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Repetitions in the speech of normal two year old males

Stephanie Herrick
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AN ABSTRACT OF THE THESIS OF Stephanie Herrick for the
Master of Science in Speech Communication presented July 23,
1987.

Title: Repetitions in the Speech of Normal Two Year Old
Males.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

Robert L. Casteel, Chair

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Development of fluency has always been an important focus of stuttering research. However, to date there are no standardized norms on the development of fluency. Reliable and valid information regarding the normal development of fluency is necessary in order to differentially diagnose normal disfluency from incipient stuttering. Establishment of norms for part-word repetitions is especially important since this type of disfluency has traditionally been considered an indicator of early stuttering. The present study sought to

contribute to the investigation of the development of fluency by examining the frequency of occurrence of repetitions in 30- to 36-month-old males.

Twenty male subjects ranging in age from 30 to 36 months were chosen. Subjects were videotaped for fifteen minutes during free play with toys and during conversation with the examiner. Speech samples were analyzed for the following types of disfluencies: sound repetitions, syllable repetitions, single syllable word repetitions, multisyllable word repetitions, phrase repetitions, revision-incomplete phrases, interjections, disrhythmic phonations, tense pauses, and intrusive schwas. A one-tailed t-test revealed that whole word and phrase repetitions combined occurred significantly more frequently than part-word (sound and syllable) repetitions. The rank order of repetitions, from most frequent to least frequent, was single syllable word repetitions, sound repetitions, phrase repetitions, syllable repetitions, and multisyllable word repetitions. Among subjects, mean frequencies of occurrence of repetitions varied from 0 to 10.66 per 100 words. The highest ranking repetition, single syllable word repetition, was produced by 85 percent of the subjects. When subjects were placed in rank order and divided into quartiles it was revealed that the total rate of repetitions of the fourth quartile alone was greater than the sum of the total rate of repetitions of the other three quartiles. No significant difference in frequency of occurrence of

repetitions was found when an analysis of variance test was applied to subjects with high verbal output and low verbal output.

The findings of the present study indicate that the occurrence of multiple repetitions in the speech of 30- to 36-month-old males is common, particularly for part-word and single syllable word repetitions. While some children rarely exhibit repetitions, approximately 25 percent exhibit ten times more repetitions than others. Disrhythmic phonations and tense pauses are consistently low in frequency of occurrence. The findings of the present study are consistent with recent studies which found that the occurrence of part-word repetitions, single syllable word repetitions, revision-incomplete phrases, and interjections are common in the speech of normal two-year-old children. The findings of the present study are also consistent with results of recent studies which found that the occurrence of tense pauses and disrhythmic phonations is rare in the speech of normal two-year-old males. This suggests that other factors besides frequency and types of repetitions be considered in the differential diagnosis of stuttering. This finding, and that of the Yairi and Lewis study, done in 1984, in which stuttering children exhibited ten times the number of disrhythmic phonations as normal speaking children, indicate that the occurrence of disrhythmic phonations is a much stronger indication of early stuttering than the presence of part-word repetitions.

REPETITIONS IN THE SPEECH OF NORMAL
TWO YEAR OLD MALES

by
STEPHANIE HERRICK

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

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1987

TO THE OFFICE OF GRADUATE STUDIES AND RESEARCH:

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CHAPTER I

INTRODUCTION

During the course of language development, young children tend to go through a period of normal disfluency characterized by part-word, whole word and phrase repetitions, revisions, and interjections. This usually occurs between the ages of two and six (DeJoy and Gregory, 1985). The age range of normal disfluency in young children overlaps with the age range when the onset of stuttering most frequently occurs (DeJoy and Gregory, 1985). Due to this overlap, it is difficult to distinguish between the normally disfluent child, and the child who exhibits incipient stuttering.

At the present time, there are no standardized norms on the development of fluency. Data from earlier studies on fluency in young children are limited for the following reasons: (1) lack of specific age levels; (2) lack of adequate numbers of subjects; (3) lack of electronic recording; and (4) variations in definitions of disfluency or disfluency types (Wexler and Mysak, 1982; DeJoy and Gregory, 1985). Thus establishment of standardized norms would lead to a better understanding of the development of fluency, and to more accurate differentiation of incipient stuttering from normal disfluency. Establishing normative data is particularly important when working with children, because early

identification is essential for determining prognosis, counseling parents, and for making recommendations regarding intervention.

The research concerning fluency in young children indicates that the different types of childhood disfluencies vary as to their frequency and to their occurrence, depending on the age of the child (Haynes and Hood, 1977; Wexler and Mysak, 1982; DeJoy and Gregory, 1985). Repetitions, particularly part-word and whole word, are consistently produced at high frequency rates in preschool children (Yairi, 1981; Wexler and Mysak, 1982; Yairi and Lewis, 1984; DeJoy and Gregory, 1985). The study by Kowal, O'Connell, and Sabin (1975) indicated that these repetitions decrease in frequency as children grow older and are replaced by other disfluency types such as revisions and interjections. From these studies, Starkweather (1985) has hypothesized that repetitions are normal characteristics of discontinuity in preschool children, but reflect immaturity of fluency development in older children. He maintains that part-word repetitions are the most immature type of discontinuity.

Because repetitions occur in the speech of both normally disfluent children and incipient stutterers, it has been difficult for the speech-language pathologist to differentiate the two groups. Guidelines developed for differentially diagnosing stuttering (Riley, 1972; Adams, 1977) include an analysis of the types and frequency of repetitions as a critical procedure. These guidelines consider only three types of

repetitions: part-word, whole word, and phrase repetitions. Most research concerning normal disfluency (Haynes and Hood, 1977; Wexler and Mysak, 1982; DeJoy and Gregory, 1985) also only considers these three types of repetitions. Wingate (1962; 1964) suggests that repetitions be broken down into smaller units. Part-word repetitions include both sound repetitions and syllable repetitions, and whole repetitions include both single syllable word repetitions and multisyllable word repetitions (Wingate, 1964). Wingate maintains that inclusion of smaller units in research and diagnosis will provide a more accurate differentiation between normal disfluency and incipient stuttering.

