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The Dixit Method of Language Sampling in Early Adolescence

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THE DIXIT METHOD OF LANGUAGE SAMPLING IN EARLY ADOLESCENCE

A Thesis
Presented to
The Faculty of the Department of Communication Sciences and Disorders
Western Kentucky University
Bowling Green, KY

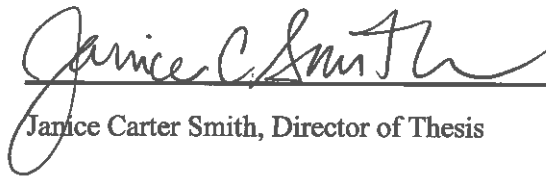
In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Tanner Smith

May 2018

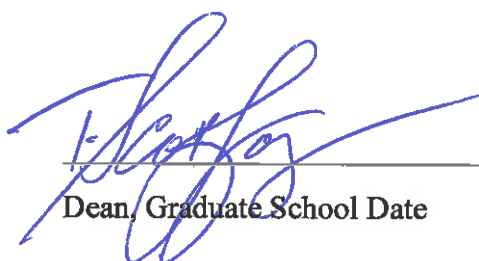
THE DIXIT METHOD OF LANGUAGE SAMPLING IN EARLY ADOLESCENCE

Date Recommended 3/19/18


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Jo Shackelford

 4/16/18
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DEDICATION

To my soon-to-be husband, Corbin, who encouraged me to pursue this research project, who gives me strength, who motivates me, and never lets me give up. Corbin, you inspire me.

To my parents and my sister who never waver in their support and encouragement, who always encourage me to be perseverant in the pursuit of my dreams, and who love me so deeply. I am so thankful for the three of you! I love you.

Lastly, I am dedicating this project to the many kids along the way who are the reason for my decision to become a Speech-Language Pathologist. Especially Mason Goodnight. Thank you all for teaching me to: Be brave. Be creative. Be kind. Be thankful. Be happy. Be you.

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Thank you, Dad, for being my best friend. Thank you for exemplifying the true meaning of hard work and dedication. Mom, thank you for teaching me how to be strong, face my fears, and dance in the rain. Connor, thank you for being you and showering me with love, tough love, and so much yummy food over the years. You are a wonderful sister. And thank you Corbin Wilson, for being my biggest fan. You are my inspiration.

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THE DIXIT METHOD OF LANGUAGE SAMPLING IN EARLY ADOLESCENCE

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The current study examined two methods of language sampling (interview and the Dixit Method) in early adolescents with typical language development. The purpose of this study was to examine the effectiveness of the two procedures in eliciting lexical diversity in spoken language samples in the early adolescent population. To examine lexical diversity, traditional methods of analysis (type token ratio, average type token ratio, and mean length of utterance) were applied. However, because literature historically alludes to flaws in these traditional methods, the researchers also applied an ecological approach to analysis of lexical diversity proposed by Scott Jarvis (2013). Student participants ($n = 22$) in the sixth grade (11:0 -12:11 years of age) were recruited through a local middle school. Both methods of language sampling were compared in a within-subject design for diversity of spoken language samples by applying the previously mentioned analysis procedures. The data was evaluated using a paired-samples two-tailed t test. Although the sample size was small, evidence from this study indicates the Dixit Method provides a more holistic view of lexical diversity than the traditional method by considering six ecological components that are reflected in typical language use.

INTRODUCTION

Statement of the Problem

When speech-language pathologists are tasked with completing an evaluation, they are armed with a battery of various standardized assessments and routine procedures. Among these formalities lie language samples: a more naturalistic approach to capturing the capabilities of a person's communication in terms of functionality and diversity. While language sampling is a well-established and widely accepted assessment technique in this area, concerns exist regarding the ability to genuinely reflect communication competency of speakers. A second concern is lack of consistency in elicitation and collection practices among professionals. Nevertheless, language sampling is still regarded as a necessary component for accurately capturing the language abilities of children and an ecologically valid method of examining natural language production (Nippold, Frantz-Kaspar, Crammond, Hayward-Mayhew, & MacKinnon, 2014; Heilmann, Nockerts, & Miller, 2010; Hadley, 1998).

Language continues to be examined across the lifespan. As children age, their language evolves, becoming more complex as they enter adolescence. Because the language of an adolescent becomes more diverse, assessment measures must evolve to capture (and analyze) the *fullness* of language ability during this phase of development. The literature reflects primary elicitation techniques for language sampling: interviews, story generation, and story retelling (Kaspar, Crammond, Hayward-Mayhew, & MacKinnon, 2013; Nippold, Hesketh, Duthie, & Mansfield, 2005).

Jarvis (2013) reported that speech-language pathologists (SLPs) typically use Type Token Ratio (TTR) for initial analysis of linguistic diversity of the sample. TTR

calculates how many total words are spoken (tokens) compared to how many different words are spoken (types). SLPs who desire to further assess diversity utilize other methods of analysis that are similar in nature, such as vocd-D, a statistical analysis procedure, and measure of textual lexical diversity (MTLD). Vocd-D is a software to measure vocabulary diversity. It calculates vocabulary richness, called D, based on a mathematical model. These measures are statistical analyses based on various strands of text that have previously been analyzed for TTR (McCarthy & Jarvis, 2010). These analysis methods focus on single components of diversity, such as number of words used or number of unique words used, but do not consider other factors that influence lexical diversity (Hux, Friehe-Morris, & Sanger, 1993). Current practices fail to elicit and analyze narrative speaking samples as a *whole*, resulting in a breakdown of identification of language disorders and appropriate treatment in adolescents. As a result, adolescents are at risk in academic, social, and practical areas where complex language abilities are required to express oneself with clarity, precision, and efficiency (Nippold, 2014).

Purpose of the Study

This research compares the effectiveness of two elicitation methods in assessing lexical diversity in typical young adolescents. The first method was a standard interview protocol (Nippold, Frantz-Kaspar, Crammond, Hayward-Mayhew, & MacKinnon, 2013) based on typical elicitation procedures. The Dixit Method (DM), was an original procedure developed by the investigators. The DM utilized richly illustrated cards from the game, Dixit (Roubira & Cardouat, 2008), to elicit language samples. Comparison of language samples collected by the two methods examined the impact of these specific elicitation procedures on lexical diversity of language samples from early adolescents.

Due to the possibility that TTR is not wholly reflective of the speaker's abilities and diminishes insight into lexical diversity, standard assessment strategies were compared to a model designed to analyze ecological diversity. Jarvis (2013) proposed a multifactor ecological analysis approach for assessing diversity in language samples. This seven-factor analysis assesses size, richness, effectiveness (how abundant certain words are), evenness, disparity, importance, and dispersion. A possible alternative to TTR, the ecological approach entails examining language samples based on six of the seven terms theorized by Jarvis (2013): size (type), richness (token), evenness, disparity, importance, and dispersion. It is hypothesized that by utilizing this six-factor assessment approach it will be possible to more accurately represent linguistic diversity and, therefore, communication competence expressed in the language samples of typically developing adolescents. This information is important to advance knowledge in the field regarding best practices for collection and analysis of lexically diverse language samples in typical adolescent populations.

Research Questions

This study proposes one research question: Does the Dixit Method (DM) of language sampling elicit a more lexically diverse sample than the standard interview procedure in early adolescents with typical language development?

