



Transfer of reading-related cognitive skills in learning to read Chinese (L1) and English (L2) among Chinese elementary school children

Yuen-Ching Keung, Connie Suk-Han Ho *

Department of Psychology, The University of Hong Kong, Pokfulam Road, Hong Kong

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ABSTRACT

This study investigated transfer of reading-related cognitive skills between learning to read Chinese (L1) and English (L2) among Chinese children in Hong Kong. Fifty-three Grade 2 students were tested on word reading, phonological, orthographic and rapid naming skills in Chinese (L1) and English (L2). The major findings were: (a) significant correlations between Chinese and English measures in phonological awareness and rapid naming, but not in orthographic skills; (b) significant unique contribution of Chinese and English rapid naming skills and English rhyme awareness for predicting Chinese word reading after controlling for all the Chinese and English cognitive measures; (c) significant unique contribution of English phonological skills and Chinese orthographic skills (a negative one) for predicting English word reading after controlling for all the English and Chinese cognitive measures; and (d) significant unique contribution of Chinese rhyme awareness for predicting English phonemic awareness. These findings provide initial evidence that developing reading-related cognitive skills in English may have facilitative effects on Chinese word reading development. They also suggest that Chinese orthographic skills or tactics may not be helpful for learning to read English words among ESL learners; and that Chinese rhyme awareness facilitates the development of English phonemic awareness which is an essential skill predicting ESL learning.

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1. Introduction

Reading is a complex process involving different mental operations in which reading-related cognitive skills play an important role in these operations. For many years, research studies on reading development have focused on the acquisition of first language: what are the developmental trajectories or patterns as well as underlying cognitive processes or skills contributing to reading development? Earlier reading acquisition models such as those of Chall (1983), Ehri (1995, 1999), and Frith (1985), were developed to understand reading development of English as the first language. These models provide a basis for the study of other alphabetic scripts sharing similar writing systems (e.g., Carillo, 1994; Cossu, Shankweiler, Liberman, Tola, & Katz, 1988; Sebastian-Galles & Parreno-Vacchiano, 1995; Sprenger-Charolles, Siegel, & Bonnet, 1998; Wimmer & Hummer, 1990).

Later, cross-cultural studies begin to investigate the reading development of nonalphabetic scripts, such as Chinese and Japanese, as compared to alphabetic scripts (e.g., Akita & Hatano, 1999; Hanley, Tzeng, & Huang, 1999; Ho & Bryant, 1997a). A large body of research studies have explored whether phonological pro-

cessing skills play the same important role as in learning to read English or other alphabetic scripts (e.g., Lundberg, 1994; Oney & Durgunoglu, 1997). Some other researchers are interested to explore whether there are other cognitive skills, besides phonological processing skills, also play an important role in first language acquisition in different orthographies (e.g., Casalis & Louis-Alexandre, 2000; Cho & Chen, 1999; Lepola, Poskiparta, Laakkonen, & Niemi, 2005; Manis, Seidenberg, & Doi, 1999; Mann, 2000; Sprenger-Charolles, Siegel, Bechennec, & Serniclaes, 2003; Wagner & Barker, 1994; Wolf, Vellutino, & Gleason, 1998).

Another line of research on reading development extends the study from first language to second language acquisition. One of the key focuses is to explore whether and to what extent acquisition of second language shares the same developmental patterns and involves the same cognitive skills, processes and development as acquisition of first language. Some studies focus on examining how one's first language development influences his or her ability to acquire a second language and this relates to the issue of cognitive skills transfer from first language (L1) to second language (L2). These studies have taken a somewhat similar approach as their earliest predecessors: with a focus on the acquisition of English as a second language for children with other alphabetic scripts as their first language such as Hebrew, Spanish and French and studying the transfer of phonological skills between them (Comeau, Cormier,

* Corresponding author. Fax: +852 2858 3518.

E-mail address: shhoc@hkucc.hku.hk (C.S.-H. Ho).

Grandmaison, & Lacroix, 1999; Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Geva, Wade-Woolley, & Shany, 1997; Gottardo, 2002).

In more recent years, some studies explore reading development of English as a second language for children with nonalphabetic scripts such as Japanese and Chinese as their first language (Akamatsu, 1999; Chow, McBride-Chang, & Burgess, 2005; Geva et al., 1997; Wang, Park, & Lee, 2006; Wang, Perfetti, & Liu, 2005). These research studies begin to examine cognitive skills transfer between a nonalphabetic script to an alphabetic script, and involve studying not just phonological skills transfer but also orthographic skills transfer (Wang et al., 2005). Rapid automatized naming, however, is less examined in these studies, despite that it has been repeatedly found to associate with reading acquisition irrespective of the orthography in which children learn to read (Manis et al., 1999; Wolf & Bowers, 1999).