STATEMENT OF PURPOSE

The purpose of this investigation is to examine the frequency of occurrence of various types of repetitions in 30- to 36-month-old males. Specifically, this study will compare the following: part-word repetitions, which include sound and syllable repetitions; whole word repetitions, which include single syllable word and multisyllable word repetitions; and phrase repetitions.

The investigation will answer the following primary question:

Do part-word repetitions have greater frequency of occurrence than the total of whole word and phrase repetitions in 30- to 36-month-old males?

The following secondary questions will be asked:

1. Is there a difference in frequency of occurrence between sound repetitions and syllable repetitions?
2. Are there differences in frequency of occurrence among single syllable word repetitions, multisyllable word repetitions, and phrase repetitions?
3. What is the range of individual diversity in frequency of occurrence of repetitions among all subjects?
4. Is there a dominant type of repetition among all subjects?
5. Is there a difference in frequency of occurrence of repetitions among children with high verbal output and those with low verbal output?
6. When looking at all types of disfluencies, are repetitions the most consistent characteristic of normal disfluency?

DEFINITION OF TERMS

The following operational definitions will aid in clarifying the language used in this study.

1. Discontinuity. A more precise term used by Starkweather rather than disfluency, to refer to pauses, hesitations, whole and part-word repetitions, and other breaks in the flow of speech.

2. Disfluency. Refers not only to breaks in the flow of speech, but also to disordered rate and inappropriate tension (Starkweather, 1985).

3. Disrhythmic phonation. A kind of phonation which disturbs or distorts normal rhythm or flow of speech. Disturbance of distortion may or may not involve tension, and may be attributable to a prolonged sound, hard attack, broken word, or an accent or timing which is notably unusual. Disrhythmic phonation is a within-word category (Williams, Silverman, and Kools, 1986).

4. Fluency. Speech production that is rapid, effortless, and without breaks in the forward flow (Starkweather, 1985).

5. Frequency. Number of disfluencies per 100 words of speech (Riley, 1972).

6. Incipient stuttering. Disfluent speech behavior judged to be the beginning of chronic stuttering.

7. Interjection. Extraneous sounds such as "uh," "er," and "hmm" and extraneous words such "well," which are distinct from sounds and words associated with the fluent or meaningful text, or with other categories of disfluency (Johnson, 1959).

8. Interjection instance. Refers to the occurrence of extraneous sounds or words, regardless of the number of times the sounds or words are repeated. Example: "Well uh, well uh, well uh, he was, um, gone," would be counted as two instances of interjection (Johnson, 1959).

9. Interjection units. Refers to the number of utterances of an interjection within each instance, including the first production. It takes only one production of an interjection to constitute a unit. Example: "Um" and "well uh, well uh, well uh" would each be counted as one instance of interjection, and the number of units would be counted as one for the first instance, and three for the second instance (Johnson, 1959).

10. Intrusive schwa. Refers to the presence of the neutral schwa vowel intruding on the intended vowel. Example: "buh-buh-baby" (Van Riper, 1971).

11. Multisyllable word repetition. Unintentional repetition, within an utterance, of a complete word consisting of two or more syllables. Example: "Maybe, maybe." This is also referred to as poly-syllabic word repetition.

12. Normal disfluency. Disfluent speech behavior which is predicted to be transitory, and not likely to escalate into more serious, chronic stuttering.

13. Part-word repetition. Unintentional repetition of a sound or syllable which is less than the entire word. Includes sound repetitions and syllable repetitions. Example: "s-s-see" or "ba-ba-ball."

14. Parallel talk. As defined by Van Riper, is an individual commenting on what a child is doing, perceiving, or feeling, and also allowing moments of silence, while playing with the child, to encourage the child to verbalize (Emerick and Hatten, 1979).

15. Phrase repetition. Unintentional repetition of an utterance of two or more words, or of one or more words and part of another word. Example: "I want, I want," or "he was g- was going" (Johnson, 1959).

16. Prolongation. Refers to any unduly prolonged sound (Johnson, 1959). This type of disfluency is referred to as disrhythmic phonation in recent studies.

17. Repetition instance. Refers to the occurrence of a part-word, whole word, or phrase repetition, regardless of the number of times the part-word, whole word, or phrase is reiterated. Example: "He, he, he was g-g-going," is two instances of repetitions.

18. Repetition unit. Refers to the number of times a part-word, word, or phrase is repeated, not including the most complete form. Example: "Ba-ba-ba-baby" is one instance of repetition and three units of repetitions; "I want, I want" is one instance of repetition and one unit of repetition.

19. Revision-incomplete phrase. Refers to instances in which the content of a phrase is modified or in which there is a grammatical modification or semantic modification. A change in the pronunciation of a word is also counted as a revision-incomplete phrase. This term is used synonymously with false starts. Example: "That's a ze, that's a giraffe" or "I was, I am going."

20. Single syllable word repetition. Unintentional repetition, within a sentence, of a complete word consisting

of one syllable. Example: "The ball, ball, ball goes here."

21. Sound repetition. Unintentional repetition of a single speech sound, or of a speech sound with an intrusive schwa. Example: "s-s-s-see" or "suh-suh-suh-see."

22. Stuttering. Disfluent speech which is judged as abnormal.

23. Syllable repetition. Unintentional repetition of one or more syllables which are less than the entire word. Example: "Ba-ba-ball" or "Ba-ba-baby" or "Eleph-elephant."