LITERATURE REVIEW

Language and Lexical Diversity

Lexical diversity (LD) has historically been utilized by speech-language pathologists (SLPs) to evaluate and understand a variety of concepts including (1) the differentiation between children with typical development of communication and/or

language skills versus individuals with communication and/or language delays; (2) to screen and evaluate individuals who are identified as having communication delays; (3) to determine the impact of therapeutic approaches; and (4) to understand the development and trajectory of phonological skills, reading skills, and language skills. LD has even been utilized to evaluate children after cochlear implantation, individuals with aphasia, and can be referred to as a marker for early onset of dementia (Fergadiotis, Wright, & Green, 2015). LD, in and of itself, has been proven difficult to define and even more complicated to measure (Fergadiotis, Wright, & Green, 2015; deBoer, 2014; Jarvis, 2013; McCarthy & Jarvis, 2007). For the purpose of this review, LD is defined as the variety, diversity, and range of the types of words used by speakers or writers. Further, it is the way in which they use or integrate their vocabulary into their actual language production (deBoer, 2014; Jarvis, 2013).

LD is critical to student success in the areas of social communication and academic performance. McCarthy and Jarvis (2007) suggest LD can offer insight regarding speaker competence, writing performance/skills, vocabulary knowledge, and even socioeconomic status. For adolescents transitioning into a period of more complex language usage, the insight offered by examining LD can help SLPs and educators prevent failure in academic, social, and practical communication areas (Nippold, 2010). As components of language become more sophisticated, LD is expected to increase, reflecting greater linguistic competence. The critical transition from the elementary years to adolescence warrants investigation of language and analysis of LD across language components.

Adolescent language. The rate of language development decelerates as children approach adolescence and continues to decline into adulthood. However, that does not mean language progression ceases completely. A gradual increase in research in adolescent language development over the last couple of decades has led to the understanding that language does, in fact, continue to develop throughout adolescence and into adulthood. Further, although it is subtler, changes that occur in language are noteworthy, and, if examined closely, are more evident in nature (Nippold, 2000 & 1993). As children approach adolescence, their language matures and dives deeper beyond the surface level. This trend continues throughout adulthood and individuals become what Owens (2016) describes as agile language users.

The three components of language—form, content, and use—each have unique characteristics in all stages of language development from birth to adulthood. As expected, syntactic complexity increases as speakers approach early adulthood. Although complexity varies among individuals, environments, and contexts, speakers typically produce more complex language as they age. As adolescents develop abstract thought processes, they subsequently develop the syntactic support necessary for more complex dialogues and social monologues. Owens (2016) explains, “Complex thought, supported by a knowledge base, seems to drive the use of complex language” (p. 367). Growth in syntactic complexity, or form, is especially apparent when written language begins to be evaluated, especially in persuasive writing.

Figurative language, a large aspect of semantics, also gradually advances during early adolescence (Nippold, 2000; Owens, 2016). Nippold (2000) discusses the progress in early adolescence towards understanding one of the most difficult types of figurative

language: proverbs, which reveal and challenge interpretative skills (Nippold, Uhden, & Schwartz, 1997). A review by Nippold (1998), described that supportive linguistic contexts can help to develop proverb understanding. Additionally, explanation tasks are a more demanding measure of proverb comprehension interpretation using a multiple-choice design. Comprehension of this type of figurative language was reported to be associated with measures of academic success in adolescents.

As children enter early adolescence, verbal and written communication becomes increasingly important. To thrive in the transition to a more conversational era of life between family, peers, and teachers, adolescents' pragmatic skills must also improve (Nippold, 2000). Research by Larson and McKinley (1980), Mayo and Waldo (1994), Nippold (1998), and Raffaelli and Duckett (1989) provided pragmatic behaviors pertinent to successful conversation for adolescents, including: topic maintenance, asking appropriate questions, interrupting aptly, turn-taking, appropriate topic shift, humor, figurative language usage, theory of mind, and appropriate facial and body gestures that boost interactions. When adolescent language use is age-appropriate, communication not only begins to serve as a tool for information, but as a source of emotional support and personal well-being (Nippold, 2000).

Language Sampling

The ability to use language properly, to express oneself across social, academic, and educational settings, can be considered a rudimentary human right (Nippold, 2014). What does that mean for individuals experiencing language difficulties? How do we identify these individuals and accommodate their needs so they are not denied this right? Language sampling, assessment, and intervention are vital tools used to ensure that

humans of all ages and stages continue along their quest for personal achievement, satisfaction, social, academic, and professional success. Measures of LD are examined by analyzing language samples and can be applied to written and spoken samples of language. Formal, standardized samples are not required to calculate LD. LD research has utilized measurements on a variety of language sample types, which are discussed later.

Language sampling allows SLPs to identify language limitations. Language sampling is a well-established, ecologically valid technique for evaluating natural language production and performance (Heilmann, Nockerts, & Miller, 2010; Hadley, 1998). Researchers have long advocated the use of language sampling procedures to understand and examine spoken language. McCarthy utilized language sampling procedures as early as 1930 to describe children's language skills. In 1983, Gallagher stated, "...spontaneous language sampling is the centerpiece of child language assessment." Thomas (1989) referred to it as the "heart" (p. 86) of language assessment (as cited in Hux, Morris-Friehe, & Sanger, 1993). Early studies utilized language sampling procedures to describe the development of language (Bloom, 1970; Brown 1973; Menyuk, 1974) and language sampling has continued to be a useful tool for researchers in the study of child language (Finestack, Payesteh, Disher, & Julien, 2014). SLPs have options for assessing children's oral language skills; however, language sampling analysis (LSA) is commonly recommended for language assessment and frequently preferred as an unbiased measure to understand a child's oral language use in a naturalistic context (Heilmann, Nockerts, & Miller, 2010).

To establish appropriate intervention plans, explore lexical diversity and lexical sophistication, and identify potential language difficulties, SLPs can elicit and analyze both spoken and written language samples. These language samples paint a bigger picture of usage in aspects such as complex syntax, literate lexicon, and pragmatics (Nippold, 2014). Nippold (2014) highlighted helpful outcomes associated with the use of language sampling (specific to adolescent populations), including insight into “real-world” communication, uncovering weaknesses in the use of complex syntax and literate lexicon, identifying deficits with pragmatics, discovering an appropriate direction for intervention, and supplementing standardized test results. Damico (1988) and Schuele (1997) suggested that aspects of linguistic vulnerability (not typically identified by standardized assessments) may be exposed through LSA (as cited in Hadley, 1998). Therefore, engaging children in challenging discourse and enabling them to demonstrate their use of higher-level language usage is vital for the purpose of uncovering linguistic vulnerability and identifying linguistic competence (Hadley, 1998).

Language sampling in the adolescent population. Nippold (2014) reports a surprising statistic regarding adolescent language use: at least 10% of adolescents are hindered by language disorders. This constraint puts them at risk in the areas previously discussed: academic, social, and practical. Standardized measures for analyzing language are helpful tools for identifying language deficits; however, they lack the ability to provide an understanding of how an individual uses language in natural contexts (Nippold, 2014). Language sampling, however, can give interventionists a broader look at how speakers utilize multiple aspects of language across different environments and

situations. This is particularly important in the adolescent stage where children are beginning to experience more linguistic individuality (Nippold, 2014).

In a study by Wilson, Blackmon, Hall, and Elcholtz (1991) a clear majority of clinicians reported the use of language sampling in conjunction with standardized assessments. Another study by Hux, Morris-Friehe, & Sanger (1993) similarly revealed that, while school-based SLPs routinely supplemented standardized assessments with language sampling procedures and utilized these results to develop treatment plans, they were less likely to use language sampling practices with students 11 years or older. The later authors suggested this may be due in part to the lack of age-appropriate language sampling procedures for this age group. Further evidence indicated that SLPs utilized language sampling procedures more often with students who were known to have moderate-severe language impairments and practiced this less often with individuals at-risk for language delays (Hux, Morris-Friehe, & Sanger, 1993). In 2014, Westerveld and Classen examined sampling and analysis procedures among 257 SLPs in Australia. They found that spontaneous language samples were routinely collected. Further, as consistent with prior research, the means of elicitation were selected based on the child's age and/or developmental stage (2014).

