Havina well-developed reading skills is important for people's survival and success in the modern world. Understanding the core skills for reading comprehension may provide a better insight into how to apply the knowledge for identifying and helping those with reading difficulties. This article provides a review of important cognitive-linguistic skills that are essential for reading comprehension in Chinese, a nonalphabetic script read by the largest population in the world. It begins with a review of word recognition and reading comprehension models that provide the conceptual basis for understanding reading comprehension in Chinese.

Models of Word Recognition and Reading Comprehension

The triangle model proposed by Seidenberg and McClelland (1989) has been widely used to explain the cognitive processes of word recognition. The model conceptualizes word recognition as the interaction of two pathways—the phonological pathway (mapping between representations of the sound and spelling of words) and the semantic pathway (mapping between representations of the sound and spelling via the meaning of words). In this model, learning to read words requires skills to process phonological, semantic, and orthographic information and to build corresponding mental representations with appropriate interconnections among the representations. Deficits in phonological, semantic, and orthographic processing may result in word reading difficulties. For example, failure in the phonological pathway may hinder children from using the spelling-sound rules to read regular words (e.g., fan); whereas, failure in the semantic pathway may hinder children from using their orthographic and semantic knowledge to store and retrieve the specific sound of irregular words (e.g., yacht).

Bishop and Snowling (2004) have extended the triangle model and incorporated syntax and discourse as two additional skills for reading comprehension. At the sentence level, syntactic skills, the ability to reflect on and manipulate the grammatical structure of sentences in a language (Gombert, 1992), are critical in understanding sentences. For instance, reading the sentence You must bear the responsibility of your decision is more efficient if the child understands that a verb (to accept or to endure), rather than a noun (an animal), follows the auxiliary verb must. Without such syntactic knowledge, the child may interpret the word bear as a noun and thus find it difficult to integrate this meaning with the entire sentence.

Going beyond the sentence level, discourse skills concern interpreting strings of sentences and connecting them together into a coherent representation (Winne, Graham, & Prock, 1993). This article makes use of the triangle model and extends it for understanding Chinese reading comprehension. In particular, the focus is on how syntactic and morphosyntactic skills may help reading and comprehending sentences. The discussion of these important skills in Chinese reading comprehension is preceded by a brief description of some of the characteristics of the Chinese language with cognitive demands that are unique to reading comprehension in Chinese.

Characteristics of Chinese

One prominent feature of the Chinese language is that it is noninflectional. Unlike English, in Chinese there is no transformation of word forms to mark number, case, tense, and so on. For instance, there is no inflected form of past-tense verbs and third-person singular pronouns in Chinese, for example, 我昨天到公園去 (I go to the park yesterday) and 他今天到公園去 (He go to the park today). Consequently, the semantic and grammatical information embedded in Chinese sentences are conveyed more by word order and sentential context than inflection (Chang, 1992; Li & Thompson, 1981). The Chinese language has a rich system of grammatical aspects and classifiers to convey meaning. Aspect markers are grammatical morphemes that mostly function as verbal affixes (Fung, 2009). With tense not being grammaticalized in Chinese, a listener usually resorts to aspect markers to tell whether an action is completed or in progress. For example, 了 is an aspectual particle to indicate completed action, for example, 我做了功課 (I had done homework).

The Chinese orthography is often described as morphosyllabic. Each Chinese character is simultaneously a morpheme and a syllable. More importantly, a syllable is often used to represent different characters with different meanings, which results in an abundance of homophones in the Chinese language. Learning to read Chinese thus requires one to distinguish characters that are pronounced identically but whose writing and meaning are different. For example, 圓 (circle), 圓 (garden), 原 (original), and 員 (member) are different characters that share the same pronunciation in Mandarin and in Cantonese. Taken together, sensitivity to different meanings of homophonic morphemes is important for understanding character meaning in Chinese. Another characteristic of Chinese is that over 75% of the words are composed of two or three morphemes (Chen, Hao, Geva, Zhu, & Shu, 2009), and the meaning of many Chinese compound words is readily predictable from their constituent morphemes, for example, the meaning of the word 升降機 (elevator) can be inferred from its component morphemes 升 (up) + 降 (down) + 機 (machine).

