# SITUATIONAL VARIATIONS OF DISFLUENCIES AND LANGUAGE USAGE IN FIVE-YEAR-OLD MALES

A Thesis

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Master of Arts

Degree

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IN MEMORY OF

MY FATHER,

JAMES SAMUEL DEMO

who has been an inspiration

To the Graduate Council:

I am submitting herewith a thesis written by Laura Leigh Demo entitled "Situational Variations of Disfluencies and Language Usage in Five-Year-Old Males." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Speech Pathology.

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"Thank you Lord for giving me strength"

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ABSTRACT

This study was designed to compare the frequency of disfluencies and specific types of disfluency to length and complexity of language structure in the speech of five-year-old male nonstutterers in two speaking situations on three different days.

Six speech samples were recorded for each subject in a structured speaking situation and in a spontaneous speaking situation once a week over a period of three weeks. Speech samples from each child in each speaking situation were transcribed from the tape recordings by the examiner. Disfluencies were identified and classified by use of Johnson's (1959) categories of disfluencies. The total frequency of disfluencies was calculated as described by Darley and Spriestersbach (1978). The language structure in each speaking situation was analyzed using Shriner's (1967) Length-Complexity Index (LCI) as scored by Miner (1969).

In order to determine if there was a significant difference in the overall frequency of disfluencies between the two speaking situations on each day of recording, a two factor design for repeated measures analysis of variance procedure was used. Results indicated that the percentage of disfluency was significantly higher in the structured speaking situation. There was not a significant difference, however, in disfluency frequency among the three days.

The three most frequently occurring types of disfluencies were calculated for each speaking situation. For the group as a whole, the most frequently occurring types in the structured speaking

situation were interjection, revision, and word-repetition respectively, while in the spontaneous speaking situation they were part-word repetition, word repetition and interjection respectively.

A two factor design for repeated measures was used to determine if there were significant differences in Length-Complexity Index (LCI) scores between the two speaking situations on the three days of recording. Results indicated significantly higher LCI scores in the structured speaking situation. No significant difference was found in LCI scores among the three days. A Pearson product-moment correlation was used to determine the relationship between the overall frequency of disfluencies and LCI scores in the two speaking situations. No significant correlation was found in either speaking situation.

The results of this study support some previous findings reported in the literature regarding disfluencies and the relationship to language usage, while failing to support others. On the basis of the results, the following conclusions may be drawn:

1. There was a significant difference in the frequency of disfluencies between the two speaking situations. The subjects exhibited more disfluencies in the interview speaking situation than in the spontaneous speaking situation.
2. For the group as a whole, there was no significant difference in the frequency of disfluencies among the three days, however, individual variability existed.

3. For the group as a whole, the three most frequently occurring types of disfluencies were: interjection, revision, and word repetition for the structured speaking situation; and interjection, word repetition, and phrase repetition in the spontaneous speaking situation.
4. The five-year-old nonstutterers had significantly higher Length-Complexity Index (LCI) scores in the interview speaking situation than in the spontaneous speaking situation.
5. For the group as a whole, there was no significant difference in LCI scores among the three days, however individual variability existed.
6. Frequency of disfluency and LCI scores were not significantly related in either speaking situation.

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# CHAPTER I

## INTRODUCTION, REVIEW OF THE LITERATURE, AND SUMMARY AND STATEMENT OF THE PROBLEM

### I. INTRODUCTION

One of the major contributions to a clinical assessment of severity of stuttering is the frequency of the moments of disfluency. The more an individual displays irregular disfluent patterns, the more severe the problem appears to be. The measurement of frequency of disfluencies, whether it entails overall frequency of disfluencies, or total number of types of disfluencies is an important part of the evaluation and diagnosis of an individual's speech disfluency behavior. Emerick (1979) feels that such an evaluation should include measures of the relative frequency with which various features of the disfluency pattern occur. In extending the discussion of the role of frequency of disfluencies, the effect of varying conditions on the frequency of moments on nonfluency should be considered. Just as disfluent individuals and/or stutterers do not typically stutter on every word in a speech sequence, neither do they usually stutter in every speech situation (Bloodstein, 1981).

Another factor that has been associated with the evaluation of speech disfluency behavior has been the relationship between linguistic behavior and disfluency. Sentence structure, syntax, grammatical complexity, and other linguistic variables have been examined and related to disfluency behavior. Although much research has been conducted utilizing frequency of disfluency and linguistic

measurements, relatively few studies have been done concerning variations of disfluencies and language structure in varied speaking situations. Therefore, the purpose of this study was to compare the frequency of disfluencies and the language structure of preschool children in two different speaking situations.

## II. REVIEW OF THE LITERATURE

The literature reviewed in this chapter is divided into three sections: first, studies indicating the importance of disfluency frequency in the evaluation of stuttering; second, the variability in frequency of disfluencies; and third, the influence of language structure on disfluency frequency.

### The Role of Frequency of Disfluencies in the Evaluation of Stuttering

The frequency of disfluencies, demonstrated as a total number or percentage of instances of disfluent speech, is one of the most familiar measures to be used in research on the variability of stuttering (Bloodstein, 1969). The studies to follow are only a few of the many investigations conducted using frequency measurements.

Sander (1963) recorded speech samples containing different amounts of single unit (Sa-Saturday) and double syllabic repetitions and submitted the samples to 240 college students who 1) were asked to describe the speech, 2) tell whether it was defective, and 3) describe whether the speaker was a stutterer. Sander observed that the more single-unit syllabic repetitions there were in a

given sample, the more frequently that sample was judged as being stuttering.

In a 1973 study, Franklin Silverman investigated the frequency of disfluency behavior of elementary-school stutterers and nonstutterers. Fifty-six stuttering and 56 nonstuttering boys each read a passage and then told a story in response to each of ten Children's Apperception Test cards. The frequency of occurrence of each of the disfluency behaviors per 100 words spoken was determined for each child in each of the two tasks. Silverman's results indicated that while the stuttering children had a higher overall disfluency frequency on both tasks, there was considerable overlap between the two groups. Silverman concluded that many children considered to be stutterers are not sufficiently disfluent on speaking tasks to be reliably differentiated from nonstuttering peers.

Floyd and Perkins (1974) compared four preschool stutterers and twenty nonstutterers to determine if children who develop stuttering differ from normal-speaking children in frequency of syllable disfluency. The children were measured for frequency of syllable disfluency during thirty minutes of free play with their mothers. The mean percent of disfluent syllables for the stutterers was 9.98 whereas for the nonstutterers it was only 1.24. The fact that a large gap in the scores existed between the two groups suggested that the preschool stutterers and nonstutterers in this study were discretely different.

Hegde and Hartman (1979a, 1979b) looked at 72 college student listener responses to speech samples containing varying amounts of

interjections and word repetitions. More specifically, the following major questions were asked, 1) What frequency levels of interjections and word repetitions are involved in obtaining judgements of disfluent and/or stuttered speech?, and 2) At what frequency level of interjections and word repetitions do listeners recommend clinical speech services? The results of this investigation revealed that interjections and word repetitions, often considered to be normal may be judged so only within a certain frequency range. It can be assumed that the higher the frequency of certain types of disfluencies, the greater the judged severity of disfluency.

On most occasions, speech contains a considerable variety of interruptions or hesitations. The frequency of specified disfluency types has been the subject of various investigations. The first major analysis of disfluency types was conducted by Johnson (1959), where data on the disfluencies of stuttering and nonstuttering adults and young children were studied through transcriptions of tape-recorded speech samples. From the information obtained, the following system of classification of disfluent types of speech behavior was devised:

1) interjections ("uh," "er," "well")
2) part-word repetitions (repetitions of sounds or syllables of words)
3) word repetitions
4) phrase repetitions ("I was——I was going")
5) revisions ("I was——I am going")
6) incomplete phrases ("She was——and after she got there he came")
7) broken words ("I was g——(pause)——oing home")
8) prolonged sounds

This classification, often with minor variations, has been widely

used in obtaining measures of a speaker's disfluency as the total number of instances per hundred words read or spoken.

