Noncompound and compound Chinese character reading: Are they the same for second-grade Hong Kong Chinese children?

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ARTICLE INFO

ABSTRACT

Previous studies have not distinguished different types of characters when examining how phonological and semantic-related skills are related to Chinese reading. In this study, Chinese characters were categorized into semantic-phonetic compound and noncompound characters. In the category of semantic-phonetic compound characters, two subtypes were subdivided into regular and irregular compound characters according to the reliability of phonetic radicals. Hong Kong second graders were tested on character reading, phonological awareness and three levels of semantic-related skills (semantic radical awareness, morphological awareness and vocabulary knowledge). Students' age and nonverbal IQ were controlled. The results revealed that all of the three levels of semantic-related skills were significant predictors of reading all types of characters. In contrast, phonological awareness was important only for reading two types of characters, i.e., noncompound characters and regular compound characters. The results have implications for theories of reading concerning the relative roles of phonological and semantic-related skills.

1. Introduction

While numerous reports have presented evidence that phonological awareness, semantic radical awareness, morphological awareness and vocabulary knowledge are important for Chinese children learning to read (Li, Shu, McBride-Chang, Liu, & Peng, 2012; Liu & McBride-Chang, 2010a; McBride-Chang, Cheung, Chow, Chow, & Choi, 2006; McBride-Chang, Chow, Zhong, Burgess, & Hayward, 2005; McBride-Chang & Ho, 2000; McBride-Chang, Shu, Zhou, Wat, & Wagner, 2003; Tong & McBride, 2014; Tong & McBride-Chang, 2010; Tong, McBride-Chang, Shu, & Wong, 2009; Yin & McBride, 2015; Zhou et al., 2014), what is less clear is the relative importance of these predictors.

Word reading can be characterized in terms of division of labor (Plaut, McClelland, Seidenberg, & Patterson, 1996). Because of repeated exposure, one learns to read words cognitively economically. For regular words, over learning, one applies grapheme-phoneme correspondence to read. For exception words, one relies on semantics information to access the pronunciations of words. Some researchers have attempted to apply the connectionist model to Chinese reading. The universal phonological principle proposed by Perfetti, Zhang, and Berent (1992) stressed the effects of phonological skills in both alphabetic and logographic writing systems. Given this view, although Chinese characters are meaning-based, phonological information is still used. While acknowledging the usefulness of phonological information, other theories have highlighted the use of semantic-related information in Chinese character reading. The Triangle Model of Chinese reading (Yang, Zevin, Shu, McCandliss, & Li, 2006) posits that the mapping from orthographic information to semantic information is learned more quickly than that from orthographic information to phonological information based on their simulation tests, which stresses the semantic-related information in Chinese word reading. Yang, McCandliss, Shu, and Zevin (2008) further pointed out that semantic input could facilitate reading all types of characters with a greater effect on irregular compound characters.

Empirically, evidence about Chinese children's reading is not consistent. Some studies have reported that phonological awareness and vocabulary knowledge in kindergarten years are both significant in predicting character reading performance in grade 3 (Zhang et al., 2013). So and Siegel (1997) found, in Hong Kong fourth graders, that phonological awareness and semantic processing (indicated by word and sentence meaning tasks) were both associated with reading ability. Other studies have produced different results. McBride-Chang, Cho, et al. (2005) found that, in predicting Hong Kong second graders' character reading, morphological awareness and vocabulary knowledge were significant, while phonological awareness was not. The above described evidence is somewhat mixed, for a variety of reasons. One

reason could be that the test characters vary across studies; some used more compound characters (e.g., Zhang et al., 2013), some used more noncompound characters (e.g., McBride-Chang & Ho, 2000), and some used two- or three-character words (e.g., So & Siegel, 1997). Most previous theories/studies did not distinguish the three types of characters when examining the relationships between different skills and character reading in Chinese young readers; this research gap may lead to overgeneralization about the roles of phonological and semantic processing skills in character reading.

To address the research gap, the present study looked at the relative roles of different skills in learning different types of Chinese characters in a group of Hong Kong primary school students. The present study is relative to the theoretical understanding of division of labor in lexical processing and its specificity in a logographic language.

1.1. Chinese character categories

With their basic logographic features, Chinese characters are constructed following some basic rules (Coulmas, 2003). The present study distinguished Chinese characters according to the presence of radicals in characters, which maximally discriminate the categories of Chinese characters (Wang, Chen, Radach, & Inhoff, 1999). Radicals are sets of stroke patterns that follow certain rules consistently when they appear in characters (Shu & Anderson, 1997). Characters with the presence of both phonetic radicals and semantic radicals are referred to as (semantic-phonetic) compound characters (Shu, Anderson, & Wu, 2000); this is the vast majority (around 80%) of modern Chinese characters (Chung & Leung, 2008, pp. 380). Phonetic radicals provide clues to the pronunciations of characters. According to the accuracy of phonetic radicals, compound characters can subdivided into regular compound characters and irregular compound characters. Regular compound characters are those of which phonetic radicals reliably predicts sounds, which are less than 20% when tone information is considered (Zhou, 1978). For example, the phonetic radical "成"/sing4/reliably indicates the sound of the character "城"/sing4/. In irregular compound characters, however, phonetic radicals are not reliable for indicating the pronunciations of the whole characters. For example, in "陳"/can4/, the phonetic radical "東" in the character leads to the sound/dung1/, which is not the pronunciation of the whole character. Semantic radicals, to some extent, reflect the meanings of characters. For example, 媽 (mother), 奶 (grandmother), 嬸(aunty) and 姐 (sister) all share the same semantic radical "女" to indicate the person is female. Semantic radicals may be independent characters (e.g., '女' in "媽") or bound forms that occur only along with characters (e.g., 𩙿 in 飲). In Hong Kong primary school years, around 30%–40% characters are those with transparent semantic radicals, in which character meaning is directly related to semantic radicals (Chung & Leung, 2008).

