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Language Sampling Methods for Early Adolescents with Specific Language Impairment

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LANGUAGE SAMPLING METHODS FOR EARLY ADOLESCENTS WITH

SPECIFIC LANGUAGE IMPAIRMENT

A Capstone Experience/Thesis Project

Presented in Partial Fulfillment of the Requirements for

the Degree Bachelor of Communication Disorders with

Honors College Graduate Distinction at Western Kentucky University

By

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ABSTRACT

One essential component of clinical practice in the field of speech-language pathology is eliciting language to assess an individual's communication abilities. Language becomes more sophisticated during the adolescent stage of development, particularly in the areas of vocabulary and complexity of sentence structures used. The current protocols used to evaluate adolescents are limited in their ability to elicit and analyze language samples, resulting in decreased effectiveness of identifying adolescents with language disorders. Preliminary data was collected at Western Kentucky University in 2018 regarding a new language sampling technique, the Dixit Method (DM), to elicit more lexically diverse language than standard interview procedures. The purpose of this research was to examine the language production of early adolescents diagnosed with specific language impairment (SLI) compared to typically developing peers on the DM. Language samples were elicited using the DM, a game-style interaction using richly illustrated picture cards, from participants recruited from Warren County Public Schools. Language samples were analyzed using the Systematic Analysis of Language Transcripts (SALT) software for analysis. Two significant differences were found when comparing the groups: type token ratio was predictably higher in the typical group, while the SLI group surprisingly used more specialized vocabulary words than their typical peers. The DM elicited significantly more language than the interview, with a maximum word count of 1508 in comparison to the interview's maximum word count of 149. Results indicated the *Expressive Vocabulary Test, 2ⁿᵈ Edition* standardized assessment scores did not

predict performance on either language sampling method. The evidence presented

indicates that the Dixit Method has potential to elicit lexically diverse language samples

to help guide future assessment and intervention for early adolescents with SLI.

Keywords: Language Sampling, Specific Language Impairment, Dixit Method, Speech-

Language Pathology, Early Adolescents

To my soon-to-be husband, Adam, who encouraged me every step of the way with this project, who motivates me and inspires me to pursue excellence.

To my incredible parents, thank you for your unwavering support and deep love through each of my endeavors.

I dedicate this thesis to my mother, who has believed in me from the beginning and is the reason for my decision to become a speech-language pathologist. I am honored to share this passion with you!

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CHAPTER 1

INTRODUCTION

Relevance of Language Sampling in Speech-Language Pathology and Education

One of the essential components of clinical practice in the field of speech-language pathology is eliciting language to assess a client's communication abilities. Language sampling allows clinicians to evaluate individual skills in multiple aspects of language due to the sample's narrative characteristics. As students progress through K-12 education, they are expected to meet standards required by the No Child Left Behind Act (Power-deFur, 2010) in order to be successful in school. These standards include oral language skills, which are fundamental for reading and writing. Language becomes more sophisticated during the adolescent stage of development, particularly in the areas of vocabulary and complexity of sentence structures used during communication. By adolescence, students are expected to be proficient in oral and written language skills. One example, found in the Common Core standards for grades 9-10 states that students must be able to "present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task," (Power-deFur, 2010, p .20). Similarly, expectations for vocabulary development require students to master 1,150 to 3,150 new words each year, in order to reach a vocabulary size of 17,000 to 45,000 words by 12th grade (Power-deFur, 2010, p. 21). Current academic standards require adolescent students to be able to understand and

manipulate the various components of oral and written language, including vocabulary and sentence structure, to be successful academically.

For this reason, it is crucial that any communication disorders, particularly in the area of language, be identified for the educational success of the student. Adolescent students who have difficulties with speech or language will find it challenging to meet the standards in place for their grade level. An unidentified communication disorder has the potential to adversely affect a student's academic performance; therefore, identification of language deficits is essential to ensuring the success of students. In a clinical forum in 1993, Larson and McKinley referenced adolescents with language disorders as an "unserved and underserved" population (Joffe and Nippold, 2012). Another forum conducted by Joffe and Nippold in 2012 concluded that, while progress has been made in the field of language disorders in adolescents, there is still a need for significant improvement in the identification and treatment of such disorders to support the educational success of such students. Speech-language pathologists must implement interventions that align with academic standards in order to best serve the students on their caseloads.

Since oral and written language skills are key components to the Common Core Standards for academic success, language sampling is a useful evaluative measure for use in the fields of speech-language pathology and education to identify skills and deficits students may have in the area of language. Language sampling examines an individual's functional language use within natural, real-life contexts and has the ability to pinpoint specific aspects of spoken language production (Miller, Andriacchi, & Nockerts, 2016). For example, a short narrative sample may indicate spoken language deficits in terms of

organization or vocabulary. Using software such as the Systematic Analysis of Language Transcripts (SALT) allows for analysis of large samples in terms of mean length of utterance (MLU), type token ratio (TTR), and overall lexical diversity. Since language disorders vary according to each individual, it is important to evaluate language with tools that provide in-depth analysis across all categories of deficits. Language sampling analysis allows for speech-language pathologists to document spoken language and generate data examining each individual's abilities in detail (Miller, Andriacchi, & Nockerts, 2016, p. 102). As language evolves in the adolescent stage of development, assessment measures must too evolve to examine language ability in its fullness. It is important to continue development of language sampling methods in order to more effectively identify deficits in language, particularly for the early adolescent population.

