Learning and Individual Differences 47 (2016) 61–69

Contents lists available at ScienceDirect

Learning and Individual Differences

journal homepage: www.elsevier.com/locate/lindif

Development of word order and morphosyntactic skills in reading comprehension among Chinese elementary school children

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ARTICLE INFO

Article history:
Received 3 April 2015
Received in revised form 17 November 2015
Accepted 23 December 2015

Keywords:
Syntactic skill
Reading comprehension
Chinese
Word order
Morphosyntax

ABSTRACT

The present paper reported two studies which compared the roles of word order and morphosyntactic skills in reading comprehension among Chinese elementary school children. In Study 1, we found that over and above the effects of age, nonverbal intelligence and word reading, word order skill was a stable predictor of reading performance throughout grades 1 to 6, whereas morphosyntactic skill was associated with reading comprehension at grades 3 and 4. Study 2 was a three-year longitudinal study which showed that morphosyntactic but not word order skill at grade 2 longitudinally predicted sentence comprehension at grade 3 beyond the control variables and the auto-regressor; word order rather than morphosyntactic skill at grade 2 contributed significant variances to passage comprehension at grades 3 and 4. The findings suggested a differential dependence of reading on word order and morphosyntactic skills at different ages and in reading comprehension at different levels.

1. Introduction

Syntactic skills constitute a conscious understanding of the rules of grammar and an ability to manipulate the grammatical structure of sentences in a language (Gombert, 1992). Note that syntactic skills concern not only a reflection upon grammaticality of sentences, but also the use of linguistic strategies or operations to fix grammatical anomalies. In the reading literature, evidence has pointed to considerable syntactic influences on both word recognition (e.g. Bowey, 1986a,b; Cain, 2007; Muter & Snowling, 1998; Plaza & Cohen, 2003; Rego & Bryant, 1993; So & Siegel, 1997) and reading comprehension (e.g. Chik et al., 2012a, Demont & Gombert, 1996, Muter, Hulme, Snowling, & Stevenson, 2004, Siegel & Ryan, 1988, Tong, Tong, Shu, Chan, & McBride-Chang, 2014, Willows & Ryan, 1986, Yeung et al., 2011). The prior work has typically studied the global relationship between syntax and literacy development, albeit using an array of syntactic measures. Nevertheless, syntax in many languages comprises at least two important dimensions, namely the linear arrangement of words (i.e., word order) and morphological marking of constituents (i.e., morphosyntax), and their respective roles in reading development have yet to be contrasted. In the present studies, we examined children's developing syntactic skills in relation to their reading performance across ages. We were particularly interested in how word order and morphosyntactic skills might differentially contribute to reading comprehension at varied levels in Chinese children at different grades.

1.1. The importance of syntactic skills in reading

To conceptualise the cognitive processes underlying reading, Bishop and Snowling (2004) have extended the triangle model and highlighted the role of syntactic skills in decoding words and comprehending connected texts. First, it has been argued that knowledge of how constituents are canonically ordered in a sentence allows children to capitalise on word order constraints to decipher unfamiliar words (Rego & Bryant, 1993; Tunmer, 1989; Tunmer & Chapman, 1998). In particular, word order knowledge enables inferences about the word class of novel words, which facilitates interpretation of unfamiliar words by limiting their probable meaning in the sentential context (Bishop & Snowling, 2004). This conjecture has been supported by the findings that children's syntactic skills significantly contributed to their single word recognition (e.g. Bowey, 1986a,b, Cain, 2007, Muter & Snowling, 1998, Rego & Bryant, 1993, Tunmer, 1989, Tunmer & Hoover, 1992, Willows & Ryan, 1986). For instance, Cain (2007) reported that the word order skill of English-speaking children was uniquely associated with their word reading even when the effects of vocabulary, grammatical knowledge, and memory were controlled.

More importantly, Bishop and Snowling (2004) claimed that reading comprehension particularly recruited knowledge and skill in syntax. Previous research has indicated that syntactic skills were involved in reading comprehension (Demont & Gombert, 1996; Gaux & Gombert,

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http://dx.doi.org/10.1016/j.lindif.2015.12.023
1041-6080/

1999; Goff, Pratt, & Ong, 2005; Plaza & Cohen, 2003, 2004; Tunmer, 1989; Tunmer, Nesdale, & Wright, 1987; Willows & Ryan, 1986). For instance, in a longitudinal study, Muter et al. (2004) found that morphosyntactic (grammatical) skill at age 4 was a significant predictor of reading comprehension one year later. To explain why reading comprehension demands syntactic skills, Gough and Tunmer (1986) argued that a child who has syntactic deficits is likely to have a poor understanding of connected texts because they cannot work out the complex clausal structures. It has also been suggested that a weak mastery of grammatical morphemes such as tense or aspect markers is likely to result in an imprecise understanding of the time reference of events in texts. Furthermore, Tunmer and Bowey (1984) held that word order knowledge allows children to use the current input to anticipate syntactic categories, thus expediting integration and monitoring of ideas in comprehension. For example, upon hearing the subject "he", a child who understands the canonical word order of subject-verb-object in English would expect a verb that can assign a thematic role to it. Such ongoing prediction of upcoming words is especially important in reading long texts because additional semantic information can be solicited from the context to smooth the text interpretation. Overall, syntactic skills serve to build up a context in which unfamiliar words and ideas could be interpreted and integrated so as to ease the comprehension processes (Adams, 1990; Bishop & Snowling, 2004).