Given the noninflectional nature of Chinese, and the abundance of homophonic morphemes in Chinese, the authors argue that morphological, syntactic, and morphosyntactic skills are particularly important for understanding Chinese sentences.
The Role of Syntactic Skills for Reading Comprehension

An extended triangle model (Bishop & Snowling, 2004) predicts that syntactic skills play a unique part in reading comprehension, even after we consider the contribution of word-decoding skills. It has been suggested that the understanding of how sentences are properly structured enables us to capitalize on the syntactic context to decipher unfamiliar words so as to ease reading comprehension (Rego & Bryant, 1993; Tunmer & Bowey, 1984). In the sentence 我家有一部留聲機 (There is a phonograph in my home), for example, the syntactic rule that a determiner precedes a noun or noun phrase to indicate the reference of that noun or noun phrase hints that 留聲機 (phonograph) is likely to be an object, even if one has no prior knowledge about this word. Such use of syntactic constraints is particularly crucial in reading long texts, because it solicits additional semantic information from the context to make sense of the overall meaning of the texts.

Empirical research on syntactic skills and reading ability began earlier in alphabetic languages (e.g., Bowey, 1986; Tunmer, Nesdale, & Wright, 1987). Findings supporting the important role of syntactic skills for Chinese reading comprehension have been accumulating as well. For instance, Chan and Wong (1991) asked Chinese children to rearrange scrambled fragments of sentences, and found that such word-order knowledge was significantly predictive of third-graders’ performance on a reading comprehension test. Using different syntactic measures, Chen, Lau, and Yung (1993) further showed that Chinese children’s ability to insert missing words in a cloze test (a test that requires filling in missing words to complete a sentence or a paragraph), and to locate grammatical anomalies, was a reliable predictor of reading comprehension from grade 1 up to grade 6.

Perhaps the most relevant evidence for the importance of syntactic skills in developing literacy comes from recent work reporting critical component skills in Chinese text-level reading comprehension. In a study involving Chinese first-graders, Yeung and colleagues (2011) demonstrated that after controlling for word-reading ability, syntactic skill (tested with an oral cloze task) emerged as the only unique predictor of both sentence and passage comprehension. Two additional studies (Tong, Chan, McBride-Chang, Tong & Shu, 2014; Yeung, Ho, Chan, Chung, & Wong, 2013) obtained complementary findings among fourth and fifth graders, showing that syntactic skills explained unique variance in comprehension at the passage level after taking word-level, reading-related skills into consideration. Chik, Ho, Yeung, Chan, and colleagues’ (2012) longitudinal findings revealed a significant prospective relationship between grade 1 syntactic skills and grade 2 sentence comprehension, above and beyond the effect of children’s age, IQ, and phonological, orthographic, and morphological processing, thus underscoring the role of syntax in acquiring literacy in Chinese. Beyond syntactic skills, understanding Chinese sentences may require some morphosyntactic skills, which require the processing of word parts carrying meaning (i.e., morphemes) as well as syntactic information simultaneously and interactively to get at the precise meaning of a sentence. Morphological awareness may be an early foundation skill for the development of such skills in Chinese.

Morphological Awareness in Chinese Involves Processing Both Morphology and Syntax

Given the abundance of homophones in the Chinese language, word reading acquisition requires children to understand the morphological structure of compound words, and such understanding emerges rather early. Morphological awareness has been found to be an important early predictor of Chinese word reading and reading comprehension because it helps young readers to grasp the meaning of unfamiliar words in text by referring to their constituent morphemes (McBride-Chang, Shu, Shou, Wat, & Wagner, 2003; McBride-Chang et al., 2005; Tong, McBride-Chang, Shu, & Wong, 2009; Zhang et al., 2012). School-age children who have disabilities in learning to read Chinese were found to have deficits in morphological awareness (Shu, McBride-Chang, Wu, & Liu, 2006; Wu, Packard, & Shu, 2009). Some retrospective research further indicated that Chinese children with dyslexia showed a weakness in morphological awareness already in the preschool years (Lei et al., 2011; Wong et al., 2012).

Theoretically, morphology and syntax may be considered as separate linguistic domains that operate at word- and sentence-level, respectively. However, it has been acknowledged that morphology may actually involve syntactic components, and this applies to compounding in Chinese words as well. The ways that morphemes are combined to form words in Chinese are in accordance with compounding rules, including modifi-
cational, predicational, complemental, governmental, and juxtapositional (Fung, 2009; Lui & McBride-Chang, 2010). Each kind of compounding rule represents distinctive semantic and syntactic relations among the constituent morphemes. For instance, the word 父母 (father-and-mother) is juxtapositional as the whole word meaning can be obtained collaterally and equally from each of the two component morphemes 父 (father) and 母 (mother). But for the word 公雞 (male-rooster), its internal relation is modificational because the morpheme 公 (male) is an adjective that modifies the noun morpheme 雞 (rooster). Apparently, these compound structures can be analyzed into certain grammatical structures of phrases. In view of the above, the ability to analyze the structural relationship among morphemes in word context (i.e., morphological awareness) may be a foundation skill that helps children to analyze the structural relationship among morphemes/words in sentential context (i.e., morphosyntactic skill). In other words, an early sense in combining and understanding morphemes at word level may pave the way for later development in morphosyntactic skill at the sentence level.

