Verb Diversities of Children With And Without Developmental Language Disorder: A Study of Language Samples

Caitlyn J. Kearns

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VERB DIVERSITIES OF CHILDREN WITH AND WITHOUT DEVELOPMENTAL LANGUAGE DISORDER: A STUDY OF LANGUAGE SAMPLES

A Thesis

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Masters of Art

in

The Department of Communication Sciences Disorders

by

Caitlyn Josie Kearns
B.A., Louisiana State University, 2020
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Abstract

Background: There have been numerous studies that have researched word learning in children with Developmental Language Disorder (DLD). These studies have found that children with DLD present with higher vocabulary deficits compared to their typically developing (TD) peers. Many of these studies’ results suggest that verb learning is the most difficult word type to comprehend in early language development for both TD children and children with DLD. This current study aims to examine verb use in children with and without DLD and to specifically examine their usage of GAP verbs. Methods: Participants included 36 children, 18 TD and 18 DLD who spoke in a SWE dialect. The group classification was determined by three standardized assessments: The Primary Test of Nonverbal Intelligence (PTONI; Ehrler & McGhee, 2008), which was a measure of nonverbal intelligence; the Goldman-Fristoe Test of Articulation (GTFA-2; Goldman & Fristoe, 2000), which was a measure of the children’s articulation abilities at the single word level; and the syntax subtest of the Diagnostic Evaluation of Language Variation-Norm Referenced (DELV-NR; Seymour, Roepers, & de Villers, 2005). All language samples were coded using the Systematic Analysis Language Transcription program (SALT; Miller & Iglesias, 2012). Results: Children with DLD produced fewer verbs and a smaller variety of both main and secondary verbs. Children with DLD also had lower rates of overt forms when producing GAP verbs. Not only did the children with DLD have lower rates of overt bound T/A morphemes, but also lower rates of auxiliary BE overt forms produced with a GAP verb. Conclusions: These findings indicate that there is no relationship between these two groups and their GAP verb usage, and therefore GAP verb production should not be considered a clinical marker of DLD. Furthermore, although non-GAP verbs likely strengthen the semantic content of a child’s spoken language, the use of GAP verbs do not necessarily flag semantic
weaknesses. As speech-language pathologists, we should follow a preventative model by working with classroom teachers and/or parents to continue to encourage children to expand their verb knowledge in both children with DLD and without.
Chapter 1. Introduction

Developmental Language Disorder (DLD) is a neurodevelopmental disorder that affects approximately 7.58% kindergarten children (Norbury et al., 2016). Children diagnosed with DLD are presented with many obstacles throughout their lifetime, and report lower rates of academic attainment, less satisfaction with career options as adults, and higher rates of bullying and victimization throughout their lifetime compared to typically developing (TD) children. Because of their communication deficits, children with DLD have a harder time communicating with their peers, often leading to a higher risk of bullying (Redmond, 2011). In the area of language, children with DLD exhibit difficulty in many areas including demonstrating smaller vocabulary breadth and depth, and delayed development of morphosyntax (Ponari et al., 2018). This population’s difficulties in vocabulary knowledge and grammar affects the way they learn and use words to communicate, compared to their TD peers.

There have been numerous word-learning studies throughout the years. Most of these studies examine word learning of nouns in children with DLD and compared them to their TD peers (e.g., Gordon et al., 2021; Gray & Brinkley, 2011; Gray et al., 2020; Haebig et al., 2019; Haebig, et al., 2017; Leonard et al., 2020, see also Kan & Windsor, 2010 for a meta-analysis of word learning studies). A few studies have also examined adjective word learning. One research study by Leonard et al. investigated adjective learning in children with DLD and TD children and examined their ability to generalize the adjectives when the target characteristic appeared on new objects (Leonard et al., 2019). Other studies that narrowed their study to nouns and adjectives include: Heibeck and Markman, (1987), Leonard et al. (2019), Nash and Donaldson (2005). This is because nouns (e.g., ball) and the adjectives (e.g., big, red) that can be used to characterize nouns are often concrete and easy to represent in pictures (Nash & Donaldson,
Across languages, children also have larger noun vocabularies than other word classes, which is known as the noun bias. The noun bias appears in typically developing children, as well as children with atypical language development like late talkers and children with autism spectrum disorder.

Although nouns are often investigated in word learning studies, verbs have occasionally been investigated (Gray et al. 2020; Leonard et al., 2007; Oetting, 1999; Oetting et al., 1995; Rice et al., 1993; 1994; Riches et al., 2005; Andreu et al., 2012). Across studies, it has been found that children with DLD have greater word learning challenges when learning verbs relative to nouns; this challenge is more pronounced for children with DLD relative to their age-matched TD peers (Kan & Windsor, 2010). The meanings of verbs are expressed through their syntax so for children to learn a new verb, they must learn the verb’s syntactic properties. Given this, upon hearing a new verb, children use strategies such as syntactic bootstrapping to map the new verb to its meaning. This leads to challenges for children with DLD who struggle using syntactic cues to find the meanings of unknown words (O’Hara & Johnston, 1997). As will be outlined below, the verb knowledge deficits that are seen in children with DLD lead to smaller verb repertoires and a reduced diversity in the types of sentences they produce with the verbs compared to their TD peers. The purpose of this study is to compare the verb repertoires and types of sentences with verbs produced by children with DLD and by TD children.

**Word Learning in Children**

Children learn an impressive number of words early in development; the skill that enables the impressive number of words is often referred to as fast mapping (Gray & Brinkley, 2011). Heibeck and Markman describe fast-mapping as “when the child encounters a novel word and uses the linguistic and nonlinguistic context in which the word occurs to rapidly acquire
information about its meaning” (1987, p. 1021). Fast mapping is typically defined as word learning that includes 1-3 exposures of the new word. An examination of fast-mapping in TD children was conducted by Heibeck and Markman (1987). Children ages two, three, and four were separated and taught a new color, shape, or texture term that was unfamiliar to them. The results of the study showed that in TD children, although there are individual differences, children are able to quickly learn new words. Despite having a small number of contextual clues that were given in the non-linguistic context, TD children proved their ability to fast-map unfamiliar adjectives. Even when the participants were taught texture-based adjectives, where they displayed the weakest learning gains, more than half were able to use fast-mapping to know that the unfamiliar word was a texture (Heibeck & Markman, 1987). TD children explicitly rely on contextual information and quickly eliminate the number of possible meanings of unfamiliar words. This study shows that children can use fast-mapping to not only learn the meaning of nouns, but adjectives as well.

Gray and Brinkley (2011) conducted a study comparing fast mapping in TD children and children with DLD in a supported learning context. Out of 3 trials, the researchers provided phonological and semantic information to the participants immediately after a word was modeled through fast-mapping, and no cues in the last trial. The semantic encoding cue typically consisted of a physical description, association, or action. When the researchers used a phonological encoding cue, they provided the first sound of the word or the initial syllable. Results showed that encoding cues hindered the performance of learning new words in children with DLD and TD children (Gray & Brinkley 2011). While the encoding cues were intended to accentuate the fast-mapping abilities of TD children and children with DLD, they “shifted the children’s attention from processing the phonological or semantic characteristics of the words to processing
the cues, thereby hindering word learning” (Gray & Brinkley 2011, p. 880). While they might not be as skilled as their normally developing peers, children with DLD are able to add to their lexicons through fast-mapping.

Rice, Buhr, and Nemeth (1990) also conducted a study measuring the fast-mapping abilities of children with DLD. The study used animated videos with narration to introduce 20 unfamiliar words to children. The participants were five-year-old children with and without DLD. During the word learning experiment, each target word was taught five times, with exception to two words. Fast mapping was measured by subtracting the children’s scores on a vocabulary pre-test from their post-test. While the children with DLD exhibited some fast-mapping abilities, it was greatly impaired compared to their TD peers. Those with DLD learned 1.5 words on average, while the TD controls learned 4.22 words. The greatest difference between TD children and children with DLD was their rate in learning unfamiliar words (Rice et al., 1990).

Later Rice coined the term, Quick Incidental Learning (QUIL) to refer to children’s ability to “fast map” new words without explicit teaching by adults. QUIL is similar to fast mapping but adds the additional detail that children do not have to be explicitly taught words. Instead, they can learn new words “incidentally,” through the context of their everyday lives. In multiple studies, children’s QUIL abilities have been studied by introducing words to children through videotaped stories.