24. Tense pause. A disfluency that occurs between words, part-words, and nonwords when at the between-point in question there are barely audible manifestations of heavy breathing or muscular tightening. The same phenomena within a word would place the disfluency in the category of dis-rhythmic phonation (Williams, Silverman, and Kools, 1968).

25. Whole word repetition. Unintentional repetition of a complete word within an utterance. This includes single syllable and multisyllable words. Example: "Ball, ball" or "maybe, maybe."

CHAPTER II

REVIEW OF THE LITERATURE

Repetitions have always been an important area of focus in research concerning the development of fluency. This review of the literature will discuss the validity of earlier studies on the development of fluency in children, repetitions in normal speech, repetitions in the speech of children identified as stutterers, and recent studies concerning disfluency in preschool children.

VALIDITY OF EARLIER STUDIES

Recently researchers in the area of stuttering have begun to reconsider the available data on the development of fluency in young children. Researchers are questioning the validity of earlier studies, particularly those from the 1930's and 1940's. A number of factors have led to these questions. One factor is the type of recording techniques that were used (DeJoy and Gregory, 1985; Wexler, 1982; Wexler and Mysak, 1982; Yairi, 1981). In these early studies, such as that of Davis (1939), the recording method consisted of handwritten transcripts and coded, hand-recorded assessments. This recording method restricted the range of observation to only three types of disfluency: syllable, whole word, and

phrase repetitions (Yairi, 1981). It also limited the accuracy and reliability of the results (Yairi, 1981).

Another problem is that some of the early studies did not study specific age levels, whereas others used only single age levels rather than a range of age levels (Wexler, 1982; Wexler and Mysak, 1982). The limited numbers of subjects within age groups is another factor which calls the validity of earlier studies into question (DeJoy and Gregory, 1985; Wexler, 1982; Wexler and Mysak, 1982). An example of this is the data collected by Johnson (1959). Only 25 two-year-olds were used, and they were grouped together with subjects up to eight years of age (Yairi, 1981). Yairi (1981) maintained that the inclusion of two-year-olds is crucial to the study of the development of fluency, because of the large number of stuttering cases that emerge during the third year of life, or shortly thereafter.

Another problem is the lack of longitudinal data (Yairi, 1981). To date, Yairi (1981) has produced the only longitudinal data on fluency in normal children (Starkweather, 1985), and this study ran only one year.

Earlier studies are also questioned because of the failure to report standard deviations for different types of disfluencies (Starkweather, 1985). The studies in the 1930's and 1940's reported standard deviations for age groups, but not disfluency types (Starkweather, 1985). Starkweather stated that developmental effects are masked when disfluency types are combined together as a single category.

Finally, earlier studies have been questioned because of the lack of consistency in definitions of disfluencies, and in the disfluency types included, from one study to another (DeJoy and Gregory, 1985; Wexler, 1982). Wexler (1982) maintained that this lack of consistency has made it difficult to determine what types of disfluency should be included in the differential diagnosis of stuttering.

REPETITIONS IN NORMAL SPEECH

Speech repetition has always been an important area of focus in stuttering research. Repetitions may occur as early as the first month of life as part of vocal play, and therefore are not dependent on the advent of meaningful speech (Winitz, 1961). Infant vocal play may consist of over one-fourth repetitions, so the judgment of repetitions as stuttering is made only in the context of language (Perkins, 1971).

To date, there has not been complete agreement as to what amount of repetition may be considered normal. For example, Van Riper (1971) presented a list of 26 guidelines for differential diagnosis of stuttering. Among these are the following criteria for normal disfluency: (1) less than two syllable repetition units per word; (2) less than two syllable repetitions per 100 words; (3) absence or rare occurrence of the intrusive schwa; and (4) less than one prolongation per 100 words. Adams (1977), on the other hand, suggested the following as normal limits: (1) average of

five disfluencies per 100 words; (2) few part-word repetitions or sound prolongations; (3) disfluencies occurring briefly with little effort involved; (4) no more than three repetition units per part-word repetition instance; and (5) absence of the intrusive schwa. These guidelines appear to be in a state of flux since Adams (1984) also suggested nine or fewer disfluencies per 100 words, and no more than two repetition units per part-word repetition instance as normal limits.

REPETITIONS IN CHILDREN IDENTIFIED AS STUTTERERS

Just as researchers have attempted to understand repetition as a normal characteristic of speech, they have also tried to determine how repetition differs in the speech of children who are considered abnormally disfluent. Past studies indicate that sound and syllable repetitions tend to be more characteristic of children who stutter than non-stuttering children (Bloodstein, 1960; Perkins, 1971; Wingate, 1964a). Bloodstein (1960) studied two- to sixteen-year-old children who stuttered. In analyzing disfluency by age level, he found that repetitions were observed at every age level, and were the dominant disfluency types until age six to seven. These findings tend to affect criteria used for identification of stuttering. Van Riper (1971) proposed the following criteria for diagnosing stuttering: (1) more than two syllable repetition units per word; (2) more than two syllable repetitions per 100 words; (3) frequent occurrence of the intrusive

schwa; and (4) more than one prolongation per 100 words. Adams (1977) described the stuttering child as exhibiting the following: (1) at least ten disfluencies per 100 words; (2) exhibiting a conspicuous number of part-word repetitions and sound prolongations; (3) part-word and sound prolongations marked by termination of voice or air flow; (4) producing at least three repetition units per instance; and (5) exhibiting the intrusive schwa. Costello (1983) used the following criteria: (1) the presence of part-word repetitions and/or silent or audible prolongations; and (2) disfluencies occurring on approximately 5 percent of the syllables or more. Ryan (1979) considered speech to be abnormally disfluent if three or more stuttered words occur per minute.