Current language sampling practices. Language sampling typically takes place across four genres, including conversational, narrative, expository, and persuasive discourse (Nippold, 2014). Language, being a natural social tool, requires proficient understanding of and use within these genres. In addition, adolescents are required to utilize both written and spoken language to meet Common Core State Standards (CCSS). According to the CCSS, "The Common Core is a set of high-quality academic standards

in mathematics and English language arts/literacy (ELA/Literacy) created to ensure that all students graduate from high school with the skills and knowledge necessary to succeed in college, career, and life, regardless of where they live,” (National Governors Association, 2018, para. 2). Standards for ELA/Literacy are separated by grades kindergarten through fifth grade and sixth grade through twelfth grade. This separation indicates an expected change in language use: a shift to increased complexity in thought processes, deeper social interactions, diverse thinking, and persuasive and narrative writing that is organized, logical, and coherent. From sixth grade throughout twelfth grade, CCSS require students to dive into research, present information and findings, engage in collaborative thinking and discussions, adapt their speech to a variety of contexts, demonstrate proper English grammar and usage in speaking and writing, and understand and use figurative language (Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects, 2018). While this is not an exhaustive depiction of the CCSS for ELA/Literacy, it does represent the need for age-appropriate language skills in each of the genres. It further confirms the importance of effective language assessment and intervention at this stage in adolescents’ lives. Several methods for eliciting language are discussed in the literature. Methods appropriate for adolescent populations are limited in comparison to spontaneous or free-play methods that are commonly utilized for elementary-age speakers (Southwood & Russell, 2004; Hux, Morris-Friehe, & Sanger, 1993).

Conversation. Crystal (2002) explained that conversational discourse can be described as an interactive genre of language (as cited in Nippold, Hesketh, Duthie, & Mansfield, 2005). Crystal, Fletcher, and Garman (1976 & 1989) argued that

conversational tasks consist of dialogue related to a student's experience that is unrelated to the immediate situation (as cited in Southwood & Russell, 2004). Southwood & Russell (2004) provided examples of such tasks, including (1) answering questions about a variety of topics such as family, hobbies and interests; (2) student describing picture cards, silent movies, or how to play a game; and (3) student describing a picture from a set of illustrated cards for the researcher to guess which card is being described. Nippold (2014) claimed conversational methods were more supportive interactions since the demands of other genres place large responsibilities on the communicator. In a review by Hadley (1998), the majority of clinicians reported a reliance on conversational sampling methods.

Narrative. Narrative speaking is especially important in adolescence for everyday communication, meeting educational standards, and establishing social and emotional welfare (Nippold, Frantz-Kaspar, Crammond, Kirk, Hayward-Mayhew, & MacKinnon, 2013). Leadhom and Miller (1992) and MacLachlan and Chapman (1988) claimed narrative speaking tasks allowed students to express themselves with fewer limitations and barriers, and also elicit longer utterances than conversational tasks (as cited in Hadley, 1998). The primary methods for eliciting narrative language in the adolescent population are story generation and story retell. Typically, in story retelling tasks, students are presented with a single story. This story can be presented verbally by the researcher or SLP, read by the student, or listened to via audio recording or video recording (Gazella & Stockman, 2003; Hadley, 1998). Students are prompted to retell the story according to the protocol selected. Story generation places the responsibility on

the student to produce a story independently, unless the facilitator provides a topic prompt (Southwood & Russell, 2004).

It should be noted that, while these are common language sampling practices for the adolescent population, these are not flawless methods. Hadley (1998) argued that conversational elicitation methods for adolescents may not be challenging enough to capture language barriers or breakdowns. Story retelling or story generation tasks may be limited due to (1) samples not being long enough to make informed conclusions regarding language skills; (2) limited representation of interactive communication; and (3) students can be primed with the language needed to include in the retell, reducing processing demands needed for complex language production (Gazella & Stockman, 2003). For this study, the last limitation is referred to as “priming the pump.” Another important note highlighted in the literature by Hux, Morris-Friehe, and Sanger (1993) is the significant number of respondents who reported using materials such as pictures, familiar topics of interest to the student, and story books to elicit language across both genres of discourse (as cited in Hadley, 1998).

This study investigates the use of illustrated cards to elicit typical adolescent language samples across both conversational and narrative genres of discourse. A typical interview protocol was administered along with a novel method developed by the researchers incorporating intricately illustrated Dixit cards. Dixit is a board and picture card game aimed at sparking imagination, creativity, and generating story telling. Published by Libellud, the cards used were originally created by a child psychiatrist to help children and teenagers express their feelings.

Language Sampling Analysis

Many indices of lexical diversity (LD) have been proposed; however, discrepancy remains regarding the best method for assessment of LD (deBoer, 2014; Jarvis, 2013).

Although LD has a wide variety of applications and can be useful, LD metrics have historically been sensitive to text length, making a fully reliable and valid measure of LD obscure (McCarthy & Jarvis, 2010; 2007). The most widely and common measures of LD are discussed.

Type-Token Ratio (TTR). Type-token ratio (TTR) has long been utilized to describe measures of vocabulary knowledge, lexical diversity, and vocabulary diversity (Miller, 1981; Miller, 1991, as cited in Hess et al., 1986; Johnson, 1994, as cited in Hess, Landry and Sefton, 1986; Retherford, 2000). It is often considered the simplest measure of LD (deBoer, 2014). TTR is a ratio measurement where the number of different types of words is divided by the total number of words in a given sample (token) (deBoer, 2004; Jarvis, 2013). A higher TTR indicates a more diverse range of vocabulary, or LD.

Voc-d. Voc-d is a more recent tool for assessing vocabulary diversity (McCarthy & Jarvis, 2007) and is a graphical method. Voc-d-D is a software to measure vocabulary diversity. It calculates vocabulary richness, called D, based on a mathematical model. Voc-d is calculated by taking 100 random samples of 35 tokens from a given text. Then TTR for each sample is analyzed and the mean TTR is kept. For tokens 36 to 50, the same procedure is applied. Finally, a TTR curve is created from each of the means.

Measure of Textual Lexical Diversity (MTLD). MTLD is a measure that holds TTR constant by maintaining a default TTR value (.720). MTLD is calculated as the mean length of sequential word strings that maintain this given TTR. Thus, it

sequentially calculates the average number of words in a sample that remains above the TTR value of .720 (McCarthy & Jarvis, 2010).

Ecological approach. In his article, “Capturing the Diversity in Lexical Diversity,” (2013) linguist Scott Jarvis explored how language researchers could learn from ecologists and the field of ecology. Jarvis argued that ecologists have a much more complex understanding of lexical diversity as a multidimensional approach in comparison to statistical measures. Jarvis (2013) proposed a multifactor ecological analysis approach to be applied to the assessment of diversity in language samples. This seven-factor analysis includes assessment of size, richness, effectiveness (how abundant certain words are), evenness, disparity, importance, and dispersion. By quantifying and applying appropriate measures for each, Jarvis believed that a better picture and method for capturing LD may be achieved.

Current Study

The need for age appropriate elicitation methods for the adolescent population is evident. The current study aims to compare the effectiveness of two elicitation methods in assessing lexical diversity in young adolescents. It further seeks to apply Jarvis’ theoretical model of ecological assessment to lexical diversity (LD) by quantifying six of the seven properties of diversity (Jarvis, 2013). This study proposes to expand the understanding of LD by examining the interaction of three components: typical LD as a measure of vocabulary, lexical complexity (LC) as the value of the speakers’ vocabulary, and lexical sophistication (LS) as a measure of how that vocabulary is organized across the sample. The project’s primary objective is to determine which elicitation/collection method is more effective for collecting lexically diverse language samples reflective of

adolescents' spoken language skills. The second objective is to advance the knowledge in the field regarding best practices for collection and analysis of lexically diverse language samples in adolescence. The study aims to answer the following research question: Does the Dixit Method (DM) of language sampling elicit a more lexically diverse sample than the standard interview procedure in early adolescents with typical language development?