Given the importance or word knowledge, researchers have examined multiple aspects of word learning and various word-learning mechanisms. The ways children learn novel words plays a large role in understanding children with vocabulary deficits, such as children with DLD.
An important aspect of word learning that has been studied to provide supplemental assistance to children with DLD is dose frequency, or repetition. Dose frequency is best described as the amount of exposure to a word that a child is given. Encoding and memory consolidation are key components of word learning when using dose frequency (Storkel et al., 2019). A learner uses encoding to store a new word’s form and meaning in their working memory, as well as an initial representation in their hippocampus (Storkel et al., 2019). On the other hand, memory consolidation forms initial representations of novel words in the cortex of your brain while you sleep (Storkel et al., 2019). It is believed that children with DLD have greater difficulties with encoding new words relative to challenges with memory consolidation (Storkel et al., 2019). Because of these encoding weaknesses, dose frequency is an important component of word learning experiences. Repetition during the learning phase helps children to encode the phonological and semantic information in their working memory (Storkel et al., 2019). Successful encoding is necessary in order to recall a word when needed for use (Storkel et al., 2019). Repetition has proven to be useful for children with DLD, because it provides the child a longer exposure time to process and encode the word.

Storkel et al. (2019) recently tested the impact of dose frequency in children with DLD using interactive book reading. The participants of the study were in kindergarten and diagnosed with DLD. They were taught one set of words through interactive book reading. After 36 exposures of the 30 novel words, children with DLD demonstrated optimal improvements in recognizing and defining the novel words (Storkel et al., 2019). In comparison, in a related study, TD children only required one-third of the exposures that the children with DLD needed to learn the same amount of words (Justice et al., 2005). Notably though, of the 30 words that were taught, the children with DLD learned five words on average (Storkel et al., 2019). While
children learned only a small number of the words that were taught, the amount of exposure necessary to get the results for children with DLD was three times higher than the TD children (Storkel et al., 2019). Once again, while memory processing is seemingly a simple task amongst TD children, children with DLD require the extra exposure to fully learn and comprehend new words.

**Verb Learning in Children**

Many studies suggest that verb learning is the most difficult word type to comprehend in early language development for both TD children and children with DLD. Verbs are expected to be more difficult than nouns and other words in general due to their relational meanings that require the learner to consider many factors, including place and time (Thordardottir & Ellis Weismer, 2001). Therefore, there are strategies children employ to comprehend unfamiliar verbs in sentences.

One main strategy that children employ when learning novel verbs in sentences is syntactic bootstrapping. During syntactic bootstrapping, children interpret familiar syntactic categories, like noun phrases, and base their understanding of a meaning of a new verb off of this interpretation; therefore, children leverage their syntactic knowledge to learn new words (Fisher et al., 2020). Pinker (1989) notes that an essential approach to understanding the meanings of verbs is using contextual and syntactic information. These strategies have been found to be more challenging for children with DLD because they struggle with morphosyntax.

In one of the first studies of verb learning, Van der Lely (1994), defined canonical linking rules in semantic versus syntactic contexts. The first distinction she made in verb learning was forward linking. Forward linking is when a learner uses their knowledge of the semantic roles to
identify a novel verb to interpret grammatical categories like noun phrases (Van der Lely, 1994). The second distinction Van der Lely created was reverse linking. Reverse linking is when a learner uses a syntactic context to help determine semantic roles that may be associated with a given verb, and eventually recognizing the meaning of the novel word (Van der Lely, 1994). The distinction between semantic and syntactic mapping needed to be addressed due to the significant difference in how it is completed (Van der Lely, 1994). In Van der Lely’s study, six participants diagnosed with DLD were matched to TD peers on receptive and expressive language abilities. The children were first shown the meaning of a new verb through a video displaying the action. They were then asked to describe an event with this novel word. The children then heard a sentence that contained a novel verb and asked to act out the meaning of the verb. The results of this study exhibited that “the children with SLI [DLD] knew the prototypic mappings between semantic roles and syntactic units but were unable to use this knowledge to infer the meaning of the sentences containing the novel verbs in the absence of real-world events” (Van der Lely, 1994 p.191). This inability to use syntactic bootstrapping is believed to be due to the language deficits that children with DLD experience (Van der Lely, 1994). Because children with DLD struggle with interpreting syntactic contexts, which is one of the most common forms of verb learning, it has been proposed to be one of the main hinderances of the acquisition of verb meanings (Van der Lely, 1994).

O’Hara and Johnston (1997) conducted a study of syntactic bootstrapping in children with DLD and typically developing children. The study included six school-aged children diagnosed with a language impairment and six school-aged children who were typically developing. To test the children’s syntactic bootstrapping abilities, an examiner read a sentence aloud with unfamiliar words in it. Similar to Van der Lely’s (1997) study, the children were
required to use their inferred knowledge to act out the meaning of the novel words with a toy. The results of this study indicated that children with DLD did not have as strong of syntactic bootstrapping skills as their TD counterparts (O’Hara & Johnston, 1997).

**Lexical-Semantic Knowledge in Children with DLD**

In addition to having smaller vocabulary sizes, children with DLD have been found to have a reduced depth of word knowledge (McGregor et al., 2013). McGregor, et al. (2013) conducted a study on the deficits in breadth and depth of word knowledge in children with language impairment, and the extent of their development over time. In their research, vocabulary breadth refers to the amount of total words a child may know; vocabulary depth is how well the children knows the words (McGregor et al., 2013). They extracted 502 language samples from the Child Language Research Center project across several years (across grades 2, 4, 8, and 10). They classified the children based off of their kindergarten language disorders, Language Impaired (LI) vs. Normal Developing (ND). McGregor et al. used the Comprehensive Receptive and Expressive Vocabulary Test (CREVT) to determine each child’s language classification. In the end, they found that children with LI have vocabulary deficits characterized by limited breadth and depth of word knowledge. These deficits that were found in second grade persist throughout the school years.

The deficits in word knowledge that are seen in children with DLD may impact their ability to attach finiteness markers to novel words. Leonard et al., (2007) conducted a study comparing the use of verb inflections in these children with DLD and TD MLU-matched children. The two groups were given contexts that promoted the use of past tense -ed or progressive -ing in past contexts (e.g., “was walking”). They also used two sets of verbs. Half of the verbs were defined as prototypical. These prototypical verbs exhibited distinct endpoints
(e.g., drop; Leonard et al., 2007). The other half of the verbs were defined as nonprototypical, which presented events with less distinct endpoints (e.g., play). The results revealed that both the TD children and the children with DLD consistently used past tense -ed more often than the progressive -ing (Leonard et al., 2007). In addition, the TD-MLU children correctly produced past tense -ed more often than their DLD counterparts with both prototypical and nonprototypical words (Leonard et al., 2007). Leonard and colleagues suggested that “difficulties with tense-related morphology may be compounded in children with SLI if they fail to make use of associations between the lexical aspect of verb predicates and the grammatical function of the accompanying inflections” (Leonard et al., 2007, p. 759).

**Lexical Diversity in Children with DLD and GAP Verbs**

Given the well-documented difficulties in learning new words and in building robust lexical representations, it is not surprising that their spoken language is lacking in lexical diversity. For instance, Watkins et al. (1993) compared the number of different words produce in language samples between TD age-matched peers and children with DLD. The lexical diversity, or NDW, of the children with DLD was well below average compared to the TD 5-year-olds per 100 utterances (Watkins et al., 1993). In addition, children with SLI [DLD] have been specifically found to have reduced verb diversity in their naturalistic language use (Conti-Ramsden & Jones, 1997).

The lexical deficits, and specifically deficits in verb knowledge, that children with DLD experience impact their ease in using diverse verbs in their speech. Therefore, some researchers have noted the importance of examining verb diversity in children with DLD. When lexical diversity is considered, two factors come into play: type and token. Type can be defined as the different unique of words produced, and token is the amount of times these words are produced.
Rice and Bode (1993) examined the types and tokens of verbs used by three preschool children with DLD. The children were observed in naturalistic settings to observe their everyday, spontaneous language patterns. The results showed that the children’s overall verb use as measured by word tokens were similar to adult word tokens in spontaneous speech; however, they reached this level by repeating the same verb types. In about 100 utterances, the children with DLD on average only produced ten different verb types (Rice & Bode, 1993). Notably, these frequently used verbs were rather generic and could be used in several linguistic contexts. Rice and Bode (1993) classified these verbs as general all-purpose verbs, or GAP verbs. The GAP verbs identified in this study were go, get, do, put, need, come, did, look, make and work. The authors further posited that there are three characteristics to GAP verbs that make learning and using them relatively easy for children. One of these characteristics is input frequency. These words are often used in child-directed speech and are some of the first verbs that toddlers use early in life. Another characteristic is that these words have many different meanings and are fairly nonspecific. The last characteristic is that they have simple phonetic forms so they are easy to pronounce. The current study primarily focused on GAP verbs in an older sample of children with DLD.