Prevalence and Relevance of Specific Language Impairment in Early Adolescents

Language use for spoken communication is fundamental for successful navigation of school, work and social relationships (Miller, Andriacchi, & Nockerts, 2016, p. 99). If an individual is experiencing difficulties with language, it is crucial to identify and address their needs in order to promote their social and academic success. Generally speaking, when a child fails to make normal progress in the area of language learning and there is no obvious reason, it is defined as specific language impairment (SLI; Bishop, 2004, p. 309). An individual is considered to have specific language impairment if he or she has a language disorder that is not connected to any other disorder, such as autism spectrum disorder or Down syndrome. This disorder is not caused by any known sensory, neurological, intellectual, or emotional deficits; in fact, individuals with SLI may be otherwise healthy and intelligent (Ervin, 2001, p. 1). Because it is not paired with a

cooccurring disorder, SLI can be very challenging to diagnose in individuals. SLI is more commonly identified in young children, but often goes undocumented and untreated when children reach primary and secondary school years (Poll, Betz, & Miller, 2010). It is difficult to find data regarding the prevalence of SLI in early adolescents due to the disorder's subtle nature. Since this language disorder is unaccompanied by other diagnoses, parents and teachers are less likely to notice deficits related to language. SLI contains a wide spectrum of deficits including combinations of impairments in specific areas of communication such as phonology, morphology, syntax, semantics, and pragmatics, all of which are dynamic over time (Bishop, 2004, p. 23). Labels for this disorder vary from state to state due to this wide range of characteristics, including terminology such as "speech-language impairment", "speech delay", "developmental language disorder", and "persistent language impairment" (Ervin, 2001, p. 5). Traditionally, SLI is diagnosed if there is a substantial discrepancy between a child's nonverbal IQ and language level, but this method is problematic. Research suggests that insisting on a discrepancy is overrestrictive, as well as unreliable by nature (Bishop, 2004, p. 313). Using stringent criteria to diagnose this disorder results in exclusion of many individuals who have language problems, while more inclusive criteria creates difficulty defining the disorder itself. Such ambiguity in classifying SLI contributes to the difficulty educational systems encounter diagnosing this impairment.

For clinical purposes, Bishop recommends classifying individuals as either affected or unaffected by SLI, in order to prevent exclusion of those who need services for difficulties with language (Bishop, 2004, p. 311). This differentiation is best determined by observable markers in the area of language. The clearest markers for SLI

in adolescents and adults are functional consequences, such as low academic performance and qualitative aspects of language to identify deficits. Poll, Betz, and Miller (2010, p. 425) conducted a study in which adults with a history of SLI and peers without a history of SLI completed a series of language-related tasks, which revealed that language deficits associated with SLI may be observed in adulthood. Furthermore, research reveals that adolescents with a history of SLI perceive themselves as having greater mental health, behavioral, and social difficulties than their typically developing peers (Conti-Ramsden, Mok, Pickles, & Durkin, 2013, p. 4168). This suggests a need for more reliable measures to identify SLI in early adolescents.

It is important to note that SLI can include difficulties with speech sound production, as well as language use. A 2012 study conducted by the Centers for Disease Control and Prevention (CDC) reported that more than one-third of children aged 3-10 years with a communication disorder had more than one type of communication disorder. Furthermore, one-fourth of children aged 11-17 years had more than one type of communication disorder (CDC, 2012). In the schools from which participants were recruited for this study, students were either diagnosed with a speech sound disorder or a language disorder that both fall under the classification umbrella of SLI. For the purposes of this study, these participants grouped together will be referred to as having specific language impairment (SLI).

Assessment of Vocabulary in Relation to Language Sampling

Vocabulary use is a helpful area to examine in relation to language abilities. When analyzing language samples, one component of language that is always considered is vocabulary skills, typically analyzed in terms of lexical diversity or type token ratio

(TTR). In other words, the speech-language pathologist examines the number of different words used, in comparison to the total number of words used in a given language sample. The *Expressive Vocabulary Test, 2nd Edition* (EVT-2) is a norm-referenced assessment that measures expressive vocabulary and word retrieval for Standard American English (Williams, 2007). This assessment tool can be administered to individuals aged 2:6 years to 90+ years and quickly evaluates vocabulary abilities without requiring any reading or writing. This test is administered by showing an individual a sequence of illustrated pictures and prompting him to either verbally name the picture or answer a question about the picture. The EVT-2's evaluation of oral expression has the ability to quickly identify any deficits an individual may have in the area of expressive vocabulary or word retrieval. In relation to specific language impairment, the EVT-2 was administered to a sample of children with SLI to determine whether poor naming ability was related to poorly developed semantic skills. The EVT-2 was found to be a positive predictor of naming performance, indicating the effectiveness of this assessment in evaluating the expressive vocabulary of individuals with SLI (McGregor, Newman, Reilly, & Capone, 2002, p. 1008). However, according to Gray, Plante, Vance, & Henrichsen (1999, p. 205), the EVT-2 alone is not a good identifier of SLI, since the scores of children with SLI frequently still fall into the normal range of the test scoring system. Although this assessment tool alone is not able to definitively diagnose SLI, when paired with a language sample, the EVT-2 has the potential to effectively measure vocabulary skills and deficits. Assessing an early adolescent's vocabulary could provide useful insight into that individual's overall language abilities, in order to help with the identification and treatment of SLI.

Current Methods for Language Sampling

While language sampling remains the standard way to examine an individual's spontaneous language, the current protocols used to evaluate early adolescents are limited in their ability to elicit and analyze narrative speaking samples. While collecting a language sample from a young child can be accomplished by engaging in free-play activities and recording the child's spontaneous utterances, this method is not age-appropriate for an early adolescent. Language samples are typically elicited by conducting an interview-style interaction between the clinician and the student, documenting the individual's response to prepared questions. However, this reduces the spontaneity of the language produced by the adolescent, since his or her responses are prompted by directive questions. Furthermore, early adolescents may be less willing to engage in question-answer-style dialogue with an adult clinician, potentially reducing the amount of language used in his or her utterances. These limitations in the current methods for eliciting language samples have resulted in decreased effectiveness of the identification and treatment of adolescents with language disorders. If an individual has an unidentified disorder, he or she may not be able to adequately express himself or herself, increasing the risk of social and academic deficits (Conti-Ramsden, Mok, Pickles, & Durkin, 2013, p. 4168). There is need to develop new language sampling methods for early adolescents that promote spontaneous elicitation of language, in order to fully and accurately assess language abilities.