Young (1961) studied the relative importance of frequencies of occurrence of different types of disfluency in predicting ratings of severity of stuttering. Speech samples from 100 male stutterers were collected and analyzed in terms of frequency counts of each of a number of types of disfluency and the time in seconds required to speak 200 words. Analysis of the data indicated that the types of speech disfluency that appear to be associated with ratings of severity of stuttering are syllable or sound repetitions, sound prolongations, broken words, and words involving stress or tension.

Schiavetti (1975) conducted a similar study concerning the effects of type and locus of disfluency on sophisticated and naive listeners' judgements of stuttering severity, using equal-appearing interval scaling. Types and loci were systematically varied in artificial or contrived disfluencies. Results indicated that type of disfluencies significantly and systematically affected ratings; and therefore appear to be in agreement with previous research (Young, 1961).

## Variations in Frequency of Disfluencies

A great deal of information is needed concerning early stuttering and its relationship to normal disfluency. In addition we know even less about the variation in disfluencies among children, both those labeled as stutterers and those considered normal speakers.

According to Bloodstein (1981), the frequency of disfluencies/ stuttering behaviors varies in response to a number of situational factors including: audience size, listener reactions, concern about social approval, time pressures, degree of responsibility for relaying a meaningful message, and demands on motor planning. Frequency is also affected by the factors of attention (associated activities, emotional arousal, or strange sensory stimuli), tension, anxiety, and anticipation of stuttering.

There is a considerable amount of data which reveals that normal disfluencies in older children and adults have a tendency to vary under the same conditions as does stuttering. For instance, it has been shown that normal speakers display characteristics of the adaptation effect as do stutterers (Bloodstein, 1981). Other similar disfluency behaviors noted in stutterers and nonstutterers are the influence of response-contingent stimuli, rhythmic stimuli, and production under masking noise. However, there is far less information on young children than adults with regard to variations in frequency.

Davis (1940, cited in Bloodstein, 1969) studied the situations where sixty-two normal-speaking children produced speech repetitions of all types during an hour of free play in a preschool situation. She noted that speech repetitions occurred with great frequency under certain conditions; for example when the child was excited over his or her own activity, desired to direct the activity of other children or attract the attention of another child or the teacher, or wanted an object possessed by another child.

More recent studies have attempted to study the variations in frequency of normal childhood disfluency associated with variations

in the listeners or the speaking situations. In 1971, E.M. Silverman conducted a study of three 4-year-old nonstutterers in three different speaking situations: in homes talking with family members, in structured speaking tasks, and in a preschool classroom during free play. Each subject was recorded in each speaking situation and the total number of disfluencies were calculated and compared. Results revealed that the children's nonfluency frequencies were fairly stable from day to day and from situation to situation; however they did appear to vary systematically on a situational basis. All the children had a higher frequency of disfluencies in the home than in either the interview or the preschool.

E.M. Silverman (1972) conducted a follow-up study, increasing the number of subjects to ten children. The same procedures were followed with the exception that the situations compared were narrowed down to a structured interview speaking situation and a spontaneous speaking situation on each of three days spaced one week apart. The duration and frequency of nonfluencies were calculated for each sample. The distribution of disfluency types and duration were comparable in the two situations. The majority of subjects were more disfluent during the structured interview than in their preschool classroom each day. Silverman concluded, based on the findings of her two studies, that sampling preschoolers' speech disfluency in only one situation is inadequate for clinical purposes.

Martin, Haroldson, and Kuhl (1972) made a similar investigation, using a population of ten children between the ages of 3.5 and 4.5 years. In this study, the subjects conversed with a "talking puppet"

and with an adult female for ten 20-minute sessions. For ten minutes the child talked with the puppet, and for the remaining ten minutes the child spoke with an adult. Counts were made of the total number of disfluencies spoken by each child, and the total number of words spoken by each of the children, the adult, and the puppet. Results revealed that 1) the total number of words spoken by the children were stable across the ten sessions; 2) the children produced more words with the puppet than with the adult; 3) the percent of disfluent words produced were more stable, and 4) there was no significant difference in percent disfluencies by the children between the puppet and adult speaking conditions.

Ten children ranging in age from 3.5 to 5.0 served as subjects in Martin and Haroldson's (1975) study based on disfluencies of young children in private speech and in conversation. Observations were reported on two play situations where for ten minutes of each session the child was involved in play activities with an adult and for the other ten minutes the child played alone. The number of words spoken and the percent produced disfluently were stable across all five sessions. All subjects produced fewer words in the private speaking situation, but more words were disfluent in that condition. They concluded that the relationship between the speaking environment, the speaking purpose, and the speech fluency of children is complex.

As stated earlier, E.M. Silverman (1971, 1972) found that preschoolers tend to be more disfluent during an interview-like situation conducted by an adult than in the school classroom. In a subsequent study, Silverman (1973) offered the hypothesis that

perhaps language usage as well as the speaking environment was a factor in determining the amount of disfluency in a child's speech. Speech samples were collected from ten preschoolers in their classroom and in a structured interview. The language usage analyzed was determined as either ego-centric speech (no desire to influence the listener) or socialized speech (desire to influence the listener). Results indicated that 1) the children produced a higher percentage of words in the classroom than in the interview; 2) there was more nonfluency during socialized speech and 3) there was more fluency in the classroom than in the interview situation. She concluded that the function of the children's language usage influenced the frequency of their disfluency.

## Language and Disfluencies

There has been much research conducted with regard to the relationship between disfluencies and various aspects of language usage. A brief summary of these studies will be provided since so many of the studies have been presented and discussed in various other reviews of literature.

In 1938, Berry concluded that stuttering children were slow in acquiring language skills. She reviewed data on two aspects of speech development: 1) the beginning of speech or the first words, and 2) the development of intelligible speech which could be understood by persons outside of the immediate family. The records indicated that the stutterers differed significantly from the control group and were definitely retarded in the initiation of speech and the development of intelligible speech.

Silverman and Williams (1967) compared 22 stuttering and 22 nonstuttering children, all first graders, in terms of five measures of oral language development; number of one-word responses, mean length of responses, and the structural complexity score. Each child told a story in response to the Children's Apperception Test cards. Verbal responses were tape recorded. Results indicated that the mean scores for the stutterers were smaller than corresponding mean scores for the nonstutterers with the exception of number of one-word responses. The stutterers produced twice as many one-word responses as did the nonstutterers.

Muma (1971) looked at the syntax of fluent and disfluent speech in four year old children through a transformational analysis. The analysis examined: 1) the usage of matrix sentence types, 2) the distribution of kernel and transformed sentences, 3) the number of single-based transformations per sentence, 4) the number of double-based transformations per sentence and 5) a complexity analysis. The fluent and disfluent groups were not found to differ significantly in the number of complex transformations used. The disfluent group used fewer double-based transformations than the fluent group.

Westby (1974) studied the language performance of stuttering and nonstuttering children. Three groups of children with five kindergarten and five first-grade boys in each group were chosen for the study. A 100-word utterance-length language sample was obtained from ten stutterers, ten highly disfluent children and ten normally disfluent children. Lee's (1974) Developmental Sentence Score analysis was applied to all language samples. The results indicated

that 1) the stuttering and highly disfluent groups were more disfluent than the normal disfluent group; 2) the three groups did not differ significantly on the Developmental Sentence Score; 3) the stuttering and highly disfluent gorups exhibited more grammatical errors; and 4) the stuttering and highly disfluent groups had lower receptive vocabulary scores than the normal disfluent group. Westby postulated that there was the possibility that the stuttering and highly disfluent children were "outgrowing a language delay that may have been greater at younger ages."

Haynes and Hood (1977) obtained speech samples from thirty male and female nonstuttering children to look at language and disfluency variables. All samples were analyzed, using the Developmental Sentence Score (Lee, 1974), for number and types of disfluencies. Analyses were performed to determine if differences existed among the different groups (five males and five females between the ages of 46 and 50 months; five males and five females between 70-74 months of age; and five males and five females between 94 and 98 months of age), between sexes, and to determine the relationship between language and disfluency. No sex differences were found in either language or disfluency. No significant relationship was found between the disfluency and language variables studied.

