INCREASING THE VOCABULARY DIVERSITY OF

THREE YEAR-OLD CHILDREN THROUGH PLAY:

A PARTS-OF-SPEECH APPROACH

by

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INTRODUCTION

Literature Review

In 2011, approximately 1.4 million children ages 3-21 were served under

IDEA for "speech and/or language impairments". This does not include the large

number of children with impairments who were not identified nor referred, those

who were not covered under IDEA, and those whose speech and language

conditions were secondary to another condition (Power-de Fur, 2011;US Dept of

Education, 2012). There were 73.9 million children in the US that year (Federal

Interagency Forum, 2011), which means that approximately 1 out of every 74

children received speech and/or language therapy. These numbers show the high

prevalence of speech and language disorders among American children.

A language disorder is defined as, "The impaired comprehension and/or use

of spoken, written, and/or other symbol systems. The disorder may involve the

form, content, and/or function of language in communication" (American Speech-

Language Hearing Association, 2008). Because language allows people to "transmit

ideas and desires to one another" (Owens, 2008), children with language deficits

have a more difficult time communicating with those around them. If not corrected,

studies show that these deficits can persist into adulthood, possibly leading to a

variety of social, behavioral, and academic problems (Chuang, 2011).

Nickola Wolf Nelson (2010) names vocabulary as one of four "goal areas"

that should be directly targeted in preschool language intervention, and some

evidence shows that between 18 months and 6 years, children learn an equivalent of

one word for every hour they are awake (Santrock, 2011). That means a child who is

awake for 12 hours a day will learn almost 20,000 new words during this critical

period! There is a great amount of variability in what is considered a "normal-sized"

vocabulary for young children. According to research, a normally-developing 18-

month old can produce anywhere from about 22 to 50 different words (Hoerning &

Retherford, 2010). However, researchers agree that consciously helping a child

develop an ample vocabulary during this time is the key to later success. Vocabulary

development is an important part of reading comprehension, so if a child enters

elementary school with a limited vocabulary, he or she is already at risk for reading

problems (Santrock, 2011). For this reason, the 3 to 5 year age range is the

opportune time to identify and correct vocabulary deficiencies, as well as

other language delays.

Methods of Assessing Language

Speech-language pathologists (SLPs) are encouraged to use both formal and

informal methods to sufficiently assess a child's language at the preschool age

(Nelson, 2010). Some formal tests that include vocabulary assessment are the

Boehm Test of Basic Concepts-Preschool, 3rd Edition (BTBC-P3), the Expressive One

Word Picture Vocabulary Test, 2000 Edition, and the Bracken Basic Concept Scale,

3rd Edition (BBCS-3), which separate the receptive and expressive aspects of

language into two tests (Nelson, 2010). These, plus many others, are helpful to SLPs

in gathering normative data on a client. However, vocabulary is too complex to be

adequately assessed by a standardized test alone, even in preschool-aged children.

Many tests are noun-based and depend on visual aids, which limit the test to words

that can be represented with a simple picture (Nelson). This would most likely leave

out the more abstract parts of speech, such as adverbs (quickly, loudly) and pronouns (he, us). The SLP, as a result, would get an incomplete picture of the child's lexicon. Another problem with some frequently used tests, such as the aforementioned <u>Expressive One Word Picture Vocabulary Test</u>, is that they are not standardized for very young children; other standardized tests are not standardized to include culturally diverse populations. Also, the tests must be administered according to very specific rules, or the data may be compromised. If an SLP makes a substantial mistake, she cannot simply retest the child, because he has already been exposed to the material. Whether it is sickness, a tantrum in the car, or lack of sleep the night before, factors other than a lack of ability can cause a child to perform poorly on a test. Young children are inconsistent, yet standardized tests do not account for this potential problem. This is where informal testing fills in the gaps. To informally test a child's expressive language, specifically their vocabulary development, a SLP collects a language sample.

