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In search of subtypes of Chinese developmental dyslexia

Connie Suk-Han Ho [a,*], David W. Chan [b], Kevin K.H. Chung [a],
Suk-Han Lee [c], Suk-Man Tsang [c]

[a] *Department of Psychology, University of Hong Kong, Pokfulam Road, Hong Kong*
[b] *Department of Educational Psychology, Chinese University of Hong Kong, Shatin, Hong Kong*
[c] *Education and Manpower Bureau, Hong Kong SAR Government, Hong Kong*

Abstract

The dual-route model offers a popular way to classify developmental dyslexia into phonological and surface subtypes. The current study examined whether this dual-route model could provide a framework for understanding the varieties of Chinese developmental dyslexia. Three groups of Chinese children (dyslexics, chronological-age controls, and reading-level controls) were tested on Chinese exception character reading, pseudocharacter reading (analogous to English nonword reading), novel word learning, and some phonological and orthographic skills. It was found that Chinese exception character reading and pseudocharacter reading were highly correlated and that orthographic skills was a better predictor of both Chinese exception character and pseudocharacter reading than was phonological skills. More than half (62%) of the children in the dyslexia sample were classified as belonging to the surface subtype, but no children were classified as belonging to the phonological subtype. These results suggested that the lexical and sublexical routes in Chinese are highly interdependent or that there may be only one route from print to speech as suggested by the connectionist models. Chinese dyslexic children generally are characterized as having delays in various phonological and orthographic skills, but some, such as those identified as surface dyslexics in the current study, are more severely impaired.

* Corresponding author. Fax: +852 2858 3518.
  E-mail address: shhoc@hkucc.hku.hk (C.S.-H. Ho).

Introduction

Research studies on individuals with developmental dyslexia or specific reading disability often have focused on examining cognitive deficits that might lead to such individuals' problems in reading and spelling. In general, there is a consensus that phonological deficit is a core cause of developmental dyslexia (e.g., Bradley & Bryant, 1978; Hulme & Snowling, 1992; Olson, Rack, & Forsberg, 1990; Shankweiler, Liberman, Mark, Fowler, & Fischer, 1979). However, research findings also show that there are multiple causes of this disability apart from phonological problems, and the causes and manifestations may vary for speakers of different languages (e.g., Miles, 2000). Dyslexic populations often have been characterized as heterogeneous with varying degrees of impairment in different cognitive skills. Consequently, some researchers have devised different ways of classifying developmental dyslexia into different subtypes or subgroups (e.g., Castles & Coltheart, 1993; Lyon, Stewart, & Freedman, 1982; Lyon & Watson, 1981).

Frames of reference in subtyping studies

Dual-route model

The dual-route model is one of the common paradigms in subtyping studies. The idea of the dual-route model is that learning to read involves two main strategies: a grapheme–phoneme rule-based strategy for reading regular words and a lexical strategy for reading exception words (e.g., Aaron, Wilczynski, & Keetay, 1998). The former involves phonological skills, whereas the latter involves word-specific memory and orthographic knowledge.

Based on the dual-route model, Castles and Coltheart (1993) proposed two varieties of developmental dyslexia: surface and phonological. Surface dyslexics are those who have selective impairment in the lexical route and tend to have difficulty in reading exception words. Children with surface dyslexia were found to perform poorly in orthographic judgment (Manis, Seidenberg, Doi, McBride-Chang, & Petersen, 1996) and learn both regular and exception words more slowly than do chronological-age controls (Bailey, Manis, Pedersen, & Seidenberg, 2004). Stanovich, Siegel, and Gottardo (1997) suggested the causes of surface dyslexia to be mild phonological impairment coupled with inadequate reading experience. It appears that surface dyslexia is a delayed type of reading problem that displays a cognitive profile similar to that of younger average readers.

Phonological dyslexics, in contrast, are those who have selective impairment in the sublexical route and tend to have difficulty in reading nonwords. Children with phonological dyslexia tend to exhibit more severe reading and phonological impairment than do surface dyslexic readers. They were found to perform more poorly on phonemic analysis (Manis et al., 1996; Stanovich et al., 1997) and to learn regular and exception words more slowly than reading-level controls (Bailey et al., 2004). There is also a genetic basis for these two subtypes. As a group, phonological dyslexia is more genetically heritable (67%), whereas surface dyslexia depends more on environmental factors such as print exposure and reading instruction (Castles, Datta, Gayan, & Olson, 1999).