Rice and Bode (1993) found that the GAP verbs only consisted of a small ratio of the children’s verb types produced, with an average of 9.3% between the three subjects. However, they discovered that the GAP verbs comprised of a large percentage of the children’s verb tokens, with an average of 46% across the three subjects (Rice & Bode, 1993). This small set of verbs accounted for a large portion of the verb tokens produced by the children. These results suggest that children with DLD may heavily rely on GAP verbs due to their vocabulary deficits. Due to the characteristics of GAP verbs, they are easy to fill in the gaps of unknown words.
Similar to non-GAP verbs, children with DLD occasionally produce grammatical errors when using GAP verbs. Across the three participants in this study, there were 100 verb errors, which only accounted for approximately 2% of the utterances (Rice & Bode, 1993). The verb error types were categorized into six types: GAP verb overuse, non-GAP stem substitutions, form class assignment, transitivity, verb omission, and preposition/participle omission (Rice & Bode, 1993). Importantly, errors of verb morphology (tense and pronoun agreement) were not included in this error analysis (Rice & Bode, 1993, p. 121); this is notable because tense and agreement errors are a hallmark clinical marker of children with DLD. The most common verb error that was identified was GAP verb overuse. This error was classified when a participant would take a commonly used verb, like push, and replace it with a GAP verb, like get, a verb that they were more familiar and comfortable using. Another frequently used verb error was verb omission. This error type was identified when the participants would produce an utterance that the semantic context suggests that a verb was missing to fully display the speaker’s intended meaning (Rice & Bode, 1993).

Additional studies have examined GAP verbs in young children with DLD. Conti-Ramsden & Jones (1997) analyzed three children with DLD by comparing their naturalistic spoken language using MLU-matched samples to TD children. They aimed to examine the development of expressive language, particularly verb use and word combinations, over the course of 2 years. Conti-Ramsden and Jones (1997) considered GAP verbs as one of the factors in their research that aligned with the research of Rice and Bode (1993). Both of these studies examined language samples with similar utterance lengths (MLUs of 3.2-3.8) to compare their participants’ frequency of GAP verbs. However, contrary to expectations, Conti-Ramsden and Jones (1997) discovered that MLU-matched peers employed a similar number of GAP verbs as
their DLD counterparts. Conti-Ramsden and Jones (1997) suggested that alternative measures of lexical diversity such as Number of Different Words (NDW) and Number of Total Words (NTW) as well as Number of Different Verbs and Total Number of Verbs were better tools to describe the lexical strengths and weaknesses of children with DLD.

A similar finding was reported by Watkins et al. (1993). Using a 100-utterance language play sample, Watkins et al. (1993) categorized frequently used verbs between 3 subject groups: language-impaired (average age = 59.5, average MLU = 3.29), language-matched (average age = 38.1 months, average MLU = 3.35), and age-matched (average age = 60.9 months). The frequently used verbs (i.e., GAP verbs) accounted for 29% of the language-impaired children’s verb types and 58% of their verb tokens (Watkins et al., 1993). The language-matched children’s use of high frequency verbs also consisted of 29% of their verb types and 60% of their verb tokens. Finally, the age-matched participants’ use of high frequency verbs only consisted of 28% of their verb types, as well as 60% of their verb tokens. These results highlighted that there were no differences between subject groups (Watkins et al., 1993).

**Current Study**

The primary aim of this current study is to examine verb use in children with and without DLD and to specifically examine their usage of GAP verbs. This study is an extension on the previous studies (Conti-Ramsden & Jones, 1997; Rice & Bode, 1993; Watkins et al., 1993). The previous studies examined children with DLD who were slightly younger (ages 3-5 years) with a lower MLUs (1.28-4.13); this current study focused on older children with DLD (5-6 years) who have slightly higher MLUs (4.91-6.39). Another way that this study is an extension to previous studies, is we are looking at the verb usage of participants who speak Southern White English (SWE) dialect. My specific research questions are:
1. Does verb production differ between children with and without DLD during a semi-structured adult-child language sample, elicited during play? Do children with DLD differ in the total number of verbs produced in the samples? Do children with and without DLD differ in the number of different verbs produced in samples?

2. Do children with and without DLD differ in the total number of GAP verbs and non-GAP verbs produced in the language samples? Do children with and without DLD differ in the number of different GAP verbs produced in the language samples?

3. Do children with and without DLD differ in the proportion of overtly marked bound T/A morphemes produced with the GAP verbs in the language samples? Do children with and without DLD differ in the proportion of overtly marked auxiliary BE morphemes that were produced with GAP verbs in the language samples?

Based on previous findings, I hypothesized that this study would reveal group differences in verb production between children with DLD and typically developing children. When considering the first research question, which examined the types and tokens of verbs used between the two groups, I hypothesized that children with and without DLD would not differ in the total number of verbs produced in the language samples. Results from Rice and Bode (1993) showed that the children’s verb use when measured by word tokens were similar to adult word tokens in spontaneous speech. However, I predicted that when measured by the different types of verbs produced, children with DLD would produce a less diverse group of verbs relative to the TD children. In Rice and Bode’s study, the children with DLD only produced about 10 different verb types in about 100 utterances (Rice & Bode 1993). Furthermore, Conti-Ramsden and Jones (1993) found that the children with DLD in their study produced a smaller number of different verbs relative to typically developing children who are matched on MLU.
In reference to our second research question, while children with and without DLD may not differ in their overall total of verbs produced in samples, when separated into GAP versus non-GAP verbs, I have two hypotheses based on previous literature. Children with DLD may produce a larger amount of GAP verbs compared to their TD peers, which would potentially be driven by the vocabulary deficits in children with DLD and their reliance on familiar GAP verbs. Conversely, there may not be group differences in GAP verb use, aligning with Conti-Ramsden and Jones (1997). In this situation, just as the younger kids with lower MLU’s in Conti-Ramsden and Jones (1997) displayed no differences in frequently used verbs, there would be a continuation of this pattern in our older sample of children with higher MLUs.

For the final research question, I hypothesized that, relative to children with DLD, TD children would produce a higher total of overt marking T/A morphemes and a higher total of overt marking Aux Be verbs produced with a GAP verb. While Rice and Bode (1993) examined error types when GAP verbs were produced, they did not look at tense and agreement errors. This current study extended Rice and Bode’s (1993) previous literature by comparing verb tense and agreement in TD and children with DLD. Additionally, Rice and Bode (1993) conducted a different type of error analysis of children’s productions of GAP verbs that did not focus on finiteness marking; the current study extended their error analysis by examining finiteness marking with GAP verbs.
Chapter 2. Methods

Participants

The data that was used in the current study consist of 36 archival language samples that were elicited from children as part of a larger study (Oetting et al., 2009) and studied in previously published studies (e.g., Brown, 2017; Oetting et al., 2021; Oetting et al., 2019). Prior to the data collection phase of the study, IRB approval, caregiver consent, and child assent were obtained. The children’s ages ranged from 60 to 74 months. The age difference between the two categories were for the children with DLD ($M = 67.89; SD = 4.91$), and the children categorized as TD ($M = 69.17; SD = 3.70$). The children were matched on chronological age $t(1,34) = -0.88, p = 0.384$. All children attended public kindergartens in a rural area of southeastern Louisiana. The children were categorized into two groups: children with DLD or typical language development who spoke in a SWE dialect. Group classification was determined by three standardized assessments: The Primary Test of Nonverbal Intelligence (PTONI; Ehrler & McGhee, 2008), which was a measure of nonverbal intelligence; the Goldman-Fristoe Test of Articulation (GTFA-2; Goldman & Fristoe, 2000), which was a measure of the children’s articulation abilities at the single word level; and the syntax subtest of the Diagnostic Evaluation of Language Variation-Norm Referenced (DELV-NR; Seymour, Roepers, & de Villers, 2005). Children classified as SLI scored above -1.2 standard deviation the normative mean on the PTONI and above -1 standard deviation on the GTFA, but below -1 standard deviation on the DELV-NR. Children classified as TD scored above -1 standard deviation on all three assessments. Participant characteristics are provided in Table 2.1.
Table 2.1. Participant profiles by clinical status.