Novel Language Sampling Methods for Early Adolescents

Within the past year, research was conducted at Western Kentucky University in the area of language sampling. Preliminary data was collected regarding a new language

sampling technique, the Dixit Method (DM), to elicit more lexically diverse language than standard interview procedures (Smith & Smith, 2018). The DM utilizes illustrated cards from the game, *Dixit*, to elicit language samples (Roubira & Cardouat, 2008). While this method has been administered to typically developing children, the DM has not yet been used to assess children with speech or language disorders. The Dixit Method has the potential to improve future assessment of early adolescents' linguistic abilities. The purpose of this research study was to examine the effectiveness of the Dixit Method to collect language samples from early adolescents with SLI, in comparison to typically developing peers. This proposed three research questions:

1. Do early adolescents with specific language impairment perform differently than typically developing peers when engaged in traditional language sampling procedures?

2. Do early adolescents with specific language impairment perform differently than typically developing peers when engaged in a novel language sampling procedure?

3. For early adolescents with specific language impairment, do standardized tests such as the Expressive Vocabulary Test predict performance on language sampling methods?

CHAPTER 2

METHOD

Participants

This was a descriptive research study by design, meaning that the characteristics of the populations were examined and described in this study. Descriptive research is a structured, quantitative method that collects information for statistical analysis, observing characteristics and functions of different groups. Our study collected quantitative data regarding expressive language of typically developing children and those with SLI and described their performance using traditional and novel methods. Ten sixth grade students between the ages of 10 years and 12 years, 11 months participated in this trial study. Five of the participants had a diagnosis of specific language impairment and had been receiving speech therapy services, while the other five participants were age and gender matched typically developing peers. Participants included eight males and two females. The small sample size was due in part to the trial nature of the study, as well as the low number of early adolescents with identified specific language impairment at the schools from which participants were recruited. Participants with SLI were recruited with the assistance of local speech-language pathologists at each school. All participants were from the same rural community in south central Kentucky and were native speakers of General American English. Participants were recruited from two local elementary schools. The study was approved by the Western Kentucky University Institutional Review Board prior to recruitment activities (IRB# 17-366). Students and their parents/guardians signed written consent forms indicating willingness to participate in the

study. Data collection occurred during non-academic time periods. Incentives for participating in the study included small tokens of appreciation: a snack, drink, and fidget cube.

Participants met with a research assistant in a one-on-one setting for completion of study tasks. Research assistants were carefully trained by the author to administer assessment and language sampling measures. All data collectors were from the same accredited university. One was an American Speech-Language-Hearing Association certified speech-language pathologist who serves as faculty, two were graduate students in the speech-language pathology program, and the remaining three data collectors were undergraduate students in the communication sciences and disorders program.

Materials

Printed description of the study, consent documents, and the *Expressive Vocabulary Test, 2nd Edition* (EVT-2) picture book and forms were used for each participant. Data collectors were provided a standard interview protocol (Nippold et al., 2013) to elicit a language sample based on a typical elicitation method. The interview protocol consisted of three conversational questions prompting students to talk about school, family, pets, hobbies, and sports (see Adapted Protocol in *Figure 1).* Data collectors were also provided a novel language sampling protocol, The Dixit Method (DM), which was developed by Smith & Smith (2018). The protocol described specific procedures for utilizing richly illustrated picture cards taken from the Dixit game to elicit language samples (see DM Protocol in *Figure 2).*

GoPro video cameras were used to record data collection sessions. Decks of Dixit cards with 56 cards each were also utilized by each data collector. Twenty-eight cards

came from the original Dixit game card deck; the other twenty-eight cards came from the

Dixit memories expansion card deck. In the previous study of the DM, data collectors

chose four cards from the Revelations expansion deck to be used as

example/demonstration cards when necessary. Each card was labeled/coded with an M

(Memories) or a D (Original). Permission from Libellud, the Dixit game publisher, was

granted for use of their illustrated cards for the purposes of the study.

Procedures

All data collection sessions took place at two elementary schools from which the

participants were recruited. Educators and parents were offered the opportunity to

observe the sessions but chose not to do so. Data collection site #1 was an empty

classroom with two tables and chairs set up on each side of the room. Site #2 was a

speech therapy classroom, with a similar setup. Each participant attended one 30-minute

data collection session during the school day. Prior to the first session, sixth-grade

general education teachers and speech-language pathologists signed consent documents

and gave recommendations for recruitment of students who would be appropriate

participants in the study.

Although each participant's parent or caregiver completed consent documentation

prior to the initiation of the data collection, all sessions began with the participant signing

an assent document to express his or her willingness to participate. Researchers read

aloud the assent document to minimize and limitations to understanding. After obtaining

assent, data collectors administered the EVT-2 to each participant following the

standardized assessment protocol. The EVT-2 assesses individuals' word retrieval and

expressive vocabulary skills. Using the assessment picture book, the data collector

showed participants illustrated pictures one at a time and read a stimulus question to which the student provided a one-word answer. Each item on the test targets a specific vocabulary word or set of words for retrieval and oral expression, arranged in increasing difficulty (Williams, 2007). A basal of three consecutive correct responses was established and the data collector continued to provide prompts for test items until a ceiling of five consecutive incorrect responses was reached. Administration of the EVT-2 was not recorded for audio or video, however responses were documented in real time using the test forms for later scoring.

Following completion of the EVT-2 assessment, data collectors began recording and initiated the standard interview protocol (adapted from Nippold et al., 2013). During the interview, data collectors followed the lead of the participant, listening to his or her responses and engaging when necessary. Examples of basic prompts were "Is there anything else you would like to tell me about that?" or "Can you tell me more?" The interview continued until the participant indicated that he or she was ready for the next activity.