The Role of Morphosyntactic Skills in Reading Comprehension

The term morphosyntax has a connotation of construing morphology and syntax as an intertwined unit. In the linguistic
sense, syntax mainly concerns the way in which words are put together to form phrases and clauses; whereas, morphosyntax also involves linguistic strategies and operations to represent syntactic features via morphological marking on top of merely combinatorial strategies. Given the extensive use of word compounding in Chinese and the salience of morphological awareness in developing literacy in Chinese (McBride-Chang et al., 2005; Shu, McBride-Chang, Wu, & Liu, 2006; Tong & McBride-Chang, 2010), morphosyntax represents a core skill in reading comprehension in Chinese that should receive more empirical attention in research on typically developing and reading disabled children.

In examining syntactic skills, oral cloze, rearranging word-order patterns, and grammatical error detection and correction are commonly used tasks (e.g., Chik, Ho, Yeung, Chan, et al., 2012; Chik, Ho, Yeung, Wong, et al., 2012; So & Siegel, 1997; Tong et al., 2014; Tsang & Stokes, 2001). Among these tasks, error detection and correction are a good measure of morphosyntactic skill because it is a specific test of one’s ability to identify and fix morphemic violations in sentences. In studies involving alphabetic languages, grammatical errors usually include subject-verb agreement or tense agreement (e.g., Cain, 2007). When the target language is Chinese, Tsang and Stokes (2001) and other researchers incorporated morphosyntactic errors such as misuse or omission of classifiers, aspect markers, copula verbs (i.e., verbs that connect two noun phrases, which are usually the subject of the sentence and its predicate, for example, 我的妹妹是個小學生 (My sister is a primary school student)), and existential verbs (i.e., verbs primarily used to indicate the existence or presence of something in a particular place or time, for example, 公園裏有一隻貓 (There is a cat in the park)). Knowledge of parts of speech was also evaluated in studies by Chik, Ho, Yeung, Wong, et al. (2012) and Yeung et al., (2013). Using this error detection and correction task, the findings pointed to a significant contribution made by morphosyntactic skill in sentence and passage comprehension among fourth- and fifth-graders (Chik, Ho, Yeung, Wong, et al., 2012; Yeung et al., 2013). Including error detection and correction is salient when exploring important component skills in Chinese reading comprehension because the morpho-component is given more weight in error detection tasks compared to other syntactic measures.

A novel way to measure morphosyntactic skill in Chinese is sentence ambiguity detection (SAD). SAD refers to the ability to detect two different meanings in an ambiguous sentence. Given the massive number of homophones in Chinese, ambiguity detection is considered to be especially relevant for understanding Chinese sentences. For example, the orally presented sentence (in Cantonese) 這裡有線 for sale may either mean There is (are) thread(s) for sale or There is (are) fan(s) for sale because the word 線 (thread) and 扇 (fan) are homophones (i.e., their pronunciation is identical in Cantonese). Apart from the abundance of homophones, the reason why ambiguity surfaces strongly in Chinese sentences may be related to the paucity of grammatical markers for parts of speech in Chinese. This characteristic of the language may make it harder to determine whether a word in a Chinese sentence is a noun or a verb, thus giving rise to an ambiguous sentence. For example, the verb 輸 (lose) and the noun 書 (book) are homophones. The question 你有沒有書/輸 may be interpreted as someone asking Have you lost in the game? or Do you have a book? The listener has to realize the alternative syntactic structures involved in the ambiguous sentence to get at the dual meanings of the sentence. In Fong’s (2014) longitudinal study, young Chinese children’s ability to detect ambiguity in oral sentences contributed uniquely to reading comprehension after the effects of other reading-related factors (e.g., IQ, vocabulary, grammatical skills, morphological awareness, word reading, and working memory) were controlled. This research clearly demonstrates the importance of morphosyntactic skill for reading comprehension in Chinese. The next section focuses on the potential role of morphosyntactic skills for Chinese readers learning to read a second language.

