



Learning novel words: Detail and vulnerability of initial representations for children with specific language impairment and typically developing peers

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ABSTRACT

This study examines the phonological representations that children with specific language impairment (SLI) and typically developing peers (TD) have during the initial process of word learning. The goals of this study were to determine if children with SLI attended to different components of words than peers, and whether they were more vulnerable to interference than peers. Forty 7- and 8-year-old children, half with SLI, took part in a fast mapping, word learning task. In addition to producing the word, there was a mispronunciation detection task that included mispronunciations of the target word in the initial position, final position or that modified the word's syllable structure. Children with SLI showed a different learning profile than peers, demonstrating stronger representations of the word-initial phonemes, but less information about word-final phonemes. They were more prone to interference overall, but especially from word-final foils. Children with SLI did not demonstrate less-defined phonological representations, but did attend to different features than TD children, perhaps in an attempt to compensate for problems learning longer words. The greatest weakness of children with SLI appears to be their susceptibility to interference, particularly for word-final information.

Learning outcomes: Readers will be able to: (1) explain what children attend to when learning new words; (2) state the pattern of recognition and production performance for both children with SLI and their typical language peers; and (3) identify specific parts of novel words that are most susceptible to interference in children with SLI.

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1. Introduction

Many children with specific language impairment (SLI) have documented deficits in vocabulary development (e.g., Mainela-Arnold, Evans, & Coady, 2008; Nash & Donaldson, 2005; Sheng & McGregor, 2010; van der Lely, 2005) and word learning (Alt & Plante, 2006; Alt, Plante, & Creusere, 2004; Kiernan & Gray, 1998; Gray, 2003, 2004, 2005; Rice, Buhr, & Oetting, 1992; Rice, Oetting, Marquis, Bode, & Pae, 1994). In general, children with poor vocabulary are likely to have difficulty learning new words (Nash & Donaldson, 2005). However, in order to provide focused therapy, it is not enough to know that a child is not as proficient at word learning as his or her peers. Word learning is not an all-or-nothing proposition. Therefore it is important to determine what parts of a word a child has encoded in order to know which aspects are salient to that child, and which need additional emphasis. Because there is a difference in word learning performance between children with typically developing language and children with SLI, it is possible that there is a difference between what is and

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is not salient to word learning in the two groups. It also might be the case that a child with SLI initially encodes information as well as peers, but then is more vulnerable to interference, resulting in an incorrectly specified phonological representation. This paper will address the characteristics of performance on a novel fast mapping task by children with and without language impairment, to provide insight into (a) what parts of a word children attend to when learning novel words and (b) their ability to withstand interference during fast mapping, the initial phase of word learning. This sort of knowledge may allow for targeted intervention to help strengthen word knowledge.

1.1. What is needed for word learning?

Theories of word learning may be fairly diverse in their specifics, but are all quite similar in that they highlight the multi-factorial processes required to learn words. For example, [Hollich, Hirsh-Pasek, and Golinkoff \(2000\)](#) characterize the word learning process as the “emergent product of multiple factors, including cognitive constraints, social-pragmatic factors, and global attention mechanisms” (p. v). [Bloom and Markson \(1998\)](#) note that word learning involves, among other things, the need to make associations. Other views associate word learning with capacities such as the ability to make associations, to use syntactic cues and to use theory of mind ([Bloom & Markson, 1998](#)). Learning a new word begins when an association is made between phonetic input that is then paired with a corresponding action or object in the environment. This initial input is referred to as fast mapping and involves an incomplete representation of the word ([Carey, 1978; Carey & Bartlett, 1978](#)). Fast mapping is the starting point in word learning. For complete lexical acquisition, subsequent learning through additional exposures that strengthen the initial association is required (e.g., [Gray, 2003](#)). The continued exposure that creates a more robust association is known as slow mapping ([Carey, 1978](#)). For the purpose of this study, we are concerned with the process that is involved in learning a *lexical label*, not the specific semantic information associated with that label.

1.2. How do typically developing children process words?

Obviously, in order to make the association between phonetic input and its corresponding action, object, or idea, one must be able to process the phonetic form of words. Therefore, there is considerable interest in how children, both those with typical language skills and those with SLI, process words. One main question is: what types of information are salient to learners? Some researchers have examined how different acoustic stimuli need to be from one another for children to perceive a difference. For example, [Swingley and Aslin \(2002\)](#) found that fourteen-month-old infants were able to recognize mispronunciations of the initial segments of common words. Swingley and Aslin did not determine if the infants perceived the difference at the level of phonetic segment, or as an overall acoustic difference. Regardless of the level of speech perception, the key point is that even infants are able to perceive subtle differences in words.

There is evidence that typically developing preschoolers attend to different types of cues to encode words ([Gerken, Murphy, & Aslin, 1995](#)). In Gerken et al.’s study, children were asked to judge whether stimuli were the same or different than a target word. The stimuli varied (among other things) in terms of the number of features by which they differed from the target word. Not surprisingly, in 3 of the 4 experiments they ran, children made more identification errors when stimuli differed from the target by a single feature, compared to when stimuli differed by two features. However, these results were tempered by the position in which the difference occurred. Children made more identification errors when stimuli differed by two features within a single segment compared to a single feature difference that occurred on multiple segments of a word. In other words, children were attending to phonetic details as well as more holistic word segment information. Therefore, the number of differences between a target and a foil and the placement of those differences within the word can affect word learning in typically developing children.

[McNeill and Hesketh \(2010\)](#) used a cross-sectional design with children from ages 4 to nearly 6 to look at developmental changes on performance on mispronunciation detection tasks. They were interested in the types of information that were salient to children with primarily typical language of different ages. In general, consonant deletions were easier for children to notice than consonant substitutions. This suggests that preschool children may have less-detailed phonological representations of words early on, even though they are able to make distinctions about part-word differences. [Maillart, Schelstraete, and Hupet \(2004\)](#) conducted an auditory lexical decision task that examined different types of phonological processing in a task that included typically developing children aged 5–9. Their subjects were more likely to correctly reject pseudowords that manipulated the number of syllables in a word than pseudowords in which only ‘slight modifications’ (e.g. addition or deletion of a phoneme) had occurred.

Another feature that can affect how children process a word is prosody. [Kehoe \(2001\)](#) reviewed several studies examining influences on children’s speech production. One of the findings relevant to the current study was that, when producing multi-syllabic words, young children were most likely to keep stressed syllables and word-final syllables (even those that were unstressed) compared to other types of syllables in other positions. So, position in a word, as well as segmental and phonetic information are salient features in word processing to typically developing language learners. Because within-word position is important to word processing, it might be a factor in word learning as well. Certainly, [Slobin \(1973\)](#) suggested that paying attention to the ends of words was a universal ‘operating principle’ for children learning language. This study examines the importance of within-word position in fast mapping. These studies reported above show us that typically developing children appear to be tuned to fine-grained phonetic differences in words from infancy. However, they appear to use different levels of processing (e.g. phonetic, segmental, and positional information) to make decisions about whether or

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