Once participants answered the three questions from the interview protocol, data collectors introduced the DM, described as a "card game". Language samples were elicited by following DM protocols and using illustrated cards. The DM protocol contained three rounds of sampling, with cards, including students' initial impressions, detailed descriptions of cards, and creation of stories utilizing and combining the cards. For examples of illustrated Dixit cards, refer to Appendix A. After the DM protocol was completed, participants were given a bag of chips, a water bottle, and a fidget cube before returning to class. Recorded language samples were reviewed and verified by the

research team and digitally transcribed. Each transcribed language sample was analyzed

using the Systematic Analysis of Language Transcripts (SALT; Miller et al., 2016) as

well as the Tool for the Automatic Analysis of Lexical Sophistication (TAALES; Kyle,

Crossley, & Berger, 2017). Figure 1 shows the adapted standard interview protocol, while

Figure 2 shows the Dixit Method protocol.

Conversational Interview Protocol
General Guidelines:
   a. Show respect for the participant
   b. Show genuine interest
   c. Listen patiently
   d. Avoid interruptions and overlaps of speech
   e. Ask open-ended questions
   f. Ask one question at a time
   g. Pause after asking a question (count to four silently)
   h. Repeat or rephrase a question as necessary
   i. Feel free to "go with the flow" to encourage spontaneity

Interviewer reads the following statement:
"Now I'd like to learn something about you. I'm going to ask you a few questions. *But first, let's try out the recording equipment. Please count to 10."* (Interviewer replays the recording; makes adjustments so that it is clear and loud enough to hear later. Then the interviewer turns on the recording equipment to "Record."*)
Begin as follows:
   1. **What would you like to tell me about yourself? For example, what could you tell me about school/work or your family, friends, or pets?**
   2. **How do you like to spend your free time?**
   3. **What could you tell me about your hobbies, favorite sports, or travel activities?**

*Wording changed from "audio recorder" to "recording equipment" to more accurately reflect the procedures of the current study.

Figure 1. Adapted Conversational Interview Protocol. Adapted from Nippold et al., (2013).

The Dixit Method Procedures/Protocol

Set up:
- **Divide 56 Dixit Cards into 4 stacks of 14 cards**

Step 1:
a. Prompt the student (using script) to quickly say their first impression(s) of the card. Do this first with the 4 trial cards (coded)
- Script: "I am going to show you these cards one at a time. I want you to tell me the first thing you think when you see the card. It could be the name of the thing on the card, a description, something that it reminds you of, or feelings. You don't have to say the same type of thing for each card. Let me show you an example and then you can practice"
  - i. Lay 4 trial cards out, data collector gives an example of two and allows the student to give an example of two
- "If you don't have any questions, let's get started."
b. Using one stack of 14 cards, flip one card over at a time revealing the illustration.
- Administrator maintains a brisk pace (immediately after the student responds to the card, flip to the next one)
c. Repeat this step with the second decks of 14 cards
- "Now that you've had some practice, we are going to do another stack and then you'll get to tell me a little bit more about a few of the cards."
  - **Shuffle the stack of 14 cards that was JUST used**

Step 2:
a. Instruct the student (using script).
- "Okay, now I am going to show you 6 cards. I want you to pick the 3 cards that you want to talk about most or the three cards that you don't want to talk about and we will take those out. When you're ready, pick your cards."
b. Lay out 6 randomly drawn cards from the 56-card deck with illustration visible (use script). Administrator collects and turns over the discards.
- "So this time I want you to describe each card in detail. You can tell me several things about this card--you can describe what you see on the card, or you can tell me something it reminds you of or how it makes you feel. When you're ready describe your first card."
- Administrator: When the student has completed his/her description, say "You're doing great! How about the next one?"
c. As the student describes their card, note the coded number on the data sheet provided in the order they describe them.

Step 3:
a. Instruct the student (using script) to tell a story using their 3 chosen cards from step 2; They may talk about all 3 cards or any combination of at least 2 cards.
- "This time I want you to use at least two of the cards and make up a story to tell me about these cards. You are welcome to use all 3 cards if you want to, but you have to use two."
- If student asks for example or what do you mean, provide them with an example using the trial cards. Please use the following script…
  - i. "_____"

Step 4:
a. Repeat steps 1-3 for 2 additional rounds of play with the remaining two decks of cards.

Figure 2. The DM Protocol

Measures

Language samples, those elicited using the traditional interview protocol as well as the DM, were analyzed using two standard measures: mean length of utterance (MLU) and type token ratio (TTR). In order to further quantify lexical diversity, the samples were also analyzed for size, richness, importance, and dispersion (Jarvis, 2013). Lexical diversity is important to analyze since early adolescents are expected to use more specialized vocabulary during this crucial stage of cognitive development. For the purposes of this study, lexical diversity was the primary aspect of language examined in the collected samples.

Mean length of utterance is defined as the ratio obtained by dividing the total number of morphemes, or meaningful units of speech, by the total number of utterances in a language sample. MLU is a standard measurement of language productivity and is commonly utilized in analysis of language samples in the field of speech-language pathology. MLU was calculated for each language sample. For the purposes of this study, single-word utterances from the "first impressions" step in the DM protocol were removed in order to prevent interference with MLU calculations. In the first impressions round, participants were prompted to respond with single-word statements, which would interfere by lowering the number of morphemes per utterance and, consequently, MLU scores. This round was omitted from MLU calculation in order to accurately reflect participants' capabilities.