<table>
<thead>
<tr>
<th></th>
<th>DLD (n = 18)</th>
<th>TD (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>(SD)</td>
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<tr>
<td>Age (months)</td>
<td>65.72 (3.89)</td>
<td>66.61 (4.18)</td>
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<tr>
<td>Maternal Education (years)</td>
<td>12.33 (2.87)</td>
<td>13.17 (3.05)</td>
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<td>PTONI</td>
<td>96.50 (8.35)</td>
<td>98.28 (8.14)</td>
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<td>GFTA-2</td>
<td>104.78 (4.18)</td>
<td>110.50 (3.09)</td>
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<tr>
<td>DELV-NR Syntax</td>
<td>4.78 (1.67)</td>
<td>10.39 (1.72)</td>
</tr>
<tr>
<td>PPVT-4</td>
<td>85.78 (7.01)</td>
<td>105.56 (5.60)</td>
</tr>
<tr>
<td>C&amp;I Utterances</td>
<td>264.28 (70.11)</td>
<td>234.28 (66.80)</td>
</tr>
<tr>
<td>MLU</td>
<td>4.91 (.66)</td>
<td>6.39 (0.82)</td>
</tr>
</tbody>
</table>

Note: PTONI = Primary Test of Nonverbal Intelligence; GFTA-2 = Goldman-Fristoe Test of Articulation-Second edition; DELV-NR = Diagnostic Evaluation of Language Variation-Norm Referenced; PPVT-4 = Peabody Picture Vocabulary Test-Fourth Edition; C&I = complete and intelligible utterances; MLU = mean length of utterance

Language Samples

All language samples were collected during and adult-child play interaction at the child’s school in a small, quiet room during a 20-minute session. During the language sample, the adult and child played with a toy gas station, baby doll set, picnic set, and three Apricot pictures (Arwood, 1985). It would be good to add a sentence describing the Apricot pictures. The examiners followed the child’s lead and utilized language elicitation prompts (e.g., I wonder what happened when you went to the toy store) to encourage the children to talk about past personal experiences. In addition, the examiners produced back channeling (e.g., wow, no way, really) and affirmative comments (e.g., that’s amazing) to encourage the children to continue
talking. At the end of each session, the examiners showed the children a picture while modeling a story, and then asked the children to their own stories using pictures as prompts.

All language samples were audio recorded, which allowed for transcription and coding at a later time according to the Systematic Analysis Language Transcription (SALT; Miller & Iglesias, 2012), and Oetting et al. (2014) protocols. Only complete and intelligible utterances within the samples were analyzed. For descriptive purposes, the children’s number of complete and intelligible utterances and mean length of utterances in morphemes (MLU) are listed in Table 2.1. Although the examiners attempted to collect equal numbers of utterances from the children, they spent more time eliciting the DLD samples than the TD samples, and the DLD samples ended up being slightly longer. Despite this, the number of complete and intelligible utterances did not differ between the groups, $t(1,34) = 1.31, p = 0.198$. As expected, the DLD group had a lower MLU relative to the TD group, $t(1,34) = -5.94, p < 0.001$, Cohen’s $d = -1.98$.

**Verb Coding Section**

In this current study, I first used SALT to identify the number of total verbs (NTV) and the number of different verbs (NDV) for each child. The Analyze feature in SALT was utilized to categorize the verbs from the child language sample and acquire these data. The data found from this analysis were used to address my first research question comparing children with and without DLD.

Furthermore, I then searched the transcripts for the unique verbs that are produced, using the Word and Code List feature on SALT, and classified the verbs as GAP vs. non-GAP verbs, as defined by Rice and Bode (1993). The GAP verbs included the following verbs: want, go, get, do, put, need, come, look, make and work. The verbs gonna (going to), wanna (want to), and gotta (got to) were coded and counted in the overall total GAP verbs. Those three verbs were
collapsed into their specific GAP verb analysis. All other verbs were considered non-GAP verbs. After singling out the GAP verbs in the transcript, I coded the verbs such as: -ed, present progressive -ing, past tense irregular, etc. (ex: need/ed, go/ing, did [ptirr]; see Table 2.2). The isolated GAP verbs were then separated as main verbs vs. secondary verbs in the sentence. An example of a GAP verb employed as a main verb is: “That car go/3s fast”. A verb was classified as a main verb when it was found in a finite clause and was the only verb in the sentence. An example of a GAP verb as a secondary verb is: “She rested after go/ing the store”. A verb is categorized as a secondary verb when it is found in nonfinite or embedded clauses like infinitival verb phrases (she wants to go), relative clauses (she wore the hat that got wet), adverbial clauses, question forms, and participles (e.g., My glass is broken). Once the main verbs and the secondary verbs are divided, I coded the verbs to identify the type of tense and agreement marker produced with the verbs. As shown in Table 2.2, these markers included of overt and zero forms of regular and irregular past tense (e.g., need/ed, need/*ed [flg] [d], did [ptirr], do [ptirr] [flg] [d]), auxiliary BE (am, is, are, was, were, *am [d], *is [d], *are [d], *was [d], *were [d]), and verbal -s (run/3s, run/*3s). As shown by the examples, the samples have been transcribed with bracketed coding (e.g., [ptirr] for past tense irregular, /3s for verbal -s) and other SALT conventions. The verbs gonna and gotta were coded separately from the total verbs, and collapsed under the As SWE speakers, the children are expected to produce both overt forms and zero forms of inflectional tense and agreement forms. When zero forms are produced, they are indicated with a [d] code and/or [flg] [d] within the transcripts. This analysis addressed the second research question.

Next, I examined the relationship between the relative frequency (percentage) of the GAP verbs, separately and combined as produced by children with DLD and TD children, as well as
the variety of tense and agreement markers being used with these verbs. As mentioned earlier, I also considered whether the grammatical marker reflects an overt form (e.g., walk/ed) or zero form (e.g., walk/*ed), and whether the overt form is dialect appropriate or inappropriate. Given that the speakers produce SWE, their dialect allows both overt forms and zero forms for some of the grammatical markers. In addition, speakers of SWE can occasionally produce dialect-specific forms for grammatical structures (e.g., I says to him...). Dialect-inappropriate forms were those that have not been documented in previous SWE studies (Oetting et al., 2021). The third research question focused on the various finiteness markers produced with verb. The verb coding manual is described in detail in the Appendix.
Table 2.2. GAP Verbs and Their Inflected Forms and Zero-Marked Forms

<table>
<thead>
<tr>
<th>GAP verbs</th>
<th>GAP verbs with overt and zero grammatical markers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verbal -s Regular</td>
</tr>
<tr>
<td>Want overt</td>
<td>want/3s</td>
</tr>
<tr>
<td>Want zero</td>
<td>want/*3s</td>
</tr>
<tr>
<td>Go overt</td>
<td>go/3s</td>
</tr>
<tr>
<td>Go zero</td>
<td>go/*3s</td>
</tr>
<tr>
<td>Get overt</td>
<td>get/3s</td>
</tr>
<tr>
<td>Get zero</td>
<td>get/*3s</td>
</tr>
<tr>
<td>Do overt*</td>
<td>doo/3s</td>
</tr>
<tr>
<td>Do zero*</td>
<td>--</td>
</tr>
<tr>
<td>Put overt</td>
<td>put/3s</td>
</tr>
<tr>
<td>Put zero</td>
<td>put/*3s</td>
</tr>
<tr>
<td>Need overt</td>
<td>need/3s</td>
</tr>
<tr>
<td>Need zero</td>
<td>need/*3s</td>
</tr>
<tr>
<td>Come overt</td>
<td>come/3s</td>
</tr>
<tr>
<td>Come zero</td>
<td>come/*3s</td>
</tr>
<tr>
<td>Look overt</td>
<td>look/3s</td>
</tr>
<tr>
<td>Look zero</td>
<td>look/*3s</td>
</tr>
<tr>
<td>Make overt</td>
<td>make/3s</td>
</tr>
<tr>
<td>Make zero</td>
<td>make/*3s</td>
</tr>
<tr>
<td>Work overt</td>
<td>work/3s</td>
</tr>
<tr>
<td>Work zero</td>
<td>work/*3s</td>
</tr>
</tbody>
</table>
Note: SALT uses code morphemes to distinguish between different grammatical markers in verbs. Ex: /3s = regular verbal -s singular; /*3s = zero regular verbal -s; /ed = regular past tense; /*ed = zero regular past tense; /ing = present progressive; /*ing = zero present progressive; [3irr] = third person irregular; /n’t = negation in a verb

Reliability

Language sample transcription was deemed reliable as part of Oetting et al. (2021). As reported in that study, one-minute excerpt from each language sample was randomly selected and transcribed by an independent team of students following the original guidelines, and then these excerpts were compared to the originals. As reported in Oetting et al. (2021), the average rate of inter-transcriber agreement for utterance boundary decisions, words transcribed, and morphemes coded was 93%, 95%, and 97%, respectively.