Nevertheless, until now, not many studies have been devoted to understanding the nature of cognitive skills transfer between learning to read Chinese (L1) and English (L2). It was still unclear whether any specific Chinese cognitive skills (namely phonological skills, orthographic skills, rapid automatized naming skills) that have been established to be essential in learning to read Chinese (L1) would have positive skills transfer to the development of corresponding English reading-related cognitive skills which may be further leveraged on to promoting learning to read English (L2). The present study aimed to fill this gap by examining two different levels of transfer: one is the transfer that occurs among the reading-related cognitive skills in learning to read Chinese (L1) and English (L2) among Chinese elementary school children, and the other is the one that occurs from reading-related cognitive skills to reading outcomes across these two languages, Chinese (L1) and English (L2).

In the following paragraphs, we will review theories related to L2 reading models and discuss the cognitive skills essential for learning to read Chinese and English.

2. Early theories of L2 reading models

Theories of L2 reading models have evolved from a simple $R1 = R2$ theory to the now more sophisticated perspective to investigate the transfer of cognitive skills between L1 and L2. The $R1 = R2$ theory states that there is no significant difference in the cognitive process of learning to read a language between native speakers and second language learners. Some aspects of the processes may be used less or may operate more slowly by second language learners (Fitzgerald, 1995). Yet these differences do not render the need for a separate theory explaining the learning of second language reading. In other words, considerations such as transfer of skills and teaching approaches of second languages are ignored by this simplistic theory. This model was criticized by many researchers, most notably Bernhardt (1991), of its disregard of the importance and possible benefits of the characteristics of one's mother tongue and his or her learning experiences, skills and strategies.

Cummins (1991) introduced the idea of "interdependence" in second language acquisition. His developmental interdependence hypothesis states that the skills developed in L1 will transfer to L2, if and only if a linguistic threshold competence is attained in L2. This theoretical construct of threshold refers to general language proficiency rather than literacy (i.e., threshold hypothesis). In other words, the learning of L2 is at least partly dependent on the cognitive skills developed through the learning of L1. While, Cummins's theory put emphasis on the importance of the interdependence of learning to read L1 and L2, some theorists (e.g., Geva & Ryan, 1993) regarded his theory as too general, failing to elaborate

the specific nature of interdependence, and to take account of individual differences in cognitive ability.

3. Transfer of cognitive skills in reading development

Some researchers have adopted the component skills approach proposed by Carr and Levy (1990) to understand the transfer of cognitive skills between learning to read the first and second languages. This approach analyzes reading as a complex information-processing system involving a number of related but separate mental operations. Individual operations serve distinct functions yet interact together to acquire a visually presented language in the activity of reading. Transferable skills depend on the similarities and differences of L1 and L2 to be learnt since some languages emphasize more of a specific skill than others (Geva & Siegel, 2000).

Transfer of cognitive skills in learning to read L1 and L2 refers to cognitive skills acquired in L1 reading development that can be leveraged on to promoting or facilitating L2 reading development, and vice versa. This is also commonly known as positive transfer. While, should the cognitive skills acquired in L1 reading development hinder the learning to read L2, and vice versa, then it would be considered as negative transfer of skills or interference. In the following paragraphs, we will briefly review existing key research studies that have employed the transfer of cognitive skills approach in learning to read first and second languages.

Recent research studies provide support to the view that phonological skills transfer exists within alphabetic languages and across different orthographic systems. In particular, phonological skills transfer was found in more than a handful of alphabetic languages. For example, Durgunoglu et al. (1993) investigated factors influencing English (L2) word identification performance of Spanish-speaking beginning readers. Their findings revealed that readers' levels of phonological awareness and word recognition in Spanish (L1) predicted their English (L2) word and pseudoword recognition performance. Similarly, D'Angiulli, Siegel, and Serra (2001) investigated the English-Italian interdependence related to phonological processing among Canadian-Italian bilingual children aged 9–14 attending grades 4–8. Their findings suggest that exposure to a language with more predictable grapheme-phoneme correspondences, such as Italian, may enhance phonological skills in English.

There were also examples of phonological skills transfer across different orthographic systems, such as Chinese and English. For example, Gottardo, Yan, Siegel, and Wade-Woolley (2001) found significant correlations between Chinese rhyme detection and English phonological and reading measures in Cantonese-English bilingual children. Chinese rhyme detection in particular was predictive of English word reading after controlling the effects of age and education in respective languages. Pang (2004) has also provided some evidence to bi-directional transfer of phonological skills between English (L1) and Chinese (L2) in Singaporean English-Chinese bilingual and biliterate 2nd and 3rd grade students. Similarly, Chow et al. (2005) also demonstrated that phonological awareness in Chinese helps concurrent and subsequent English language acquisition in Hong Kong Chinese kindergarteners learning to read English as a second language. These findings support the language-universal characteristics of phonological skills that are intrinsic to children's language acquisition across orthographies. In addition, phonological transfer appears not to be restricted to languages with similar structures.

Some recent research studies also explore the possible transfer of orthographic skills across different orthographic systems. In a study of Korean-English biliteracy acquisition (Wang et al., 2006), findings suggest that there is limited facilitation of orthographic

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