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## Developmental sentence scoring sample size comparison

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AN ABSTRACT OF THE THESIS OF Peggy Ann Callan for the Master of Science in Speech Communication, with an emphasis in Speech-Language Pathology, presented October 29, 1990.

Title: Developmental Sentence Scoring Sample Size Comparison

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

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In 1971, Lee and Canter developed a systematic tool for assessing children's expressive language: Developmental Sentence Scoring (DSS). It provides normative data against which a child's delayed or disordered language development can be compared with the normal language of children the same age. A specific scoring system is used to analyze children's use of standard English grammatical rules from a tape-recorded sample of their spontaneous speech during conversation with a clinician.

The corpus of sentences for the DSS is obtained from a

sample of 50 complete, different, consecutive, intelligible, non-echolalic sentences elicited from a child in conversation with an adult using stimulus materials in which the child is interested. There is limited research on the reliability of language samples smaller and larger than 50 utterances for DSS analysis.

The purpose of this study was to determine if there is a significant difference among the scores obtained from language samples of 25, 50, and 75 utterances when using the DSS procedure for children aged 6.0 to 6.6 years. Twelve children, selected on the basis of chronological age, normal receptive vocabulary skills, normal hearing, and a monolingual background, were chosen as subjects.

A language sample of 75 utterances was elicited from each child. The sample was divided and analyzed, resulting in three separate DSS scores for 25, 50, and 75 utterances. A t-test analysis was conducted to determine if a difference existed among the means of the scores.

The statistical analysis yielded no significant difference among the scores for the different sized samples. The results of this investigation indicate that a valid representation of a child's grammatical development may be obtained by computing a DSS analysis for 25 and 75 utterance language samples for children aged 6.0 to 6.6 years rather than using only a 50 utterance sample. As stated by Lee (1974), it is best to use the DSS as a method of charting a

child's progress during clinical teaching and to assist in determining when a child should be dismissed from remediation.

DEVELOPMENTAL SENTENCE SCORING

SAMPLE SIZE COMPARISON

by

PEGGY ANN CALLAN

A thesis submitted in partial fulfillment of the  
requirements for the degree of

MASTER OF SCIENCE  
in  
SPEECH COMMUNICATION  
with an emphasis in  
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1991

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for Graduate Studies and Research

## DEDICATION

This thesis is dedicated to my husband, Gene, and my children, Taylor and Zachary, who provided support and encouragement throughout this project. Thank you for your independence, flexibility, and fondness of cold cereal for dinner.

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## CHAPTER I

### INTRODUCTION AND STATEMENT OF PURPOSE

#### INTRODUCTION

For years, researchers of child language have demonstrated that one of the most effective ways to learn about children's acquisition of language is to observe their spontaneous speech under natural conditions. Much information is available from children's spontaneous speech which is often not obtainable from their performance on formal tests (Lyman, 1986). However, until recently, sampling a child's spontaneous speech was recommended only as a supplement to the administration of standardized tests. Perhaps the reason for this is that documentation of a language problem requires the rigor that a standardized instrument provides (Barrier-Blackley, Musselwhite, & Rogister, 1978).

In 1971, Lee and Canter developed a systematic tool for assessing children's expressive language: Developmental Sentence Scoring (DSS). It provides normative data against which a child's delayed or disordered language development can be compared with the normal language of children the same age. A specific scoring system is used to analyze a child's use of standard English grammatical rules from a tape-recorded sample of their spontaneous speech during conversation with

a clinician.

The corpus of sentences for the DSS analysis is obtained from a sample of 50 complete, different, consecutive, intelligible, non-echolalic sentences elicited from a child in conversation with an adult using stimulus materials, pictures, and toys in which the child is interested. The criteria of 50 sentences has been established on the basis that it is a reasonable and realistic number to expect from even an untalkative, language delayed child during a clinic session (Lee, 1974).

Increasingly, clinicians are looking closely at children's spontaneous language (Lee & Canter, 1971). Since its development, the DSS has been used extensively as an analytical tool in studying children's grammatical complexity (Longhurst & File, 1977). However, the clinical usefulness of a language sample analysis as indices of children's linguistic development is often limited by the expenditure of time required to record and analyze the recommended 50 responses (Darley & Moll, 1960). Statisticians have proven that the reliability of a measure increases as the size of sample of behavior increases. Perhaps it is necessary to obtain language samples larger than 50 utterances from very young children because of their limited language skills, and conversely, rely on smaller samples for older children. When using any quantitative measure of spontaneous language, such as DSS, it is important to know what size a sample must be in

order to attain a particular level of reliability (Johnson & Tomblin, 1975). A study by Lee and Koenigscknecht (1971) concluded that reliabilities of all DSS measures increased with age. This finding indicates that reliabilities at different ages may be different.

There appear to be limited studies reported in the literature investigating the extent to which reliability varies dependent upon the DSS sample size. The need exists to provide comparative data from different sized language samples, with various age groups, in order to answer the question of how large a sample of children's connected speech must be elicited in order to obtain reliable scores representing the structural complexity of linguistic utterances.

#### STATEMENT OF PURPOSE

The purpose of this investigation was to compare the scores derived from three different sized language samples using the Developmental Sentence Scoring (DSS) procedure for children aged 6.0 to 6.6 years.

The question this study sought to answer was:

Is there a significant difference among the scores obtained from language samples of 25, 50, and 75 utterances when using the Developmental Sentence Scoring (DSS) procedure for children aged 6 to 6.6 years?

## CHAPTER II

### REVIEW OF THE LITERATURE

Oral language sampling has been a fundamental research and clinical technique in the study of child language for almost half a century. Today, clinicians have continued to use language sampling during speech and language evaluations to assess a child's expressive language maturity, and to provide an ongoing monitoring of language learning (Broen, 1988; Lund & Duchan, 1988).

This review of the literature provides a brief historical summation of the different methods used for elicitation and transcription, and measures used in the analysis of oral language samples. Information pertaining to the effects of sample size on the reliability of language measures and the need for further research with different age groups are addressed.