RECENT STUDIES ON DISFLUENCY IN PRESCHOOL CHILDREN

Several recent studies have been completed on disfluency in the speech of preschool children. The studies of Wexler (1982) and Wexler and Mysak (1982) analyzed disfluency in the speech of normally speaking two-, four-, and six-year-old males. Besides part-word, whole word, and phrase repetitions, they included interjections, revision-incomplete phrases, disrhythmic phonations, and tense pauses in their studies. Of the three types of repetitions considered in their studies, phrase repetitions had the highest incidence of occurrence for each age group. However, phrase repetitions did not have as high an incidence of occurrence in any age group as two other disfluency types: revision-incomplete phrases and

interjections. Of the seven types of disfluency analyzed, part-word repetitions had the lowest frequency in all age groups. Although patterns of disfluency were similar across age groups, there were differences in frequencies of specific disfluency types among age groups. For example, the two-year-old group had a higher incidence of each type of repetition than the other two age groups. In the Wexler (1982) study, which looked at the occurrence of disfluencies during a free play (neutral) and a stressful situation, the incidences of word and phrase repetitions for two-year-olds were significantly higher in the neutral situation. The two-year-olds showed a significantly higher incidence of phrase repetitions in the stress situation.

The studies of Yairi (1981) and Yairi and Lewis (1984) analyzed part-word, single syllable word, multisyllable word, and phrase repetitions, as well as interjections, revision-incomplete phrases, disrhythmic phonations, and tense pauses in the speech of two-year-old children. The Yairi (1981) study used 33 two-year-old males and females. For males and females combined, the most frequent disfluencies, in ranked order, were interjections, single syllable word repetitions, part-word repetitions, and revision-incomplete phrases. This order was the same for the males alone, while single syllable word repetitions and part-word repetitions were higher than interjections for females. Although all types of disfluency were present in the group data, part-word repetitions, single syllable word repetitions,

interjections, and revision-incomplete phrases comprised 76 percent of the total disfluencies. In other words, in analyzing the disfluencies, the speech of these subjects was dominated by repetitions smaller than phrase repetitions, and by some sort of hesitancy (interjections and revisions). Disrhythmic phonations and tense pauses were used by only half of the subjects. Multisyllable word repetitions had the lowest incidence of all disfluency types, and were observed in less than 20 percent of the subjects. Yairi (1981) speculated that this was due to the small number of this class of words in the speech samples. In comparing the males and females, the males generally tended to be more disfluent, although the difference was not significant. The males had higher incidences of part-word and single syllable word repetition than the females. This tended to be a general trend for all male subjects. The females tended to have slightly higher rates of incidence for phrase and multisyllable word repetitions.

Yairi (1981) arranged his 33 subjects in rank order, from least to most disfluent and divided them into quartiles of eight to nine subjects each. This procedure showed an interesting pattern. There was a systematic increase from quartile to quartile on all disfluency types except multisyllable word repetitions. The total disfluency rate of the fourth quartile was equal to the sum of the total disfluency rate of the other three quartiles. There were several subjects in the fourth quartile who were ten times more disfluent

than any of the others in the sample. In contrast, over 50 percent of the subjects had only one or less syllable or word repetition in 100 words. In addition, the four most disfluent subjects were males.

Yairi and Lewis (1984) used two groups of two- and three-year-old males and females. The control group consisted of children diagnosed by their parents to have begun stuttering within the last two months. Subjects in the two groups were matched individually according to sex and age. In the control group the most frequent disfluencies, in ranked order, were interjections, part-word repetitions, and revision-incomplete phrases. For the control males, the most frequent disfluencies, in ranked order, were interjections, revision-incomplete phrases, and part-word repetitions. In contrast, the most frequent disfluencies for the experimental group, in ranked order, were part-word repetitions, disrhythmic phonations, and single syllable repetitions. In the control male group, interjections and revision-incomplete phrases had a total higher incidence than the total incidence for part-word and single syllable word repetitions. In the experimental male group, part-word and single syllable word repetitions had a considerably higher total incidence than interjections and revision-incomplete phrases. Large standard deviations for individual disfluency types indicated that the two groups tended to be heterogeneous in speech behavior. There was considerable overlap in frequency of occurrence of revision-incomplete phrases and interjections,

with small overlap in single syllable word repetitions, phrase repetitions, and disrhythmic phonations. Overlap was minimal in frequency of part-word repetitions and tense pauses. Yairi and Lewis (1984) concluded that generally, overlap decreased for disfluencies most common in the speech of stutterers.

This study showed that normally speaking two- and three-year-olds exhibit all types of disfluencies, and as a group, show a relatively even distribution of disfluencies. The group of subjects diagnosed as having a stuttering problem were overall, three-and-a-half times as disfluent as the control group, and showed an overall increase in number of disfluencies, which was not uniform across the range of disfluencies. This group showed an increase which was significantly above normal in part-word repetitions and disrhythmic phonations. This study also revealed an interesting difference in part-word repetitions between the two groups. The subjects in the experimental group were likely to make two or more part-word units of repetition, whereas the control subjects rarely made more than one part-word unit of repetition per instance of occurrence. There was almost no overlap in the difference.

TENTATIVE CONCLUSIONS FROM THE PREVIOUS RESEARCH

The research on disfluent speech behavior in children has provided a basis of understanding of the development of fluency. However, recent studies have not only added to this

understanding, but have generated more questions, not only concerning normal development, but also concerning criteria for differential diagnosis.

The study by Davis (1939) indicated the following conclusions about repetitions in children's speech: (1) they are part of the speech patterns of all children; (2) the amount varies from child to child; (3) syllable repetitions show more variability than other types of repetition; (4) children use phrase repetitions most often, followed by word repetitions, then syllable repetitions; and (5) there is a general trend for word and phrase repetitions to decrease with age.