The reliability of the proposed verb coding for the current project was examined by asking a second researcher to independently code the verbs in three separate passes. To do this, the coder independently completed the same coding steps as the researcher for 20% (7 samples; 4 DLD and 3 TD) of the samples. The steps included the Analyze feature on SALT, the Word and Code List feature in SALT to categorize the verbs as GAP or non-GAP verbs, and the Word and Code List feature in SALT to categorize the verbs as a main or secondary verb and whether it was produced with a grammatical marker. Reliability for each of the dependent variables was computed by calculating the intraclass correlation coefficient (ICC). ICC was perfect for all variables of interest and ranged from perfect agreement (ICC = 1 for three variables) to excellent agreement (ICC > 0.994 for the following variables: proportion of GAP verbs, proportion of overt marking of bound T/A morphemes with a GAP verb, and proportion of overt marking of auxiliary BE with a GAP verb).
Analysis

Children with and without DLD produced a variety of verbs throughout semi-structured language samples elicited during play. The first set of research questions compared the verbs produced by children with DLD versus typically developing children. The dependent variable was the proportion of number of different verbs (NDV/C&I utterances) produced and the proportion of total number of verbs (TNV/C&I utterances) produced in the language samples. The independent variable was group (DLD vs. TD). The data from these research questions were analyzed using one-way ANOVA tests. The second research question asked whether children with and without DLD differ in the number of different GAP verbs (Num Diff GAP/C&I utterances) produced in the samples, and do they differ in the total number of GAP verbs (Total GAP/C&I utterances)? This question is aimed to examine the differences in GAP verbs. The dependent variables were the proportion of number of different GAP verbs produced and the proportion of total number of GAP verbs produced in the samples. The independent variable was the group (DLD vs. TD). A one-way ANOVA test was used to test for group differences. Lastly, we examined how each group used overt-marking during production of the GAP verbs. The dependent variable was the proportion of overt-marking bound T/A morphemes produced with GAP verbs (Total Overtly Marked bound GAP/overtly marked + zero marked), and the independent variable was the group (DLD vs. TD). The data from this research question was analyzed using a one-way ANOVA test. We also examined overt marking of the auxiliary BE verbs that were paired with GAP main verbs, to see if there were differences between the group. Using a one-way ANOVA test, our independent variable was the group (DLD vs. TD) and dependent variable was the proportion of total number of aux BE verbs paired with GAP verbs (Total Overtly Marked Aux Be/overtly marked Aux BE + zero marked Aux BE).
Chapter 3. Results

As noted in the methods, 36 children contributed data to the study: 18 children with DLD and 18 TD children. Each research question was analyzed using data in the IBM-SPSS (Statistical Package for Social Sciences). Each dependent variable was analyzed as a proportion to ensure the most reliable results during analysis. We used proportions during the analysis to control for complete and intelligible utterance, due to it potentially influencing how many times a verb or main GAP verb could be produced for each child. We also conducted analyses using the raw values During the ANCOVA analysis, the independent variables were the raw data (i.e., independent variables: raw NDV, NTV, Total Number of GAP, and Number of Different GAP) but included child complete and intelligible utterance values as a covariate. The ANCOVA analyses did not result in different findings from the ANOVA analyses that used the proportion scores as the dependent variables; Therefore, the ANOVA results are presented in the current study. Eta-squared ($\eta^2$) was used to determine effect size. According to Richardson (2011), eta-squared has a small effect size 0.01, a medium effect size of 0.06, and a large effect size of 0.14.

Proportion of Verbs and Proportion of Different Verbs

Our first research question asked if there were differences between the two groups in the proportion of the total number of verbs and the proportion of different verbs. We found a large significant difference between the proportion of total verbs that the two groups produced. TD children produced a higher proportion of verbs [$F(1, 34) = 18.46, p < 0.001, \eta^2 = 0.322$]. The second part of our first research question revealed that there was a significant group difference; TD children produced a higher proportion of different verbs relative to the children with DLD [$F(1, 34) = 16.55, p < 0.001, \eta^2 = 0.327$]. Table 3.1 provides the group means and standard
deviations for the raw values of NTV and NDW as well as the proportion of total verbs and proportion of different verbs in the language samples.

Table 3.1. Average Verb Production Summary

<table>
<thead>
<tr>
<th>Group</th>
<th>Raw Total Number of Verbs (SD)</th>
<th>Proportion of Total Number of Verbs (SD)</th>
<th>Raw Number of Different Verbs (SD)</th>
<th>Proportion of Different Verbs (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD</td>
<td>242.72 (85.55)</td>
<td>1.03 (0.14)</td>
<td>86.72 (21.66)</td>
<td>0.38 (0.08)</td>
</tr>
<tr>
<td>DLD</td>
<td>214.83 (57.58)</td>
<td>0.83 (0.14)</td>
<td>70.50 (13.57)</td>
<td>0.28 (0.07)</td>
</tr>
</tbody>
</table>

Proportion of GAP verbs and Proportion of Different GAP Verbs

Our second research question asked if there were differences between the two groups in the proportion of GAP verbs and the proportion of different GAP verbs produced. In the first part of this question, we examined whether the proportion of total number of GAP verbs differed between children with and without DLD. Using a one-way ANOVA test, our independent variable was the group (DLD vs. TD) and dependent variable was the proportion of total number of verbs. Using the proportion of total number of GAP verbs and comparing the two groups, we found no significant differences. TD children and children with DLD produced a similar number of total GAP verbs $[F(1, 34) = 2.83, p = .102, \eta^2 = .077]$. We also calculated the proportion of GAP verbs by dividing by the TNV and the results remained the same. The results for total number of GAP verbs was $[F(1,34) = 2.22, p = .145, \eta^2 = 0.061]$. The mean (standard deviation) for these results are for TD: 0.10 (0.02). Figure 3.1 displays the raw number of total GAP verbs produced for each type of GAP verb organized by group. The second part of our second research question was analyzed using the groups as our independent variable, and proportion of different GAP verbs as the dependent variable. Using the proportion of different GAP verbs and comparing the two groups, we once again found no significant differences. TD children and
children with DLD produced a similar proportion of different GAP verbs \([F(1, 34) = 2.52, p = 0.122, \eta^2 = .069]\). We also calculated the proportion of different GAP verbs by dividing by the NDV and there was an approached significant difference \([F(1,34) = 4.13, p=.050, \eta^2 = 0.108]\). The mean (SD) for these results are TD: 0.10 (0.02) and DLD: 0.12 (0.03). Table 3.2 provides the summary data of GAP verb production.

Table 3.2. GAP Verb Production Summary

<table>
<thead>
<tr>
<th>Group</th>
<th>Raw Total Number of GAP Verbs (SD)</th>
<th>Proportion of Total Number of GAP Verbs (SD)</th>
<th>Raw Number of Different GAP Verbs (SD)</th>
<th>Proportion of Number of Different GAP Verbs (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD</td>
<td>66.00 (23.05)</td>
<td>.28 (0.05)</td>
<td>8.39 (1.20)</td>
<td>.04 (0.010)</td>
</tr>
<tr>
<td>DLD</td>
<td>64.00 (18.08)</td>
<td>.25 (0.06)</td>
<td>8.00 (1.37)</td>
<td>0.03 (0.10)</td>
</tr>
</tbody>
</table>

Figure 3.1. Comparisons of the Raw Number Total GAP verbs produced by each population

*Note:* The error bars depicted in this figure represent standard deviations
Overt Tense and Agreement Forms with GAP verbs

Our final research question asked if there were differences between the two groups in the total number of overt-marking bound T/A forms and a total number of different overt-marking bound T/A morphemes produced. In the first part of this question, we examined whether the proportion of overt bound T/A morphemes, specifically regular past tense -ed and verbal -s, produced with GAP verbs differed between children with and without DLD. Using a one-way ANOVA test, our independent variable was the group (DLD vs. TD) and dependent variable was the proportion of overt bound forms attached to GAP verbs. We found a large significant difference between the proportion of overtly marked bound morphemes that the two groups produced. TD children produced a higher number of regular past tense overt -ed forms and verbal -s overt forms produced with GAP verbs [\(F(1, 34) = 28.51, p < 0.001, \eta^2 = 0.456\)].