In 1980, Pearl and Bernthal conducted a study concerning grammatical complexity and disfluency behavior of three and four year old preschool children. The effect of grammatical complexity on the occurrence of various categories of disfluency was investigated. Thirty normal children repeated after the examiner 30 sentences which represented a range of grammatical complexity.

The subjects produced more disfluencies on passive sentences than any other sentence type. These results suggested that when grammatical complexity is controlled, the relationship between disfluencies and complexity is affected. Pearl and Bernthal concluded that grammatical complexity affects the frequency and types of disfluencies in children.

In a more recent study, Colburn and Mysak (1982a) described the characteristics of developmental disfluency in nonstuttering children as language developed from single words through early multiword utterances. Spontaneous utterances of four nonstuttering children were analyzed for the occurrence of developmental disfluency from the time of one-word utterances through the emergence of beginning syntax. The frequency of total disfluencies and the frequency and distribution of specified disfluency types were computed for each child at each of four mean length of utterance (MLU) levels. Systematic changes in the disfluent speech of the four children were noted at each succeeding MLU level. In agreement with past literature on developmental disfluency, Colburn and Mysak found that the presence of disfluency is a normal occurrence in the speech of the young language-learning child.

In a related study, Colburn and Mysak (1982b) investigated the fluency of speech production when children from two to three years of age begin to combine single words into multiword utterances. From a corpus of over 47,000 spontaneous utterances from four nonstuttering preschool children who were beginning to use syntax, 4,881 multiword, disfluent utterances were identified. Semantic-syntactic structures

were identified among the disfluent utterances and differences in frequency of structures were examined. Systematic shifts were observed in the relative frequency of disfluency on semantic-syntactic structures across MLU levels for each child. Developmental disfluency shifted across structures systematically for each child and appeared to reflect a "practice effect" for those children beginning to learn syntax. The co-occurrence of disfluency with specific syntactic structures supported the conclusion that developmental disfluency was more strongly attached to the syntax of utterances than to the production of particular words.

## III. SUMMARY AND STATEMENT OF THE PROBLEM

Studies have shown that evaluation of overall frequency and frequency of specified types of disfluencies play a major role in the evaluation of stuttering. Review of the literature discussing variations of frequency in relation to situational differences indicate that the speaking environment does affect the frequency of disfluency. Also, language usage has been shown to influence the frequency of disfluency (E.M. Silverman, 1973; Muma, 1971; Pearl and Bernthal, 1980; Colburn and Mysak, 1982).

It should be pointed out that the majority of studies conducted concerning situational variation have limited the age of the subject population to three-and four-year-old children. It therefore seemed appropriate to analyze the frequency of disfluency among five-year-old children to determine if stability of fluency occurs with an increase in age. Further information was also desired on the relationship

between the frequency of disfluencies and the complexity of language usage of preschoolers in varied speaking situations.

The purpose of this study was to compare the frequency of disfluencies and the language usage in preschool children in two different speaking situations. Specifically, the following questions were asked:

1. Is there a difference in the overall frequency of disfluencies in five-year-old male children's speech between a structured speaking situation and a spontaneous speaking situation among measures taken on three different days?
2. Are there systematic differences in the frequency of disfluency types in five-year-old male children's speech between a structured speaking situation and a spontaneous speaking situation among measures taken on three different days?
3. Is there a difference in the language structure, as measured by Shriner's (1967) Length-Complexity Index, in five-year-old male children's speech between a structured speaking situation and a spontaneous speaking situation among measures taken on three different days?
4. Is there a relationship between language structure, as measured by the Length-Complexity Index, and overall frequency of disfluencies?

# CHAPTER II

# METHODS AND PROCEDURES

## I. METHODS

### Subjects

The subjects for this study were obtained from kindergarten and day-care centers in Knoxville, Tennessee. The ten subjects selected for this study met the following criteria: (1) age within the range of five years, zero months and five years, eleven months; (2) male sex; (3) member of the caucasian race; (4) normal hearing function as based on observations by the examiner, teacher, and/or parent; (5) normal receptive vocabulary age as measured by the Peabody Picture Vocabulary Test-Revised Form L; (6) absence of gross structural or functional oral anomalies which might interfere with speech production; (7) judged to be a nonstutterer by the examiner, teacher, and/or parent; and (8) intelligible speech skills as judged by the experimenter. In addition, the mother of each subject must have completed a high school education or above.

To determine which children met the selected criteria and would serve as subjects, initial screening tests were conducted. Form L of the Peabody Picture Vocabulary Test-Revised (PPVT-R) was administered to obtain a receptive vocabulary age. A score of 90 or above was accepted as normal.

To rule out subjects with gross deviations in oral structure and function, an oral-peripheral examination was performed. Adequacy of lip and tongue movements as well as lip, tongue, and palatal structures were judged by the examiner.

During the screening tests judgements were made by the experimenter, teacher, and/or parent regarding the normal hearing, nonstuttering and intelligibility criteria of the subjects.

## II. PROCEDURES

### Experimental Task

Six speech samples were recorded for each child. Each subject's speech was tape-recorded in a structured speaking situation and in a spontaneous speaking situation (in the classroom) once a week over a period of three weeks. In the structured speaking situation, the subjects told stories in response to Peabody Story Cards, and Developmental Language Materials (DLM) Sequence Cards, and responded to questions about school and family experiences. In the classroom spontaneous speaking situation, subjects were recorded during large and small group activities such as art activities, workbook activities, and free play. All subject responses were tape recorded on a Panasonic Mini-V portable cassette audio recorder.

Speech samples from each child in each speaking situation were transcribed from the tape recordings by the examiner. The recordings were replayed until the examiner felt she had made an accurate transcription; automatic responses ("Yes," "No," "I don't know") and unintelligible utterances were omitted. The samples from which experimental data were obtained were the first forty utterances by each child in each situation (Three speech samples used in the study contained less than forty utterances).

Disfluencies were identified and classified by use of Johnson's (1959) categories of disfluencies. The categories were: interjection, part-word repetition, phrase repetition, revision, incomplete phrase, prolongation, and broken-word. The total frequency of disfluencies was calculated as described by Darley and Spriestersbach (1978). The language structure in each speaking situation was analyzed using Shriner's (1967) Length-Complexity Index (LCI). Scores for the LCI were obtained by use of scoring procedures as described by Miner (1969). Two sub-parts of the LCI, a Noun Phrase Index (NPI) and a Verb Phrase Index (VPI), were combined to obtain the final LCI score. A NPI, VPI, and LCI were calculated for each subject on each day of recording and in each speaking situation. Thus each subject contributed six samples to the analysis (three replications of two situations).

As stated above, a total of forty utterances were obtained from each subject in each interview speaking situation, however, the first ten utterances in each sample were discarded to decrease the possibility of non-natural performance due to unfamiliarity with the examiner.

## Reliability

Intra- and inter-experimenter reliability for the identification of disfluencies was determined by use of the Sander's Agreement Index (1961) (Agreement/agreement plus disagreement = SAI). Recorded responses of two subjects were randomly selected for rescoring by the experimenter and three other independent listeners.

# CHAPTER III

## RESULTS AND DISCUSSION

This study was designed to investigate the total frequency of disfluencies, the frequency of specific types of disfluency, and complexity of language usage in preschool children's speech in three replications of two different speaking situations. Nonstuttering five-year-old male children served as subjects for the study. Speech samples were obtained from each subject on three different days in an interview speaking situation and in a spontaneous speaking situation. Disfluencies were identified by type and counted from recorded and transcribed utterances of each subject. Shriner's (1967) Length-Complexity Index (LCI) scores were also calculated from the transcribed utterances.

### Reliability of Measures

Intra- and inter-experimenter reliability for the identification and classification of disfluencies as well as for Length-Complexity Index scores was determined by use of the Sander's Agreement Index (1961) (Agreement/agreement plus disagreement = SAI). Recorded responses of two subjects were randomly selected for rescoring for the reliability measure. To determine intra-experimenter reliability, the experimenter recounted and reclassified types of disfluencies and rescored the Length-Complexity Index. These counts were compared with those of one graduate student in Speech Pathology and two professors in Speech Pathology (who held the

Certificate of Clinical Competence in Speech and were experienced in judging speech disfluencies) to determine inter-experimenter reliability.

