



# A reciprocal relationship between syntactic awareness and reading comprehension



Xiuhong Tong<sup>a,\*</sup>, Catherine McBride<sup>b</sup>

<sup>a</sup> Institute of Psychological Sciences, Zhejiang Key Laboratory for Research in Assessment of Cognitive Impairments, and Center for Cognition and Brain Disorders, Hangzhou Normal University, China

<sup>b</sup> Psychology Department, The Chinese University of Hong Kong, Hong Kong, China

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## ABSTRACT

This study investigated the reciprocal relationship between Chinese syntactic awareness and Chinese reading comprehension among 129 Hong Kong Chinese-speaking children participating in a 10-year longitudinal study. All children were tested on tasks of nonverbal reasoning, phonological awareness, morphological awareness, vocabulary knowledge, word reading, syntactic judgment/correction, conjunction cloze, and reading comprehension. Results showed that children's syntactic awareness at age 11 was significantly associated with their reading comprehension at age 12 even after taking into account early nonverbal reasoning ability, phonological awareness, morphological awareness, word reading, vocabulary knowledge, and the previous year's reading comprehension. The results also showed that children's performance in reading comprehension at age 11 accounted for substantial variance in syntactic awareness at age 12. These findings suggest that the relation between syntactic awareness and reading comprehension is bidirectional, and they may mutually reinforce each other during reading development in Cantonese-speaking children.

## 1. Introduction

While most contemporary models of reading and associated empirical studies emphasize the role of phonological awareness in reading, there is also compelling evidence that other metalinguistic skills such as syntactic awareness have a role in reading and reading comprehension development (e.g., Bowey, 1986; Chik et al., 2012; Tong, Tong, McBride, Shu, & Chan, 2014; Tunmer & Bowey, 1984). Syntactic awareness refers to the ability to understand the internal grammatical structure of a sentence (e.g., Tunmer & Bowey, 1984). There is a mixed picture as to the relation between syntactic awareness and reading comprehension. Some studies have reported that children's performance on syntactic awareness is associated with reading comprehension (e.g., Chik et al., 2012; Demont & Gombert, 1996; Tong et al., 2014; Tunmer & Bowey, 1984), whereas others have shown that this relationship is accounted for by other factors such as phonological awareness and vocabulary knowledge (e.g., Hagtvet, 2003; Shankweiler, Crain, Brady, Macaruso, & Gough, 1992). These previous studies also have largely focused on the unidirectional prediction from syntactic awareness to reading comprehension, with little attention

paid to the prediction from reading comprehension to syntactic awareness. Thus, the question of whether children's variations in reading comprehension performance can account for the individual difference in syntactic awareness is as of yet unknown. In the present study, we focused on unpacking the theoretical association between syntactic awareness and reading comprehension by hypothesizing a bidirectional association between syntactic awareness and reading comprehension. Specifically, we hypothesized that syntactic awareness affects children's reading comprehension and that reading comprehension, in turn, affects children's skills in syntactic awareness.

### 1.1. Syntactic awareness and reading comprehension

Syntactic awareness refers to the ability to understand the internal grammatical structure within a sentence (e.g., Bentin, Deutsch, & Liberman, 1990; Bowey, 1986; Tunmer & Hoover, 1992; Pratt, Tunmer, & Bowey, 1984) as well as the ability to “reflect on the syntactic structure of language and regard it objectively and separately from the meaning conveyed by language” (Blackmore, Pratt, & Dewsbury, 1995, p. 405). Syntactic awareness is suggested to be one of

\* Corresponding author.

E-mail address: [tongxiuhong@gmail.com](mailto:tongxiuhong@gmail.com) (X. Tong).

four components of metalinguistic awareness (Layton, Robinson, & Lawson, 1998). Some researchers have proposed that each component of metalinguistic awareness might be divisible into different levels, and these levels might be distinguished from one another (e.g., Gombert, 1992; Layton et al., 1998). Gombert (1992), for example, proposed a theoretical framework in which there are four levels across all domains of development of metalinguistic skills. Syntactic awareness is well represented in this model. Among the four levels, the first reflects the process of acquisition of tacit knowledge of syntactic or grammatical structure. The second level reflects the ability to manipulate the internal grammatical structure of sentences. The third level refers to the ability to formulate rules of syntax and identify what the rules are. The fourth level is defined as the ability to intentionally control and reflect upon one's knowledge of syntactic rules or one's performance on tasks of testing syntactic knowledge. The first two levels are conceptualized as the low-level syntactic skills, associated with the processing of intuitive and functional language. The third and fourth levels are considered as the high-level syntactic skills, reflecting intentional control and reflection on language (e.g., Layton et al., 1998). The present study focused on the lower level syntactic skills, namely, the ability to manipulate the internal grammatical structure of a sentence. The indicators of syntactic awareness at this lower level include recognition of grammatical categories of words, recognition of grammatical violations, and the ability to explicitly identify and manipulate syntactic constituent structures of sentences.