### ELICITATION METHODS

The use of elicited production procedures are often helpful when specific aspects of language are targeted for analysis, when frequency of occurrence in a clinical setting is unlikely, and where time is limited (Miller, 1981).

Elicitation procedures generally involve constructing

situations in which the child is likely to emit the desired language behavior. There are three commonly used methods for obtaining samples of expressive language from a child: spontaneous, imitation, and sentence completion. A spontaneous language sample generally involves an unstructured situation in which a child converses freely with a clinician or while describing toys, pictures, and/or stories. During sentence completion, the child is required to provide the missing word in a sentence, e.g., Bankson Language Screening Test (Bankson, 1977). Language sampling through imitation consists of instructing the child to imitate sentences which progressively become more grammatically complex, e.g., Carrow Elicited Language Inventory (Carrow, 1974).

While spontaneous language sampling is most commonly used, a major problem with this technique is the lack of a standard method (Fujiki & Willbrand, 1982). Spontaneous language sampling is also considered to be time consuming and easily influenced by variables such as stimulus and setting. The elicitation methods of sentence completion and imitation are often viewed as favorable as they are standardized, less time consuming, and easily structured for sampling targeted aspects of language.

There are numerous studies reported in the literature which have attempted to determine whether one method of elicitation is superior to another; the results, however, have been inconclusive. Longhurst and Grubb (1974) found that less



structured, conversational settings elicited language of greater quantity and complexity than more structured, task oriented settings. These results were paralleled by Labov's (1970) study which indicated that children's language was richer in content, ideas, and grammatical complexity when elicited by an unstructured interaction. Contrary to these findings, Fraser, Bellugi, and Brown (1963) studied children's control of grammatical complexity, and found their imitations to be superior to their spontaneous productions.

The results of studies comparing methods for elicitation of language samples remains controversial. Lee and Canter (1971) advise that certain elicitation methods are more effectively used with children of specific age groups, capabilities, and socioeconomic status. Therefore, procedures for elicitation must be carefully selected as they are clinically significant in establishing maximum verbal output (Baker & Nelson, 1984; Tyack, 1973; Lahey, 1988).

#### TRANSCRIPTION METHODS

Once the language sample has been elicited and recorded, a hand written transcript is needed. According to Tyack and Gottsleben (1974) the sample should be transcribed, whenever possible, by the same person who collected the sample from the child, as this person may recall important contextual information. For the same reason, the sample should be transcribed as soon as possible after the recording session.

Transcription is often tedious and time consuming since all meaningful elements must be included to assure accuracy of the resulting data. The transcription should note unintelligible utterances, imitations, false starts, hesitations, and incomplete sentences as they all have potential clinical value (Miller, 1981).

Another important part of preparing transcripts is the segmentation of the sample into discrete units of length, corresponding to phrases, clauses, and sentences. Several investigators have designated specific guidelines for segmentation in an attempt to produce standardized procedures. McCarthy (1930) regarded a response to be a separate unit if it was preceded and succeeded by pauses. Siegel (1962) describes a conversational unit as being bound by a pause or by some change in inflection. Another proponent of using intonational cues to determine response boundaries was Lee (1974). She also developed a protocol for segmenting compound sentences.

Past researchers of language sampling have often failed to control variables and/or report specific methodology used for elicitation and transcription. Consequently, standardization and reliable comparison of studies remains difficult.

#### MEASURES UTILIZED IN THE ANALYSIS OF ORAL LANGUAGE SAMPLES

Over the years, a variety of measures have been developed

for analyzing oral language samples. The procedures used are selected according to the clinical question(s) being asked (Barrie-Blackley et al., 1978). Early researchers studied the length of a child's utterance, while later studies focused on the complexities of grammar.

### Response Length

Mean Length of Response. Mean length of response (MLR) refers to the measurement of the number of words per response averaged over a sample of 50 responses (Shriner, 1969). Nice (1925), one of the first researchers to use MLR, reported it to be the most useful single criterion for assessment of language development. McCarthy (1930) used MLR as her main measure of children's linguistic achievement, calling it the simplest and most objective measure of linguistic maturity. A study conducted by Shriner and Sherman (1967) evaluated six frequently used expressive language measures and concluded that MLR was the most useful measure among those studied. However, Shriner (1969) later reported a decline in use of MLR as it does not provide enough information about morphological and syntactical changes which occur with age.

Mean Length of Utterance. Mean length of utterance (MLU) is defined as the average sentence length as measured in morphemes, rather than words. Brown (1973) reported it to be the most efficient indicator of syntactical development for children with a MLU under five. Additionally, MLU has been highly correlated with psychological scaling judgements of

development (Shriner, 1969). The use of MLU places more emphasis on linguistic complexity than does MLR, presumably making it a more sensitive measure, however, it has been found to have limited reliability when situational variables are not closely controlled during the elicitation of the language sample (Barrie-Blackley et al., 1978).

Other Measures of Utterance Length. Longhurst and Grubb (1974) measured children's expressive utterances based on the total number of words. Additional measures relied on the number of one word responses and the mean of the five longest responses (Minifie, Darley, & Sherman, 1963).

### Structural Complexity

Researchers found that measures of response length did not provide important information regarding the syntactical complexity of a child's expressive language. As stated by Barrie-Blackley et al. (1978), a language sample may contain two sentences which are the same length, but they may be very different in terms of internal complexity. Consequently, measures were developed to assess structural complexity.

Structural Complexity Scale. The Structural Complexity Scale (SCS) was designed by McCarthy (1930) to measure both grammatical complexity and completeness. The utterances are divided into categories of complete or incomplete responses. The complete sentences are grouped according to type of sentence and type of subordination. The incomplete sentences are grouped based on the type of omission.