Cross-Language Transfer of Morphosyntactic Skill
In his seminal work, Cummins (1979) has put forward the Developmental Interdependence Hypothesis, which suggests a considerable amount of interaction between first- (L1) and second-language (L2) acquisition. He has proposed that provided that there is sufficient proficiency in the language, academic literacy developed in L1 is shared across languages, thereby supporting L2 learning, which is relatively taxing. Considering this hypothesis in the prior discussion prompts the question whether the contribution of L1 morphosyntactic skill is confined to L1 literacy development, or whether morphosyntactic awareness can be transferred and contribute to reading comprehension in L2. Some initial findings were that L1 syntactic skill was a strong predictor of L2 reading proficiency in Arabic-English bilingual children (Abu-Rabia & Siegel, 2002) and Spanish-English bilinguals (Gabrielle, Troseth, Martohardjono, & Otheguy, 2009). Siu and Ho (2014) recently demonstrated that in Chinese-English bilinguals, morphosyntactic skill predicted cross-linguistically performance in L2 reading comprehension, after controlling for age, nonverbal intelligence, oral language, and working memory. Further mediation analyses were conducted to test for potential factors mediating the L1-to-L2 transfer. Results showed that it is L2 morphosyntactic skill, rather than L1 reading comprehension, that underlies the relationship between L1 morphosyntactic skill and L2 reading comprehension. In sum, evidence points to a significant role of morphosyntactic skill not only in L1, but also in L2 reading comprehension.

Educational Implications
Research findings on the topic of morphosyntax and reading comprehension has significant implications for developing tools and programs for identifying and teaching Chinese children with reading disability and for Chinese children learning English as a second language. Identification of Chinese children with reading disabilities has been relying on identifying children with poor performance in word reading and some word level reading-related skills (e.g., rapid naming, phonological awareness, phonological memory, and orthographic skills) (Hong Kong Test of Specific Learning Difficulties in Reading and Writing, 2nd Edition, Ho et al., 2007). With more recent Continued on page 28
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evidence regarding the role of syntactic and morphosyntactic skills for reading comprehension in Chinese, assessment of this skill should be included in the identification of children with reading disabilities, especially for children at higher grades where text comprehension becomes important. This consideration has been taken into account in the development of the third edition of the Chinese standardized dyslexia test in Hong Kong.

Teaching of morphological skill, syntactic, and morphosyntactic skills may help children to understand and process Chinese sentences effectively. These skills and other skills have been incorporated in the curriculum of the Chinese tiered intervention model, which has been implemented in more than 100 primary schools in Hong Kong. Regarding the effectiveness of this model, about 25% of poor or dyslexic readers in the remedial groups, who originally fell below the territory-wide benchmark, reached the benchmark of Chinese literacy after receiving one to two years of intervention (Ho et al., 2011; in press).

The findings of cross-language transfer studies, particularly those of Siu and Ho (2014), are also practically important because they suggest dimensions to consider in designing effective L2 education programs for the large population of Chinese immigrants in English-speaking countries. The mediational link via L2 morphosyntactic skill in the L1-to-L2 transfer of Siu and Ho’s (2014) study suggests that bilingual children exploit the correspondence between L1 and L2 morphosyntax to facilitate their L2 learning. Specifically, evoking L1 morphosyntactic resources and mapping them onto L2 corresponding knowledge appears to enhance L2 reading performance. Hence, we think that teachers and educators should be informed about the significance of explicitly drawing attention to the analogy between parallel L1 and L2 morphosyntactic features (e.g., gender and plural markers of pronoun, aspect markers). This strategy can enhance L1-to-L2 transfer, particularly for beginning L2 learners. Remedial programs targeting those who struggle with L2 acquisition should also incorporate explicit instruction on mapping L2 morphosyntactic features on the well-established parallel L1 structures to reinforce their developing L2 literacy.

Conclusions

Given the unique characteristics of the Chinese language, and in particular the abundance of homophones in Chinese and its noninflectional nature, morphosyntactic skill, which can be measured by error detection and correction and sentence ambiguity detection, is particularly important for reading comprehension in Chinese. It has been found to be important for sentence reading comprehension over and beyond word-level skills in Chinese, and it can predict L2 English reading comprehension via the mediation of L2 English morphosyntactic skill. Future research is needed to examine how morphosyntactic skills develop and whether it is related to earlier morphological awareness and syntactic skill.

References


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