The intra- and inter-experimenter percent agreements for frequency of disfluencies, specific types of disfluency, and the Length-Complexity Index (LCI) scores are shown in Table I and II. Intra-experimenter reliability percentages ranged from .92 to .97 for overall frequency of disfluencies; from .66 to 1.00 for frequency of types of disfluency; and from .87 to .88 for LCI scores. Inter-experimenter reliability percentages ranged from .89 to 1.00 for frequency of disfluency; from .75 to .84 for frequency or types of disfluency; and from .93 to 1.00 for LCI scores. These indexes of agreement were judged to be acceptable for the purposes of this study.

## I. RESULTS

To answer the question regarding the difference in overall frequency of disfluency between an interview speaking situation and a spontaneous speaking situation on three different days, the percentage of the total number of disfluencies was obtained in each speaking situation on each day by dividing the total number of disfluencies into the total number of words spoken. Individual subject responses are shown in Appendix A. The percent of total disfluencies for individual subjects each day of recording in each speaking situation are summarized in Table III. Each subject had some disfluencies at each observation except $S_4$ and $S_6$ on the third day of the spontaneous speaking situation. As shown in Table IV, the mean percentages of disfluencies in the interview speaking

TABLE I. Indexes of agreement for determining intra-experimenter reliability for frequency of disfluency, specific types of disfluency, and Length-Complexity Index scores on two subjects.

| | | Interview | Spontaneous |
|---|---|---|---|
| Frequency of disfluency | $S_3$ | .96 | .97 |
| | $S_6$ | .96 | .92 |
| Type of disfluency | $S_3$ | .90 | 1.00 |
| | $S_6$ | .92 | .66 |
| Length-Complexity Index Score | $S_3$ | .87 | .87 |
| | $S_6$ | .87 | .88 |

TABLE II. Indexes of agreement for determining inter-experimenter reliability for frequency of disfluency, specific type of disfluency, and Length-Complexity Index scores on two subjects.

| | | Interview | Spontaneous |
|---|---|---|---|
| Frequency of disfluency | Ex - $J_1$[1] | 1.00 | .97 |
| | Ex - $J_2$ | .93 | .89 |
| Type of disfluency | Ex - $J_1$ | .93 | .91 |
| | Ex - $J_2$ | .84 | .75 |
| Length-Complexity Index Scores | Ex - $J_3$ | .94 | .95 |
| | Ex - $J_3$ | .93 | 1.00 |

[1]Ex=the experimenter; $J_1$ and $J_3$ were professors in Speech Pathology, and $J_2$ a graduate student in Speech Pathology.

TABLE III. Percent of disfluencies to words spoken for individual subjects each day of recording in each speaking situation.

| Subjects | Interview | | | Spontaneous | | |
|---|---|---|---|---|---|---|
| | Day 1 | Day 2 | Day 3 | Day 1 | Day 2 | Day 3 |
| $S_1$ | 12.76 | 12.80 | 6.63 | 6.02 | 3,73 | 6.27 |
| $S_2$ | 10.10 | 10.70 | 10.53 | 2.18 | 5.02 | 6.62 |
| $S_3$ | 8.95 | 5.53 | 2.48 | 4.14 | 2.27 | 3.54 |
| $S_4$ | 6.40 | 6.21 | 3.72 | 1.00 | 3.67 | 0.00 |
| $S_5$ | 3.24 | 5.13 | 4.06 | 3.07 | 6.39 | 2.83 |
| $S_6$ | 2.53 | 5.02 | 3.53 | 2.32 | 3.44 | 0.00 |
| $S_7$ | 6.52 | 4.54 | 9.98 | 6.07 | 4.40 | 5.00 |
| $S_8$ | 5.26 | 6.17 | 10.00 | .88 | 6.31 | 3.03 |
| $S_9$ | 7.55 | 4.43 | 6.15 | 3.62 | 2.60 | 6.13 |
| $S_{10}$ | 8.93 | 8.41 | 4.85 | .62 | 1.84 | 3.38 |
| Mean | 7.30 | 7.00 | 6.30 | 3.01 | 3.94 | 3.73 |
| Standard Deviation | 3.16 | 2.90 | 3.09 | 1.95 | 1.51 | 2.43 |

TABLE IV. Means, standard deviations, and ranges of the mean percentage of overall frequency of disfluencies each day of recording in each speaking situation.

| Day | Interview | | | Spontaneous | | |
|---|---|---|---|---|---|---|
| | Mean | S.D. | Range | Mean | S.D. | Range |
| 1 | 7.30 | 3.16 | 3.00-13.00 | 3.01 | 1.95 | 1.00-6.00 |
| 2 | 7.00 | 2.90 | 4.00-13.00 | 3.94 | 1.51 | 2.00-6.40 |
| 3 | 6.30 | 3.09 | 2.00-11.00 | 3.73 | 2.43 | 0.00-7.00 |

situation were 7.3%, 7.0%, and 6.3% for days 1 through 3 respectively and in the spontaneous speaking situation, the mean disfluencies were 3.0%, 3.9%, and 3.7% respectively. The overall range of disfluencies was 0.00 to 13.00. The range per day and situation is also shown in Table IV.

A two factor design for repeated measures analysis of variance procedure was used to statistically analyze the data and determine significance of the differences in the overall frequency of disfluency each day of recording in each speaking situation. The results of the analysis of variance are summarized in Table V. Inspection of Table V reveals a significant difference ($F = 24.53$, $df = 1$, $p < .0001$) between the two speaking situations; no significant difference ($F = .16$, $df = 2$, $p < .8507$) among the three days; and no significant interaction ($F = .58$, $df = 2$, $p < .5608$) between the two speaking situations and the three days of recording. The mean percentage of disfluencies is plotted graphically in Figure 1. This figure makes clear that the significant difference between speaking situations is due to the greater number of disfluencies measured in the interview situation.

The frequency of specific disfluency types for each subject is shown in Appendices B and C. It can be noted that the subjects produced all the disfluency types. For each subject however, much variability occurred when comparing specific types of disfluency between the two different speaking situations over the three days. Table VI shows the three most frequently occurring disfluency types for the group as a whole by speaking situation and day. For the

TABLE V. Summary of analysis of variance for percentage of total disfluencies with repeated measures in two situations and three days.

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F ratio | Significance Level |
|---|---|---|---|---|---|
| Situation (S) | 163.87 | 1 | 163.87 | 24.53 | 0.0001 |
| Day (D) | 2.16 | 2 | 1.08 | .16 | 0.8507 |
| S X D | 7.81 | 2 | 3.90 | .58 | 0.5608 |
| Error | 360.78 | 54 | 6.68 | | |
| Total | 534.64 | 59 | | | |