The studies of Wexler (1982) and Wexler and Mysak (1982) found phrase repetitions to have the highest rate of incidence among repetitions, followed by word repetitions. This is consistent with the findings of Davis (1939). Wexler (1982) also concluded from his results that the higher incidence of disfluency in two-year-olds, compared to the other two age groups, supports the concept of fluency development. Wexler and Mysak (1982) also found that on most measures, the two-year-old group showed more variability between subjects than the other age groups. They concluded that occasional multiple repetitions in the speech of males of this age should not be considered evidence of early stuttering.

Subjects in the study by Yairi (1981) used single syllable word repetitions most, followed by part-word

repetitions, then phrase repetitions. This is not consistent with findings of Davis (1939), Wexler (1982), or Wexler and Mysak (1982). Yairi (1981) also found that over 50 percent of his subjects made one or less syllable repetition or word repetition in 100 words. Because of this finding, he questions the significance of Davis' (1939) contention that repetition is part of the speech of all children. Yairi (1981) concludes from his study that two-year-olds are very heterogeneous in respect to disfluency, and therefore group averages may not be useful as the only reference against which to compare an individual child's performance. He also concludes that this study shows a lower frequency of instance of repetition than past data.

Yairi and Lewis (1984) found that their control group used part-word repetitions most frequently, followed by single syllable word repetitions, and then phrase repetitions. This is also not consistent with the other studies. Their finding that the number of part-word repetition units per instance are rarely over one for the control group caused them to question Adam's (1977) criterion of at least three units per instance for diagnosing stuttering. Yairi and Lewis (1984) concluded that in spite of the fact that there appeared to be considerable variability within both the control group and experimental group, as well as an overlap in distribution of disfluencies, the two groups still represented two distinct population samples.

CHAPTER III

METHODS

SUBJECTS

Twenty male subjects ranging in age from 30 to 36 months (mean age = 33.1) were selected from the greater Portland, Oregon and Vancouver, Washington areas. Subjects were recruited from preschools and from the Northeast Indoor Park. They were selected according to the following minimum criteria:

1. A permission form signed by a parent.
2. Age average intelligence.
3. No history of chronic ear infection or known hearing impairment.
4. Ability to attend to two low-stress tasks in 15 minutes.
5. No neurological impairment or other disabling condition.
6. No prior intervention for stuttering.
7. Speech intelligibility of 75 percent.
8. Average of two-and-a-half words per utterance.

SUBJECT ELIGIBILITY PROCEDURES

A parent of each subject was contacted by telephone regarding the purpose and procedures of the study. During the telephone conversation, the parent gave permission for the child to participate in the study. The parent also

indicated the child had no history of ear infections, no known hearing impairment, no known physical or mental disability, or need for speech intervention.

Following the telephone conversation, a recruitment letter (see Appendix A), permission form (see Appendix B), and a questionnaire (see Appendix C) addressing the subject's speech, family structure, and family incidence of stuttering were hand delivered to the parent to complete at their respective homes. The parent was asked to complete the questionnaire and return it to the examiner prior to the videotaping session. Contents of the questionnaire were not used in this study, but will be used in future research.

The Peabody Picture Vocabulary Test - Revised, Form M (Dunn and Dunn, 1981) was administered to each subject in the home to determine language comprehension. The results of this test were not included in this investigation, but may be used in future research. In addition, a speech sample of at least three minutes was elicited from each subject and recorded on a portable tape recorder to evaluate speech intelligibility and language development. This task was also completed in the home. The sample was elicited by the investigator by using toys and asking open-ended questions. Subjects were judged to be at least 75 percent intelligible if 75 out of 100 consecutive words could be understood by the investigator. Subjects were judged as having an average language development of at least two-and-a-half words per

utterance by counting the total number of words and dividing by the number of separate responses.

SPEECH SAMPLE PROCEDURES

Each subject was videotaped behind a mirror at the Portland State University Speech Communication Department for 15 minutes during free play with toys and during conversation with the investigator.

To elicit the speech sample, the investigator presented the child with toys from a box, used parallel talk, and asked open-ended questions to stimulate verbalization by the child (see Appendix D for a list of stimuli). The speech sample was videotaped by a graduate student in the Speech Communication Department with a Panasonic single camera recording system.

SCORING PROCEDURES

A 300 word sample was transcribed verbatim for each subject with high verbal output. For subjects with low verbal output, 200 word samples were transcribed (see Appendix E for rules for counting words). Following transcription, each sample was analyzed and coded for the following types of disfluency: sound repetitions, syllable repetitions, single syllable word repetitions, multisyllable word repetitions, and phrase repetitions (see Appendix F for rules for identifying repetitions, and Appendix G for coding symbols).

RELIABILITY

Each speech sample was assigned an identifying number. From the 20 speech samples, 5 samples were randomly selected by a graduate student in the Portland State University Speech Communication Department. Random selection was carried out with the use of random order tables.

The same graduate student extracted utterance number 10 through 19 of the 5 randomly selected samples and formed them into content transcripts (see Appendix H for instructions for selection of content transcripts).

The repetitions from the content transcripts were then identified and coded as to the type of repetitions they represented by the investigator and two other trained graduate students in the Speech Communication department (see Appendix I for instructions to reliability judges). These results were compared to the investigator's original results.

In order to evaluate interjudge and intrajudge reliability, a self-agreement index (Sander, 1961) was calculated. Interjudge and intrajudge agreement indexes were .98 and .99.