Size and richness are two components of TTR. Size is the number of total words used (tokens) in a given sample. To assess size, all language samples were transcribed and the total number of words were calculated. Richness, or the number of different

words (types) used in a language sample, is the second component of TTR. To assess richness, the number of different words used in each language sample was calculated. Type token ratio refers to the ratio obtained by dividing the number of different words used in a sample by the total number of words in a sample. TTR is a standard analysis procedure for measuring lexical diversity in the field of speech-language pathology.

To analyze importance and dispersion, The Tool for Automatic Analysis of Lexical Sophistication (TAALES) was used (Kyle, Crossley, & Berger, 2017). This measure utilizes the SUBTLEXus corpus, which was selected as a best fit for comparison of spoken language in the United States to this study's participants. The SUBTLEXus corpus consists of subtitltes derived from 8,388 movies and television episodes in the United States, with a total of 51,000,000 words.

Importance is defined as the relative frequency with which words in a sample occur in language as a whole. TAALES analysis examines language samples for frequency word by word, counting the number of times each word occurs in the 8,388 American movies and television episodes. Next, it calculates an average from all word frequencies to determine the approximate importance level (mean frequency) of the language sample in comparison to the SUBTLEXus corpus. For example, the word "the" occurs 1,502,908 times across 8,388 films and television shows included within the SUBTLEXus. This indicates that this word is a more "important" word to the corpus than a less frequently used word such as "zombielike", which only occurs one time across 8,388 films or television episodes. For this study, lower importance indicates the participants' use of lower frequency (or more specialized) vocabulary.

Dispersion refers to how widely a particular word or word family is used across the SUBTLEXus (Kyle, Crossley, & Berger, 2017). TAALES analysis examines language samples for dispersion by counting the number of films or television shows that each word occurs in and averages those numbers for the whole language sample. For example, the word "the" occurs at least one time in all 8,388 films and television shows. This indicates "the" has a 100% dispersion rate for the SUBTLEXus. The word "zombielike" only occurs in one film or television episode and indicates a dispersion rate of <1%. Again, a lower dispersion rate represents use of more specialized vocabulary provides more information about the use of language across contexts.

CHAPTER 3

RESULTS

The following results presented describe the evidence collected to assist in answering three research questions. First, do early adolescents with specific language impairment perform differently than typically developing (TD) peers when engaged in traditional language sampling procedures? Secondly, do early adolescents with specific language impairment perform differently than typically developing peers when engaged in a novel language sampling procedure? Finally, for early adolescents with specific language impairment, do standardized tests such as the EVT predict performance on language sampling methods?

Research Question 1: Lexical Diversity of Traditional Interview Method

Type Token Ratio (TTR). Ten early adolescent language samples were analyzed to determine TTR for both participant groups. For the traditional interview method, TTR

ranged from a minimum of .55 to a maximum of .83 with a mean of .68 for the SLI

group. The typically developing (TD) group yielded a TTR ranging from a minimum of

.60 to a maximum of .78 with a mean of .70. This means the TD group had a slightly

higher TTR than those with SLI.

Mean Length of Utterance (MLU). Mean Length of Utterance (MLU), or the ratio of

total morphemes to total utterances, for each group was determined. MLU for the

traditional interview method with the SLI group ranged from a minimum of 3.75 to a

maximum of 23.25 with a mean of 10.97. MLU for the TD group ranged from a

minimum of 7.67 to a maximum of 16.20 with a mean of 12.39. This shows the TD group

had a slightly higher MLU than the SLI group.

Size. Size indicates the total number of words used by a speaker in a given language

sample. For the traditional interview, the SLI group's language sample size ranged from a

minimum of 29 words to a maximum of 149 words. This reflects a range of 120 words.

Minimum size of the TD group's language samples was 48 words with a maximum of 81

words, reflecting a range of 33 words. The mean size for the SLI group and the TD group

was 77.6 and 70, respectively, signifying a larger size for those with SLI.

Importance (Frequency). Importance is the relative frequency with which words in a

text appear in a language as a whole. The SUBTLEXus corpus was utilized to evaluate

importance in the elicited language samples (Kyle & Crossley, 2014). Importance for the

SLI group with the traditional interview ranged from a minimum of 322,046 to a

maximum of 427,480 with a mean of 373,417. The TD group ranged from a minimum of

368,253 to a maximum of 522,283 with a mean of 451,626. This indicates for interviews,

the SLI group, on average, used more specific vocabulary than the TD group.

Dispersion. Dispersion refers to how widely a particular word or word family is used across television shows and films in the SUBTLEXus. Dispersion rate within the traditional interview language samples for both groups was analyzed. Recall that dispersion rate is the percentage of the 8,388 films and television episodes that contain a particular word. For the SLI group, dispersion rate ranged from 62% to 74% with a mean of 69%. The TD group yielded a dispersion rate ranging from a minimum of 68% to a maximum of 77% with a mean of 72%, indicating this group used words that occurred more evenly throughout the corpus.

Table 1

Analysis of Lexical Diversity – Standard Interview Procedure

Measure	SLI					Typical				
	n	*range*	*minimum*	*maximum*	*mean*	*n*	*range*	*minimum*	*maximum*	*mean*
TTR	5	.28	.55	.83	.68	5	.18	.60	.78	.70
MLU	5	19.50	3.75	23.25	10.97	5	8.53	7.67	16.20	12.39
SIZE	5	120	29	149	77.6	5	33	48	81	70
FREQ	5	105434	322046	427480	373417	5	154030	368253	522283	451626
DISP	5	1027	5173	6200	5768	5	826	5665	6491	6049