Researchers in the child development field, such as Piaget and Vygotsky, cite play as an important aspect of learning for pre-school aged children (Santrock, 2011). It has been linked to many positive outcomes, such as enhanced cognitive abilities or increased levels of creativity and imagination. However, play is not just another method of learning. A study by Sualy, et al. showed that play and language develop at similar rates, especially in young children. "As play increases in complexity, so do language use and vocabulary development" (Sualy et.al, 2011). Collecting a language sample is normally accomplished through play, because it allows the clinician to get a clear picture of the client's vocabulary in a natural

setting. The Early Childhood Speech and Language Program-Level I Classroom is also play-based.

TTR as a Method of Assessment

Type Token Ratio (TTR), introduced by Mildred Templin in 1957 (Templin, 1957) is one widely used method of analyzing expressive vocabulary diversity in spontaneous speech samples, and was applied to the samples of the children who attended the Early Childhood Speech & Language Program (ECSLP) – Level I at the Miller Speech & Hearing Clinic (MSHC). TTR requires the analyst to obtain a 50-utterance sample and separate the words into part-of-speech categories (nouns, adverbs, etc); if a word is used more than once, a tick mark is made by that word. After assigning each word in the sample to a column, the analyst adds up the number of different words and total words in each column, then in the sample as a whole. The number of different words is divided by the total number of words, and the resulting decimal is the TTR.

In Templin's study, she found that although the number of words varied according to developmental age, a ratio of 1:2 was consistent among the participants (Retherford, 2007). A decimal greater than .5 indicates a vocabulary more diverse than normal, and decimal around .5 is considered appropriate. If a child has a significantly lower number, it could indicate a deficit in language skills; however, an unusually large number does not necessarily mean that the participant has high vocabulary diversity. It may instead disguise abnormally short utterances or a highly non-verbal child (like some of the participants in this study). As the length of utterances increases, words like "the" and "is" are inevitably repeated,

which lowers the TTR; this could close the gap between normally-developing children and those with a language impairment, hiding "important linguistic differences" (Watkins, 1995).

Because of this flaw, some recent research discourages the use of TTR in the traditional manner (Nelson, 2010), and instead encourages counting the Number of Different Words (NDW) in a sample using a computerized language sample analysis tool. These computer programs can be expensive, and therefore not easily accessible to everyone; analysts also need to be trained to use the programs, and that requires more money and time. When a language sample is analyzed using TTR, the NDW is found along the way (TTR = number of different words/number of total words). Templin's data on the mean number of total words and different words produced organized by age is useful and was considered along with the TTR when the study samples were analyzed (Retherford, 2007) (Watkins, 1995). The methods may be different, but the outcome is still the same; Templin simply takes it one step further and includes normative data on what ratio of different words to total words is appropriate for each age. While that ratio alone is not able to give a clear picture of a child's vocabulary, the data gained from using the TTR method can help one gain some understanding about that child's lexical growth.

The question this study is addressing is does a TTR analysis on the language samples of children enrolled in the ECSLP-Level I indicates that the program is effective in increasing vocabulary diversity? This study's purpose is to provide an answer for this question, as well as provide a foundation for future experimental studies.

<u>METHODS</u>

Level I Classroom

The Early Childhood Speech and Language Program (ECSLP) - Level I at Miller Speech and Hearing Center (MSHC) is a highly structured program that occurs for 90 minutes once a week during the fall and spring semesters. During each semester there are 12 classroom sessions and 25 individual therapy sessions. Six to eight 3-year-olds with speech and/or language disorders are paired with student clinicians who work with a specific child for the entire semester. Each child also attends individual therapy twice weekly for 30 minutes, and individual clinicians stay in weekly contact with classroom clinicians. The small class size and 1:1 client-clinician ratio allows each child to receive personalized instruction and assistance, even during large group activities. As the semester progresses, each clinician not only becomes familiar with the client's abilities, but is able to respond appropriately to the other children according to their individual levels of development.

A rotating schedule divides classroom responsibilities between the clinicians, and each clinician has a different role from week to week. Each activity (and accompanying vocabulary) is structured around both the weekly theme and a specific part of language, and the actual class time follows a set schedule (Fig. 1).