We also examined overt marking of the auxiliary BE verbs that were paired with GAP main verbs, to see if there were differences between the group. Using a one-way ANOVA test, our independent variable was the group (DLD vs. TD) and dependent variable was the proportion of total number of aux BE verbs paired with GAP verbs. There was a significant group difference, with the TD children producing more overt auxiliary BE forms with a GAP verb, [\(F(1, 34) = 15.46, p < .001, \eta^2 = 0.313\)]. Additionally, we analyzed the different auxiliary BE forms (am, is, are, was, were) that were produced with GAP verbs to examine overt marking. We found significant differences in overt am [\(F(1, 23) = 7.30, p = .013, \eta^2 = 0.241\)], overt is [\(F(1, 32) = 9.95, p = .003, \eta^2 = 0.237\)], overt are [\(F(1, 24) = 7.36, p = .012, \eta^2 = 0.235\)], but not overt was [\(F(1, 21) = 1.66, p = .212, \eta^2 = 0.073\)]. There was not enough data to analyze the auxiliary BE verb, were alone. Only 6 participants produced were between the two groups, and descriptively the two groups had the same mean at 0.75. However, in SWE, it is optional to
optionally overtly mark was and were in the same linguistic contexts (e.g., We was going. We were going). Therefore, we combined overt forms of was and were that were produced with GAP verbs and found that there were no significant differences in the proportion of overtly-marked auxiliary was and were when produced with a GAP verb \( F(1, 21) = 1.82, p = .192, \eta^2 = 0.080 \).

Figure 3.2 shows the raw number of overt forms auxiliary BE verbs produced with GAP verbs produced organized by group. Table 3.3 provides the summary data of overt forms with GAP verb production.

Table 3.3. Summary of Tense and Agreement Form use with GAP verbs

<table>
<thead>
<tr>
<th>Group</th>
<th>Proportion of Zero Marking Bound (SD)</th>
<th>Proportion of Overt Marking Bound (SD)</th>
<th>Proportion Zero Marking Auxiliary BE (SD)</th>
<th>Proportion of Overt Marking Auxiliary BE (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD</td>
<td>0.12 (0.14)</td>
<td>0.88 (0.14)</td>
<td>0.12 (0.12)</td>
<td>0.88 (0.12)</td>
</tr>
<tr>
<td>DLD</td>
<td>0.58 (0.33)</td>
<td>0.42 (0.33)</td>
<td>0.44 (0.33)</td>
<td>0.56 (0.33)</td>
</tr>
</tbody>
</table>

Note. Raw Number of bound tense and agreement overt forms: \( M_{TD} = 7.11 (SD_{TD} = 3.58), M_{DLD} = 3.11 (SD_{DLD} = 3.10) \), Raw Number of auxiliary BE overt forms: \( M_{TD} = 12.72 (SD_{TD} = 7.91), M_{DLD} = 8.11 (SD_{DLD} = 9.27) \). Raw Number of bound tense and agreement zero forms: \( M_{TD} = 0.94 (SD_{TD} = 1.06), M_{DLD} = 4.39 (SD_{DLD} = 3.53) \), Raw Number of auxiliary BE zero forms: \( M_{TD} = 2.61 (SD_{TD} = 3.22), M_{DLD} = 5.83 (SD_{DLD} = 5.63) \). In the TD group, the total participants producing the auxiliary BE verbs are as follows: am = 14, are = 14, is = 17, was = 14, were = 4; In the DLD group, the total participants producing the auxiliary BE verbs are as follows: am = 11, are = 12, is = 17, was = 9, were = 2
Figure 3.2. Comparisons of the Raw Overt form of auxiliary BE verbs with a GAP verb produced by each population

Note: The error bars depicted in this figure represent standard deviations
Chapter 4. Discussion

This study was focused on examining the verb repertoires of children with and without DLD, and determining if there are similarities or differences in the usage of GAP verbs. The participants in this study spoke SWE dialect, which was an added strength to this study. The main findings to the three research questions are as follows: Children with DLD produce significantly less TNV and DNV compared to TD children. The findings for research question two revealed no significant differences between TD children and children with DLD when comparing the proportion of Total GAP verbs and the proportion of different GAP verbs. For the third and final research question, the results showed significant differences in the proportion of overtly marked bound T/A forms (verbal -s and regular past tense -ed) and proportion of overtly marked auxiliary BE forms produced with GAP verbs. With one exception, the predictions aligned with the results.

The group difference in the proportion of verbs produced in the language samples was unexpected. Originally, I predicted that there would be no difference between children with DLD and TD children in proportion of verbs produced. Rice and Bode (1993) found that children with DLD’s verb usage, when measured by word tokens, were similar to adult word tokens in spontaneous speech. However, the current study’s findings are similar to those of Conti-Ramsden and Jones (1997). Their data revealed that slightly younger children with DLD produce fewer total number of verbs. Relatedly, the current study also revealed that kindergarten children with DLD also produced a smaller proportion of different verbs relative to the TD group. This finding once again aligns with Conti-Ramsden and Jones’s (1997) findings, which were that preschool TD children produce more diverse verbs than preschool children with DLD.
Despite the group differences in the general verb production in our samples, we did not uncover group differences that were specifically related to GAP verbs. The similar production of GAP verbs between children with and without a language disorder aligns with the findings of both Conti-Ramsden & Jones (1997) and Watkins et al. (1993). Therefore, there is a continued pattern of children with DLD and children with typical language development have a similar rate of production of GAP verbs during the preschool and early school-age (kindergarten) years. The current study also revealed that there were no significant differences between the groups in the proportion of different GAP verbs produced. When comparing these results to Rice and Bode’s (1993) findings, there are a few concepts to consider. Rice and Bode (1993) did not compare their results with TD children; instead, they suggested that children with DLD may produce GAP verbs more often than their TD peers. However Conti-Ramsden and Jones (1997) and Watkins et al. (1993) found that, when compared to TD children, the difference in the total production of GAP verbs was actually not significantly different. As previously noted, the previous studies examined participants are younger and have lower MLUs relative to the current sample. The participants I examined are kindergarteners rather than pre-school and had MLUs around 4.91. The current study’s participants who are older may have had more of a possibility of having group differences because the TD children likely had more advanced vocabulary knowledge, and the children with DLD may have fallen further behind in their verb knowledge. Rice and Hoffman (2015) found that children with DLD have a widening gap in their vocabulary acquisition as they age.

Finally, I had hypothesized that children with DLD would produce GAP verbs that had less overt-marking of T/A forms relative to the TD children. The bound T/A morphemes we focused on were: verbal -s and regular past tense -ed, which are two of the five T/A morphemes.
The current study coded both zero and overt marking. This approach allows us to examine finiteness marking in a way that is more culturally-sensitive. The findings mirrored what we typically see in overt marking across all verb types. In the literature, there is a great deal of evidence that children with DLD less frequently overtly mark tense and agreement forms, relative to TD peers (e.g., Leonard et al., 2007). The current results showed that TD children produced more overt marking of the verbal -s and past tense -ed morphemes when that are connected to GAP verbs. This finding was expected because Leonard and colleagues have documented that children with DLD are not as productive with their tense and agreement knowledge with all types of verbs, not specifically GAP verbs (Gladfelter & Leonard, 2013; Leonard et al., 2007; Leonard et al., 2017).

We additionally predicted that children with DLD would produce less overt marking of auxiliary BE verbs that were produced with GAP verbs. Our findings once again aligned with our hypothesis, revealing TD children produced a significantly higher amount of overtly marked auxiliary BE verbs. This finding was expected, because previous work has also documented that children with DLD overtly mark auxiliary BE forms with other verbs, not specifically GAP verbs, relative to typically developing peers (Leonard et al., 2017; Rice & Wexler, 1996). Additionally, the current study aligns with previous findings that children with DLD who speak SWE also have lower rates of overtly marking auxiliary BE forms when compared to TD peers who also speak SWE (Oetting et al., 2021). This is group difference is notable because overt marking of both the bound tense and agreement morphemes that we examined and auxiliary BE is optional in SWE. Furthermore, we found that overt marking of auxiliary BE forms with GAP verbs did not differ when each of the BE forms were examined (is, are, am, was, were). Therefore, it appears that overt marking is not impacted by whether or not a verb is a GAP verb.
Clinical Implications

This current study provides valuable information on understanding the verb knowledge of children with DLD. Our finding that children with DLD produced fewer verbs overall and fewer different verbs in the language samples indicates that when assisting a kindergarten child with DLD in a clinical/educational setting, it may be important to specifically target growing children’s verb knowledge. This study highlighted however, that children with DLD do not tend to rely on common or general-all-purpose (GAP) verbs more than their TD peers do. Knowing this, as speech-language pathologists (SLPs) we can continue to encourage our children with DLD to produce a higher variety of verbs, as well as a total number of verbs. One strategy that SLPs can utilize is retrieval practice that requires contextual reinstatement. Haebig et al. (2019) and Leonard et al. (2019) found that both typically developing and children with developmental language disorder retain more novel words in retrieval practice conditions.