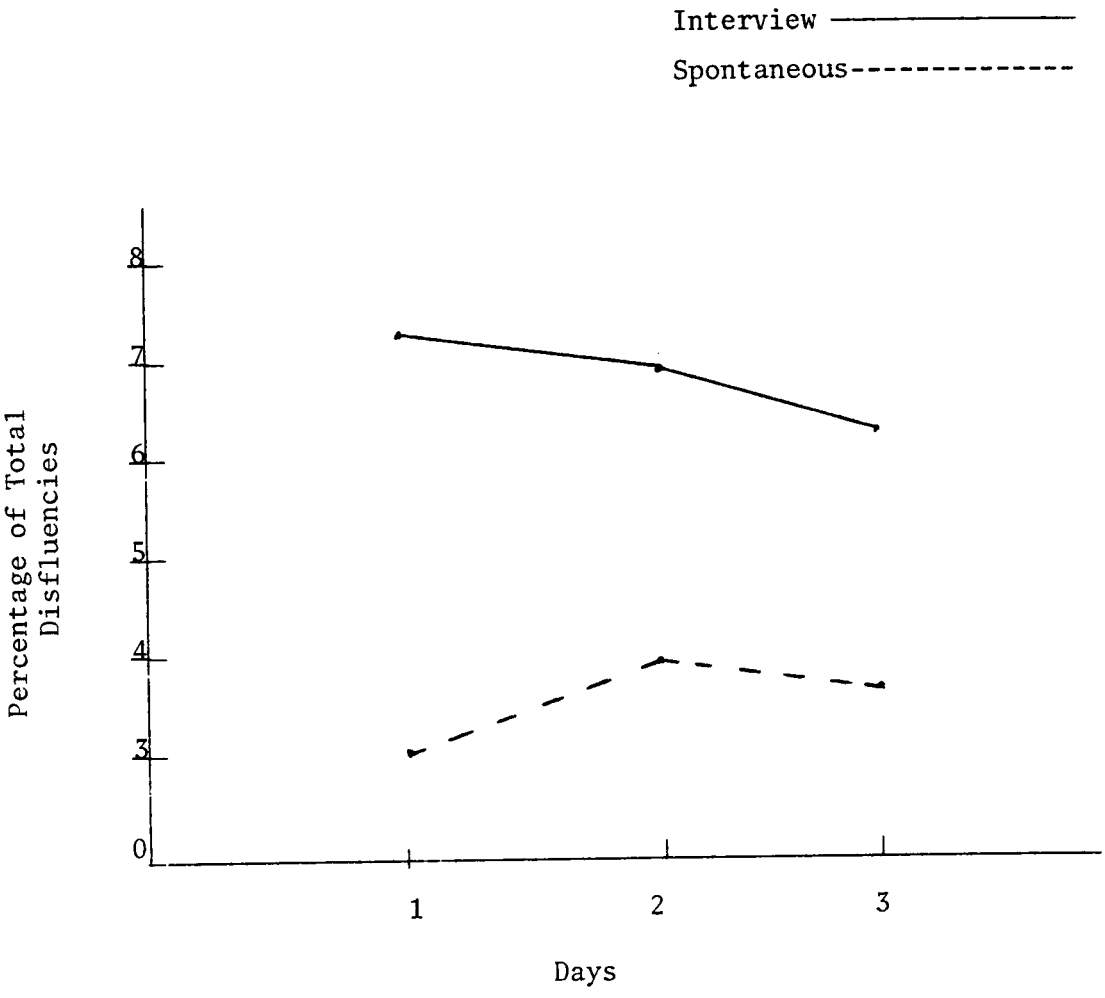


Figure 1. The mean percentage of disfluencies in each day of recording in each speaking situation.

TABLE VI. Total number of specific types of disfluency in two speaking situations.

| Disfluency Type[1] | Interview | Spontaneous |
|---|---|---|
| I | 110*[2] | 37* |
| R | 80* | 29 |
| WR | 75* | 44* |
| PW | 39 | 21 |
| IP | 31 | 27 |
| P | 8 | 4 |
| PR | 35 | 52* |
| BW | 2 | 1 |
| Total | 380 | 215 |

[1]The Disfluency Classification utilized includes the following types: Interjection (I), Revision (R), Word Repetition (WR), Part-Word Repetition (PW), Incomplete Phrase (IP), Prolongation (P), Phrase Repetition (PR), and Broken Words (BW).

[2]Asterisks indicate the three most frequently occurring types in each speaking situation.

group as a whole, the three most frequently occurring types of disfluency in the interview situation were interjection, revision, and word repetition respectively. For the spontaneous speaking situation, the three most frequently occurring types were part-word repetition, word repetition, and interjection respectively.

To determine any differences in language structure between a structured interview speaking situation and a spontaneous speaking situation on three different days, the Length-Complexity Index (LCI) was used to analyze all recorded speech samples. A Noun Phrase Index (NPI) and a Verb Phrase Index (VPI) was computed to obtain an overall LCI score for each speech sample used in the study. Individual subject scores are shown in Appendix D. The LCI scores for individual subjects each day of recording in each speaking situation are summarized in Table VII. For days 1 through 3, the mean LCI scores were 7.09, 6.60, and 6.23 respectively in the structured interview speaking situation and 5.27, 6.25, and 6.02 respectively in the spontaneous speaking situation. The LCI scores ranged from 4.18 to 9.50. The mean LCI scores and range per speaking situation and day are recorded in Table VIII.

To statistically analyze the data and determine the significance of the differences in the LCI scores each day of recording in each speaking situation, a two factor design for repeated measures analysis of variance are summarized in Table IX. Inspection of Table IX reveals a significant difference ($F=7.95$, $df=1$, $p$ .0067) in LCI scores between the two different speaking situations; no significant difference ($F=.41$, $df=2$, $p$ .6645) among the three days; and a significant interaction

TABLE VII. Length-Complexity Index (LCI) scores for individual subjects each day of recording in each speaking situation.

| Subjects | Interview | | | Spontaneous | | |
|---|---|---|---|---|---|---|
| | Day 1 | Day 2 | Day 3 | Day 1 | Day 2 | Day 3 |
| $S_1$ | 6.85 | 8.06 | 7.75 | 4.18 | 6.34 | 5.80 |
| $S_2$ | 5.43 | 5.83 | 7.75 | 5.09 | 6.89 | 5.22 |
| $S_3$ | 6.70 | 6.33 | 8.85 | 5.02 | 5.92 | 6.10 |
| $S_4$ | 8.50 | 7.20 | 7.43 | 5.69 | 7.25 | 6.36 |
| $S_5$ | 7.60 | 9.50 | 6.75 | 5.69 | 4.86 | 6.77 |
| $S_6$ | 7.20 | 6.23 | 4.76 | 4.44 | 5.88 | 4.57 |
| $S_7$ | 8.66 | 4.57 | 6.31 | 5.35 | 6.25 | 6.81 |
| $S_8$ | 8.33 | 6.33 | 5.32 | 4.40 | 6.10 | 6.06 |
| $S_9$ | 5.66 | 5.26 | 4.51 | 6.02 | 6.20 | 6.00 |
| $S_{10}$ | 6.00 | 6.70 | 4.64 | 6.86 | 6.81 | 6.59 |
| Mean | 7.09 | 6.60 | 6.23 | 5.27 | 6.25 | 6.02 |

TABLE VIII. Means, standard deviations, and ranges of the mean scores of the Length-Complexity Index obtained each day of recording in each speaking situation.

| DAY | Interview | | | Spontaneous | | |
|---|---|---|---|---|---|---|
| | Mean | S.D. | Range | Mean | S.D. | Range |
| 1 | 7.09 | 1.17 | 5.43-8.66 | 5.27 | .82 | 4.18-6.86 |
| 2 | 6.60 | 1.40 | 4.57-9.50 | 6.25 | .66 | 4.86-7.25 |
| 3 | 6.23 | 1.46 | 4.51-8.85 | 6.02 | .70 | 4.57-6.81 |

TABLE IX. Summary of analysis of variance for Length-Complexity Index (LCI) scores with repeated measures in two situations and three days.

| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Squares | F ratio | Significance Level |
|---|---|---|---|---|---|
| Situation (S) | 9.44 | 1 | 9.44 | 7.95 | 0.0067 |
| Day (D) | 0.97 | 2 | .48 | 0.41 | 0.06645 |
| S X D | 7.93 | 2 | 3.96 | 3.34 | 0.0427 |
| Error | 64.09 | 54 | 1.18 | | |
| Total | 82.45 | | | | |

($F = 3.34$, $df = 2$, $p$ .0427) in LCI scores between the two speaking situations and the three days of recording. The mean LCI scores are plotted graphically in Figure 2. This figure illustrates that the significant difference between the two speaking situations is due to the higher LCI scores measured in the interview situation. The difference in LCI scores in each speaking situation between the three days was greater for day 1 than for day 2 or day 3, thus resulting in the significant interaction.

In order to determine a possible relationship between the overall frequency of disfluency and language usage, Pearson product-moment correlations were computed in the structured speaking situation and the spontaneous speaking situation. The correlation ($r = -0.13$) between the overall frequency of disfluency and LCI scores in the interview speaking situation was not significant. In the spontaneous speaking situation, the correlation ($r = -0.02$) between the overall frequency of disfluency and LCI scores was also not significant.