Fig. 1: Level I Classroom Schedule

Time	Activity
9:15-9:30	Free play – theme-related toys (emphasis on greetings, interaction, & language/articulation targets)
9:30-9:35	Opening – Large group to provide focus on the theme and introduce new vocabulary
9:35-9:45	Activity Table One
9:45-9:50	Large Group One – Phonological Awareness: rhyming, syllable counting, syllable blending, or sound blending
9:50-10:00	Activity Table Two
10:00-10:10	Snack Time
10:10-10:20	Activity Table Three
10:20-10:25	Large Group Two – Theme-based book or activity
10:25-10:35	Activity Table Four
10:35-10:45	Closing & Dismissal

As the children come in, clinicians involve them in approximately 10 minutes of free play. At this time, the individual clinician may introduce the child's individual speech and language goals for the day, tell him about the theme, and encourage him to use pragmatic skills to appropriately interact and play with his classmates. To begin class, the entire class participates in an opening activity in which the theme of the day is officially introduced with related concepts and vocabulary. For example, if the week's theme is transportation, each child may get a different picture related to transportation. The lead clinician then calls each child up to show the rest of the class his or her picture and talks about it. She may discuss the type of transportation, the color, the sound it makes, and who might drive it. This results in the children not only encountering new terms, but also building up a schema surrounding them.

After the opening, child-clinician pairs rotate to the different activity tables, each with a specific focus: verbs, adjectives, prepositions, and turn taking. During this time, the clinician incorporates the client's individual goals into the language-based activity at the table. These activities change each week according to the theme, allowing clinicians to introduce new vocabulary with every class. Preschool children frequently use fast mapping to learn new words after only one exposure, but gain a deeper understanding after multiple exposures (Cunningham, 2009) (Wagner, 2007) (Owens, 2008). Because of this, the clinician also encourages the child to use new vocabulary in the context of both the theme and the language goal to better facilitate the child's understanding of these new words. At snack time, children practice requesting different components of their snack and then more of their snack, which exercises their pragmatic language abilities.

There are two large group activities during each class as well. The first focuses on phonological awareness, which is the ability to detect or manipulate the sound structures of oral language. This consists of forming words after hearing them segmented into sounds or syllables (c + a + t = "cat", and yel + low = "yellow"), rhyming (what does "dog" rhyme with? "log"), and syllable counting (how many syllables are in "water"? two). According to Dr. C. Melanie Shuele, reading consists of two parts: recognizing words and understanding words. The latter is relies mainly on semantic knowledge (which comes through building up a child's vocabulary). The former is taught through phonological skills. Knowing the relationship between letters and the sounds they make, then building words with those sounds, is directly related to a child's reading ability. Studies show that children who do not have

strong phonological awareness skills have a more difficult time learning new words. They are unable to "decode" unfamiliar terms due to a lack of knowledge concerning phonics, and subsequently have a harder time learning to read (Wagner, Muse & Tannenbaum, 2007). Thus, this pre-reading skill is actively targeted in the Level I Classroom, which focuses on not only expanding the children's vocabulary, but also improving their language as a whole.

The second large group activity, one clinician reads a theme-related book to the children, who interact with the clinician. They may do so by making sounds (such as animal sounds in <u>Brown Bear Brown Bear</u>), placing felt pieces on a board at the front, or holding up a picture when their part of the story is read. This encourages them to be active participants instead of passive listeners during the reading. Studies show that teaching word meanings while reading a book (like in this activity), help students retain the learned vocabulary, as well as interpret unfamiliar words in the future (Biemiller & Boote, 2006).

For closing, the lead clinician has the class participate in one more small themed activity (similar to the opening), such as singing a song or doing a finger play, and the day's vocabulary is reviewed. The class then sings "The Goodbye Song", which involves the children singing and waving goodbye to their classmates. Parents pick up their children at the classroom door, which gives the clinician an opportunity to share some successes and areas of improvement, as well as things to work on and how to incorporate the weekly lesson into everyday activities. Parents also receive information and retention tips through a classroom letter handed out by clinicians each week, and are encouraged to observe the classroom as well.

Although parents do not participate during the actual class, the practice they do with their child at home can only help them improve; therefore, parent-clinician interaction is an important part of the child's success in the program.