Limitations

There were several limitations to this current study. First, the findings that my study found that children with DLD produced significantly lower proportions of verbs than their TD peers could be the result from the computational approach implemented within SALT. The Grammatical Categories List was used to identify total number of verbs in the language sample through SALT. The SALT database has a preconceived list in their system to identify words as different grammatical categories, in this case, verbs. SALT may have identified some words as being used as verbs, when they were actually used as other categories such as nouns or adjectives. For example, a common word that was incorrectly categorized was work (e.g. “Mom is at work”). As mentioned before, these child participants come from a separate study from Oetting et al. (2009). A limitation to this is that our groups were different ages and had different
MLUs compared to the previous literature. This could make direct comparisons challenging in future research or past research. As mentioned before, having participants who speak SWE is a strength in our study, as the data found can be used to compare the pattern of GAP verb use and overt marking with GAP verbs across dialects. However, it can also be a limitation in comparing our results to past studies. According to Oetting et al. (2021), it is appropriate in SWE dialect to use optional marking of certain tense and agreement morphemes. These optional or variable markings are limited to mainstream overt forms and nonmainstream zero forms (e.g. walk/ed vs. walk/*ed, she is run/ing vs. she *is run/ing) (Oetting et al., 2021).

Future Directions

When studying verb lexicons and GAP verbs between children with DLD and TD children, future studies should increase the number of participants to collect more data from each participant. In doing so, the researchers in future studies should focus on getting larger samples to have more content to study. Another factor that should be considered in the future is to directly compare GAP verb production of different dialects. For instance, future research could directly compare children with DLD that speak SWE with children with DLD who speak African American English (AAE), and mainstream American English when examining the following variables: TNV, NDV, GAP verbs, different number of GAP verbs, and total number of overtly marked T/A morphemes connected to GAP verbs. This would allow clinicians and researchers to examine the pattern of GAP use and overt and zero marked forms with GAP verb production.
Conclusion

In conclusion, the current study showed a relationship between the differences in the verb lexicon of children with developmental language disorder and typically developing children. Children with DLD produced fewer verbs and a smaller variety of both main and secondary verbs. Children with DLD also had lower rates of overt forms when producing GAP verbs. Not only did the children with DLD have lower rates of overt bound T/A morphemes, but also lower rates of auxiliary BE overt forms produced with a GAP verb. In addition, this study highlights that there are no significant differences in children with DLD and TD children in their total productions of main GAP verbs and the variety of GAP verbs produced. These findings indicate that there is no relationship between these two groups and their GAP verb usage, and therefore GAP verb production should not be considered a clinical marker of DLD. Furthermore, although non-GAP verbs likely strengthen the semantic content of a child’s spoken language, the use of GAP verbs do not necessarily flag semantic weaknesses. As speech-language pathologists, we should follow a preventative model by working with classroom teachers and/or parents to continue to encourage children to expand their verb knowledge in both children with DLD and without.
Appendix

Verb Coding Manual

*Males = 1, Females = 2

**Step 1:** Go to the Shared Data Drive → Theses and Dissertations → Caitlyn → Reliability
Create an individual folder for the participant naming it with the code letters (ex: ABCDE_123_REL)
   i. This is where you will be saving the Excel files you will be exporting/creating

**Step 2:** Open the blank Google sheets, export into an Excel document, and save as (ex: ABCDE_123)

**Blank Excel Document:** Master Data Spreadsheet

1. **On Excel document:** *Fill in the following identifying information about the participant.*
   *You can get this information from the first few bullet points in the language samples*
   a. Participant number (ex: 123)
   b. Gender: males (M_1), females (F_2)
   c. Chronological Age in months (CA)

**Step 3: Open up Language Sample in SALT**

1. Open up SALT and click “Open” for an existing language sample
2. Go to the Shared Data Drive → Theses and Dissertations → Caitlyn → SALT samples →
   click on the sample you are assigned

**Step 4: Standard Measures Report**

1. **In SALT:** *Click Analyze → click Standard Measures Report*
   d. MLU in morphemes (MLUm)
   e. Total Utterances (TotUtts)
   f. Complete and Intelligible Utterances (CI_utts) → *Analysis Set (C&I Utts)*
   g. Mean verbs per utterance (Mverbs_Utt)
   i. Export into an Excel document and save under the correct participant folder (Ex: ABCDE_SMR)
Step 5: Answering Research Question 1: *Number of Total Verbs vs. Number of Different Verbs*

1. **In SALT: Analyze → Grammatical Categories List → Verbs**
   - a. This is where you will find the *Number of Total Verbs (NTV)* in Complete and Intelligible (C&I) Utterances
   - b. **Hint:** make sure “Analysis Set” is checked off in the box on the right
      - i. Click “ok”
   - c. Export into an excel document and save under the correct participant folder (ex: ABCDE_GCL)

2. When finding the *Number of Different Verbs (NDV)*, open the excel document you just saved from the previous step.
   - a. **First, you should delete the adult’s column of verb totals. Then go through each row**
   - c. Scroll to the bottom to find the NTV under the “child” column
      - i. Add this information into the NTV column in the master Excel document
   - b. Select every row of all of the verbs, Excel should give you a count of how many verbs are selected. This is the NDV.
      - i. Add this information into the NDV column in the master Excel document
Step 6:

1. **Click Explore → List → Click on Word and Code List.** It should look like the screenshot below:

![Screenshot of Explore - List dialog box](image)

2. Insert list of GAP verbs with and without codes found in the following link:
   a. **Copy and Paste this List:** GAP Verbs Word and Code List
      i. **Click “Ok”, then click “List” in the top right corner**
   b. Export into an Excel document and save under the correct participant folder (Ex: ABCDE_GAP_LIST)
   c. NOTE: You must go through each utterance on this list. There is a [google doc](#) with some rules/reminders to consider when going through this list

Step 7: Answering of Research Question 2: **Total Number of GAP verbs vs. Total Number of Different GAP verbs**

1. First Identify whether the GAP verbs used are main verbs or secondary verbs. **Table A.2** has the definitions and how to correctly identify between a main or secondary verb.
   a. In our research, we are only using **main verbs**. The secondary verbs will not be included.
a. **When done with the above rules: Scroll to the bottom of the Word and Code List to find the Total Number of GAP Verbs**
   i. Add this total to the TotGAP column in the master Excel document

b. Then scroll back to the top, and count each different GAP verb that was produced.
   i. This includes if they used a version of one of the 10 MAIN GAP verbs (want, go, get, do, put, need, come, look, make, work)
   ii. This is the Number of Different GAP Verbs
   iii. Add this total to the Ndiff_GAP column in the master Excel document

**Step 8: Answering Research Question 3: Total Number of Grammatical Morphemes vs. Total Number of Different Grammatical Morphemes**

1. In the list of main GAP verbs, separate the verbs between an overt (e.g., walk/ed) or zero form (e.g., walk/*ed)
   i. *Examples of zero and overt forms you will code are in Table A.1*

2. You must also establish whether the zero form is dialect appropriate or inappropriate for Southern White English (SWE) dialect.
   i. *The definition and comparison of dialect appropriate Overt and Zero forms of a word can be found in Table A.3*

3. Make sure while coding to distinguish if a verb is a zero form vs an overt form
   a. Fill in the total of each different overt or zero coded GAP verb in the master Excel document under the correct verb and verb code.

