Development of Writing Skills in Children

This article reviews the development of knowledge about written Chinese, the cognitive-linguistic skills underlying Chinese writing, and the relationship between Chinese writing and reading, in native Chinese-speaking children. The word “writing” here refers to the processes that children go through in writing characters from memory.

Chinese writing is a less explored domain than Chinese reading (→ Development of Reading Skills in Children). In alphabetic writing systems, phonological awareness, rapid automatized naming, and letter knowledge are known to be the core skills underlying writing (spelling) development (Caravolas et al. 2001; Furnes and Samuelsson 2011). In Chinese, contrastingly, visual-orthographic skill and copying skill were found to be important for writing development (Wang et al. 2015; Yeung et al. 2013).

In alphabetic writing systems, words are formed from a fixed set of symbols (typically 22–30 letters of the alphabet), but in Chinese, characters are written with a configuration of strokes. The majority of the 2,570 characters that children in mainland China are expected to learn by the end of the sixth grade have 7 to 12 strokes; some have more than 20 strokes (Shu et al. 2003). Approximately 80–90% of Chinese characters are compound characters consisting of two radicals, by which we mean patterns of strokes that recur across characters. The semantic radical gives a clue to the character’s meaning, and the phonetic radical gives a clue to the character’s pronunciation. To write a character correctly, children not only need to possess proper visual motor skills to integrate strokes into components (e.g., radicals and recurring stroke patterns) and then into whole characters, but also need to know which components to use and how to place them legally.

1. Development of Knowledge about Written Chinese

Knowledge about written Chinese emerges from age two in Chinese children, develops obviously around age five, and reaches a rudimentary level by grade 1 in primary school (around age six).

From age two, Chinese children show cross-domain knowledge about writing. In Treiman and Yin’s (2011) study, two- to six-year-old children in Beijing were asked to write and draw four objects and adults who were not present during the process of production were asked to differentiate children’s writing from drawing. The mean proportion of correct judgments of the adults was significantly higher than chance level (.50) even for the two-year-olds’ writings. The distinctions that the two-year-old Chinese children made between writing and drawing contain not only those that hold across cultures and writing systems, such as that writings were
sparser and smaller than drawings, were more likely to be made with a single black writing implement and less likely to consist of filled-in outlines, but also those that are specific to the Chinese writing system children are exposed to; for example, their writings were more squarish than drawings.

From age three, Chinese children demonstrate within-domain knowledge about different types of writing. Yin and Treiman (2013) found that three-year-old Chinese children can produce important visual distinctions between personal names (which often consist of two or more single characters, e.g., wú péi ēn 吴培恩) and non-name single characters (e.g., nǐ 你 ‘you’). The adults performed significantly above the level of chance at judging the names as names as opposed to single-character words, and were also above chance at judging whether a production was that child’s name as opposed to another child’s name. The three-year-old Chinese children’s name productions (e.g., ) were more complex, more segmented, and less square than single-character word productions (e.g., ).

From age four, Chinese children develop sensitivity to the phonetic, structural, and positional regularities of Chinese characters. In a word learning task (Yin and McBride 2015), four- and five-year-old Chinese children from Běijīng were taught to read novel printed stimuli in two phonetic conditions (with phonetic cue and without phonetic cue) and three orthographic conditions (random strokes, noncharacter, and pseudocharacter). The four-year-old children learned significantly better in the noncharacter condition (stimuli consisting of real character components but in illegal positions, e.g., ) than when phonetic cues were not available (e.g., ), indicating sensitivity to the phonetic regularity in Chinese characters. The 5-year-old children demonstrated sensitivity to the positional regularity of character components; they learned significantly better in the pseudocharacter condition than in the noncharacter condition. Such sensitivity explained unique variance in Chinese word reading and word writing ability one year later, after controlling for age, IQ, and autoregressive effects (i.e., each child’s own reading and writing abilities in the previous year).

From age five, Chinese children pay more attention to the visual form information of Chinese in the print environment. Zhao et al. (2014) found that children of this age named words more easily when presented in the context of familiar logos than in isolation (e.g., Běijīng huànyíng nǐ 北京欢迎你 ‘Beijing welcomes you’, a logo used for the 2008 Běijīng Olympics). Their reading experience was significantly related to the neural specialization of word processing. Li et al. (2013) demonstrated through an event related potential (ERP) study on five- and six-year-old Chinese children that degree of left-hemisphere brain activation when reading was positively correlated with vocabulary size.

By grade 1 (age six), children possess rudimentary knowledge about radical positions in the characters. First-graders in Hong Kong and Běijīng were able to differentiate pseudocharacters from noncharacters by referring to the positional rules in compound characters (Ho et al. 2003; Shu and Anderson 1997).