Sample

The sample of children chosen for this case study consists of seven boys and one girl with varying degrees of speech and/or language delays and disorders. The age of participants at time of enrollment ranged from 2 years, 11 months to 3 years, 11 months, with an average age of 3 years, 2 months. The average MLU of the participants was 2.97, which is lower than age-appropriate norms. These children attended Level I Classrooms at the Miller Speech and Hearing Center (MSHC) over the course of two years; 4 more children attended the class each week, but because they were either non-verbal or highly unintelligible, clinicians were only able to obtain one speech sample or were unable to obtain a usable sample during the semester. Two of the students had a documented hearing loss, and one of those students received Auditory Verbal therapy while in the Level I Classroom.

Procedure

This study used two language samples taken by each child's individual clinician, one pre-therapy in September and one post-therapy at the end of November. The original audio sampling footage was not available, so transcriptions written by those clinicians were used. The samples were first typed out for neatness and clarity, and then analyzed by hand using the Type Token Ratio (TTR) worksheet from *Guide to Analysis of Language Transcripts: 3rd Ed* (Retherford 2007)(Appendix A). This involved assigning each word in the sample to a category depending on its

part of speech. The rules in *Guide to Analysis of Language Transcripts: 3rd Ed* (Retherford 2007), along with 4 additional rules (Appendix B), were used to determine the part of speech for words with multiple meanings (such as "to") and maintain sampling consistency. If a word occurred in the sample more than once, a tick mark was placed by the word.

When all words were assigned to a category based on part of speech, the total number of words and different words were found in each category, then in the sample as a whole. Dividing the number of different words by the total number of words in the sample resulted in the Type Token Ratio. This measure can only be applied to the Total Number of Words in a sample, but because the sample is separated into individual parts of speech during TTR calculation and the ECSLP-Level I Classroom concentrates specifically on parts of speech during therapy, this study included three of those as well: nouns, verbs, and adjectives.

The design of this study was a factorial design with repeated measures on the variables of total words, nouns, verbs, and adjectives, where the factor was measurement period (pre-therapy vs. post-therapy). The mean and standard deviation of each variable was calculated. Then paired samples t-tests were applied to the dependent variables. The level of significance used for all variables was 0.05.

<u>RESULTS</u>

The analysis looked at the vocabulary diversity of language samples from children enrolled in the ECSLP-Level I Classroom and separated into four categories: Total number of different words, number of different nouns, number of different verbs, & number of different adjectives. Other categories were used in the TTR analysis, but were not included in this study.

On average, the children spoke approximately 15 more different words in post-therapy sampling than in pre-therapy sampling, increasing the mean from 70 to 84.75. Nouns saw the greatest growth of the three part-of-speech categories, with a mean increase of 7.75 words. Adjectives increased a little less than half of that at 3.375 words, and verbs remained constant from pre to post-therapy. At the beginning of the semester, the total number of different words used by each child ranged from 34 to 93. This shrank slightly to a range of 62 to 104 by the end of the semester. Ranges for the rest of the categories remained similar throughout the semester.

There were two outliers in the sample of eight participants. One participant achieved much higher numbers than the others. For instance, the mean increase in total different words pre-therapy to post-therapy for the other seven children was 10.29, but this child's sample increased by 46 words. The other participant's word count decreased in every measured category except for total words, which grew by only three words (compared to the mean increase of 14.75).

Every participant increased in Number of Different Words used pre to post-therapy. All but one (the aforementioned outlier) used more nouns as well. Verbs

and adjectives, however, were mixed. In both categories, four participants

experienced an increase and three a decrease.

Results from t-tests revealed a significant increase in mean number of total

words used pre-therapy (x = 70, SD = 21.88) to post-therapy (x = 84.75, SD = 15.14)

(t[1,7] = -2.95, p = .021), as well as in mean number of nouns used pre-therapy (x =

16.63, SD = 5.68) to post-therapy (x = 23.13, SD = 7.12) (t[2,7] = -3.27, p = .014). The

change in mean number of adjectives used pre-therapy (x = 9.13, SD = 5.79) to post-

therapy (x = 12.75, SD = 2.31) was not significant (t[3,7] = -1.80, p = .115). The mean

number of verbs used pre-therapy and post-therapy remained constant (x = 17.38)

and was not significant (Fig. 2).