It is expected that adolescents will respond to the DM using more linguistically diverse language in comparison to standard conversational interview procedures. Diverse responses are expected, because the DM allows individuals to tap into prior experiences using their imagination to make connections from the visual content in the game card illustrations. Further, it is likely adolescents will produce a more representative and unlimited sample of their own language. It is also suspected that this more individualized method will significantly increase interest in completing the activity. Lastly, by using both the standard analysis procedures and applying Jarvis' ecological approach, the study aims to wholly examine and capture the true LD of the student samples.

METHODOLOGY

Participants

Forty-two sixth grade students between the ages of 11 years and 12 years 11 months participated in this study. Participants included 23 females and 19 males. Twenty-two samples were transcribed for analysis. Eighteen students were excluded from data analysis due to scores that indicate potential language learning difficulties on the Student Language Scale screening from the Test of Integrated Language and Literacy Skills. Two student samples were excluded because of poor sound quality that prohibited

accurate data collection. All participants were from the same rural community in south central Kentucky and were native speakers of General American English. Participants were not required to report ethnicity, however researchers observed that students represented a variety of ethnicities. Participants were recruited via a local middle school. The study had been approved by the Western Kentucky University Institutional Review Board prior to any recruitment activities. Students and their parents or guardians signed written consent forms indicating their willingness to participate in the study. Data collection occurred during non-academic time periods. Incentives for participating in the study included a small token of appreciation (a snack, drink, and treat bag).

Participants met with a research assistant in a one-on-one setting for complete of study tasks. These research assistants were trained by the first author in administering the language sampling measure. Training consisted of face-to-face instruction, modeling, and administration practice prior to the beginning of data collection. All data collectors were from the same accredited university: one was a graduate student in the speech-language pathology program, one was an American Speech-Language-Hearing Association certified speech-language pathologist who serves as faculty in the same 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 Test of Integrated Language and Literacy Skills (TILLS) Student Language Scales (SLS) were used for each participant. To recruit a population that displayed typical language development, the sixth-grade language arts/reading teachers of participating students were asked to

complete the TILLS SLS to identify the potential of a student at risk for a language disorder/delay which would prevent them from participating in the study. The TILLS SLS 12-question screener is intended to show teachers, parents, and/or students' perception of how the student is performing on academic tasks as compared to their same-age peers (Nelson, Howes, & Anderson, 2016). This scale considers multiple sources to screen for language/literacy disorders by rating students. When teachers or parents rate a score of less than five in more than two areas on Items 1-8 of the screener, SLS results indicate the student is at risk for a language delay and warrants further assessment. In order to avoid singling out students, each student who returned consent forms was included in the sampling procedure. Data was only analyzed for students who qualified by a passing score on the SLS. Data was analyzed on 25 samples.

The data collectors were provided a standard conversational interview protocol (Nippold, et al., 2013) to collect a language sample based on a typical elicitation procedure. The interview protocol included three conversational tasks that prompted students to talk about school, family, hobbies, and pets (see adapted protocol in *Figure 1*). Data collectors were also provided with a novel language sampling protocol, The Dixit Method (DM) protocol, developed by the investigators. The protocol outlined specific procedures for utilizing the richly illustrated cards from the game, Dixit, to elicit language samples (see DM protocol in *Figure 2*).

Each data collector had an Interview Protocol form to take notes from the interview portion of the session. In addition, each data collector had a Dixit Method form where information (such as coded card numbers chosen by the students) were recorded

and information related to their responses was documented. An electronic GoPro camera was used to record each data collection session.

Other materials included decks of Dixit Cards with fifty-six cards each. Twenty-eight of the cards came from the Dixit Original Game card deck; the other twenty-eight cards came from the Dixit Memories Expansion card deck. Prior to the study, data collectors chose 4 cards from the Revelation Expansion deck to be used as example/demonstration cards when necessary. Each card was labeled/coded with a M (Memories Expansion) or D (Dixit Original). Permission from Libellud, the Dixit game publisher, was granted for the use of their illustrated cards for the purpose of the study.

Procedures

All data collection sessions took place at the middle school facility from which the participants were recruited. Although neither parents nor educators observed the sessions, they were offered the opportunity to do so. Two of the data collection locations were individual rooms with a table and chair. One data collection location was a lobby area between regular education classrooms where a specific table for data collection was blocked off from student traffic and background noise. Each participant was scheduled to attend one 30-minute data collection session during the school day. Prior to the first session, the language arts teachers completed the TILLS SLS to ensure the absence of a language deficit that would prevent the students from participation in the study.

Although, each students' parent/caregiver completed consent documentation prior to the initiation of the data collection, each session began with the student reading and signing appropriate consent document to express his/her willingness to participate. After gaining written consent from the student, the data collectors started the GoPro camera

and initiated the standard interview protocol (adapted from Nippold et al., 2013). During the interview, the data collector followed the lead of the student, listening to his/her responses and engaging when necessary. Examples of basic prompts used by the data collectors included, “Is there anything else you would like to tell me about that?” or “Can you tell me more?” The interview continued until the student indicated that he/she was ready for the next question or appeared ready for a new activity.

After the students answered the three questions on the interview protocol, the data collector introduced the DM. The data collector followed the DM protocol to collect language samples using the illustrated cards. The DM protocol contains three rounds of sampling with the cards including students’ first impressions, detailed descriptions of cards, and stories utilizing the cards. For examples of the illustrated Dixit cards, refer to Appendix A.

After language samples were collected, they were reviewed and transcribed. Samples were then reviewed and verified by the research team, and, when necessary, reviewed and verified a third time by the primary investigator. Each language sample was transcribed and submitted into the Systematic Analysis of Language Transcripts (SALT) 16 Research Software (Miller & Iglesias, 2012) as well as the Tool for the Automatic Analysis of Lexical Sophistication (TAALES) (Kyle, Crossley & Berger, 2017).

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 4 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, both those derived through the traditional interview protocol as well as the Dixit method, were analyzed using three standard measures: type token ratio (TTR), moving average type token ratio, and mean length of utterance (MLU). To further quantify lexical diversity, samples were also analyzed using six factors described by Jarvis (2013). These include size, richness, evenness, disparity, importance, and dispersion. Jarvis provided a brief description of each item presented to define a specific aspect of lexical diversity. For the purpose of this study, each item used was quantified by interpretation for clinical use. The seventh ecological factor included in Jarvis' theoretical model, effectiveness, was not included because the calculation of this factor was unwieldy for the purpose of this study.

Size, or how many total words used (tokens) is analyzed for each sample. In order to assess size, all language samples were transcribed and number of total words were calculated. Size is one component of TTR.

Richness is defined as the number of different words used in a language sample (or the different types of words). Richness (types) is the second component of TTR. To assess richness, the number of different words used in each sample was calculated. Because TTR is the common analysis procedure for lexical diversity in the field of speech-language pathology it was also calculated.

Evenness, by interpretation, is the degree to which word types are evenly dispersed among a sample. For the purposes of this study, evenness of nouns, verbs, adjectives, and adverbs were compared. These word types were chosen for the preliminary analysis of evenness because they are well defined and should be extensively

used by adolescents. Evenness was quantified by calculating percentages of use for each word type in comparison to total number of words (i.e. nouns/total number of words).