Noncompound characters refer to the remaining characters outside the compound character category. The common feature of these characters is that they lack phonetic radicals. These characters can be constructed through different mechanisms, for example, pictograms ("山" means mountain), ideograms ("一" means one), and ideographs ("森" means forest). Some noncompound characters are simple characters that can be considered as holistic visual patterns (e.g., 自). Most are characters are made up of ideographic or pictographic components (Hsiao & Shillcock, 2006). For example, 休 (rest) consists of "亻" and "木", which indicates that a man is sitting against a tree. In these ideographic and pictographic noncompound characters, semantic radicals are often present. In the example of '森' (forest), '木' (wood) is the semantic radical component which indicates its meaning relevant to tree.

1.2. Predictors of Chinese character reading

1.2.1. Phonological predictors of Chinese character reading

Although Chinese characters are considered to be phonologically opaque compared to alphabetic languages, studies have found the important role of phonological awareness in reading Chinese characters, especially for young children (McBride-Chang, Bialystok, Chong, & Li, 2004; Pan et al., 2016; Siok & Fletcher, 2001). Prior research has indicated two potential roles of phonological awareness in Chinese character reading. With phonological awareness, students are able to separate syllables from a series of sounds and thus learn the pronunciation of characters. For example, in a parent-child book reading activity, the ability to isolate "hok6haau6" into two syllables (i.e., /hok6/ and /haau6/) enables children to know the sounds of the two characters "學" and "校". The second role is assumed to be somewhat associated with the use of phonetic radicals. Take 醇 (seon4), 諄 (zeon1) and 淳 (seon4) for an example. An accurate access to onsets allows for knowing that 享is a phonetic radical and also about its reliability and variations in indicating sounds. The use of phonetic radicals has been found to emerge early in the first grade of primary school and to develop through the whole primary school years (Anderson, Li, Ku, Shu, & Wu, 2003; Chen, Shu, Wu, & Anderson, 2003; Shu et al., 2000).

1.2.2. Semantic-related predictors of Chinese character reading

Since Chinese characters are constructed through the meaning-based mechanism, individuals use semantic information embedded in characters to read them (e.g., Zhou, Duff, & Hulme, 2015). Researchers have considered semantic information in Chinese character reading from three levels, i.e., semantic radical awareness, morphological awareness and vocabulary, which refer to semantic-related skills on the sub-lexical, morphological and word levels, respectively (Tong, Tong, & McBride, 2017; Zhang et al., 2012). Ample evidence has revealed that all three levels of semantic-related skills are mastered by primary school students and play important roles in their character reading (Ho, Ng, & Ng, 2003; McBride-Chang et al., 2003; Shu & Anderson, 1997; Song et al., 2015; Yeung, Ho, Chan, & Chung, 2016).

On the sub-lexical level, semantic radicals are components in characters related with the meanings of the whole characters. Generally, to understand semantic radicals strengthens the lexical quality of characters (Perfetti & Hart, 2002), which therefore in turn facilitates word recognition (Ku & Anderson, 2001). In addition, semantic radical awareness provides a principal basis for distinguishing among homophone characters. For example, the characters 盅/zung1/(bowl) and 忠/zung1/(loyalty) share the same phonetic radical (i.e., "中"/zung1/) that indicates the same sound. Discrimination through the phonetic radical between the two does not work. A good approach is to attend to their semantic radicals, one (皿) referring to 'vessel' and the other (心) referring to 'heart'. In this way, two characters are stored in the long-term memory and distinguished from each other, and can be recruited efficiently.

On the morphological level, morphological awareness involves understanding and manipulation of morphemes and morphological structure of language (Liu & McBride-Chang, 2010b; Liu, McBride-Chang, Wong, Shu, & Wong, 2013; McBride-Chang et al., 2003; McBride-Chang et al., 2008; Zhou, McBride-Chang, Fong, Wong, & Cheung, 2012). Homophone awareness is important because, in Chinese (Cantonese), approximately 10,000 Chinese characters are commonly used, while the total number of syllables in Cantonese is about 1700 (Lee, Lo, Ching, & Meng, 2002). Therefore, many morphemes share the same sound. The ability to understand that a syllable may represent different meanings is an important component of morphological awareness in Chinese, and was found to be important for Chinese character reading in a number of studies (e.g., Liu et al., 2013). Additionally, lexical compounding awareness is essential for character reading because a majority of Chinese words is made of two or more morphemes to lead to transparent semantic meanings. For example, the word "飛機" (plane) is made of two morphemes "飛" (fly) and "機" (machine). Compounding morphological awareness is assumed to help vocabulary expansion and, in turn, help character reading through the semantic information (Chen, Hao, Geva, Zhu, & Shu, 2009; Liu et al., 2013; Tong et al., 2017).