DATA ANALYSIS

Sound, syllable, single syllable word, multisyllable word, and phrase repetitions were identified and coded for each subject's speech sample. Descriptive statistics were then applied to determine the mean, standard deviation and range of each type of repetition per 100 words, as well as for total repetitions per 100 words. To determine if part-word

repetitions had a greater frequency of occurrence than the total of whole word and phrase repetitions, a one-tailed t-test for related measures was computed. An analysis of variance was performed to determine difference in frequency of repetition between subjects with high verbal output and subjects with low verbal output.

CHAPTER IV

RESULTS AND DISCUSSION

RESULTS

Individual speech samples were elicited from 20 males between the ages of 30 and 36 months. The speech samples were videotaped, transcribed, and analyzed for the following types of disfluency: (a) sound repetitions; (b) syllable repetitions; (c) single syllable word repetitions; (d) multisyllable word repetitions; (e) phrase repetitions; (f) interjections; (g) revision-incomplete phrases; (h) disrhythmic phonations; (i) tense pauses; and (j) intrusive schwas. This data will be reported in regard to the questions posed in Chapter I, beginning with the primary questions, as well as findings regarding extent of repetitions and the intrusive schwa.

Questions

Do part-word repetitions have a greater frequency of occurrence than the total of whole word and phrase repetitions in 30- to 36-month-old males?

A one-tailed t-test for related means was computed for the mean score of part-word repetitions (sound and syllable repetitions) and for the mean score for the total of single syllable word, multisyllable word, and phrase repetitions.

Table I shows the comparison between the two means. The data revealed that whole word and phrase repetitions combined occurred at a higher frequency of occurrence than part-word repetitions. Further examination revealed that a statistically significant difference beyond the .01 level of confidence occurred between the mean of whole word and phrase repetitions combined, and the mean of part-word repetitions. Thus, the data from the present study revealed a significantly higher frequency of occurrence for whole word and phrase repetitions combined than for part-word repetitions in 30- to 36-month-old males.

TABLE I

RESULTS OF A ONE-TAILED t -TEST FOR RELATED MEASURES COMPARING THE MEANS OF FREQUENCIES OF OCCURRENCE FOR SOUND AND SYLLABLE REPETITIONS COMBINED, AND WHOLE WORD AND PHRASE REPETITIONS COMBINED

Repetition	Mean	df	t -test
Part-word (Sound + Syllable)	.86	19	2.85*
Whole word + Phrase	1.80	19	

*Significant at $p < .01$.

Is there a difference in frequency of occurrence between sound repetitions and syllable repetitions?

The means, standard deviations, and ranges were computed for sound and syllable repetitions. These are presented in Table II. The data revealed the mean frequency of occurrence

for sound repetitions, .60, is two times greater than the mean frequency of occurrence for syllable repetitions, which is .27.

TABLE II
MEANS, STANDARD DEVIATIONS, AND RANGES OF
REPETITIONS PER 100 WORDS SPOKEN

Repetition	Mean	SD	Range
Single syllable word repetition	1.31	1.23	0 - 4
Sound repetition	.60	1.00	0 - 4.33
Phrase repetition	.47	.42	0 - 1
Syllable repetition	.27	.34	0 - 1.33
Multisyllable word repetition	.03	.11	0 - .5
TOTAL	2.66	6.43	0 -10.60

Are there differences in frequency of occurrence among single syllable word repetitions, multisyllable word repetitions, and phrase repetitions?

The means, standard deviations, and ranges were computed for single syllable word, multisyllable word, and phrase repetitions as shown in Table II above. Single syllable word repetitions were the most frequently occurring repetitions with a mean of 1.31 per 100 words. This type of repetition was followed by phrase repetitions, with a mean of .47, and multisyllable word repetitions with a mean of .03. Single

syllable word repetitions occurred more than two and a half times more frequently than phrase repetitions, and phrase repetitions occurred 15 times more frequently than multi-syllable word repetitions.

What is the range of individual diversity in frequency of occurrence of repetitions among all subjects?

The total number of repetitions varied across subjects, from a low of 0 to a high of 10.66 repetitions per 100 words spoken. A frequency distribution of the subjects along the range of repetitions is presented in Figure 1. The largest concentration of subjects was near the middle, at two to three repetitions per 100 words.

Figure 1. Repetition frequency distribution of subjects ranging from 0 to 10.66 per 100 words.

The data were further analyzed according to subgroups with different rates of repetitions. Subjects were first arranged in rank-order from least to most disfluent (based on repetitions only) and were then divided into quartiles of five subjects each. The results are presented in Table III. These data show an increase from quartile to quartile for overall rates of repetition, and for single syllable word repetitions, which were the most frequently occurring repetitions. In addition, the data show that the total rate of repetitions of the fourth quartile alone was greater than the sum of the total rate of repetitions of the other three quartiles.

TABLE III

MEANS OF REPETITIONS ACCORDING TO QUARTILES,
CONSISTING OF FIVE SUBJECTS EACH

Repetition	Quartiles			
	1st	2nd	3rd	4th
Sound repetition	.13	.50	.36	1.40
Syllable repetition	0	.40	.33	.33
Single syllable word repetition	.26	.63	1.30	3.03
Multisyllable word repetition	0	.10	0	0
Phrase repetition	.13	.13	.70	.90
TOTAL	.53	1.76	2.70	5.66

Percentages of subjects who uttered each type of repetition within certain frequency ranges are presented in Table IV. These data show that although all types of repetitions were represented in the speech of these subjects, not all subjects uttered single syllable word repetitions. Phrase repetitions were uttered by 65 percent of subjects, sound repetitions by 55 percent of subjects, syllable repetitions by 50 percent of subjects, and only 5 percent (one subject) uttered a multisyllable word repetition.