## II. DISCUSSION

The purpose of this study was to compare the frequency of disfluencies, types of disfluencies, and language structure of five-year-old male children's speech in two speaking situations on three different days and to see if the frequency of disfluencies was related to language usage. Disfluencies were counted and classified according to Johnson's (1959) categories. The Length-Complexity Index (Shriner, 1967) was used to assess language structure.

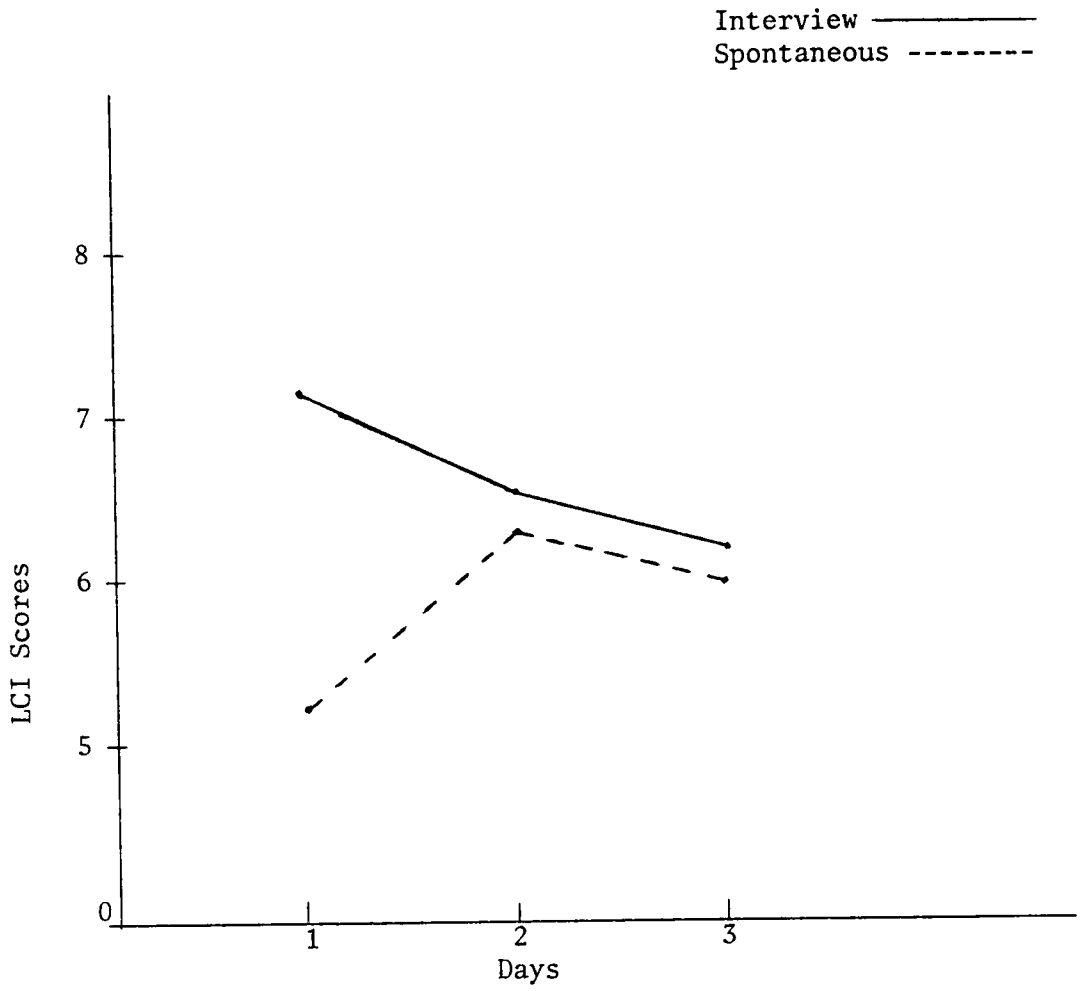


Figure 2. The mean LCI scores in each day of recording in each speaking situation.

Frequency of Disfluencies

The results of this study indicated a significant difference in the overall frequency of disfluencies between an interview speaking situation and a spontaneous speaking situation. Significantly more disfluencies were produced in the interview speaking situation. Results also revealed a nonsignificant difference in the frequency of disfluencies from day to day. These findings are in agreement with results of a similar study by E.M. Silverman (1972) which also indicated that a significant difference existed in the frequency of disfluencies in four-year-old males between two speaking situations while the nonfluency frequencies were stable from day to day. This significant difference in frequency of disfluencies between two speaking situations does not agree with the findings reported by Martin, Haroldson, and Kuhl (1972). The subjects in the Martin, et al. study conversed with a "talking" puppet in one speaking situation and with an adult female in the other speaking situation over ten sessions. Results revealed that there was not a significant difference in percent disfluencies by the children between the two speaking conditions. The authors concluded that the differences in speaking environment experimentally created in their study was not sufficient to produce different amounts of disfluency in the children. Based on the comparative findings from the Silverman study, the Martin, Haroldson, and Kuhl study, and the present investigation, it may be postulated that there is a greater difference between a free play and a structured interview situation than between free play and talking to a puppet.

It was reported also that there was no significant difference in percent disfluencies by the children across the ten sessions. This is in agreement with the findings of the present study and the Silverman (1972) study with regard to differences in disfluencies across several different days. Although statistical analysis revealed a nonsignificant difference for the group as a whole in the number of disfluencies across the three days in each speaking situation, examination of individual subject percentages of overall frequency of disfluencies revealed variability. For example, Table III shows for the interview situation for Day 1, a mean percentage of disfluencies of 7.30 and a standard deviation of 3.16. It might be assumed then that any child having a disfluency percentage greater than 7.3 + 3.16 = 10.46 would be considered abnormally disfluent for Day 1. Applying this criterion to the data in Table III, we see that only $S_1$ and $S_2$ produced abnormal numbers of disfluencies for that day. On Day 2, $S_1$ and $S_2$ again produced an abnormal amount of disfluencies ($>9.90$), but on Day 3, $S_2$, $S_7$, and $S_8$ were abnormally disfluent. In the spontaneous speaking situation $S_1$ and $S_7$ were abnormally disfluent on Day 1, $S_5$ and $S_8$ on Day 2, and $S_1$ and $S_2$ on Day 3.

From a clinical prediction standpoint, therefore, the percentage of disfluencies among subjects on one day can be seen to be less than a perfect predictor of frequency of disfluencies on other days. Despite the lack of a significant difference among the group as a whole from Day 1 to Day 3, one would still need to exercise caution in using individual disfluency counts from one day to predict disfluency counts on other days.

As indicated earlier, significantly more disfluencies were assessed in the interview situation than in the spontaneous speaking situation for the group as a whole. Individually, the percentages of disfluency for each subject was higher in the interview speaking situation than in the spontaneous speaking situation with the exception of $S_3$ on Day 3, and $S_5$ and $S_8$ on Day 2. Therefore it may be concluded that overall, five-year-old subjects will tend to be more disfluent in an interview speaking situation with an adult than in a spontaneous speaking situation with peers, although exceptions will be found for individual subjects. Silverman (1972) also concluded that her four-year-old subjects were more disfluent in an interview situation and were "rather consistent" with themselves from day to day in the same situation.

The findings of this study, as in Silverman's study, suggest that the speaking situation influences the frequency of disfluency in the speech of preschoolers. Hence it appears that the frequency of disfluencies for this age group was basically stable among days, but varied considerably between speaking situations.

## Specific Types of Disfluencies

In her 1972 study, Silverman found a great degree of variability in specific types of disfluency between two speaking situations among measures taken on three different days. Examination of specific types of disfluencies for each subject in this study also revealed much variability in type of disfluency between the interview speaking situation and the spontaneous speaking situation, as well as considerable variability among the three days.