Figure 2: Number of different words used in pre and post-therapy language samples,

total & separated into part-of-speech categories

		Mean (*x*)	*N*	*SD*	*t*	Sig-2
Pair 1	Wordspre	70.00	8	21.88	-2.95	.021
	Wordspost	84.75	8	15.14		
Pair 2	Nounspre	16.63	8	5.68	-3.27	.014
	Nounspost	23.13	8	7.12		
Pair 3	Verbspre	17.38	8	7.89	0.00	1.00
	Verbspost	17.38	8	6.80		
Pair 4	Adjpre	9.13	8	5.79	-1.80	.115
	Adjppost	12.75	8	2.31		

<u>DISCUSSION</u>

Findings

This study looked at the effectiveness of the ECSLP-Level I regarding an increase in vocabulary diversity. Test results revealed a significant increase in total words used and in the number of nouns. There was not a significant increase found for adjectives or verbs. This latter finding may be due to the introduction and use of more complex parts of speech, such as conjunctions and *wh*-words, which were not measured. As a result, participants use early parts of speech, such as verbs, less often. This would cause those categories to show little or no increase, even though the child is actually using a larger variety of words.

Although the prediction of greater diversity across all parts of speech did not prove true, the number of total words did increase significantly. This suggests that while the individual parts of speech show only minimal improvement independently, they added up to a meaningful difference in total words used. That difference indicates that the children in the ECSLP-Level I have improved their vocabulary diversity through therapy sessions over the course of one semester. Studies show that children are able to function at a higher cognitive level while engaged in play (Sualy, 2001), so the play-based activities of the ECSLP-Level I Classroom provide the perfect environment for growth regarding the targeted language goals.

Limitations

The limitation of this study was the language sampling methods. Individual clinicians, not classroom clinicians or researchers, recorded the language samples

used. Some individual clinicians had little experience with how to obtain an adequate language sample, as indicated by using inappropriate sampling methods (such as reading a book with the child), asking many yes/no questions, and counting repeat utterances as usable (which resulted either in a sample of less than 50 utterances or repeated words).

Variables regarding the classroom may have impacted client success. Although the Level I Classroom is set up to teach each part of speech individually, it is sometimes difficult to achieve this during a 10-minute interval. Each clinician targets six to nine goals each session, some of which do not directly involve parts of speech. Furthermore, some clinicians have to deal with reoccurring behavioral issues, which detract from the time spent on goals.

Suggestions for Future Studies

A suggestion for future studies would be to include more Level I children in the sample. Classroom records and samples extend back many more years, so including these children as well may yield more significant results. Also, the included children were only observed for one semester, but most participated in the Level I classroom for two semesters. Some of the children did not make much progress from August to November, but a preliminary look at samples from January and April of the following semester indicate even more of an improvement in their speech and language skills. Due to time constraints and to the fact that this was the first study conducted regarding the ECSLP-Level I Classroom, these samples were not included.

Adding children with normally developing language to the sample would provide a control group for future experiments. This would assist researchers in determining whether the increase in vocabulary was due to the therapy received in the Level I Classroom or a natural result of the children developing more complex language skills as they get older.

<u>CONCLUSION</u>

This study found that using a parts-of-speech approach to therapy found significant improvement in the total number of different words and different nouns used pre-therapy to post-therapy, as well as non-significant improvement in different adjectives. These results indicate that by itself, the Type Token Ratio is not sufficient to determine the efficacy of the Early Childhood Speech and Language Program-Level I Classroom on improving the vocabulary of the participants. However, using the data in addition to other methods of analysis can assist the Miller Speech & Hearing Clinic in assessing each child's level of growth, as well as the role that the ECSLP-Level I Classroom plays in that growth.