Disparity refers to the proportion of words in a language sample that are semantically related. Two groups of semantically related word types were used to evaluate disparity: adjectives to nouns and adverbs to verbs. This assessment provided preliminary information regarding disparity between the most common of word types. However, the potential of semantic relationships is innumerable and this study did not purport to fully assess disparity of the language sample.

All language samples were transcribed and separate analyses were run for the interview and Dixit portion. To analyze importance and dispersion, the Tool for the Automatic Analysis of Lexical Sophistication (TAALES) was used (Kyle, Crossley, & Berger, 2017). For this measure, the SUBTLEXus corpus was selected as a best fit for spoken language. The SUBTLEXus is a corpus consisting of movie and television subtitles from the United States encompassing 8,388 films and television episodes with a total of 51,000,000 words.

Importance refers to the relative frequency with which words in a text occur in a language as a whole. TAALES analyzes language samples for frequency word by word, counting the number of times each word occurs in the 8,388 American films and television shows. It then calculates an average from all word frequencies to determine the approximate importance level of the language sample compared to the corpus created using the 8,388 films and television shows, known as SUBTLEXus. For example, the word “the” occurs 1,502,908 times across 8,388 films and television shows included within the SUBTLEXus. This would indicate the word “the” is a more important word to

the corpus than a less frequently used word such as the word “zombielike” which only occurs one time across 8,388 films or television episodes.

Dispersion refers to how widely a particular word or word family is used across films and television episodes in the SUBTLEXus (Kyle & Crossley, 2014). TAALES analyzes the dispersion of language samples by counting the number of films or television shows that each word occurs in and then averages those numbers for the entire language sample. For example, the word “the” occurs at least one time in all 8,388 films and television shows included within the SUBTLEXus. This would indicate “the” has a 100% dispersion rate for the SUBTLEXus. The word “zombielike” which only occurs in one film or television episode has a dispersion rate of 1%.

RESULTS

The results presented describe the answers to the study’s main research question: does the Dixit Method of language sampling elicit a more lexically diverse sample than the standard interview procedure in early adolescents with typical language development? The results further explore the application of Jarvis’ proposed ecological approach to analysis of language samples. The tables illustrating these results are below.

Forty-two sixth grade students between the ages of 11 years and 12 years 11 months participated in this study. Participants included 23 females and 19 males. Twenty-two samples were transcribed for analysis. Eighteen students were excluded from data analysis due to scores that indicate potential language learning difficulties on the Student Language Scale screening from the Test of Integrated Language and Literacy Skills. Two student samples were excluded because of poor sound quality that prohibited accurate data collection. Therefore, 22 student samples were included in our analysis to

assist in determining which language sample method was more effective in eliciting more lexically diverse language.

Level of Lexical Diversity Based on Traditional Measures

Type-Token Ratio (TTR). Twenty-two early adolescent language samples were analyzed for each method. TTR was determined for each sampling method. For the Dixit Method (DM) TTR ranged from a minimum of .21 to a maximum of .53 with a mean of .37. TTR results for the interview ranged from .45 to .75 with a mean of .60.

Average TTR. Twenty-two early adolescent language samples were analyzed for each method. Average (AVG) TTR, which accounts for sample size, was determined for both sampling methods. AVG TTR yielded observably different results. For the DM, AVG TTR ranged from a minimum of .56 to a maximum of .72 with a mean of .60. AVG TTR results for the interview ranged from .53 to .75 with a mean of .64.

Table 1

Traditional Measures of Lexical Diversity

Measure	Dixit					Interview				
	<i>n</i>	<i>range</i>	<i>minimum</i>	<i>maximum</i>	<i>mean</i>	<i>n</i>	<i>range</i>	<i>minimum</i>	<i>maximum</i>	<i>mean</i>
TTR	22	.32	.21	.53	.37	22	.30	.45	.75	.60
AVG TTR	22	.17	.56	.72	.60	22	.22	.53	.75	.64
MLU (MORPH)	22	8.19	4.03	12.22	8.39	22	9.92	3.46	13.38	7.97

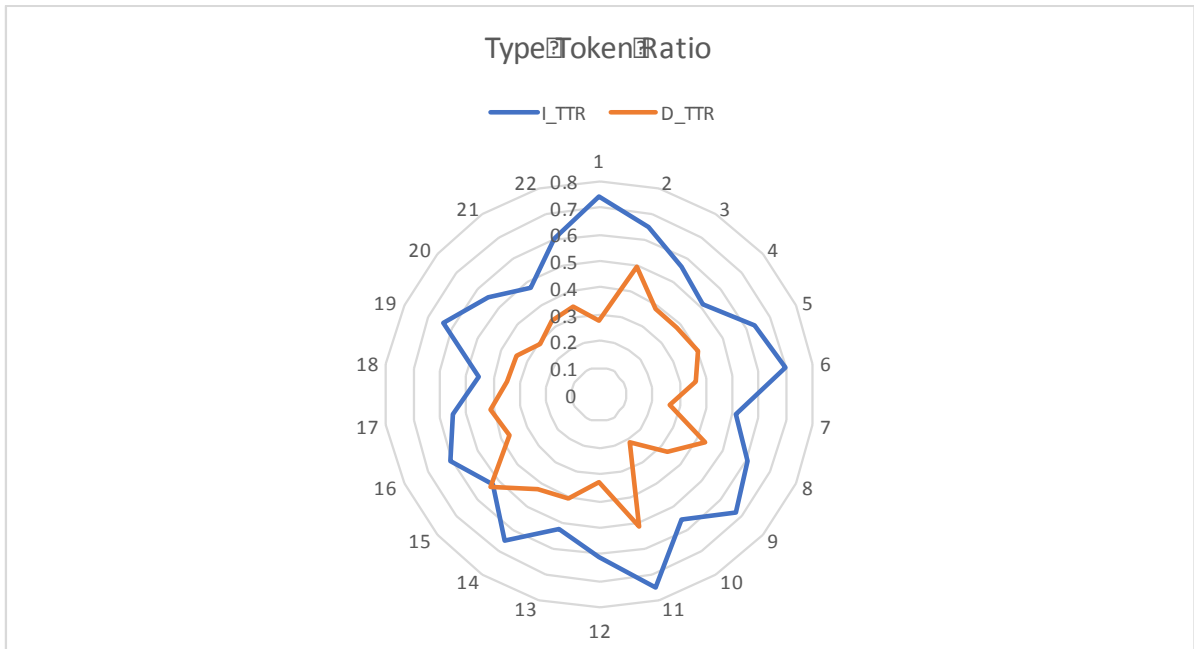


Figure 3. Comparison of Type Token Ratio.