2. Cognitive-linguistic Skills underlying Chinese Writing

Yeung et al. (2013) followed 251 primary school children from grade 1 to 4 and reported that after controlling for performance at earlier ages, orthographic skill (tapped by the pseudocharacter meaning judgment task) was the only significant longitudinal predictor of Chinese word writing in grade 4 and that orthographically based errors were the most common type of writing errors in grades 1 to 4. Wang et al.
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(2015) examined 73 kindergarteners averaged 5 years and 2 months and found that after controlling for age, IQ, and word reading, visual-orthographic copying skill (tapped by the delayed copying task which combines visual-motor skills and orthographic knowledge) was the only unique correlate of Chinese word writing ability. As asserted by Tan et al. (2005), character copying may facilitate children’s internalization of the visual-orthographic aspects of Chinese writing in addition to visual-motor coordination. By repeatedly copying, children may also gradually attend to stroke order, which is essential for expert word representation in Chinese (Yeung et al. 2013).

3. Relationship between Chinese Writing and Reading

Children appear to make use of different skills in learning to read and write, especially in early development. For example, correlates of Chinese reading (word recognition) include morphological awareness (Li et al. 2012; McBride-Chang et al. 2003), rapid automatized naming, phonological awareness (McBride-Chang and Ho 2005; Siok and Fletcher 2001), and vocabulary knowledge (Shu et al. 2006), and correlates of Chinese writing are predominantly visual-orthographic skills, as reviewed earlier (Wang et al. 2015; Yeung et al. 2013).

Despite the initial separation, studies on languages with alphabetic writing systems suggest that separate skill specializations for reading and writing are transitory in nature and the various skills involved become better integrated as reading and spelling ability advances (Bradley and Bryant 1979). Consistently, Wang et al. (2015) found that Chinese reading and writing skills were not strongly related in early development (ages five to six), but they became moderately and significantly associated with one another one year later. Semantic radical awareness, reflecting children’s sensitivity to the formal and functional characteristics of Chinese radicals, was a significant longitudinal predictor for both Chinese reading and writing with age, IQ, and performance at the earlier age statistically controlled.

In summary, Chinese children develop writing skills from age two and their early knowledge about written Chinese is significantly linked to their Chinese word reading and writing ability.

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Developments in Speech and Language Disorders

For various reasons, some children do not develop adequate speech and language spontaneously, resulting in speech and/or language disorders. The disorder may involve the language form (i.e., phonological/phonetic, morphological, and syntactic systems), the language content (i.e., semantics), and/or the language function (i.e., pragmatic use) in any combination (American Speech-Language-Hearing Association 1993). A distinction is drawn between disorders of “speech” and disorders of “language”. The former relates to the use of sounds realized as a set of phonetic parameters such as speech sounds, rhythms and duration, whereas the latter concerns impairment in comprehending and expressing ideas. Research in this area aims to understand the normal developmental trajectory and the manifestation of the pathological forms so as to provide management directions as well as to test psycholinguistic theories and models that have been developed for normal language processing and acquisition.

In the development of speech, most English-speaking children complete their phonemic inventory by the age of seven years old, and phonological patterns such as substitution of a fricative with a stop (e.g., /ʃip/ → [tip]) disappear gradually before school entry (Smit et al. 1990). Children who show persisting difficulties in mastering speech sounds, or who are unable to eliminate non-adult-like phonological patterns as well as their peers, can develop speech sound disorders. Zhu and Dodd (2000a, 2000b) investigated the speech sound and lexical tone production of 129 typically-developing (TD) Mandarin-speaking children, and 33 peers with functional speech difficulties. For the TD children, tones were mastered first, followed by syllable-fnal consonants and vowels, and syllable-initial consonants were the last. Affricates and retroflex fricatives were found to be the most challenging phonemes, which were mastered by most Mandarin-speaking children by the age of four and a half years old (Zhu and Dodd 2000a). Similar to their English-speaking counterparts, Mandarin-speaking children with speech sound problems not only exhibit developmental errors, but also idiosyncratic errors, which they are not likely to correct as a result of maturation. These errors include final consonant addition (e.g., /tʂuo/→[tʰun]) and substitution of (i) a syllable-final alveolar nasal for a syllable-final velar nasal (e.g., /ŋ/→[ŋ]), (ii) alveolar and retroflex affricates for a velar stop and vice versa (e.g., /k/→[ʨ], /tʃ/→[k-]), and (iii) homorganic fricatives for the affricates (e.g., /ts/→[s-], /tc/→[c-], /ts/→[s-]) (Zhu and Dodd 2000b).

Similar research has been conducted on Cantonese-speaking children in Hong Kong. These children complete their initial consonant inventory by the age of 5 years old, slightly earlier than their English-speaking peers (P. Cheung