Length Complexity Index. Miner (1969) developed the Length Complexity Index (LCI) to analyze sentence length and complexity according to a numeric weighing system. The child's final score is the sum of points assigned for noun-phrases, verb-phrases, and additional points for questions and negatives, divided by the number of sentences. Barlow and Miner (1969) compared reliability across time for MLR and LCI and found the LCI to be a more consistent measure than the MLR, reporting that the LCI was affected least by differences in methods of elicitation in their study.

Developmental Sentence Scoring. Lee and Canter's (1971) Developmental Sentence Scoring (DSS) is also a measure of sentence complexity. It was designed as an index of a child's use of grammatical rules during spontaneous speech. A corpus of fifty complete, different, consecutive, non-echoic sentences are included in the analysis. Weighted scores are assigned to a developmental order of the following eight grammatical classifications: indefinite pronouns and/or noun modifiers, personal pronouns, main verbs, secondary verbs, negatives, conjunctions, interrogative reversals, and wh-questions. The DSS technique is restricted to these eight categories as they have been found to give important information on developmental sequence and progressive learning. An additional point is added to the sentence score if the entire sentence is grammatically correct. The summation of the 50 sentence scores are averaged and a mean or

DSS score is computed.

Computer Analyses. Recently, speech-language pathologists have had access to several computer programs for language sample analysis. One widely used program is Parrot Easy Language Sample Analysis (PELSA) (Weiner, 1985). It is designed to analyze a language sample which has been entered via the keyboard using a coded system. PELSA performs the analysis by searching 16 different grammatical categories for frequency of occurrence within the language sample. The percentage of correct usage is also computed.

Entering the language sample into the computer continues to be time consuming; however, utilizing this program, a 50 item utterance can be analyzed and scored in approximately five minutes. Clinicians have found that the PELSA provides a thorough grammatical analysis as it not only includes the eight grammatical categories used in the DSS, but also scores an additional eight categories.

#### SIZE OF LANGUAGE SAMPLE

In the past, researchers have disagreed regarding the issue of how large an oral language sample must be in order to reliably represent a child's language skills. Nice (1925) suggested 100 sentences; McCarthy (1930), 50 sentences; Williams (1937), 40 sentences; and Schneiderman (1955), 15 sentences. More recently, Tyack and Gottsleben (1974) recommend collecting 100 utterances during language sampling,

stating that 100 utterances provide a more typical sample of a child's language than do samples of only 50 utterances. In addition, they report that small errors in the analysis procedure were less significant with 100 utterances than with 50.

Traditionally, a language sample of 50 utterances is used as many researchers consider this number to give a fairly representative sample of a child's linguistic skills in a relatively brief period of time, without tiring the child with prolonged observation (McCarthy, 1930; Lee, 1974).

Statisticians have demonstrated that the reliability of a measure increases as size of behavior is increased. When using quantitative measures such as the DSS, it is imperative to know what size a sample must be in order to attain a desired level of reliability (Johnson & Tomblin, 1975).

Barrie-Blackley, et. al. (1978) state that the number of utterances necessary for a reliable sample is dependent upon such variables as the measure used, the type of elicitation task, and the age of the subject. Lee and Koenigsnecht (1971) also suggest that reliabilities at different ages may be different. Their study indicated a tendency for the reliabilities of all DSS measures to increase with age.

There are few studies reported in the literature which have investigated the effects of sample size on the reliability of language measures. This does not appear to be an area that has been investigated recently. The only studies

which dealt specifically with sample size were those done by Darley and Moll (1960) on Mean Length of Response and Structural Complexity Score; Griffith and Miner (1969) on Length Complexity Index; Johnson and Tomblin (1975) on Developmental Sentence Scoring; and Layton and Stick (1979) on Mean Length of Utterance Measured in Morpheme Units. Darley and Moll (1960) found that the reliability of MLR scores based on 50 responses was adequate for most research purposes, however, the reliability of SCS values based on 50 responses represented less precision than is needed for research. Layton and Stick (1979) reported that a corpus of 15 utterances yielded adequate reliability for MLU when separated from the initial portion of a 50 utterance sample. In the study conducted by Johnson and Tomblin (1975) DSS reliabilities were computed for sample sizes of five to 250 sentences. They reported a significant difference among the scores for the different sized samples, and concluded that the smaller the language sample, the less reliable the score.

#### THE NEED FOR SAMPLE SIZE COMPARISONS FOR DSS

Although the DSS is a widely respected tool for measuring language development in children, the requirement of collecting, transcribing, and analyzing the recommended 50 utterances is often too time consuming and demanding for speech-language pathologists who test large numbers of children (Valenciano, 1981). According to Darley and Moll



(1960) the research and clinical usefulness of any measure of children's linguistic development is limited by the time required to record and analyze the responses. Consequently, the question arises as to whether equally reliable information can be obtained from an analysis of fewer responses. While quick administration and scoring are important, it is recognized that reliability is usually improved by increasing test length. In contrast, the Northwestern Syntax Screening Test (NSST) (Lee, 1971) was shortened from 20 test items to 11 items which resulted not only in a time saving and clinically valuable instrument, but it also received an improved reliability score.

There is an abundant amount of literature on the subject of oral language sampling analysis; however, the studies have generally not included the effects of various sample sizes on the reliability of DSS scores. As several reviews indicated, the need exists to determine the reliabilities of scores obtained from samples smaller and larger than 50 utterances and with varied age groups.

## CHAPTER III

### METHODS AND PROCEDURES

#### SUBJECTS

Twelve normally developing children, ages 6.0 to 6.6 years served as subjects for this investigation. They were chosen with no preference to the sex of the child from Cooper Mountain and Errol Hassell Elementary Schools, located in Beaverton, Oregon.

In addition to meeting the age requirements, children met the following criteria:

1. from monolingual, Standard American English speaking families;
2. normal hearing sensitivity as defined by audiometric screening at 20 dBHL (bilaterally);
3. normal reception vocabulary age which was consistent with chronological age plus or minus 6 months according to the Peabody Picture Vocabulary Test, Revised (Dunn, 1981).

Permission form letters describing the purpose of the study were sent to parents of potential participants (Appendix A). Children with returned, signed permission forms were screened for inclusion in the study.