**Conclusion:** Each box should be filled in the master Excel Document. If not go back and look through steps 1-8 to correct.
<table>
<thead>
<tr>
<th></th>
<th>Verbal -s Regular</th>
<th>Verbal -s Irregular</th>
<th>Past Tense Regular</th>
<th>Past Tense Irregular</th>
<th>Aux am</th>
<th>Aux are</th>
<th>Aux is</th>
<th>Aux was/were</th>
</tr>
</thead>
<tbody>
<tr>
<td>Want</td>
<td>want/3s</td>
<td>--</td>
<td>want/ed</td>
<td>--</td>
<td>am</td>
<td>want/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Want</td>
<td>want/*3s</td>
<td>--</td>
<td>want/*ed</td>
<td>--</td>
<td>*am</td>
<td>want/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Go</td>
<td>go/3s</td>
<td>--</td>
<td>go/ed</td>
<td>went</td>
<td>am</td>
<td>go/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Go</td>
<td>go/*3s</td>
<td>--</td>
<td>go [ptirr]</td>
<td>*am</td>
<td>are..</td>
<td>*is</td>
<td>*was/*were</td>
<td></td>
</tr>
<tr>
<td>Get</td>
<td>get/3s</td>
<td>--</td>
<td>get/ed/got/ed</td>
<td>got</td>
<td>am</td>
<td>get/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Get</td>
<td>get/*3s</td>
<td>--</td>
<td>get [ptirr]</td>
<td>*am</td>
<td>*are.</td>
<td>*is</td>
<td>*was/*were</td>
<td></td>
</tr>
<tr>
<td>Do</td>
<td>doo/does</td>
<td>[3irr]</td>
<td>do/ed</td>
<td>did [ptirr]</td>
<td>am</td>
<td>do/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Do</td>
<td>--</td>
<td>do [3irr]</td>
<td>--</td>
<td>do [ptirr]</td>
<td>*am</td>
<td>do/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Put</td>
<td>put/3s</td>
<td>--</td>
<td>put/ed</td>
<td>--</td>
<td>am</td>
<td>put/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Put</td>
<td>put/*3s</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>*am</td>
<td>put/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Need</td>
<td>need/3s</td>
<td>--</td>
<td>need/ed</td>
<td>--</td>
<td>am</td>
<td>need/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Need</td>
<td>need/*3s</td>
<td>--</td>
<td>need/*ed</td>
<td>--</td>
<td>*am</td>
<td>need/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Come</td>
<td>come/3s</td>
<td>--</td>
<td>came/ed/com e/ed</td>
<td>came [ptirr]</td>
<td>am</td>
<td>come/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Come</td>
<td>come/*3s</td>
<td>--</td>
<td>--</td>
<td>come [ptirr]</td>
<td>*am</td>
<td>come/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Look</td>
<td>look/3s</td>
<td>--</td>
<td>look/ed</td>
<td>--</td>
<td>am</td>
<td>look/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Look</td>
<td>look/*3s</td>
<td>--</td>
<td>look/*ed</td>
<td>--</td>
<td>*am</td>
<td>look/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Make</td>
<td>make/3s</td>
<td>--</td>
<td>make/ed/mad e/ed</td>
<td>made [ptirr]</td>
<td>am</td>
<td>make/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Make</td>
<td>make/*3s</td>
<td>--</td>
<td>--</td>
<td>make [ptirr]</td>
<td>*am</td>
<td>make/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
<tr>
<td>Work</td>
<td>work/3s</td>
<td>--</td>
<td>work/ed</td>
<td>--</td>
<td>am</td>
<td>work/ing</td>
<td>are..</td>
<td>is..</td>
</tr>
<tr>
<td>Work</td>
<td>work/*3s</td>
<td>--</td>
<td>work/*ed</td>
<td>--</td>
<td>*am</td>
<td>work/ing</td>
<td>*are.</td>
<td>*is</td>
</tr>
</tbody>
</table>
Table A.2 Identifying Main vs. Secondary Verbs

<table>
<thead>
<tr>
<th>Main Verbs (Primary Verbs)</th>
<th>Secondary Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A primary verb can be marked for tense (<em>walked</em>), person (<em>walks</em>) and in some cases number (<em>is, was, were</em>). Present and past tenses are formed with verb inflection, the other tenses are formed in combination with auxiliary verbs. A finite clause includes a primary verb.</td>
<td>A nonfinite clause cannot stand alone. It rarely includes a subject, and its verb is a secondary verb form (ininitival, gerund-participle or past participle) which cannot be inflected for tense, person or number. It is a dependent clause serving as a subject or a complement to a verb, preposition or noun.</td>
</tr>
<tr>
<td>● Ex: He <em>walked</em> outside.</td>
<td>● A secondary verb is not marked for tense, aspect, mood, number and person, and it cannot serve as a predicate, nor can it be used in an independent clause.</td>
</tr>
<tr>
<td><strong>How to determine if it is a secondary verb:</strong></td>
<td><strong>How to determine if it is a secondary verb:</strong></td>
</tr>
<tr>
<td>● Embedded in clauses like relative clauses</td>
<td>● Embedded in clauses like relative clauses</td>
</tr>
<tr>
<td>● Adverbial clauses (ex: <em>occasionally go..</em>)</td>
<td>● Adverbial clauses (ex: <em>occasionally go..</em>)</td>
</tr>
<tr>
<td>● Question forms (how, where, when, who)</td>
<td>● Question forms (how, where, when, who)</td>
</tr>
<tr>
<td>● Gerund participle (she likes walking)</td>
<td>● Gerund participle (she likes walking)</td>
</tr>
<tr>
<td>● Plain form</td>
<td>● Plain form</td>
</tr>
</tbody>
</table>

In the paper, *Nonmainstream Dialect Use and Specific Language Impairment* by Oetting and McDonald (2001), there were 53 children identified as SWE speakers. In Table A.3, it displays the findings of the most common overt forms in SWE dialect. Note that these are not the only overt forms that were identified, just the most commonly found in SWE speakers at this age.
Table A.3. Frequency of Nonmainstream Dialect Use in Oetting and McDonald (2001)

<table>
<thead>
<tr>
<th></th>
<th>SWE</th>
<th>SLI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Verbs:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4N (4 yrs of age)</td>
<td>6N (6 years of age)</td>
<td></td>
</tr>
<tr>
<td><strong>Zero be</strong></td>
<td>89</td>
<td>63</td>
</tr>
<tr>
<td><strong>SV agreement with be</strong></td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>Omission of auxiliary do</strong></td>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td><strong>Zero regular third</strong></td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td><strong>Zero irregular third</strong></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><strong>SV agreement with don’t</strong></td>
<td>33</td>
<td>23</td>
</tr>
<tr>
<td><strong>Zero regular past</strong></td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td><strong>Zero irregular past</strong></td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td><strong>Zero Plural</strong></td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

According to Oetting and McDonald (2001), the above-mentioned overt forms are described below:

1. **Zero be**: Zero-marking of copula and auxiliary structures regardless of contractibility, person, or number was counted (e.g., Oscar in the can). Although zero-marking of be is rare or infrequent in some contexts (e.g., with first-person pronouns, in finite contexts, clause find positions, and in contexts with emphatic stress) and there is thought to be differences in SAAE and SWE regarding the effect of these contexts on be marking, all contexts were coded here to examine the effects of the independent variables of interest.
2. **Subject-verb agreement with be forms**: Instances where the person and number of the be form differed from its subject (e.g., When we was about to go to church).

3. **Omission of auxiliary do**: Instances where auxiliary do was not produced, but in standard English its presence is obligatory. Many of these instances involved question inversion (e.g., How you get up here? and What you did?). Questions with an omitted do in the initial position of the utterance (e.g., You know what? and You got a baby?) were not counted. See discussion below about the coding of noninverted indirect requests/questions.

4. **Zero regular third present**: Instances where regular third-person marking on the verb was zero-marked (e.g., But when she poo on herself I don’t change her). Decisions as to whether present or past tense was implied by the child were based on context.

5. **Zero irregular third present**: Instances where the subject of the verbs say, have, and do required says, has, and does in standard English but the child produced the unmarked form (e.g., She just do it herself). Utterances involving don’t were not included because they were counted elsewhere. For the verb say, all zero-marked forms were coded as third present irregular. For some of these utterances, the child’s meaning may have been past rather than present. The decision to include all of the say examples as present was based on the children’s frequent use of historical present with the verb say (e.g., So she says stop it!). Within the sociolinguistic literature, a distinction between regular versus irregular verb forms is not always made, although some (like Myhill & Harris, 1986) exclude the verb say in analyses because it is irregular and typically zero-marked.

6. **Subject-verb agreement with don’t**: Instances where the subject of the verb required doesn’t in standard English, but the child produced don’t (e.g., And he don’t go to school).

7. **Zero regular past**: Instances where unmarked verbs were produced and in standard English simple past marking is obligatory (e.g., I dress them before). Adjectival readings also were included because they are included in sociolinguistic research (e.g., It’s finish).

8. **Zero irregular past**: Instances where an irregular verb was zero-marked for past tense (e.g., fall for fell) or a different past-tense form was used instead of a standard English form (e.g., Course I brung him up real fast). In some cases, the different verb form was the participle (e.g., I seen it).
9. **Zero plural**: Instances where the regular plural inflection was zero-marked and in standard English overt marking is obligatory (e.g., Six dollar and fifty-five). This pattern is thought to occur most frequently with nouns of weights and measures or with nouns preceded by quantification.

References


Vita

Caitlyn Josie Kearns graduated from Louisiana State University with a Bachelor of Arts in Communication and Sciences Disorders in December of 2020. She anticipates earning her Master’s degree in December of 2022. Thereafter, she plans to move to Virginia to work as a clinical fellow speech-language pathologist and earn her clinical certification.