There are several empirical studies showing a positive relationship between syntactic awareness and reading comprehension across languages thus far (e.g., Bowey, 1986; Chik et al., 2012; Demont & Gombert, 1996; Tong et al., 2014; Tunmer, Herriman, & Nesdale, 1988; Tunmer, Nesdale, & Wright, 1987). For example, longitudinal studies reveal that children's early syntactic awareness predicts their later reading comprehension (e.g., Oakhill & Cain, 2011). One intervention study showed that training in syntactic skills appeared to promote growth in reading comprehension in English-speaking third graders (Weaver, 1979). In addition, there is some evidence that children with reading difficulties have difficulties in understanding and manipulating syntactic relations, and the differences in syntactic processing between good and poor English-speaking comprehenders are often found in the absence of phonological deficiency (e.g., Mokhtari & Thompson, 2006; Nation & Snowling, 2000; So & Siegel, 1997; Tong, Deacon, & Cain, 2014).

There have also been a few studies in Cantonese-speaking children suggesting that syntactic awareness might be uniquely associated with children's reading either at the word, sentence, or text level (Chik et al., 2012; Kwan, 2003; So & Siegel, 1997; Xiao, 2010; Tong et al., 2014). Chik et al. (2012) reported that Cantonese-speaking children's syntactic skills in word order, connective usage, and knowledge of morpho-syntactic structures in grade 1 were significantly correlated with children's sentence reading comprehension in grade 2 when other variables were statistically controlled. Tong et al. (2014) also demonstrated, in Cantonese-speaking children from ages 10 to 11 years old, that syntactic awareness uniquely explained reading comprehension beyond other measured variables. Despite the positive correlation between syntactic awareness and reading comprehension across languages, the question of whether syntactic awareness is an independent predictor of reading ability and reading disability remains controversial. Gottardo and colleagues (1996), for example, investigated the relations among phonological sensitivity, syntactic processing, and verbal working memory in the reading performance of third graders. A battery of standardized measures used to tap various aspects of reading, a phonological sensitivity task, two syntactic measures including a sentence judgment and a sentence correction task, and a verbal word memory task were included in that study. Results of that particular study showed that the phonological sensitivity task explained 28% unique variance in

reading performance when syntactic processing was statistically partialled out, whereas syntactic processing only explained 2.3% of the variance in reading performance when phonological processing was partialled out. Furthermore, syntactic processing did not significantly predict reading after controlling for both phonological processing and verbal memory skills. However, phonological processing still accounted for 24.6% of the variance in reading when both syntactic processing and verbal memory were partialled out. Thus, Gottardo and colleagues suggested that there is no special association between syntactic processing and word-level reading. Shankweiler et al. (1995) also found that syntactic awareness could not distinguish children with reading disability from typically developing children. In contrast, phonological awareness and morphological awareness deficits were significant predictors of reading disability; the deficit of morphological awareness might stem in large part from the weakness in the phonological component given its strong correlation with a phonological deficit. The authors, thus, suggested that syntactic awareness per se could not distinguish poor readers from typical readers but instead that the phonological deficit was the reason for the difficulty in acquiring reading.

However, according to the simple view of reading (SVR), reading is the product of decoding and linguistic comprehension, which encompasses "receptive vocabulary, grammatical understanding and discourse comprehension" (Catts, Adlof, & Weismer, 2006), and the two parts are of equal importance for reading (Hoover & Gough, 1990). This model hypothesizes that impairment in either decoding or linguistic comprehension, which includes syntactic awareness, or in both, may cause reading problems. Bishop and Snowling (2004) extended the "triangle" model of reading, which originally consisted of three components, including phonology, semantics and orthography, by taking into consideration the contextual significance of syntactic skills in facilitating readers' understanding of the meanings embedded within particular sentence structures.

Tunmer and Hoover (1992) also argued that syntactic awareness uniquely explains children's reading achievement, and there are at least two ways in which syntactic processing influences the process of reading comprehension. First, Tunmer and Hoover suggested that syntactic skills may enable readers to monitor their ongoing comprehension processes more effectively during reading comprehension. Second, syntactic awareness facilitates children's understanding and recognition of difficult words that they have not learned. These two points are further discussed in the discussion section. Nevertheless, there have been few studies that have thoroughly examined the nature of the association between syntactic awareness and reading comprehension, in particular in Chinese. In the present study we sought to determine the stability of the association of syntactic awareness to reading comprehension over time in Chinese-speaking children, statistically controlling for the contribution from other variables such as phonological awareness and vocabulary knowledge.

### 1.2. Reading predicts syntactic awareness: an unexplored question

There has been no direct empirical research on the question of whether reading comprehension contributes to the development of syntactic awareness thus far, and theoretical speculation concerning the contribution of reading comprehension to the development of syntactic awareness is also highly limited, but it would appear to be possible. First, it is well known that the language used in children's printed materials, including books or magazines, is more complex compared to that typically found in oral language (e.g., Crain-Thoreson, Dahlin, & Powell, 2001; Mokhtari & Thompson, 2006). Reading comprehension may also facilitate children's understanding and acquisition of complex syntactic structures (Perfetti, Landi, & Oakhill, 2005). More specifically, such exposure to more syntactically complex sentences in reading comprehension should promote learning of a variety of

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