#### INSTRUMENTATION

A portable Audiotone Au-1 audiometer ANSI 1969 was used to conduct the audiometric screenings. A Bell and Howell

Commercial tape recorder, Model 3185A and a Dynamic microphone attached, were used to tape record the language samples.

The Peabody Picture Vocabulary Test, Revised Edition (Dunn 1981), Form L, an instrument created to measure receptive vocabulary, was used to establish normal receptive vocabulary age, consistent with chronological age.

The Developmental Sentence Scoring (DSS) (Lee, 1974) procedure was used for analysis of each spontaneous tape recorded speech sample. The analysis of these samples is based upon the selection of fifty complete, consecutive, different, intelligible, non-echolalic utterances of subject-predicate form. The DSS utilizes scores in eight grammatical categories: indefinite pronouns and/or modifiers, main verbs, personal pronouns, secondary verbs, negatives, conjunctions, interrogative reversals, and wh-questions (Appendix B). The specific structures within each classification are assigned weighted scores ranging from 1 to 8 points, based on a general developmental order. An additional point is added if the entire sentence is correct in all respects, i.e., syntactically and semantically (Lee & Canter, 1971).

## PROCEDURES

### Screening

Hearing screening and administration of the Peabody Picture Vocabulary Test, Revised, Form L, were performed by the investigator upon receiving signed parental permission

forms for subject participation. The children were screened in quiet rooms at their schools. Information regarding fluctuating hearing disorders and the native language of each child's family was obtained by teacher report and investigator observation (Appendix C; Schnabel, 1979). Twelve children who met the screening and age criteria were chosen for inclusion in this study.

### Language Sample Collection

Language samples were elicited and tape-recorded by the investigator at the schools. The child and the investigator were seated at a table with the tape-recorder and microphone placed two feet away. A piece of felt material was placed under the tape recorder to minimize extraneous noise.

A language sample consisting of 75 utterances was collected during the visit. The investigator used open-ended questions and prompts in an attempt to elicit complete and syntactically varied sentence responses. The subject area for questions included home, school, future events, and imaginary situations.

Various toys and pictures were introduced to stimulate conversation when necessary. The toys used were a doll family and plastic furniture, a transport truck with cars in it and a small barn with farm animals. An assortment of commercially prepared picture cards were used for description tasks and story telling. Many of the children's responses were repeated for clarification and to avoid confusion in later

transcription.

### Transcription of Samples

The tape-recorded samples were transcribed by the investigator into typed transcripts (Appendix D; Mathis, 1970). Specific instructions were followed for combining and separating sentences, and for selecting the corpus for grammatical analysis (Lee, 1974). Sentences selected required a subject and verb, but did not need to be grammatically correct. Following transcription of the samples, a corpus consisting of 75 complete, consecutive, different, non-echoic, and intelligible sentences was selected and recorded onto the Developmental Sentence Scoring record form (Appendix E).

## DATA MEASUREMENT AND ANALYSIS

### Analysis of Samples

The Developmental Sentence Scoring (DSS) (Lee, 1974) was used by the investigator to analyze all language samples. Grammatical forms used by the child were assigned weighted scores ranging from one to eight. Scores were recorded in eight columns on the DSS record form representing eight categories of grammatical structures.

Each grammatical form met the requirements of adult, standard English (syntactical, morphological, and semantic) to receive credit. A sentence point was added if a sentence was acceptable by these standards. If a grammatical structure

was attempted, but lacked a requirement of standard English, an attempt mark (-) was given instead of a numerical score.

After the sentences were scored, a mean DSS score was obtained by dividing the total of the sentence scores by the number of sentences resulting in three scores which represent the division of the language sample into segments of 25, 50, and 75 utterances.

### Reliability of Data

All language samples were analyzed by this investigator in accordance with the DSS procedure. The investigator completed a course entitled "Developmental Sentence Analysis" offered at Portland State University, September, 1984. This course was taught by an associate professor holding a Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP).

Interjudge and intrajudge reliability was determined between the investigator and a speech-language pathologist with a CCC-SLP. A randomly selected language sample consisting of 100 utterances was presented to each judge for independent DSS analysis. Interjudge reliability was .99. Decisions were made about the analysis of various utterances during a calibration session between the two judges. The remainder of the analyses were then scored in accordance with these decisions.

One week later, the investigator randomly selected and scored 25 utterances from the sample utilized in the

interjudge comparison to determine an intrajudge reliability of 1.00.

### Analysis of Data

Three individual mean scores were computed by dividing the 75 utterance sample into three consecutive segments of 25, 50, and 75 utterances. Two-tailed t-tests for dependent means were then calculated using these scores to determine the significance of the differences among the DSS scores.

## CHAPTER IV

### RESULTS AND DISCUSSION

#### RESULTS

The purpose of this study was to compare the scores derived from different sized language samples using the Developmental Sentence Scoring (DSS) (Lee, 1974) for children aged 6.0 to 6.6 years. The question this study sought to answer was: Is there a significant difference among the scores obtained from language samples of 25, 50, and 75 utterances when using the DSS procedure for children aged 6.0 to 6.6 years?

Individual language samples consisting of 75 utterances were elicited from 12 children who met all subject criteria. The language samples were transcribed and analyzed according to the DSS protocol. Each child's 75 utterance sample was divided into three language samples by analyzing the first 25 consecutive utterances to determine a language score, then adding the score for the following 25 utterances to the previous 25 to determine a score for 50 utterances. This procedure was repeated for the final 25 utterances to form a sample of 75 utterances for developmental sentence scoring. The DSS scores for the 25, 50, and 75 utterance language samples were then compared using a two-tailed t-test analysis.



The descriptive data displayed in Table I indicate that there was no statistically significant difference beyond the .05 level of confidence among the three different sized language samples used for analysis.