1.2. Different facets of syntactic skills

Although researchers have suggested a general notion that understanding of syntax is a critical component of literacy acquisition, they focused more on word order than morphosyntax in explaining the syntactic influence on reading. However, we argue that there is a need to reconsider the findings and carefully differentiate the parts of different syntactic skills in developing reading ability. Reviewing the above studies informs us that past research has been diverse in measuring syntactic skills. Earlier work often used an oral cloze design to tap syntactic skills (e.g. Chen, Lau, & Yung, 1993; Siegel & Ryan, 1988; So & Siegel, 1997; Willows & Ryan, 1986), in which the participant was asked to supply a correct word to complete a sentence grammatically (for example, "It_____very windy outside yesterday."). More recent studies, however, have tended to use either or a combination of morphosyntactic (grammatical) and word order tasks to assess syntactic skills. The morphosyntactic judgment and/or correction task requires the participant to first decide whether the sentences are grammatically correct and then to locate and fix the errors to restore the grammaticality of the sentences; for example, *eat* should be replaced by *ate* in "Yesterday Mary eat an apple." (e.g. Cain, 2007; Davidson, Raschke, & Pervez, 2010; Gottardo, Stanovich, & Siegel, 1996; Jongejan, Verhoeven, & Siegel, 2007; Reder, Marec-Breton, Gombert, & Demont, 2013; Tsang & Stokes, 2001; Yeung, Ho, Chan, Chung, & Wong, 2013). In other words, this task calls for both grammatical knowledge and a conscious ability to supply appropriate words to repair the sentences. The word order correction task is another popular syntactic measure (e.g. Cain, 2007, Chen & Wong, 1991, Chik et al., 2012a, Muter et al., 2004, Nation & Snowling, 2000, Tsang & Stokes, 2001, Yeung et al., 2011, 2013), where the scrambled segments of a sentence have to be rearranged into a correct order (for example, "driving/a/Sally/car/was" should be corrected as "Sally was driving a car.").

Note that the oral cloze task is a more general measure of syntactic skills because participants must call on both word order and morphosyntactic knowledge to come up with a word to complete the sentence. However, word order and morphosyntactic operations are assessed respectively in the word order and morphosyntactic correction tasks, and processing demands in these two measures are thought to be rather different. In a study that intended to compare the commonly used syntactic tasks, Cain (2007) found that after controlling for receptive vocabulary, memory explained unique significant variances in word order skill, whereas grammatical knowledge was uniquely correlated with morphosyntactic performances. The results indicated that these two popular syntactic measures differed in language and memory requirements, thus suggesting that they were not equivalent in testing syntactic skills. In view of this, we think the findings produced from studies using disparate syntactic tasks are not readily comparable to establish the role of syntactic skills in proficient reading.

Following up on Cain's (2007) findings, we called for a refined conceptualisation of syntactic skills as constituting two separate facets, namely word order and morphosyntactic skills. Apparently, these two abilities have to do with two distinct types of grammaticality. In terms of assessed knowledge, the morphosyntactic task primarily tests one's evaluation of the morphemic agreement between constituents, which is essentially different from the understanding of legitimate word order tested in the word order task. In addition, the word order task requires a rearrangement of words into a correct sequence, a process that necessitates reflection on the entire sentential context to position all the constituents. Contrastively, the manipulation in the morphosyntactic task is more localised to isolated words (Pratt, Tunmer, & Bowey, 1984). Therefore, we support Cain's (2007) notion that the syntactic knowledge and processing demands in these two tasks are by nature different. In this research, we attempted to consider anew the relationship between syntax and literacy by delineating the roles of different facets of syntactic skills in reading comprehension among Chinese school-aged children.

1.3. Syntactic skills and reading in Chinese

Recent years have witnessed a surging interest in the involvement of syntactic skills in reading in Chinese. Chen and colleagues reported initial findings that syntactic skills, in terms of rearranging words into a sentence (Chen & Wong, 1991), detecting grammatical errors and filling in missing words (Chen et al., 1993), were important correlates of reading proficiency among Chinese school-aged children. So and Siegel (1997) also showed that children's ability to insert missing words in an oral cloze task improved steadily from grades 1 to 4, and such syntactic skill was a reliable predictor of their word reading ability. A few more recent studies have also substantiated the significance of syntactic skills in reading comprehension in Chinese. At the sentence level, Chik et al. (2012a) demonstrated that syntactic skills (including word order, connectives and morphosyntactic knowledge) at grade 1 were longitudinally related to sentence comprehension at grade 2, after taking the children's age, nonverbal intelligence, phonological, orthographic, and morphological processing into consideration. Yeung et al. (2011) also found that syntactic skill assessed with an oral cloze task uniquely predicted sentence and passage comprehension among Chinese first graders above and beyond the effects of word reading ability and other reading-related skills. Some others (Chik et al., 2012b; Tong et al., 2014; Yeung et al., 2013) obtained complementary findings among grades 4 and 5 children that syntactic skills accounted for unique variances of sentence- and passage-level reading comprehension after controlling for the influence of word-level reading-related skills.

1.4. Development of individual syntactic skills in relation to reading in Chinese

According to C. N. Li and Thompson (1981), Chinese is unique in its simple structure of words, in which a word is a single morpheme that cannot be decomposed into smaller units. Hence, Chinese is characterised as an isolating language that has an impoverished inflectional system (Matthews & Yip, 1994). For instance, nouns in Chinese are not marked for their grammatical function in a sentence; case is instead expressed by the use of prepositions and word order. Plurality is also indicated by the use of a separate word rather than transforming the noun itself. Furthermore, there is no subject-verb agreement in Chinese. Verbs in Chinese are also not inflected for tense, number, and