Note: n=number; TTR = type token ratio; MLU = mean length of utterance; SIZE= word count; FREQ = frequency; DISP= dispersion rate
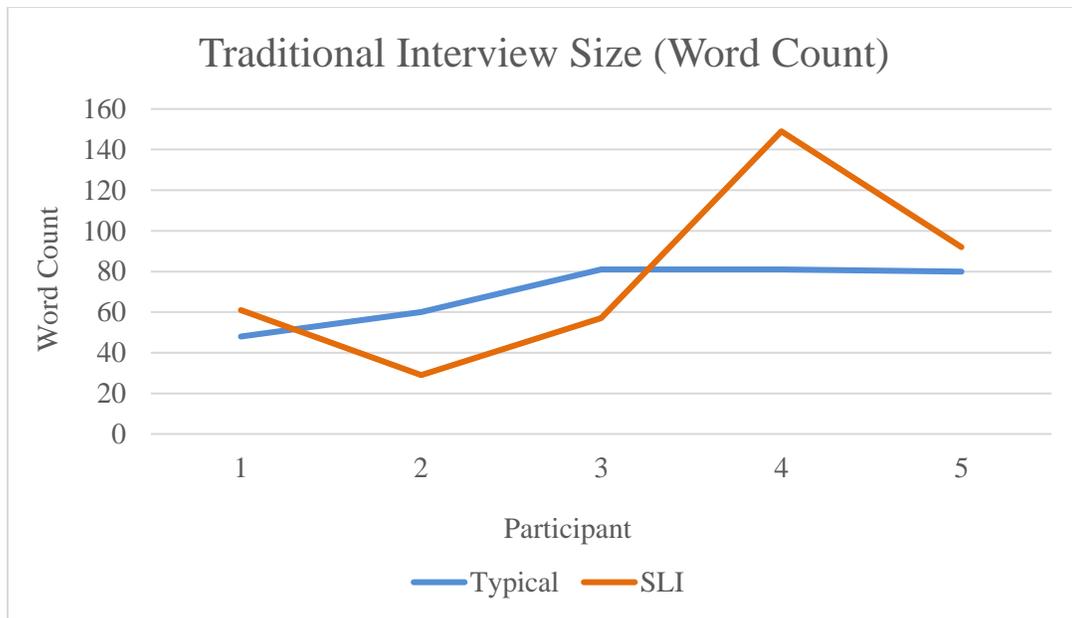
Figure 3. Traditional Interview Size (Word Count).

Research Question 2: Lexical Diversity with Dixit Method

Type Token Ratio (TTR). Type token ratio was determined for language samples

elicited using the DM for both participant groups. TTR ranged from a minimum of .29 to

a maximum of .41 with a mean of .34 for the SLI group. The TD group yielded a TTR

ranging from a minimum of .38 to a maximum of .50 with a mean of .42, indicating a

higher TTR for the TD group.

Mean Length of Utterance (MLU). MLU for each group was calculated with each

sampling method as well. MLU for the DM with the SLI group ranged from a minimum

of 13.66 to a maximum of 24.79 with a mean of 19.97. MLU for the TD group ranged

from a minimum of 11.03 to a maximum of 27.93 with a mean of 19.18. This means both

groups performed very similarly with regard to MLU on the DM.

Size. Size, or total word count, was determined for both groups of language samples

elicited from the DM protocol. For the DM, the SLI group's language sample size ranged

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from a minimum of 485 words to a maximum of 1508 words. This reflects a range of 1023 words. Minimum size of the TD group's language samples was 422 words with a maximum of 650 words, reflecting a range of 228 words. The mean size for the SLI group and the TD group was 934 and 580, respectively. For size, the SLI group had a higher score than the TD group.

Importance (Frequency). Importance, or the relative frequency that words appear in language as a whole, for the SLI group with the DM ranged from a minimum of 310,517 to a maximum of 366,696 with a mean of 343,932. The TD group yielded frequency results that ranged from a minimum of 271,581 to a maximum of 366,819 with a mean of 317,476. This means the TD group, on average, used more specific vocabulary than the SLI group.

Dispersion. Dispersion rate within DM language samples for both groups was analyzed. For the SLI group, dispersion rate ranged from 69% to 75% with a mean of 72%. The typically developing group yielded a dispersion rate ranging from a minimum of 63% to a maximum of 74% with a mean of 69%, suggesting the SLI group used words that occurred more evenly throughout the corpus.

Table 2

Analysis of Lexical Diversity – Dixit Method Procedure

			SLI					Typical		
	n	*range*	*minimum*	*maximum*	*mean*	*n*	*range*	*minimum*	*maximum*	*mean*
Measure										
TTR	5	.12	.29	.41	.34	5	.12	.38	.50	.42
MLU	5	11.13	13.66	24.79	19.97	5	16.90	11.03	27.93	19.18
SIZE	5	1023	485	1508	934	5	228	422	650	580
FREQ	5	56179	310517	366696	343932	5	95238	271581	366819	317476
DISP	5	554	5773	6327	6028	5	963	5254	6217	5764

Note: n=number; TTR = type token ratio; MLU = mean length of utterance; SIZE= word count; FREQ = frequency; DISP= dispersion rate