TABLE I  
COMPARISON OF DSS SCORES FROM  
DIFFERENT-SIZED LANGUAGE  
SAMPLES FOR ANALYSIS

Number of Utterances	Mean	S.D.	df	t*
25	7.78	1.21	22	-.22
50	7.90	1.52		
25	7.78	1.21	22	-.54
75	8.06	1.38		
50	7.90	1.52	22	-.28
75	8.06	1.38		

\* Critical value of  $t = 2.074$

#### DISCUSSION

This study sought to determine the reliability of scores obtained from language samples smaller and larger than 50 utterances. It was designed to replicate Valenciano's (1981) study, using a different age group, to investigate the possible influence of age on sample size as well. Valenciano

sampled 12 children aged 4.0 to 4.6 years, while this study included 12 children, 6.0 to 6.6 years of age. Results from both studies conclude that samples smaller or larger than 50 utterances can validly represent a child's grammatical skills. The results of these studies, as well as the sample size, age of population, and experimental design, differed from those of Johnson and Tomblin (1975). A review of the literature conducted by this investigator revealed their study to be the only other research found which focused on the reliability of the DSS with different sized language samples.

The Johnson and Tomblin (1975) study sampled 50 children, aged 4.8 to 5.8 years. Their research indicates that increments in the sample size of a language corpus increases the reliability of a measure based on that corpus; therefore, they found a significant difference among the DSS scores obtained from samples of 25, 50, and 75 utterances.

Visual inspection of the raw data in this study (Appendix F) revealed that 75% of the subjects exhibited DSS scores which fluctuated less than one DSS point, indicating internal consistency across all sample sizes.

Subjects 1, 6, and 8 received higher DSS scores for their 25 utterance samples than for the 50 and 75 utterance samples; however, the latter samples were still within age level norms. This finding may have been influenced by fatigue or restlessness occurring in the latter part of the language sample.

The DSS scores of subjects 3 and 7 were compared with DSS age norms revealing that their scores fell below the 10th percentile for 25, 50, and 75 utterance samples, indicating that they may have received a false-positive rating in language delay. In this instance, regardless of sample size, the resulting scores were below age level norms. According to Lee (1974), children scoring close to the 10th percentile line need to be evaluated further. Lee cautions that the DSS is a measure of a child's spontaneous use of grammatical rules at a particular time in a particular setting, and the decisions about enrolling or continuing a child for remedial training should never be made on the basis of a DSS score alone as it was not designed as an initial diagnostic tool.

The grammatical categories presented in the 25 utterance samples were similar to those in the 50 and 75 utterance samples. Koenigsknecht's (1974) study supports this observation. He reported that the effects of warm-up and general adjustment to the conversational setting was not an indicator that the latter utterances in a corpus would yield significantly better grammatical usage.

All of the language samples were elicited in the same environment, and according to Lee's (1974) criteria for elicitation. High level grammatical forms were used by the clinician in an attempt to elicit such forms from the child. Picture stimuli was used on only one occasion in which the child "could not think of any more to say."

In summary, one may conclude that the difference among the scores from the three different sized language samples used in this study was not statistically significant. Therefore, when testing a similar population, a speech-language pathologist may use language samples that are shorter or longer than the 50 utterance sample recommended by Lee (1974) to obtain a valid overview of a child's grammatical development.

Based on the results of this study and similar findings reported by Valenciano (1981), clinicians who do not use the DSS because of the time required to elicit and score the required 50 utterances, can expect to obtain a representative sample of a child's grammatical skills when utilizing the DSS on a 25 utterance sample.

## CHAPTER V

### SUMMARY AND IMPLICATIONS

#### SUMMARY

Since 1925, researchers and speech-language pathologists have utilized oral language sampling and analysis to obtain information regarding the development of expressive language in children. A number of methods have been used to analyze the samples. Some have judged a child's language maturity based upon the length of the utterance (MLR, MLU), while others have focused on the grammatical complexity (SCS, LCI, DSS).

The DSS is the focus of the present study. Lee (1974) designed Developmental Sentence Scoring (DSS) as a specific scoring system used to analyze children's use of standard English grammatical rules from a tape-recorded sample of their spontaneous speech during conversation with an adult. In DSS, the sample is required to have 50 sentences containing subject and verb agreement.

There appear to be a limited number of studies reported in the literature which investigate the extent to which reliability varies dependent upon the DSS sample size. In 1981, Valenciano investigated the difference among the scores obtained from language samples of 25, 50, and 75 utterances

using the DSS procedure for children aged 4.0 to 4.6 years. The differences among the scores used in her study were not found to be statistically significant. These results conflicted with the findings of Johnson and Tomblin (1975) who reported that reliability scores increased as the DSS sample size increased.

Considering this, the present study sought to continue the investigation into the effect of language sample size on the DSS scores for children of a different age group. The purpose was to replicate Valenciano's (1981) study with children aged 6.0 to 6.6, to determine if results similar to those reported by Valenciano also were true for another age group. Twelve children, selected on the basis of chronological age, normal receptive vocabulary skills, normal hearing, and a monolingual background, were chosen as subjects.

A language sample of 75 utterances was elicited from each child. The sample was divided and analyzed, resulting in three separate scores for 25, 50 and 75 utterances. A t-test analysis was conducted to determine if a significant difference existed among the means of the scores.

The statistical analysis yielded no significant difference among the scores for the different sized samples. The results of this investigation indicate that a valid representation of a child's grammatical development may be obtained by computing a DSS analysis for 25 and 75 utterance

language samples for children aged 6.0 to 6.6 years rather than using only a 50 utterance sample. As stated by Lee (1974), it is best to use the DSS as a method of charting a child's progress during clinical teaching and to assist in determining when a child should be dismissed from remediation.

## IMPLICATIONS

### Clinical

In contrast to Johnson and Tomblin (1975), the results of the present study indicate that a 25 or 75 utterance language sample represents a valid overview of a child's grammatical development when utilizing the DSS procedure for children aged 6.0 to 6.6. Therefore, the speech-language pathologist does not need to be restricted to the 50 utterance sample recommended by Lee (1974), but may use the 25 utterance sample for DSS Analysis.