TABLE IV

PERCENTAGES OF SUBJECTS SHOWING AVERAGE PRODUCTION OF EACH TYPE OF REPETITION, PER 100 WORDS, BASED ON 200 AND 300 WORD SAMPLES

Type of Repetition	Range of Repetitions				
	0	.1-.5	.6-1.0	1.1-2.0	2.1+
Sound repetition	45	20	20	10	5
Syllable repetition	50	40	3	5	0
Single syllable word repetition	15	15	35	15	20
Multisyllable word repetition	95	5	0	0	0
Phrase repetition	35	25	40	0	0

Is there a dominant type of repetition among all subjects?

Single syllable word repetitions were the most frequently occurring repetition with a mean of 1.31 per 100 spoken words.

Single syllable word repetitions occurred more than two times more frequently than sound repetitions, the next most frequently occurring type of repetition (see Table II). Single syllable repetitions were exhibited by 85 percent of all subjects. They were the most frequently occurring repetition in the speech of 50 percent of the subjects. Only 10 percent of the subjects produced other repetitions at a higher frequency. The remaining subjects either did not produce any repetitions, or produced other types of repetition at equal rates of frequency as single syllable word repetitions.

Is there a difference in frequency of occurrence of repetitions among children with high verbal output and those of low verbal output?

An analysis of variance test was performed to compare the frequency of occurrence of repetitions among subjects with high verbal output and those with low verbal output. Results, presented in Table V, reveal that there appeared to be no significant relationship between amount of verbal output and rate of repetition.

TABLE V
RESULTS OF ANALYSIS OF VARIANCE FOR COMPARISON OF
REPETITIONS AMONG SUBJECTS WITH HIGH VERBAL
OUTPUT AND SUBJECTS WITH LOW
VERBAL OUTPUT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F-test
Word Group ^a	1	1.41	1.41	1.10 ^c
Subject in Word Group ^b	18	23.10	1.28	
TOTAL	19	24.51		

^aVariation between 200 word and 300 word groups.

^bVariation among subjects within word groups.

^cNot significant at any level.

When looking at all types of disfluencies, are repetitions the most consistent characteristic of normal disfluency?

Table VI shows the means, standard deviations, and ranges for all types of disfluency except the intrusive schwa, which is displayed on Table VIII. Revision-incomplete phrases were the most frequently occurring disfluency types with a mean of 1.38.

TABLE VI
MEANS, STANDARD DEVIATIONS, AND RANGES OF
DISFLUENCIES PER 100 WORDS SPOKEN

Disfluency	Mean	SD	Range
Revision-incomplete phrases	1.38	.64	5 - 3.33
Single syllable word repetitions	1.31	1.23	0 - 4
Interjections	.77	.89	0 - 3
Sound repetitions	.60	1.00	0 - 4.33
Phrase repetitions	.47	.42	0 - 1
Syllable repetitions	.27	.34	0 - 1.33
Disrhythmic phonations	.07	.17	0 - .66
Multisyllable word repetitions	.03	.11	0 - .5
Tense pauses	.02	.07	0 - .33
Total Disfluencies	4.90	8.74	1 -15.66

Extent of Repetition

In addition to instances of repetition, repetition units were also counted to determine extent of repetition. Group data for extent of repetition is presented in Table VII.

Although there were instances of up to 5 repetition units, the data shows that on the average, instances of repetition tended to consist of a single unit. The highest number of repetition units occurred on single syllable word and sound repetitions.

TABLE VII

RANGE OF REPETITION UNITS PER INSTANCE FOR EACH TYPE OF REPETITION, AND MEAN NUMBER OF REPETITION UNITS PER INSTANCE FOR EACH TYPE OF REPETITION EXHIBITED PER 100 WORDS SPOKEN

Repetition	Range	Mean
Sound	1 - 5	1.44
Syllable	1 - 2	1.14
Single syllable word	1 - 5	1.24
Multisyllable word	1	1.00
Phrase	1 - 2	1.04

The Intrusive Schwa

Because sound repetitions were counted separately from syllable repetitions, instances of intrusive schwa were also counted. Data regarding occurrence of the intrusive schwa are included in Table VIII. Only 30 percent of subjects produced the intrusive schwa, resulting in an overall mean of .28. These subjects were all children with high verbal output, and represent all four quartiles. While most productions of the intrusive schwa consisted of one to two units per instance, the most disfluent child in the study produced one to four units per instance (see Table VIII).

TABLE VIII
FREQUENCY AND EXTENT OF OCCURRENCE OF
THE INTRUSIVE SCHWA

Mean	.28
Standard deviation	.64
Range	0 - 3
% of subjects who exhibited intrusive schwa	30
Mean of repetition units per instance	1.59
Range of repetition units	1 - 4

DISCUSSION

The analysis of the data revealed that whole word and phrase repetitions combined occurred more frequently than part-word repetitions in the speech of normal 30- to 36-month-old males. The dominant repetition type, single syllable word repetitions, occurred in the speech of 85 percent of subjects. Single syllable word repetitions were followed by, in descending order, sound repetitions, phrase repetitions, syllable repetitions, and multisyllable word repetitions. The frequency distribution among subjects ranged from 0 to 10.66 repetitions per 100 words. No difference in frequency of repetitions was found among subjects with high and low verbal output. The following discussion will examine: methodological differences among studies; a comparison of frequencies of repetitions; a comparison of distributions of repetitions; a comparison of extent of repetitions; a

comparison of rates of disfluency; a comparison of recent studies with the present study; implications regarding the research; and implications regarding differential diagnosis of stuttering.

Methodological Differences Among Studies

There are a number of methodological differences among the past and present studies which may affect results and findings, and therefore should be considered in comparing results of recent studies and findings of the present study. One difference is the ages of subjects in each study. The studies by Wexler (1982) and Wexler and Mysak (1982) used 26- to 33-month-old males. The study by Yairi (1981) used 24- to 33-month-old subjects, while Yairi and Lewis (1984) used 24- to 39-month-old subjects. The present study limited subject age to 30 to 36 months.