Appendices B and C summarize the three most frequently occurring types of disfluencies for each subject in each speaking situation on each day. Comparisons of disfluency types between each time of recording for individual subjects revealed so much variability that no systematic pattern was discernable. However, when analyzing the group as a whole (Table VI), similarities in disfluency types were noted between the two speaking situations. Interjections (I) and word repetitions (WR) were two of the three most frequently occurring disfluency types in both speaking situations. Revision, which was the second most common type of disfluency noted in the interview situation was the fourth most common type observed in the spontaneous situation. Broken words occurred least frequently in both situations and prolongations had the second least occurrences in both situations.

There appears then to be some stability in types of disfluency in the five-year-old males as a group, since two of the three most frequently occurring types (interjection and word repetition) were the same in both speaking situations and since the same two types (broken words and prolongation) occurred least frequently. Whether this distribution of disfluency types is representative of other five-year-old children is not known.

Silverman (1972) reported that the most frequently occurring types of disfluencies among her four-year-old male subjects were part-word repetition and disrhythmic phonation (the category disrhythmic phonation, was not used in the present study). The lack of similarity in the most frequently occurring types of disfluency

between Silverman's four-year-old subjects and the present study's five-year-old subjects suggests that the frequency of disfluency types may change with age. Longitudinal studies would help determine whether the differences in disfluency types between the two studies is a function of age or merely differences in these specific samples or populations.

Language and Disfluencies

Results of the present study indicated a significant difference in language usage, as measured by Shriner's (1967) Length-Complexity Index (LCI), between an interview speaking situation and a spontaneous speaking situation. Significantly higher LCI scores were obtained in the interview situation. A nonsignificant difference in language structure was revealed from day to day.

Although statistical analysis revealed a nonsignificant difference in LCI scores across the three days for the group as a whole, examination of individual subject's LCI scores revealed considerable variability. In view of these findings it can be concluded that language structure in the speech of preschoolers is affected by the speaking situation. Although both the highest percentage of overall frequency of disfluency and the highest Length-Complexity Index scores were found in the interview speaking situation, neither the correlation ($r = -0.13$) between the frequency of disfluency and LCI scores in the interview situation, nor the correlation ($r = -0.02$) of the same two scores in the spontaneous situation proved significant. This finding is in accord

with the findings of another study (Haynes and Hood, 1977) which concluded no significant relationship between the disfluency and language variables studied.

The findings of the present study appear to be in contradiction, however, to the majority of previous research reports (Berry, 1938; Muma, 1971; Pearl and Bernthal, 1980; Colburn and Mysak, 1982) which indicate a relationship between language and the occurrence of disfluencies. A possible explanation for these contradictory findings in the present study could be that variables other than language structure, such as factors of attention (associated activities, emotional arousal, or sensory stimuli), tension, or anxiety (Bloodstein, 1981) affected the frequency of disfluency in the preschoolers' speech. Recall also that Silverman (1973) found in her structured interview speaking situation not only a higher number of disfluencies, but more socialized speech (desire to influence the listener) as opposed to the spontaneous speaking situation which revealed less disfluencies and more egocentric speech (no desire to influence the listener). Since the two situations in the present study were patterned after Silverman's design, it is possible that the subjects also used more socialized speech in the interview situation and more egocentric speech in the spontaneous speaking situation. The number of disfluencies produced in the two speaking situations may again have been related to the egocentric/socialized speech factor.

The findings of this study have implications of clinical importance. Silverman (1972) has reported that most data obtained

on the disfluency behavior of preschoolers has been gathered in one kind of speaking situation, the structured interview speaking situation. This observation probably holds true for most clinical practices of evaluating a sample of disfluent behavior in a clinical, "interview-like" situation and then generalizing the results to all other speaking situations. This generalization then assumes that the child's disfluency behavior in one speaking situation is representative of his disfluency behavior in other speaking situations at other times. As indicated in this study and Silverman's 1971, 1972 studies, there are indeed differences in preschoolers' disfluency behavior in varied speaking situations. Therefore, it hardly appears warranted to evaluate a preschooler's disfluency behavior in only one-speaking situation and call it representative of his disfluency behavior as a whole. The results are further interpreted to indicate that the length and complexity of children's language also varies in different speaking situations. Clinicians may find that evaluating preschoolers' speech in varied speaking situations could give a more precise description of the disfluency behavior and language usage of this age group than evaluations made only in one situation.

Finally, from a clinical decision making standpoint, it is important to note that all of these five-year-old boys displayed disfluencies that ranged as high as 12.80 percent even though none were judged to be stutterers by their parents, teacher, or the experimenter. Clinicians should use caution, therefore, in their interpretations of the importance of frequency of disfluencies when making decisions for intervention purposes.

# CHAPTER IV

# SUMMARY AND CONCLUSIONS

## I. SUMMARY

This study was designed to compare the frequency of disfluencies and specific types of disfluency to length and complexity of language structure in the speech of five-year-old male nonstutterers in two speaking situations on three different days.

Six speech samples were recorded for each subject in a structured speaking situation and in a spontaneous speaking situation once a week over a period of three weeks. Speech samples from each child in each speaking situation were transcribed from the tape recordings by the examiner. Disfluencies were identified and classified by use of Johnson's (1959) categories of disfluencies. The total frequency of disfluencies was calculated as described by Darley and Spriestersbach (1978). The language structure in each speaking situation was analyzed using Shriner's (1967) Length-Complexity Index (LCI) as scored by Miner (1969).

In order to determine if there was a significant difference in the overall frequency of disfluencies between the two speaking situations on each day of recording, a two factor design for repeated measures analysis of variance procedure was used. Results indicated that the percentage of disfluency was significantly higher in the structured speaking situation. There was not a significant difference, however, in disfluency frequency among the three days.

The three most frequently occurring types of disfluencies were calculated for each speaking situation. For the group as a whole, the most frequently occurring types in the structured speaking situation were interjection, revision, and word-repetition respectively, while in the spontaneous speaking situation they were part-word repetition, word repetition and interjection respectively.

A two factor design for repeated measures was used to determine if there were significant differences in Length-Complexity Index (LCI) scores between the two speaking situations on the three days of recording. Results indicated significantly higher LCI scores in the structured speaking situation. No significant difference was found in LCI scores among the three days. A Pearson product-moment correlation was used to determine the relationship between the overall frequency of disfluencies and LCI scores in the two speaking situations. No significant correlation was found in either speaking situation.

## II. CONCLUSIONS

The results of this study support some previous findings reported in the literature regarding disfluencies and the relationship to language usage, while failing to support others. On the basis of the results, the following conclusions may be drawn:

1. The subjects exhibited significantly more disfluencies in the interview speaking situation than in the spontaneous speaking situation.

2. For the group as a whole, there was no significant difference in frequency of disfluencies among the three days, however individual variability existed.
3. For the group as a whole, the three most frequently occurring types of disfluencies were: interjection, revision, and word repetition for the structured speaking situation; and interjection, word repetition, and phrase repetition in the spontaneous speaking situation.
4. The five-year-old nonstutterers had significantly higher Length-Complexity Index (LCI) scores in the interview speaking situation than in the spontaneous speaking situation.
5. For the group as a whole, there was no significant difference in LCI scores among the three days, however individual variability existed.
6. Frequency of disfluency and LCI scores were not significantly related in either speaking situation.

These findings should not be accepted or rejected without consideration of the following limitations:

1. The subjects were limited to male children only and therefore, conclusions cannot be generalized to the entire five-year-old population.
2. Language samples used in this study were limited to the first thirty utterances and in three instances less than forty were recorded. This number of utterances may not have been a true sample of each child's language usage.

Suggestions for further research include:

1. Examination of disfluency and language behavior of six-year-old children, using a similar experimental design, to determine if fluency and language usage stabilizes in varied speaking situations.
2. Investigation of frequency of disfluencies and language usage in both male and female children.
3. Further investigation of frequency of specific types of disfluencies of children's speech in varied speaking situations.
4. Further investigation of the relationship between freqnency of disfluencies and language usage in children's speech.

