



# Novel-word learning deficits in Mandarin-speaking preschool children with specific language impairments



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## ABSTRACT

Children with SLI exhibit overall deficits in novel word learning compared to their age-matched peers. However, the manifestation of the word learning difficulty in SLI was not consistent across tasks and the factors affecting the learning performance were not yet determined. Our aim is to examine the extent of word learning difficulties in Mandarin-speaking preschool children with SLI, and to explore the potent influence of existing lexical knowledge on to the word learning process. Preschool children with SLI ( $n = 37$ ) and typical language development ( $n = 33$ ) were exposed to novel words for unfamiliar objects embedded in stories. Word learning tasks including the initial mapping and short-term repetitive learning were designed. Results revealed that Mandarin-speaking preschool children with SLI performed as well as their age-peers in the initial form-meaning mapping task. Their word learning difficulty was only evidently shown in the short-term repetitive learning task under a production demand, and their learning speed was slower than the control group. Children with SLI learned the novel words with a semantic head better in both the initial mapping and repetitive learning tasks. Moderate correlations between stand word learning performances and scores on standardized vocabulary were found after controlling for children's age and nonverbal IQ. The results suggested that the word learning difficulty in children with SLI occurred in the process of establishing a robust phonological representation at the beginning stage of word learning. Also, implicit compound knowledge is applied to aid word learning process for children with and without SLI. We also provide the empirical data to validate the relationship between preschool children's word learning performance and their existing receptive vocabulary ability.

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## 1. Introduction

Children with apparent language deficits, but without neurological, sensorimotor, or nonverbal cognitive deficits are called specific language impairment (SLI; Leonard, 1998). Many children with SLI demonstrate deficits in vocabulary development, such as late talking, smaller and less variety of vocabularies, and word finding problems (Leonard & Deevy, 2004). Vocabulary development deficits are particularly devastating in young children because lexical acquisition is strongly associated with oral and written language development (Catts, Fey, Tomblin, & Zhang, 2002; NICHD Early Child Care Research Network, 2005). Therefore, researchers and clinicians are working to understand the word-learning process in children with SLI and the factors that influence the learning process. However, the manifestation of the word-learning

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difficulty in SLI is not consistent across tasks and the factors affecting learning performance have not been determined. In designing an effective intervention program, it is necessary to identify the specific deficits and factors that influence the learning process. This study examines word-learning difficulties in Mandarin-speaking preschool children with SLI and explores the influence of existing lexical knowledge on the word-learning process.

### 1.1. Novel-word learning in SLI

Word learning is the process of lexical acquisition, including initial form-meaning mapping of new lexical items and continued learning through further exposure to various contexts. Three-year-old children can acquire a novel color word after being exposed to the word once in the classroom (Carey & Bartlett, 1978). Because this fast-mapping ability has been observed in typically developing children as young as 13 months old, this ability may be related to the vocabulary spurt during the second year of a child's life (Kay-Raining Bird & Chapman, 1998; Schafer & Plunkett, 1998). In addition to the early onset of emergence, studies have shown that fast mapping in children becomes increasingly mature and efficient during the preschool years (Mervis & Bertrand, 1994; Wilkinson, Ross, & Diamond, 2003), suggesting that this ability is still developing in early childhood.

In experiments that test fast mapping in children with SLI, children are usually presented with novel words that are embedded in sentences within certain contexts (e.g., a play situation) denoting novel objects. Their ability to comprehend or produce the target words is then tested. In the comprehension test, children are asked to select the corresponding object when they hear the novel word stimuli (by using a real object or picture). A naming task is used to test children's production of a novel word. Dollaghan (1987) used a game to test the ability of children with SLI to fast-map one novel word and found that preschool children with SLI comprehended the single novel word as well as their age-matched peers, but produced fewer of the word's phonemes than children with typical language development. This suggests that for children with SLI, the phonological representation of a novel word may be sufficient for them to distinguish the words from alternative options in the comprehension task. However, the stronger or more complete representation required to fulfill the production task was not established. In a series of studies examining fast-mapping abilities in preschool children with SLI, children were presented with four novel word-object pairs three times and asked to perform comprehension and production tasks (Gray, 2003, 2004, 2005, 2006; Gray & Brinkley, 2011). Although the studies produced marginally inconsistent results, children with SLI generally performed as well as their age-matched peers in the comprehension or production tasks, which contradicts the conclusion reached by Dollaghan (1987).

Based on the clinical need, researchers have also attempted to establish the instructional components for vocabulary intervention programs. This has been explored by examining the word-learning process with the supported learning context (SLC) provided (Gray, 2003, 2004, 2005; Kiernan & Gray, 1998). Therefore, SLC word-learning tasks involve more word presentation, and these studies administered various intervention strategies – including models, prompts, and feedback – after the fast-mapping tasks. To achieve the criterion for comprehending or producing a new word, children were required to respond correctly to three of four probes on two of three consecutive word-learning days. Results from studies that have used the SLC paradigm show that children with SLI performed more poorly than their age-matched counterparts at novel word comprehension and production beyond the initial fast-mapping stage, because they learned fewer words and required more trials to achieve the learning criterion.

Unlike typical fast-mapping studies where children receive prompting from adults to attend to new words, Rice, Buhr, and Nemeth (1990) introduced the quick incidental learning (QUIL) paradigm to investigate word learning in preschool children with SLI. In the QUIL paradigm, new words were used to replace common, but general, labels. For instance, "conduit" replaced a word like "hose" in a garden story. The new words were embedded in the sentence and presented in an animated story. Children watched the video without prior notice of the word-learning task. After watching the video, children were asked to select the corresponding picture from four pictures when presented with a target word to assess their comprehension of the new words. As well as the typical fast-mapping studies, the QUIL experiments tested the initial form – meaning mapping ability. However, the paradigm emphasized the incidental nature of the linguistic context of learning support. The results showed that children with SLI retained significantly fewer words than typically developing children matched either by chronological age or by mean length utterance (Rice & Bode, 1993; Rice et al., 1990). More exposure to each new word is also necessary for children with SLI to perform comparably to their matched peers (Rice, Oetting, Marquis, Bode, & Pae, 1994). These studies also examined the relationship between performance on the Peabody Picture Vocabulary Test – Revised (PPVT-R; Dunn & Dunn, 1981) and performance on the QUIL tasks, but no statistically significant correlations were observed.

In brief, studies on word-learning processes have shown that children with SLI exhibit overall deficits in novel-word learning compared to their age-matched peers, but these results are inconsistent across studies and tasks. Because children with SLI have shown deficits in phonological learning skills, such as phonological short-term memory or fine-grained phonological analysis (Archibald & Gathercole, 2006; Bishop, North, & Donlan, 1996; Robertson, Joannisse, & Ng, 2009; Ziegler, Pech-Georgel, George, & Lorenzi, 2011), this suggests that word-learning deficits should be more apparent in production tasks that require complete phonological representations. Although children with SLI tend to perform as well as their age-matched peers in comprehension tasks in fast-mapping settings, they perform worse on QUIL tasks. The task demands in the QUIL paradigm may explain this discrepancy, that is, children must deduce the meaning of new words from their context. Other possible confounding factors may be involved. For example, the story videos were 6–8.5 min long in previous QUIL

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