Interpretation of *wh*-words in Mandarin-speaking high-functioning children with autism spectrum disorders☆

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A B S T R A C T

Mandarin *wh*-words *shenme* 'what' and *shei* 'who' can convey both question readings and statement readings, a distinction of which is subject to intonation cues (rising intonation vs. level intonation) in ambiguous sentences, or is influenced by semantic contexts in unambiguous sentences. In this study, we investigated the interpretation of *wh*-words in 4–15-year-old Mandarin-speaking high-functioning children with autism spectrum disorders (ASD), as a comparison to typically developing (TD) children. The results showed that older children with ASD demonstrated unimpaired knowledge of the access to both readings, either by using intonation cues in ambiguous sentences or via semantic contexts in unambiguous sentences. However, compared to TD controls and older children with ASD, younger children with ASD appeared to have more difficulties with accessing the statement readings of these *wh*-words, though they had no problems with the question readings. To sum up, the experimental findings demonstrated children with ASD's relative strengths in understanding these linguistic properties specific to the interpretation of the Mandarin *wh*-words, though a complete capture of this knowledge is subject to a developmental effect. We discussed the results from the perspective the contribution the language faculty makes to language acquisition in children with ASD.

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1. Introduction

Language acquisition in children with autism spectrum disorders (ASD) has been primarily focusing on English-exposed children with ASD, with much fewer investigations into the acquisition process in children with ASD learning other languages. However, cross-linguistic research in ASD is important, because theoretically it may help to reveal the nature of language acquisition underlying the general ASD population, and it also allows cross-cultural comparisons of language specific properties (Luyster, Kadlec, Carter, & Tager-Flusberg, 2008; Terzi, Marinis, Kotsopoulou, & Francis, 2014). Practically,

cross-linguistic autism studies may enhance the establishment of sensible clinical measurements appropriate for the detection of language skills in the ASD population within and across cultures (Peppé et al., 2010).

The present study investigates Mandarin-speaking children with ASD's interpretation of the *wh*-words *shenme* 'what' and *shei* 'who', which promises to both illuminate the acquisition process of *wh*-words in the general ASD population and to reveal children with ASD's knowledge of several aspects of language specific to Mandarin Chinese. More specifically, we wish to contribute to our understanding about whether comprehension of *wh*-words is impaired or intact in children with ASD. This question has yielded conflicting results in previous ASD language studies. For instance, Eigsti, Bennetto, and Dadlani (2007) suggested that 3–6-year-old high-functioning children with autism may not always understand the complex forms of *wh*-questions they produced (e.g., *what does it do?*). By contrast, in a longitudinal study by Goodwin, Fein, and Naigles (2012), 2–5-year-old children with ASD were found to develop the comprehension of *wh*-questions in a similar manner as typically developing (TD) children (albeit chronologically delayed). In particular, tested via the implicit measure of preferential looking paradigm (Naigles & Trovar, 2012), children with ASD were capable of comprehending subject *wh*-questions (e.g., *what hit the flower?*) and object *wh*-questions (e.g., *what did the apple hit?*), prior to their production of similar forms in spontaneous speech.

In addition to address this general question about whether children with ASD perceive *wh*-words in a similar or deviant way as TD children, we also attempt to explore Mandarin-speaking children with ASD's knowledge of several linguistic properties specific to the Mandarin *wh*-words. This includes the non-interrogative interpretations of the Mandarin *wh*-words, in addition to their normal functions as question words. The next section briefly introduces some of these special properties of the Mandarin *wh*-words as well as relevant acquisition studies in the TD and ASD literature.

2. *Wh*-words in Mandarin Chinese: specific linguistic properties and the acquisition

In forming questions in Mandarin, *wh*-words remain in situ, rather than being positioned at the front of the question as in English. This is one of the most prominent typological features of Mandarin Chinese, a *wh*-in-situ language (Huang, 1982; Huang, Li, & Li, 2009). *Wh*-words in Mandarin Chinese, furthermore, serve dual semantic functions by conveying both question readings and statement readings (e.g., Cheng, 1991; Huang, 1982; Li, 1992; Lin, 1998). The distinction between these two types of readings of the Mandarin *wh*-words is either resolved by prosodic features in ambiguous sentences, or is unambiguously determined by semantic structures.

Specifically, in ambiguous sentences, either rising or level intonation placed on a *wh*-word determines whether the speaker is asking a question (rising) or making a statement (level). This is illustrated in sentence (1), in which the *wh*-word *shenme* 'what' appears in simple negative sentences. In particular, sentence (1) yields either a question reading or a statement reading, depending on the intonation cues placed on *shenme*.

(1) Xiaohouzi meiyou chi shenme shuiguo
    Monkey   not   eat   what   fruit
    a. What did the monkeys not eat? (rising intonation on the *wh*-word)
    b. The monkeys didn't eat any fruit (level intonation on the *wh*-word)

More often, the question vs. statement readings of *wh*-words are unambiguously determined by semantic structures in which these words appear. In many ordinary linguistic contexts, *wh*-words serve as question-markers, turning a sequence of words into questions. By contrast, when they appear in the scope of certain semantic contexts called 'downward entailing contexts',[1] *wh*-words are interpreted as indefinite NPs. Consequently, the sequence of words that contains the *wh*-words constitutes statements rather than questions. One such semantic context includes the subject phrase of the Mandarin universal quantifier *dou* 'all', which is downward entailing.[2] Sentence (2) shows that the appearance of the *wh*-word *shei* 'who' in the subject phrase of *dou* 'all' conveys a statement reading; whereas in sentence (3) without *dou*, the *wh*-word *shei* functions as a normal question word. Note that this interpretive distinction exists even when both sentences are uttered via the same level intonation.

(2) Shei dou meiyou mai shuiguo
    who all   not   buy fruit
    'Everybody didn't buy any fruit.'

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[1] Downward entailing contexts license inferences from general terms to more specific terms (Ladusaw, 1979). These semantic contexts also license negative polarity items like English *any* and the statement reading of the Mandarin *wh*-words *shenme* 'what' and *shei* 'who'. Recently, beyond the scope of downward entailing contexts, studies suggest that the Mandarin *wh*-words are licensed in a broader range of linguistic contexts called 'non-existence' contexts (Lin, 1998).

[2] To see that the subject phrase of *dou* is downward entailing, if the sentence containing the general term 'flowers' in the subject phrase of *dou* is true, e.g., *Zhai-le xiaohua de xiaogou dou dedao-le xingxing* 'Puppets that picked up flowers all got stars', then the sentence with the more specific term 'red flowers' is also true, as in *Zhai-le xiaohonghua de xiaogou dou dedao-le xingxing* 'Puppets that picked up red flowers all got stars'.