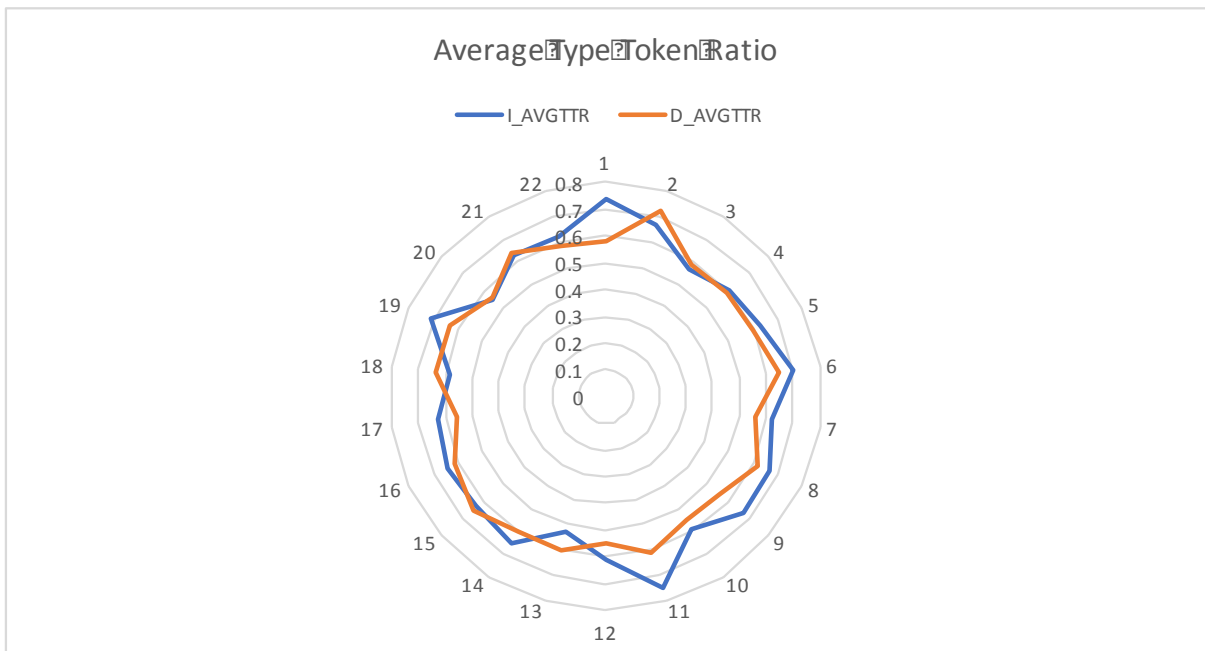


Figure 4. Comparison of Average Type Token Ratio.

MLU. Mean Length of Utterance (MLU) was determined for each sampling method as well. For the DM, MLU ($n=22$) ranged from a minimum of 4.03 to a maximum of 12.22 with a mean of 8.39. MLU results for interview samples ranged from 3.46 to 13.38 with a mean of 7.97.

Level of Lexical Diversity Based on Ecological Analysis

Size. Size indicates the total number of words used by a speaker in a given language sample. For the DM, minimum size was 220 with a maximum size of 2158. This reflects a range of 1938 words. Minimum size of interview samples was 24 words with a maximum of 344 words, resulting in a range of 320 words. The mean size for the DM and interview was 730.45 and 126.59, respectively.

Richness. Richness indicates total number of *different* words used by a speaker in a given language sample. Minimum size of DM samples was 115 different words with a maximum richness of 463. For the interview, minimum richness was 18 with a maximum of 161 different words. The mean richness for the DM and interview was 246.14 and 69.64, respectively.

Table 2

Ecological Approach to Analysis of Lexical Diversity

Measure	Dixit					Interview				
	<i>n</i>	<i>range</i>	<i>minimum</i>	<i>maximum</i>	<i>mean</i>	<i>n</i>	<i>range</i>	<i>minimum</i>	<i>maximum</i>	<i>mean</i>
RICHNESS	22	348	115	463	246.14	22	143	18	161	69.54
SIZE	22	1938	220	2158	730.45	22	320	24	344	126.59
IMPORTANCE	22	135119.0	263254.1	398373.1	335491.65	22	212387.8	287820.4	500208.2	396142.73
DIS RATE	22	17%	63%	80%	72%	22	17%	63%	80%	72%

Evenness. Evenness is a comparison of frequency counts of commonly used words. For this study, frequency counts of the occurrence of nouns, verbs, adjectives, and adverbs were analyzed based on percentage of use per sample. Visual analysis of data revealed a predictable pattern of evenness. Adjectives and adverbs were used at similar percentages within the samples regardless of length. Overall, nouns were used more often than verbs, but both were used at a higher percentage than adjectives and adverbs. Regardless, of elicitation method frequency counts of all four word types followed the same trend.

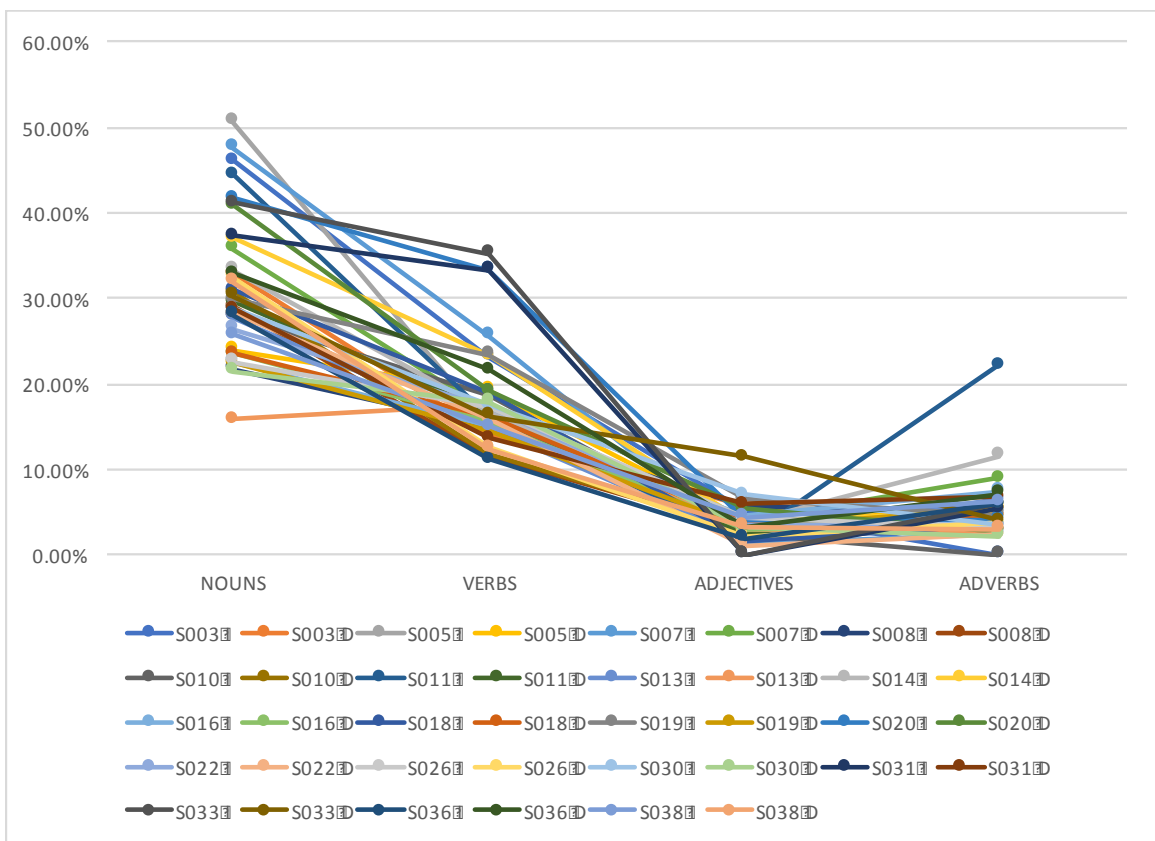


Figure 5. Evenness of Nouns, Verbs, Adjectives, Adverbs for each participant by method (e.g. S003 I = Participant number 3, interview method).