Clinically, the shorter sample may be used for screening purposes and to obtain information needed for remedial teaching. For diagnostic purposes, however, Lee (1974) emphasizes that the DSS should be used as part of an assessment battery, as the DSS score, when compared with the mean of a child's chronological age group, yields only limited and gross information about language development.

### Research

Considering the discrepancies among research findings, it becomes apparent that further investigation is needed to

determine the extent to which the size of a language sample effects reliability.

This study selected subjects from a "normal" population and from a narrow age range. As many speech-language pathologists evaluate and remediate children with varied disorders, it may be of value to continue this study using language samples from children with language delays, learning disabilities, and/or mild hearing impairments. The performance of children aged two to three years may also be of interest as many schools are implementing early intervention programs.

In conclusion, this investigator believes that further research with children from a variety of populations and age groups would contribute to the validity of this study as well as establish more complete data on the effect of sample size on reliability.



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**APPENDIX A**

**PERMISSION FORM**

## APPENDIX A

## PERMISSION FORM

I agree to let my child \_\_\_\_\_ participate as a subject in the study entitled "Developmental Sentence Scoring Sample Size Comparison." This study is carried out by Peggy Callan under the supervision of Joan McMahon, Thesis Director, Speech and Hearing Sciences Program, Portland State University.

The purpose of the study is to compare the scores obtained from language samples of 25, 50, and 75 sentences when using the Developmental Sentence Scoring procedure in order to determine which size gives the most useful information.

There are no risks or dangers inherent in the procedures of the study. To protect subject confidentiality, no names will be used when reporting study results. My child will be given a hearing screening, hearing vocabulary test, and then will simply participate in conversation with Peggy Callan. Subjects are free to withdraw from the study at any time, and may contact the Chair of the Human Subjects Research Review Committee, Office of Grants and Contracts, 303 Cramer Hall, PSU, 752-3417 with any concerns.

\_\_\_\_\_  
Signature of Parent/Guardian

\_\_\_\_\_  
Date

\_\_\_\_\_  
Child's Birthdate

Please return this form with your child tomorrow, indicating your approval. If you have any questions, please leave a message with the secretary at your child's school and I will return your call. Thank you.

Peggy Callan.

**APPENDIX B**

**DEVELOPMENTAL SENTENCE SCORING CATEGORIES  
AND REWEIGHTED SCORES**

## APPENDIX B

DEVELOPMENTAL SENTENCE SCORING CATEGORIES  
AND REWEIGHTED SCORES

	INDEFINITE PRONOUNS OR NOUN MODIFIERS	PERSONAL PRONOUNS	MAIN VERBS	SECONDARY VERBS
1	It, this, that	1st and 2nd persons: I, we, my, mine, you, your(s)	A. Uninflected verb: I <u>see</u> you. B. Copula, is or 's: He <u>is</u> red. C. is + verb + ing: He <u>is coming</u> .	
2		3rd person: he, him, his, she, her, hers	A. -s and -ed: <u>plays, played</u> B. Irregular past: <u>saw, saw</u> C. Copula: <u>am, are, was, were</u> D. Auxiliary <u>am, are, was, were</u>	Five early-developing infinitival complements: I <u>wanna see</u> (want <u>to see</u> ) I'm <u>gonna see</u> (going <u>to see</u> ) I <u>gotta see</u> (got <u>to see</u> ) Letme <u>[to] see</u> (let me <u>to see</u> ) Let's <u>[to] play</u> (let us <u>to play</u> )
3	A. no, some, more, all, lot(s), one(s), two (etc.) other(s), another B. something, somebody, someone	A. Plurals: we, us, our(s) they, them, their B. these, those C.		Non-complementing infinitives: I stopped <u>to play</u> . I'm afraid <u>to look</u> . It's hard <u>to do</u> that.
4	nothing, nobody, none, no one		A. can, will, may + verb: <u>may go</u> B. Obligatory do + verb: <u>don't go</u> C. Emphatic do + verb: I <u>do see</u> .	Participle, present or past: I see a boy <u>running</u> . I found the toy <u>broken</u> .
5		Reflexives: myself, yourself, himself, herself, itself, themselves		A. Early infinitival complements with differing subjects in kernel: I want you <u>to come</u> . Let him <u>[to] see</u> . B. Later infinitival complements: I had <u>to go</u> . I told him <u>to go</u> . I tried <u>to go</u> . He ought <u>to go</u> . C. Obligatory deletions: Make it <u>[to] go</u> . I'd better <u>[to] go</u> . D. Infinitive with wh-word: I know what <u>to get</u> . I know how <u>to do</u> it.
6		A. Wh-pronouns: who, which, whose, whom, what, that, how many, how much I know who came. That's what I said. B. Wh-word + infinitive: I know what <u>to do</u> . I know <u>when</u> to take.	A. could, would, should, might + verb: <u>might come, could be</u> B. Obligatory does, did + verb C. Emphatic does, did + verb	
7	A. Any, anything, anybody, anyone B. every, everything, everybody, every one C. both, few, many, each, several, most, least, much, next, first, last, second (etc.)	(his) own, she, oneself, whichever, whoever, whatever Take <u>whatever</u> you like.	A. Passive with <u>get</u> , any tense Passive with <u>be</u> , any tense B. must, shall + verb: <u>must come</u> C. have + verb + en: I've <u>eaten</u> D. have got: I've <u>got</u> it.	Passive infinitival complement: With <u>get</u> : I have <u>to get</u> dressed. I don't want <u>to get</u> hurt. With <u>be</u> : I want <u>to be</u> pulled. It's going <u>to be</u> locked.
8			A. have been + verb + ing had been + verb + ing B. modal + have + verb + en <u>may have eaten</u> C. modal + be + verb + ing <u>could be playing</u> D. Other auxiliary combinations: <u>should have been</u> sleeping	Gerund: <u>Swinging</u> is fun. I like <u>fishing</u> . He started <u>laughing</u> .