Figure 4. Dixit Method Size (Word Count)
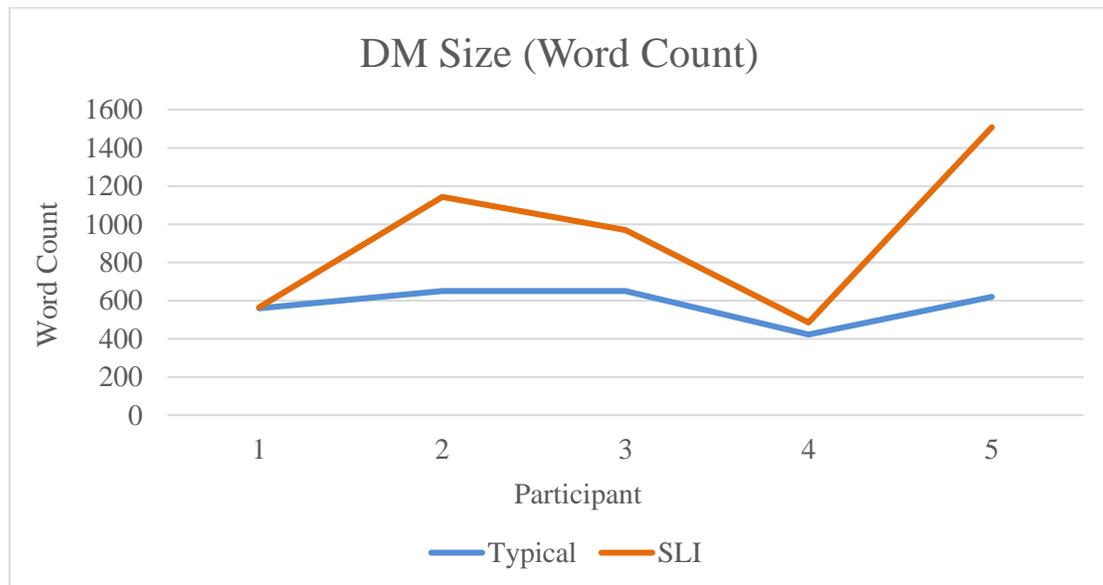
Research Question 3: Correlation Between Expressive Vocabulary Test-2 Scores and Performance on Language Sampling Procedures

To examine whether performance on a standardized assessment would predict performance on language sampling procedures, each of the ten participants was given the *Expressive Vocabulary Test, 2nd Edition* (EVT-2) before language sampling began. The

EVT-2 is an individually administered, norm-referenced instrument that assesses expressive vocabulary word retrieval for children and adults. Age norms were used to score the administration for each participant. As was predicted by the investigators, participants in the typically developing group scored slightly better than the SLI group on the EVT-2. For the typically developing group, EVT standard scores ranged from a minimum of 85 to a maximum of 113 with a mean of 98.8. The SLI group's scores ranged from a minimum of 83 to a maximum of 97 with a mean of 90.4. While the typically developing group's scores were higher, the standard scores yielded by both groups were within normal limits according to the specifications of the EVT-2.

Table 3

Expressive Vocabulary Test-2 Standard Scores

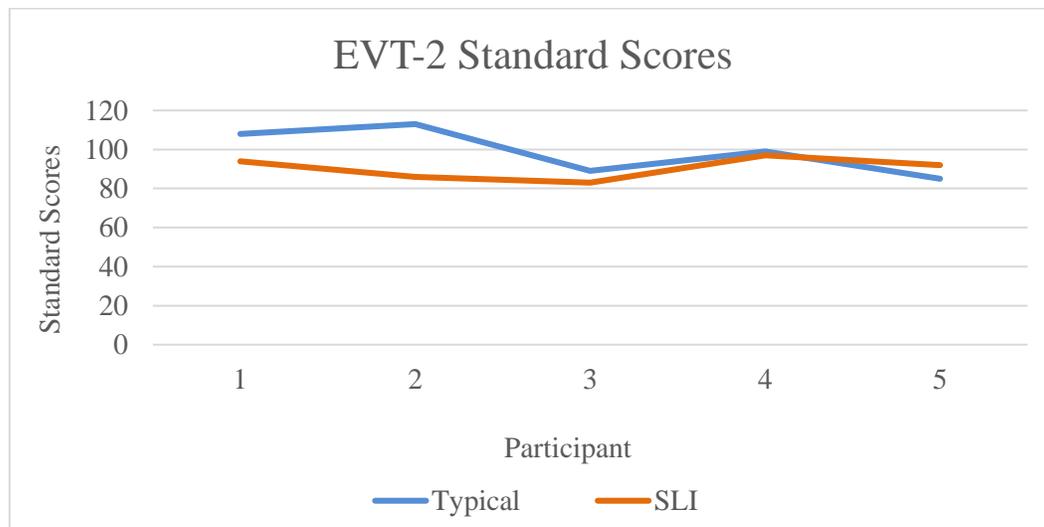|			SLI					Typical		
	n	*range*	*minimum*	*maximum*	*mean*	*n*	*range*	*minimum*	*maximum*	*mean*
Measure										
Std. Score	5	14	83	97	90.4	5	28	85	113	98.8

Figure 5. Expressive Vocabulary Test-2 Standard Scores

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Test of Significance

A test of significance analysis was performed to determine if there was sufficient evidence to determine a statistically significant difference between the two groups' performances on language sampling methods. To address the three research questions of this study, an independent samples *t* test was completed (Table 4). Table 4 represents complete results from the test while Table 5 includes only the two statistically significant variables.

Table 4

Independent Samples t-test

	SLI		Typical			Significance	SLI, Typical (95% CI)	
Variable	*M*	*SD*	*M*	*SD*	*t(10)*	*Sig. (2-tailed)*	LL	UL
I_TTR	.68	.12	.70	.08	.375	.719	-.13, -.12	.18, .17
I_MLU	10.9	7.37	12.39	3.53	.389	.712	3.65, 3.65	10.46, 9.85
I_SIZE	77.6	45.7	70.0	15.2	-.353	.739	-63.44, -57.31	48.24, 42.11
I_FREQ	373417	38188.7	451626	64101.5	2.344	.054	-1884, 1260	158301, 155157
I_DISP	5768	404.11	6049	303.22	1.245	.251	-247, -240	810, 802
D_TTR	.34	.05	.42	.05	2.419	.042	.03, .03	.15, .15
D_MLU	19.97	4.87	19.18	6.68	-.214	.836	-9.46, -9.32	7.87, 7.74
D_SIZE	933.8	422.1	580.0	95.8	-1.828	.135	-872, -800	164, 93
D_FREQ	343932	23201	317476	38121.49	-1.326	.229	-74225, -72478	21314, 19567
D_DISP	6028	198.51	5764	443.76	-1.213	.274	-807, -765	279, 238
EVT	90.40	5.77	98.80	11.97	1.414	.209	-6.28, -5.30	23.08, 22.10

Note: LL = lower limit; UL = upper limit; I= interview; D=Dixit Method; TTR = type-token ratio; MLU = mean length of utterance; SIZE= word count; FREQ= frequency; DISP = dispersion rate.