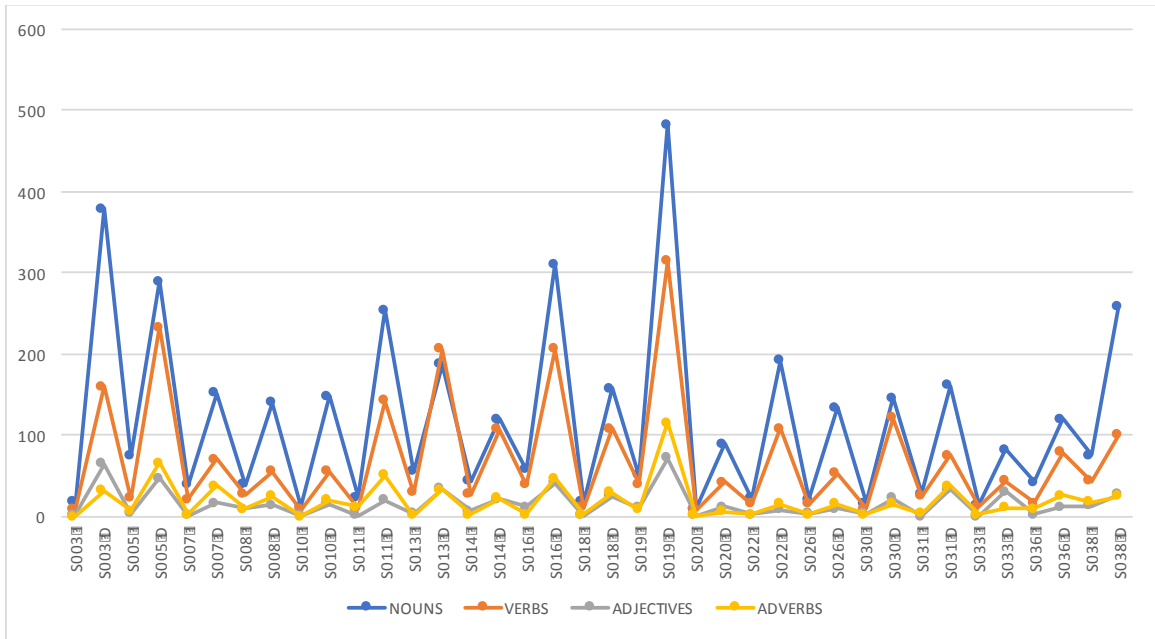


Figure 6. Evenness (frequency counts) of Nouns, Verbs, Adjectives, Adverbs for each participant by method.

Disparity. Disparity considers the ratio of semantically related words (e.g. adjectives:nouns and adverbs:verbs). As anticipated, the ratio reflects what is expected with adjectives occurring less frequently than nouns. Overall, results revealed a trend that when the use of nouns increased the use of adjectives also increased. Similarly, as verb usage increased, adverb usage also increased. Further, within our sample, adverbs were much more likely to be paired with verbs than adjectives were to be paired with nouns. This is to be expected in typical language users of this age. However, the ratios often differed markedly between interview and DM samples.

Table 3

Disparity Ratios

Student	Interview	Dixit	Interview	Dixit
	<u>Adjectives/Nouns</u>		<u>Adverbs/Verbs</u>	
003	1 / 9	65 / 379	0 / 9	1 / 5
005	2 / 37	47 / 280	7 / 22	66 / 233
007	1 / 39	17 / 152	2 / 21	38 / 71
008	10 / 39	1 / 10	1 / 3	5 / 11
010	1 / 12	3 / 32	0 / 8	12 / 31
011	1 / 24	10 / 127	4 / 3	51 / 143
013	1 / 14	2 / 11	13 / 30	33 / 206
014	3 / 26	15 / 149	9 / 13	21 / 94
016	6 / 29	41 / 311	19 / 39	47 / 206
018	1 / 18	5 / 158	2 / 11	5 / 18
019	11 / 51	24 / 126	1 / 5	115 / 314
020	1 / 10	2 / 15	1 / 8	1 / 7
022	2 / 23	1 / 24	1 / 5	4 / 27
026	4 / 21	3 / 44	3 / 16	5 / 17
030	4 / 17	11 / 73	1 / 5	15 / 121
031	0 / 28	33 / 161	4 / 25	1 / 2
033	0 / 22	31 / 82	1 / 6	1 / 4
036	3 / 43	1 / 10	9 / 17	26 / 79
038	13 / 75	9 / 86	9 / 22	1 / 4

Importance. Importance is the relative frequency with which words in a text occur in a language as a whole. The SUBTLEXus corpus was used to evaluate importance in collected language samples (Kyle & Crossley, 2014). Importance for the DM ranges from 26325.4 to 398373.1 with a mean of 335491.65. The interview ranges from 287820.4 to 500208.2 with a mean of 396142.73.

Dispersion. Dispersion reflects how widely a particular word or word family is used across films and television episodes in the SUBTLEXus. For this analysis, dispersion rate was evaluated. Dispersion rate is the percentage of films and television episodes that contain a particular word. Dispersion rate for the DM ranges from a minimum of 63% to a maximum of 80% with a mean of 72%. The interview dispersion rate yielded a minimum of 61% to a maximum of 79% with a mean of 72%.

Test of Significance

A test of significance was utilized to determine if there is sufficient evidence to infer that the means of corresponding population distributions would also differ (Darren & Paul, 2010). For this study, a paired-samples two-tailed *t* test was employed to determine whether a difference existed between samples elicited through interview and through the DM.

Table 4

Paired Samples t test

Variable	Interview		Dixit		<i>t</i> (22)	Sig (2-tailed)	95%	
	M	SD	M	SD			LL	UL
TTR	.60	.08	.37	.08	10.15	.00	.18	.27
AVG TTR	.64	.06	.60	.04	2.64	.02	.01	.06
MLU	7.97	2.90	8.34	2.38	-.55	.59	-1.98	1.15
SIZE	126.59	82.06	730.45	427.26	-.691	.00	-785.67	-422.05
RICH	69.64	37.48	246.14	88.88	-10.27	.00	-212.24	-140.76
IMP	396142.73	60488.12	335491.65	36157.88	4.02	.001	29293.14	92009.01
DISR	.72	.05	.72	.04	-.26	.80	-.03	.02

Note: CI = confidence interval; LL = lower limit; UL = upper limit; TTR = type-token ratio; AVG TTR = average type-token ratio; MLU = mean length of utterance; RICH = richness; IMP = importance; DISP = dispersion rate.

Comparison of TTR between interview and the DM samples indicates that the mean performance for the interview protocol ($M = .60$, $SD = .08$) was significantly higher than the DM ($M = .37$, $SD = .08$) at the $p < .001$ level. When size is accounted for with AVG TTR, results indicate that the mean performance for the interview protocol ($M = .64$, $SD = .06$) was significantly higher than the DM ($M = .60$, $SD = .04$) at the $p < .02$. MLU for the interview protocol ($M = 7.97$, $SD = 2.89$) compared to the DM protocol ($M = 8.39$, $SD = 2.38$) indicates that the mean performance does not meet the level of significance ($p = .05$) at $p = .59$.

Analysis for both size ($M = 126.59$, $SD = 82.06$; $M = 730.45$, $SD = 427.26$) and richness ($M = 69.64$, $SD = 37.48$; $M = 246.14$, $SD = 88.88$) revealed a significant difference at the level of $p < .001$. Comparison of importance between interview and the DM samples indicates that the mean performance for the interview protocol ($M = 396142.73$, $SD = 60488.12$) was significantly higher than the DM ($M = 335491.65$, $SD = 36157.88$) at the $p = .001$ level. Additionally, a significant negative correlation was found for the two measures. Dispersion rates for the interview protocol ($M = .72$, $SD = .05$) compared to the DM protocol ($M = .72$, $SD = .04$) indicates that the mean performance does not meet the level of significance for this study ($p = .80$).

DISCUSSION

The purpose of this study was to determine which language elicitation method resulted in the most lexically diverse spoken sample in early adolescents with typical language development. Further, the study compared traditional approaches to analysis for lexical diversity with Jarvis' (2013) theoretical approach. The rationale for this research is based on the need for language elicitation and analysis measures to evolve for the

adolescent population. Due to a lack of procedures and materials for examining adolescent language, this population is at risk for delays in areas where complex language usage is required (Nippold, 2014).