NEGATIVES	CONJUNCTIONS	INTERROGATIVE AUXILIARIES	WH-QUESTIONS
<p>it, this, that + copula or auxiliary be, 's, 're not: It's <u>not</u> mine. This is <u>not</u> a dog. That is <u>not</u> moving.</p>		<p>Reversal of copula: <u>Isn't</u> it red? <u>Were</u> they there?</p>	
			<p>A. who, what, what + noun: Who <u>is</u> it? What <u>is</u> he eating? What <u>book</u> are you reading? B. where, how many, how much, what...do, what...for Where <u>did</u> it go? How <u>much</u> do you want? What <u>is</u> he doing? What <u>is</u> a hammer <u>for</u>?</p>
	and		
can't, don't		<p>Reversal of auxiliary be: <u>Is</u> he coming? <u>Isn't</u> he coming? <u>Was</u> he going? <u>Wasn't</u> he going?</p>	
isn't, won't	<p>A. but B. so, and so, so that C. or, if</p>		<p>when, how, how + adjective When <u>shall</u> I come? How <u>do</u> you do it? How <u>big</u> is it?</p>
	because	<p>A. Obligatory do, does, did Do they run? They <u>is</u> bite? Didn't it hurt? B. Reversal of modal: Can you play? <u>Wasn't</u> it hurt? Should I sit down? C. Tag question: It's fun, <u>isn't</u> it? It isn't fun, <u>is</u> it?</p>	
<p>All other negatives: A. Uncontracted negatives: I can <u>not</u> go. He has <u>not</u> gone. B. Pronoun-auxiliary or pronoun-copula contraction: I'm <u>not</u> coming. He's <u>not</u> here. C. Auxiliary-negative or copula-negative contraction: He <u>wasn't</u> going. He <u>hasn't</u> been seen. It <u>couldn't</u> be mine. They <u>aren't</u> big.</p>			<p>why, what if, how come How <u>about</u> + gerund Why <u>are</u> you crying? What <u>if</u> I <u>won't</u> do it? How <u>come</u> he is crying? How <u>about</u> coming with me?</p>
	<p>A. where, when, how while, whether (or not), till, until, unless, since, before, after, for, as, as + adjective + as, as if, like, that, than I know where you are. Don't come <u>until</u> I call. B. Obligatory deletions: I run faster <u>than</u> you run. I'm <u>as</u> big <u>as</u> a man (he is big). It looks <u>like</u> a dog (looked). C. Elliptical deletions (score 0): That's <u>why</u> I took it. I know <u>how</u> I can do it. D. Wh-words + Infinitive: I know <u>how</u> to do it. I know <u>where</u> to go.</p>	<p>A. Reversal of auxiliary have: <u>Has</u> he seen you? B. Reversal with two or three auxiliaries: <u>Has</u> he been eating? <u>Couldn't</u> he <u>have</u> written? <u>Could</u> he <u>have</u> been crying? <u>Wasn't</u> he <u>having</u> been going?</p>	<p>whose, which, which + noun Whose car is that? Which <u>book</u> do you want?</p>

**APPENDIX C**

**QUESTIONS FOR TEACHERS**

## APPENDIX C

## QUESTIONS FOR TEACHERS

1. Has this child ever had ear or hearing problems? Please explain.
2. Has this child ever been taken to a doctor for an ear problem?
3. Has he/she ever had draining or running ears?
4. Would you say this child has had the problem: once; more than once; many times?
5. At what age did the parents of this child first discover the problem? At what age did it seem to go away?
6. What language is spoken in this child's home?

(from Schnabel, "Central Auditory Processing in Children with a History of Chronic Middle Ear Problems," 1979)

**APPENDIX D**

**TRANSCRIPT TYPIST INSTRUCTION**

## APPENDIX D

## TRANSCRIPT TYPIST INSTRUCTION

In a speech situation between an adult and a child, tape recordings have been made. These tape recordings are the only information we have regarding the conversation taking place between these two people; so, for this reason, it is critical that the typing be accurate. There are certain general and specific instructions that you need to adhere to at all times in transcribing these tape recordings.

## A. General Instructions

1. Use the letter A to designate utterances by the adult and use the letter C to designate a response by the child.
2. Do not use standard punctuation, other than apostrophes, which are to be used to indicate the possessive case or contractions.
3. Any response or part of response, i.e., episode, which you cannot comprehend after diligent effort to determine what is being said, omit that entire episode from the transcript, even one word in an otherwise intelligible response. Since the language of children is not predictable by adult standards, one should not over rely on context clues for unclear or missing words. Many factors may contribute to the utterance being unintelligible: too low an intensity of utterance, environmental noise, speech defect, two people talking at once, or the recorder is malfunctioning. Do note that an unintelligible episode has occurred.
4. The speech response need not be a complete thought; but, if all words are intelligible, include the response as one speech episode.
5. At times, you will find both the adult and child talking at the same time. First type the complete response of the person being interrupted, and then, type the other speaker's utterance.
6. Certain utterances are not meaningful words, but are vocal pauses, such as er, ah, and ah, um etc. Do not type vocal pauses.

7. Some words acoustically similar to meaningless interjections are considered as real words and should be typed, such as huh-uh, uh-huh, hm, or animal sounds which are used in lieu of the name of the animal in a thought. An example would be, "The grr is after the boy." Another example of a noise being an integral part of the response would be, "The cat goes meow."
  8. Word and phrasal repetitions are excluded if they represent natural non-fluencies as opposed to repeating for stress or elaboration. An example would be, "He he he went home." The underlined words in this example would not be typed.
- B. Determining and Designating a Vocal Response Unit
1. Usually, a vocal response unit is ended by a complete stop for breath.
  2. At times, it is indicated by a falling inflection.
  3. At other times, it is indicated by a rising inflection, such as in a question or exclamation.
  4. At times, you may be able to recognize that one speech episode is complete when one person stops talking and other other person beings.
  5. A vocal response unit may be the utterance of a single word, such as, uh-huh, if it is an affirmation, huh-uh for negation, huh for interrogation or oh for exclamation.
  6. A single word response that is not recognizable as a word or a word approximation is considered not to be a vocal response unit and should not be transcribed. As an example, if the response to the phrase, "The flag is red, white, and ..." was "dom," this would not be considered a vocal response; however, if the response was "boo," it is conceivable that this is a verbal approximation of "blue."
  7. When one simple sentence is followed immediately by another simple sentence with no pause for breath, the two are considered to comprise one sentence if the second statement is clearly subordinate to the first. Examples: "I have a sister she's in fourth grade" and "I see a car it's a Ford."
  8. Remarks which appear to be clearly enumerative, separated by pauses, are considered separate response units.