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# APPENDICES

APPENDIX A

TABLE X. Total words (TW), total number of disfluencies (TD), and percentage of disfluencies (%) for individual subjects each day of recording in each speaking situation.

| Subjects | Interview | | | | | | | | | Spontaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day 1 | | | Day 2 | | | Day 3 | | | Day 1 | | | Day 2 | | | Day 3 | | |
| | TW | TD | % | TW | TD | % | TW | TD | % | TW | TD | % | TW | TD | % | TW | TD | % |
| 1 | 180 | 23 | 12.76 | 241 | 31 | 12.80 | 226 | 15 | 6.63 | 83 | 5 | 6.02 | 214 | 8 | 3.73 | 239 | 15 | 6.27 |
| 2 | 168 | 17 | 10.10 | 223 | 24 | 10.70 | 171 | 18 | 10.53 | 137 | 3 | 2.18 | 239 | 12 | 5.02 | 181 | 12 | 6.62 |
| 3 | 201 | 18 | 8.95 | 217 | 12 | 5.53 | 161 | 4 | 2.48 | 193 | 8 | 4.14 | 220 | 5 | 2.27 | 254 | 9 | 3.54 |
| 4 | 250 | 16 | 6.40 | 193 | 12 | 6.21 | 188 | 7 | 3.72 | 199 | 2 | 1.00 | 272 | 10 | 3.67 | 204 | 0 | 0.00 |
| 5 | 216 | 7 | 3.24 | 253 | 13 | 5.13 | 197 | 8 | 4.06 | 195 | 6 | 3.07 | 172 | 11 | 6.39 | 247 | 7 | 2.83 |
| 6 | 196 | 5 | 2.53 | 179 | 9 | 5.02 | 113 | 4 | 3.53 | 129 | 3 | 2.32 | 145 | 5 | 3.44 | 114 | 0 | 0.00 |
| 7 | 230 | 15 | 6.52 | 132 | 6 | 4.54 | 204 | 20 | 9.98 | 214 | 13 | 6.07 | 227 | 10 | 4.40 | 260 | 13 | 5.00 |
| 8 | 133 | 7 | 5.26 | 162 | 10 | 6.17 | 150 | 15 | 10.00 | 113 | 1 | .88 | 206 | 13 | 6.31 | 165 | 5 | 3.03 |
| 9 | 172 | 13 | 7.55 | 158 | 7 | 4.43 | 130 | 8 | 6.15 | 193 | 7 | 3.62 | 230 | 6 | 2.60 | 212 | 13 | 6.13 |
| 10 | 179 | 16 | 8.93 | 214 | 18 | 8.41 | 103 | 5 | 4.85 | 160 | 1 | .62 | 217 | 4 | 1.84 | 236 | 8 | 3.38 |

APPENDIX B

TABLE XI. The three most frequently occurring specific types of disfluencies spoken by each subject each day of recording in the interview speaking situation.

| Subject | Day 1 | Day 2 | Day 3 |
|---|---|---|---|
| $S_1$ | I, W, R | I, R, W | R. I, PW |
| $S_2$ | I, W, PW | I, R, W | I, W, PW |
| $S_3$ | I, R, IP | I, W, R, IP | PR, I, R |
| $S_4$ | PR, R, W | W, R, I | IP, R, PW, PR, W |
| $S_5$ | I, W, PW, R | PW,R, I | W, PR, I, R, IP |
| $S_6$ | IP, R, PR, W, PW | R, W, PRO, W, IP, PW | I, R |
| $S_7$ | R, PW, W | W, I, PW, R | R, W, I |
| $S_8$ | I, PW, R | W, I, PR, R, IP | I, R, W, PW, IP |
| $S_9$ | I, R, W, IP, PW | PR, IP, PW, W, I | R, W, I |
| $S_{10}$ | I, IP, PR, W | I, PR, R, W | I, W, IP, PW |

APPENDIX C

TABLE XII. The three most frequently occurring specific types of disfluencies spoken by each subject each day of recording in the spontaneous speaking situation.

| Subject | Day 1 | Day 2 | Day 3 |
|---|---|---|---|
| $S_1$ | I, W, PR, IP | I, W, PR, IP | I, W, R |
| $S_2$ | PW, W | PR, IP, I | PR, PRO, R |
| $S_3$ | PR, W, I | PR, R, W, PW | PR, W, I |
| $S_4$ | W, I | PR, I, W | —— |
| $S_5$ | PR, PW, IP, W | PR, W, PW, I | W, PR, R |
| $S_6$ | W, R, PR | PW, PR, R, W | —— |
| $S_7$ | PR, W, I, IP | PR, W, R | I, PR, IP |
| $S_8$ | R | I, R, W | PR, W, PW, IP |
| $S_9$ | W, IP, PR, PW, R | R, I, IP, PW, PR | PR, IP, W, I, R |
| $S_{10}$ | PW | BW, W, R | R, I, IP |

## APPENDIX D

TABLE XIII. Noun Phrase Index (NPI), Verb Phrase Index (VPI), and Overall LCI scores for individual subjects each day of recording in each speaking situation.

| | Interview | | | | | | | | | Spontaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subjects | Day 1 | | | Day 2 | | | Day 3 | | | Day 1 | | | Day 2 | | | Day 3 | | |
| | NPI | VPI | LCI | NPI | VPI | LCI | NPI | VPI | LCI | NPI | VPI | LCI | NPI | VPI | LCI | NPI | VPI | LCI |
| 1 | 1.41 | 1.96 | 6.85 | 1.46 | 2.25 | 8.06 | 1.32 | 1.97 | 7.75 | 1.00 | 1.41 | 4.18 | 1.65 | 2.20 | 6.34 | 1.12 | 1.65 | 5.80 |
| 2 | 1.16 | 1.63 | 5.43 | 1.24 | 1.96 | 5.83 | 1.34 | 2.69 | 6.06 | 1.15 | 1.62 | 5.09 | 1.14 | 1.89 | 6.89 | 1.13 | 1.44 | 5.22 |
| 3 | 1.28 | 1.60 | 6.70 | 1.41 | 1.60 | 6.33 | 1.29 | 1.50 | 8.85 | 1.17 | 1.76 | 5.02 | 1.22 | 1.70 | 5.92 | 1.22 | 2.04 | 6.10 |
| 4 | 1.65 | 1.60 | 8.50 | 1.13 | 1.55 | 7.20 | 1.06 | 1.72 | 7.43 | 1.22 | 1.78 | 5.69 | 1.09 | 1.86 | 7.25 | 1.27 | 1.88 | 6.63 |
| 5 | 1.86 | 2.00 | 7.60 | 1.65 | 1.81 | 9.50 | 1.51 | 2.14 | 6.75 | 1.20 | 1.75 | 5.69 | 1.12 | 1.90 | 4.86 | 1.20 | 1.92 | 6.77 |
| 6 | 1.16 | 1.68 | 7.20 | 1.12 | 2.12 | 6.23 | 1.31 | 2.03 | 4.76 | 1.55 | 1.52 | 4.44 | 1.08 | 1.51 | 5.88 | 1.64 | 1.52 | 4.57 |
| 7 | 1.60 | 2.06 | 8.66 | 1.16 | 1.83 | 4.57 | 1.60 | 2.10 | 6.31 | 1.53 | 1.52 | 5.35 | 1.30 | 1.81 | 6.25 | 1.21 | 1.67 | 6.81 |
| 8 | 1.17 | 1.22 | 8.33 | 1.34 | 1.80 | 6.33 | 1.57 | 1.79 | 5.32 | 1.26 | 1.36 | 4.40 | 1.28 | 1.78 | 6.10 | 1.20 | 1.66 | 6.06 |
| 9 | 1.62 | 1.66 | 5.66 | 1.23 | 2.24 | 5.26 | 1.56 | 1.65 | 4.51 | 1.05 | 1.97 | 6.02 | 1.20 | 1.70 | 6.20 | 1.15 | 1.85 | 6.00 |
| 10 | 1.32 | 1.89 | 6.00 | 1.13 | 2.65 | 6.70 | 1.11 | 2.00 | 4.64 | 1.48 | 1.75 | 6.86 | 1.31 | 2.28 | 6.81 | 1.27 | 1.55 | 6.59 |

# VITA

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