Table 5

Independent Samples t-test: *Interview Importance and DM TTR*

	SLI		Typical			Significance	SLI, Typical (95% CI)	
Variable	*M*	*SD*	*M*	*SD*	*t(10)*	*Sig. (2-tailed)*	*LL*	*UL*
I_FREQ	373417	38188.7	451626	64101.5	2.344	.054	-1884, 1260	158301, 155157
D_TTR	.34	.05	.42	.05	2.419	.042	.03, .03	.15, .15

Note: LL = lower limit; UL = upper limit; D_TTR = Dixit type token ratio; I_FREQ= interview frequency

Analysis for importance indicated a significant difference between the SLI group and the typically developing group for the traditional interview method. The SLI group utilized more specialized vocabulary, or low frequency words, (M = 373417, SD = 38188.74) than their typically developing peers (M = 451626, SD = 64101.49) on the language samples elicited using the traditional interview procedure at the *p* =.05 level. TTR results for the traditional interview comparing the SLI group (M = .68, SD = .12) and the typical group (M = .70, SD = .08) did not show a significant difference. Similarly, MLU, size, and dispersion means did not result in a significant difference on the *t* test when the traditional interview language samples were analyzed. Comparison of TTR between the SLI group and the typically developing group on the language samples from the DM indicates that the mean performance of the typically developing group (M = .42, SD = .05) was significantly higher than the SLI group (M = .34, SD = .05) at the *p* =.04 level. Results for MLU, size, frequency, and dispersion did not show a significant difference when each of the means was tested.

EVT-2 Standard Scores for both the SLI group (M = 90.40, SD = 5.77) and the typically developing group (M = 98.80, SD = 11.97) did not indicate a significant difference in performance.

CHAPTER 4

DISCUSSION

The purpose of this study was to examine the language production of early adolescents diagnosed with specific language impairment (SLI) with the Dixit Method (DM), in comparison to same-aged peers with typical language development. Furthermore, the study compared performance on traditional language sampling methods with the DM. The rationale for this research is based on the need for language elicitation and analysis measures to evolve for the early adolescent population. A lack of procedures and materials for examining early adolescent language puts this population at risk for delays with complex language (Joffe & Nippold, 2014).

In this study, the results revealed two significant findings. The typically developing (TD) group yielded a higher TTR than the SLI group, which supports existing research regarding the effects of SLI on oral expressive language. Participants without deficits in language used a greater variety of words in relation to their total number of words produced. However, when engaged in traditional interview methods, the participants with SLI surprisingly used lower frequency vocabulary than their typically developing peers to answer the prompt questions. In other words, the individuals with language deficits used more specialized vocabulary than their peers when engaged in this method of language elicitation. This could be due to the fact that the participants with SLI

had each received regular intervention services and therefore may have been more comfortable in a one-to-one context with the intervention setting where data was collected than the TD group, who had not previously received intervention for speech or language. If the students with SLI felt more comfortable in an individual assessment environment, it is possible that this contributed to higher performance on this component. Both groups utilized lower frequency vocabulary when engaged in the DM than when engaged in the traditional interview procedure. Furthermore, the DM resulted in much higher sizes (word counts) for all participants than the traditional interview procedure.

Expressive Vocabulary Test-2

The lack of statistical significance between the two participant groups' standard scores on the EVT-2 confirms existing literature stating that the EVT-2 alone is not a sufficient diagnostic indicator for SLI. However, the TD group displayed a wider range of scores, with the average mean being eight points higher than their early adolescent peers with SLI. Finally, there was not consistent evidence to determine whether the EVT-2 was able to predict performance on either elicitation protocol. While the mean standard score for the TD group was higher than the SLI group's standard score, results did not suggest correlation between EVT-2 scores and performance on elicitation methods in terms of MLU or TTR.

Limitations

The sample size for this study was limited since participants were recruited from only two local schools. The small sample size was also due in part to the preliminary nature of this research. Another factor to consider regarding performance of the two participant groups is that the participants with SLI were accustomed to receiving

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individual attention during intervention services in the data collection settings and may have felt more comfortable or confident talking there than the typically developing group. While the DM was a novel activity for all participants, there is potential that the SLI group's familiarity with speech and language therapy impacted their motivation levels and performance.

Future Research

Additional studies with larger groups of participants would be beneficial for further exploring and replicating these preliminary results. As previously stated, the small sample size was one limitation of this study, which limits the ability to draw substantial conclusions regarding application of the results of this study. However, evidence from this study supports previous research regarding the strong difference among elicitation methods for language sampling in early adolescents. Language samples elicited using the DM were significantly more lexically diverse than language samples elicited using the traditional interview method, supporting previous research (Smith & Smith, 2018).

Future research may include replicating the current study with a larger sample size for both groups. This could provide researchers with better information regarding ways to best serve adolescents with specific language impairment in terms of their academic success. Future research could adapt the DM for use as an intervention tool to target a variety of early adolescents with limited language abilities. One example is currently being developed to examine adaptation of the DM to utilize American Sign Language for administration with individuals who have hearing loss.

Conclusion

The evidence presented from this study indicates the effectiveness of the DM for elicitation of more lexically diverse language samples than traditional methods, for both early adolescents with typical language development and early adolescents with specific language impairment. Both participant groups produced a greater amount of lexically diverse language with the DM than when engaged in the traditional interview procedure. While future research is necessary to further evaluate and examine these claims, there is a definite need for continual development of effective language sampling methods to evaluate early adolescents' language abilities.

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APPENDIX: EXAMPLE OF ILLUSTRATED DIXIT CARDS