- C. How to Mark the Transcript
1. Indicate the beginning word of any speech episode by underlining it; and make the appropriate ending response which is a single slash (/) for a statement and a double slash (//) for a question.
  2. It is important that, even if the episode is composed of only one word, it must be underlined and followed by the appropriate slash mark.
  3. It is important to remember that each speaker must be designated appropriately and accurately.

(from Mathis, "Comparison of Amounts of Verbal Response Elicited from a Speech Pathologist in the Clinic and a Mother in the Home," 1970)

**APPENDIX E**

**DEVELOPMENTAL SENTENCE SCORING RECORD FORM**



## APPENDIX E

## DEVELOPMENTAL SENTENCE SCORING RECORD FORM

NAME:	Ind Tra	Per Pro	Main Verb	Sec Verb	Neg	Conj	Int Rev	Wh- ?	Sent Point	Total
BIRTHDATE:										
SENTENCE SAMPLE										
1. What is it?	1		1					2	1	5
2. Is that horse trucker?	1		1				-		0	2
3. This doesn't stand up very good.	1		6		7				1	15
4. I don't need that.	1	1	4		4				1	11
5. (After lunchtime), he needs to go to the truck.		2	2	5					1	10
6. The farmer will try.			4						1	5
7. He did try.		2	6						1	9
8. Other farmer did.	3		inc						0	3
9. I'm gonna play with this.	1	1	2	2					1	7
10. (The) baby is sleeping on the couch.			1						0	1
11. This truck takes to the doctor.	1		2						0	3
12. How (do you) open the truck?			-					5	0	5
13. (But) how does he drive them there?		2,3	6					5	1	17
14. Here's the doctor.			1						1	2
15. Get the farmer out.			1						1	2
16. The farmer needs to be at the doctor first.	7		2	7					1	17
17. He tried on the thing but it didn't work.	1	2	2,6		7	5			1	24

	Ind	Per	Main	Sec	Neg	Conj	Int	Wh-	Sent	Total
	Pro			Verb			Rev			
	Noun	Pro	Verb					?	Point	
18. He falled off.		2	-						0	2
19. (The) Doctor's fixing him.		2	1						0	3
20. Here we go.		3	1						1	5
21. She'll be all right.		2	4						1	7
22. (The) baby needs to go in beddie.			2	5					0	7
23. The other dad is all right.	3		1						1	5
24. There's another dad.	3		1						1	5
25. (The hospital said that) the mommy and the dad are all right now.			2			3			1	6
26. (Yeah) I got them.		1,3	2						1	7
27. Mommy needs to get into the truck.			2	5					1	8
28. Mommy has to walk.			1	3					1	5
29. (Yeah) she can take home.		2	4						0	6
30. This daddy can.	1		inc						1	2
31. She's gonna hold her little baby.		2,2	1	2					1	8
32. She has to take a bath.		2	1	3					1	7
33. (Ah) she can't get in the bath thing.		2	4		4				1	11
34. There she is.		2	1						1	4
35. She's all clean.	3	2	1						1	7
36. Where's the towel?			1					2	1	4
37. What's this?	1		1					2	1	5
38. (I bet) she can't sit on the couch.		2	4		4				1	11
39. (I bet) dad can.			inc						1	1
40. There's two dads.	3		-						0	3

	Ind			Sec			Int			Total	
	Pro	Noun	Per	Main	Verb	Neg	Conj	Rev	Wh-		Sent
		Mod	Pro	Verb					?	Point	
41. The other dad needs to get out.	3			2	5					1	11
42. Could you put dad out there?			1	6				6		1	14
43. Who wants to ride this horsie?	1			2	3				2	1	9
44. (If she falls off) she has to go to the doctor.			2	1	5					1	9
45. The baby hurt herself on the horsie.			5	1						1	7
46. She's gonna be all right.			2	1	2					1	6
47. The trucks go into the hospital.				1						1	2
48. The doctor says.				2						1	3
49. How can the baby get out?				4					5	1	10
50. There she is.			2	1						1	4

TOTAL 342  
Divide by 50 6.84

(from Lee, Developmental Sentence Analysis, 1974)

APPENDIX F

TOTAL POINTS AND DSS SCORES FOR EACH CHILD'S  
DIFFERENT-SIZED SAMPLES FOR ANALYSIS

## APPENDIX F

TOTAL POINTS AND DSS SCORES FOR EACH CHILD'S  
DIFFERENT-SIZED SAMPLES FOR ANALYSIS

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Subject #	25 utterances		50 utterances		75 utterances	
	Total Points	DSS Score	Total Points	DSS Score	Total Points	DSS Score
1	215	8.60	388	7.76	544	7.25
2	176	7.04	357	7.02	592	7.89
3	165	6.60	283	5.66	464	6.19
4	199	7.96	377	7.54	640	8.53
5	193	7.72	403	8.06	603	8.04
6	225	9.00	434	8.68	669	8.92
7	143	5.72	287	5.74	454	6.05
8	207	8.28	386	7.72	576	7.68
9	176	7.04	382	7.64	588	7.84
10	176	7.04	468	9.36	653	8.71
11	202	8.08	419	8.38	614	8.19
12	257	10.28	565	11.30	855	11.40