In this study, researchers defined and analyzed six ecological characteristics of language based on his model (size, richness, evenness, disparity, importance, and dispersion). If LD is to be considered a multi-dimensional concept as Jarvis proposed, then current traditional methods (TTR AVG TTR MLU) are not comprehensive enough to authentically reflect spoken language performance of early adolescents. Visual analysis combined with a paired-samples two-tailed *t* test reveal clear trends suggesting the DM of language sampling results in more lexically diverse language samples from this study's population of 22 students. Further, the ecological approach to analysis of LD provides a more holistic look at current spoken language skills and provides observable differences between the two elicitation methods for each characteristic examined.

Type Token Ratio (TTR)

To reiterate, previous research suggests LD metrics are often sensitive to text length, making a fully reliable and valid measure of LD obscure (McCarthy & Jarvis, 2010; 2007). The most popular measure of LD, type token ratio, was examined in this study. As anticipated, type token ratio between the two methods of elicitation (interview and the DM) revealed that mean performance for the interview protocol ($M = .60$, $SD = .08$) was significantly higher than the DM ($M = .37$, $SD = .08$). An in depth look at size ($M = 126.59$, $SD = 82.06$; $M = 730.45$, $SD = 427.26$) and richness ($M = 69.64$, $SD = 37.48$; $M = 246.14$, $SD = 88.88$) reveals the average size (tokens) and richness (types) for the DM is significantly higher. Therefore, TTR was unable to account for the difference

in size between the two samples. Results indicate that the interview protocol elicited spoken samples with greater lexical diversity from our population of students. In conclusion, TTR is an unreliable measure of LD for the DM samples.

Average Type Token Ratio (AVG TTR)

The second traditional measure of LD, average type token ratio, was also applied to both samples. Unlike TTR, AVG TTR accounts for sample size. Comparison of *Figure 3* and *Figure 4* illustrates an observable difference between TTR and AVG TTR. AVG TTR appears to be more representative of the samples' diversity, however there is still a significant difference between the interview protocol ($M = .64$, $SD = .06$) and the DM ($M = .60$, $SD = .04$) protocol. Based on this measure of LD, interview samples were more lexically diverse. As mentioned above, individual examination of size (tokens) and richness (types) resulted in significantly higher values for the DM samples. Although analysis of AVG TTR is more representative of the sample, it is still not an appropriate, valid measure of LD for the DM samples.

Mean Length of Utterance (MLU)

Comparison of the interview to the DM revealed an insignificant difference between MLU, likely due to the first impressions round of the DM protocol. As previously stated, the DM included a first impressions round encouraging students to use brief statements to communicate their first impression of individual Dixit cards. While the first impressions round is valuable to allow students to retrieve vocabulary and prior experiential knowledge from memory, this may have influenced the MLU data in a negative manner for the DM language samples because investigators specifically instructed students to be brief in their responses. For example, when the number of

utterances is increased, but a greater proportion of them is very brief (first impressions) the MLU may decrease significantly. Prior to future publication, data will be reanalyzed excluding first impressions to further investigate the potential negative impact this phase of the DM protocol may have on MLU.

Size and Richness

Results for size and richness were vastly different between elicitation methods. The DM elicited samples significantly higher in size ($M = 126.59$, $SD = 82.06$; $M = 730.45$, $SD = 427.26$) and richness ($M = 69.64$, $SD = 37.48$; $M = 246.14$, $SD = 88.88$). This is likely due to the engaging nature of the DM protocol. Although formal qualitative data was not recorded, researchers observed that students were excited to choose cards they wanted to talk about in the DM. Students were also motivated to tell creative stories and offer unique descriptions about the cards. Because of this, the DM samples were significantly longer and students utilized unique words and word types more often. Further, the DM elicited unique vocabulary from the students that was not used during the interview. This is likely the reason for the significant difference between the elicitation methods.

Importance

Importance refers to the relative frequency with which words in a sample occur in language as a whole. Importance results indicate that the mean performance for the interview protocol ($M = 396142.73$, $SD = 60488.12$) was significantly higher than the DM ($M = 335491.65$, $SD = 36157.88$). In this study, a lower importance (M), or a negative correlation, suggests students are utilizing more specialized vocabulary. As previously described, the word “the” occurs 1,502,908 times across 8,388 films and

television shows included within the SUBTLEXus. Therefore, the word “the” is a more important word to the corpus than a less frequently used word such as the word “zombielike” which only occurs one time across 8,388 films or television episodes. Consequently, the word “the” would have a much higher mean in comparison to the word “zombielike.” Based on importance results from the current study, student participants were using more specialized/unique vocabulary in the DM.

Evenness and Disparity

Results from evenness and disparity in this study revealed students followed typical usage patterns of commonly used and semantically related words. For this study, nouns, verbs, adjectives, and adverbs were considered. For early adolescent English speakers, it is expected for them to use more nouns than adjectives and more verbs than adverbs. This is what occurred in the current study. In addition, adolescents did pair adjectives with nouns and adverbs with verbs based on their semantic relationships. Although these results are not surprising, they do offer supportive evidence of the success of the ecological approach to analyzing lexical diversity in early adolescence.

Dispersion Rate

Dispersion rate represents how widely a particular word or word family is used across films and television episodes in the SUBTLEXus. Dispersion rates were calculated by counting the number of films or television shows that each word occurs in and averaging those numbers for the entire language sample. An insignificant difference between dispersion rates for interview and the DM was determined ($M = .72, SD = .05; M = .72, SD = .04$). This reflects that the student participants used words similarly in both

methods that cover the same amount of the samples of English from the SUBTLEXus corpus.

Limitations

The sample size was limited since participants were recruited from only one local school and because of the unexpected number of students identified as at risk by the TILLS SLS. Eighteen student samples were eliminated from analysis based on this exclusion criteria. Two additional samples were unable to be analyzed due to poor sound/audio recording quality. An additional limitation of this study was a lack of information regarding students' current academic language performance levels. If this information had been accessible, analysis of effectiveness for both methods of language sampling would have been more reflective of individual student skill. Lastly, researchers identified a need for qualitative questions inquiring about students preferred method of language elicitation; however, because this was not in the approved IRB these questions were not asked.

Future Research

Additional studies with larger groups of students are needed to further explore and confirm these preliminary results. As previously addressed, one limitation of this study was its small sample size, which was compounded by exclusion criteria based on scores from the TILLS SLS and poor audio quality. While a small sample size limits the ability to draw substantial conclusions, the evidence reveals a strong enough difference between the elicitation procedures to warrant further research exploring the effects of sampling method on lexical diversity in the early adolescent population. Future research may include replicating the current study with an entire sixth grade population. Future studies

could also utilize these same sampling methods with another student population demonstrating specific language impairments. Further, an adapted DM is being created to elicit academic language from science, technology, engineering, arts, and mathematics content areas.

Conclusion

The evidence indicates the DM provides a more holistic view of LD than the traditional method by considering six ecological components that are reflected in typical language use. The DM may be an effective alternative (than typical measures such as interviews, story generation, and story retelling) for eliciting lexically diverse spoken language samples in the early adolescent population (Kaspar, Crammond, Hayward-Mayhew, & MacKinnon, 2013; Nippold, Hesketh, Duthie, & Mansfield, 2005). Further, the ecological approach to LD analysis offers a more in depth picture of the lexical diversity that early adolescent children are exhibiting in spoken language samples. While future research is necessary to validate these claims, there is a need for effective elicitation and analysis procedures to prevent adolescents from being at risk in academic, social, and practical areas where complex language abilities are required (Nippold, 2014).

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APPENDIX A: EXAMPLES OF ILLUSTRATED DIXIT CARDS