APPENDIX A

Guide
to Analysis
of Language
Transcripts

Templin's Type-Token Ratio

Name of Child _____

50 Utterances # _____

Nouns	Verbs	Adjectives	Adverbs	Prepositions
				Others

APPENDIX A CONT

Appendix A: Semantic Analysis Forms

Pronouns	Conjunctions	Negatives/Affirmatives	Articles	*Wh-* Words

Total Number of Different:

Nouns	_____
Verbs	_____
Adjectives	_____
Adverbs	_____
Prepositions	_____
Others	_____
Pronouns	_____
Conjunctions	_____
Negatives/Affirmatives	_____
Articles	_____
Wh- Words	_____
TOTAL NUMBER OF DIFFERENT WORDS	_____

Total Number of:

Nouns	_____
Verbs	_____
Adjectives	_____
Adverbs	_____
Prepositions	_____
Others	_____
Pronouns	_____
Conjunctions	_____
Negatives/Affirmatives	_____
Articles	_____
Wh- Words	_____
TOTAL NUMBER OF WORDS	_____

$$\frac{\text{Total Number of Different Words}}{\text{Total Number of Words}} = \_\_\_\_ = \_\_\_\_ = \_\_\_\_ \text{ Type-Token Ratio (TTR)}$$

APPENDIX B

Rules from *Guide to Analysis of Language Transcripts: 3rd Ed* (Retherford, 2007)
1. Contractions of subject and predicate, like *it's* and *we're*, are counted as two words. Also, the contracted verbs forms are counted as different words than their uncontracted forms. Thus, the *is* in "It's a big dog" is counted as a different word than the *is* in "It is a big dog".

2. Contractions of the verb and the negative, such as *don't,* are counted as one word. They can go in the Verbs or Negatives/Affirmatives category, but not both.

3. Each part of the verbal combination is counted as a separate word. Thus *have been playing* is counted as three words.

4. Semiauxiliaries are counted as only one word. Even though *wanna = want to*, count it as only one type in the Verbs category.

5. Hyphenated words and closed compound nouns are one word. Thus, *blackboard* is counted as one word and *fire truck* is counted as two.

6. Expressions that function as a unit in the child's understanding are counted as one word. Thus, *oh boy, all right,* etc. are counted as one word, while a noun like *Christmas tree* is counted as two words.

7. Interjections, such as *um, oh,* and *huh* are counted as one word.

8. Articles (*the, a, an*) count as one word.

9. Bound morphemes and noun and verb inflections are not counted as separate words. Thus, *cats* and *walked* are each counted as one word.

10. Forms of the same verb with tense and/or number difference are counted as different words. Thus, *make, makes,* and *making* are counted as three different words, not as three types of the same token.

Additional Rules
1. The phrases *right here* & *right there* are treated as 1 word, and are always adverbs of place

2. If a contraction of the verb and the negative, such as *don't*, occurs by itself, it is treated as a verb; if it is with another verb (ex: I don't like that) it is treated as a negation

3. *To* is always treated as a preposition, even in sentences such as "I am going to play".

4. If a child says a color by itself, it is treated as a noun (ex: What color do you like? Pink); If it is with another word, it is treated as an adjective (ex: The purple elephant)

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ABSTRACT

Language is the basis of communication between individuals; therefore, language disorders that are not treated can lead to academic, behavioral, and social problems. Vocabulary is an important aspect of language, and can be assessed with both formal and informal tests. Because formal vocabulary tests are mostly noun-based, are not standardized for all groups of children, and have strict rules, language sampling is sometimes used to evaluate a child's expressive language more thoroughly. One way to look at a language sample is with the Type Token Ratio (TTR), which uses the number of different words divided by total words to measure vocabulary diversity.

This study used TTR to examine the effectiveness of the Early Childhood Speech & Language Program (ECSLP)-Level I regarding an increase in vocabulary diversity. The language samples of eight preschool children in the program were assessed using TTR rules, and statistical analysis was applied to the results.

The mean number of total words used and different nouns used increased significantly, while the mean number of different adjectives used increased non-significantly. The mean number of different verbs used remained constant. A small increase in each part-of-speech category led to a large increase overall, which supports a positive relationship between the children's vocabulary diversity and their participation in the ECSLP-Level I Classroom. Future studies will expand the sample size by adding another set of samples from the current participants, including more participants with language disorders, and including participants with normally-developing language.