awareness about Chinese dyslexia (Siok et al. 2004, 71).

Cross-linguistic studies have further confirmed the impact of language systems on dyslexia performance. A case study of an English-Japanese bilingual boy shows that his dyslexia is restricted

to English, with a notable difference in his reading abilities between English and Japanese (Wydell and Butterworth 1999, 273). Although the study does not focus on Chinese-English bilingualism, it should be noted that Japanese and English also come from entirely different writing systems. The findings of this case study further support the significance of recognising the influence of the language system on dyslexia performance. Moreover, brain imaging studies have shown that various writing systems activate distinct brain networks (Siok et al. 2004, 71). This suggests that cultural and linguistic contexts significantly influence the development of dyslexia. In fact, these findings call into question the conventional belief that dyslexia is primarily rooted in universal biological factors.

Alongside biological mechanisms, the socio-cultural context plays a significant role in the identification and intervention of dyslexia. Comparative studies of Chinese-English bilingual dyslexia involving the same individual are extremely rare, on account of the education system in Mainland China. The impact of dyslexia on the learning process is not widely recognised in Mainland China, so there is a lack of support measures, such as extended time for examinations. Currently, there is a significant variation across regions in identifying Chinese dyslexia. There are no standardised criteria for identifying dyslexia in Mainland China, while in Hong Kong and Taiwan, dyslexic children are identified through the use of standardised tests (Cheah et al. 2024, 1-3). A lack of awareness about dyslexia often leads to misconceptions that it is linked to lower IQ, resulting in children being unfairly labelled as "stupid" or "lazy" (Cai 2018). These misunderstandings often have a direct effect on children's academic development. In turn, the stigma associated with dyslexia may lead to mental health problems such as impaired self-esteem, anxiety and even depression—all of which may seriously affect children's social adaptation and psychological growth.

4. Implications for Language Education and Policy

Based on the previous analysis and discussion, this report suggests that Mainland China needs to establish a systematic identification and intervention mechanism for dyslexia. In comparison to Taiwan and Hong Kong, Mainland China has significant gaps in the understanding and management of dyslexia in Chinese. These challenges encompass a lack of public awareness about dyslexia, a limited capacity among schools and parents to recognise the condition, and the absence of a social intervention system. Dyslexia continues to be heavily stigmatised in Mainland China, leading to labelling and discrimination against those affected. This not only hinders the personal development of children with dyslexia but also fosters unwarranted fear within society.

Real-life examples demonstrate that dyslexia does not determine a person's fate or failure; in fact, many individuals with dyslexia thrive and achieve success in a variety of fields (Institute for Multi-Sensory Education, 2017). For example, the scientist Albert Einstein, the actress Keira Knightley, and the painter Picasso all suffered from dyslexia, but this did not prevent them from becoming outstanding in their respective fields of science, performance, and art. Consequently, raising social awareness of dyslexia will foster more opportunities for children with the condition. At the same time, early identification and intervention can minimise the adverse effects of dyslexia on their learning and overall life experiences.

Mainland China can draw valuable lessons from the effective language policies and educational practices of Taiwan and Hong Kong. The key point is that standardised testing criteria can enhance the identification rates of dyslexia. In Hong Kong, students with dyslexia are typically categorised as part of the Special Educational Needs (SEN) group. They are often enrolled in mainstream schools, where teachers undergo relevant training to better support their students' development (Hue 2012, 143-145). Consequently, education authorities in Mainland China can implement systematic

professional training for teachers. This initiative will enhance their capacity to identify and support students with dyslexia, while also promoting equity and diversity in education.

5. Conclusion

This report contends, from a cross-linguistic standpoint, that dyslexia does not possess a universal biological foundation. Due to the variation in language systems, dyslexia in Chinese is linked to deficits in the left middle frontal gyrus (LMFG), while dyslexia in English is associated with impairments in the left temporoparietal regions. As a result, dyslexia is shaped not only by biological factors but also by linguistic systems and cultural contexts. At present, Mainland China is still in the early stages of development. There is a notable disparity between Hong Kong and Taiwan regarding the identification and intervention of Chinese dyslexia. Furthermore, studies indicate that the educational and economic status of parents is linked to the prevalence of dyslexia in their children in Mainland China (Sun et al. 2013, 3-9). Nevertheless, significant disparities in wealth exist across various regions of China, highlighting that the influence of economic factors on dyslexia should not be overlooked. Considering both biological and cultural perspectives, developing a more inclusive education system that genuinely supports all learners would be beneficial.

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