Another difference is the number of words included in the speech sample, and the amount of time allowed for eliciting the sample. The studies by Wexler (1982) and Wexler and Mysak (1982) were based on 100 word samples. The studies by Yairi (1981) and Yairi and Lewis (1984) were based on 500 word samples elicited in 25 to 40 minute sessions. The present study limited time of recording to 15 minutes for each subject, resulting in 200 and 300 word samples, according to the subjects' level of verbal output.

The frequencies of disfluency for all studies were based on the number of disfluencies per 100 words, with the exception

of the Yairi and Lewis (1984) study, which was based on number of disfluencies per 100 syllables.

All studies based identification of disfluency types on the scheme outlined in Williams, Silverman, and Kools (1968), with some minor variations. However, methods of counting words and counting repetition units is not always clearly stated. Differences in methods of counting words may have considerable effect on overall results. For example, an early study by Branscom et al (1955) counted each repetition of a word as a separate word (i.e., "can-can-can" was counted as three words, and "I can go, I can go" was counted as six words). In contrast, repetition units were not included in the word count in the present study, in order to avoid inflated frequencies of disfluency. In addition, the examiner of the present study attempted to include only nonintentional repetitions in disfluency counts (specific criteria for calculating word samples and for identifying repetitions in the present study are included in Appendix E and F).

Differences in subject ages, sizes of speech samples, and methods of determining frequencies of disfluency should all be considered in comparing results of past studies with findings of the present study.

Comparison of Frequencies of Repetitions

Examination of Table IX reveals that the study by Yairi (1981) found single syllable word repetitions to be the most frequently occurring type of repetition. This is

consistent with the findings of the present study. The study by Yairi and Lewis (1984) found part-word repetitions to occur more frequently than single syllable word repetitions. This difference could be accounted for by the fact that the subjects in the Yairi and Lewis study included three-year-olds. The studies by Wexler (1982) and Wexler and Mysak (1982) found phrase repetitions to be the most frequently occurring repetition. The overall rate of disfluency of these studies is considerably higher than of the other studies, suggesting that a different method of word and repetition counting may have been utilized. This could contribute to differences in individual repetition rates, as well as in overall rates.

The findings of the present study are consistent with the results of Yairi (1981) and Yairi and Lewis (1984) indicating phrase repetitions occur less frequently than single syllable word and part-word repetitions, with multisyllable word repetitions occurring least frequently.

TABLE IX

COMPARISON OF RECENT STUDIES AND THE PRESENT STUDY SHOWING TOTAL MEANS OF DISFLUENCIES AND RANK ORDERS OF TYPES OF DISFLUENCIES FROM MOST FREQUENT TO LEAST FREQUENT IN OCCURRENCE

Yairi (1981)	Wexler (1982) ^a Wexler & Mysak (1982) ^a	Yairi & Lewis (1984) ^b	Present Study ^a
CM EM			
I ^c	RIP	I	DP
SSWR	I	RIP	PWR
PWR	Ph R	PWR	SSWR
RIP	WR	DP	RIP
Ph R	DP	SSWR	I
TP	TP	Ph R	Ph R
DP	PWR	TP	DP
MSWR		MSWR	MSWR
		MSWR	TP
Mean of Disfluency			
7.95	14.60	6.66	23.26
			4.90

^aIncluded normal 2-year-old males.

^bIncluded normal 2- and 3-year-old control males (CM) and stuttering 2- and 3-year-old experimental males (EM).

^cLegend: DP = disrhythmic phonation
I = interjection
MSWR = multisyllable word repetition
Ph R = phrase repetition
PWR = part-word repetition
RIP = revision-incomplete phrase
SSWR = single syllable word repetition
TP = tense pause
WR = word repetition

Yairi (1981) divided subjects into quartiles for further comparison of frequencies of disfluencies, and found a systematic increase from quartile to quartile. In the present study, there is a general increase of repetitions from the first to the fourth quartile, with some variation in the second and third quartile (see Table III). The Yairi (1981) study and the present study both found that the frequency of disfluency of the fourth quartile was equal to, or greater than, the sum of the other three quartiles. The Yairi (1981) study and the present study also both found that over 50 percent of the subjects had less than two part-word repetitions in 100 words. These findings support the conclusion that a small number of normal children (25 percent) account for the relatively high rate of disfluency among normal children.

Comparison of Distributions

Results of past research indicate greatest variation of ranges in the two most frequently occurring repetitions, part-word and whole word repetitions. The study by Yairi (1981) presents the broadest ranges: 0 to 5.6 for part-word repetitions, and 0 to 6.6 for single syllable word repetitions. The study by Yairi and Lewis (1984) resulted in the smallest ranges: .57 to 2.22 for part-word repetitions, and 1.19 to 2.59 for single syllable word repetitions. Wexler and Mysak (1982) found the following ranges: 0 to 1.8 for part-word repetitions, and 1 to 3.6 for word repetitions. The ranges for the present study (see Table II) fall between those reported by Yairi (1981) and those reported by Wexler and

Mysak (1982). This supports the fact that even though the number of subjects in the present study was small, the ranges of variation were consistent with similar studies. In addition, even though normal children exhibit variations in disfluency, these variations still fall within consistent ranges.

Comparison of Extent of Repetitions

Yairi (1981) examined repetition units as well as instances of repetition. Results revealed that although there were isolated instances of up to five repetition units per instance, on the average repetitions consisted of a single unit. Single syllable word repetitions had the highest maximum repetition units per instance, while part-word repetitions had the highest mean ratio of repetition units to instances. The results of the study by Yairi and Lewis (1984) also revealed an average repetition unit of one. These results are consistent with the findings of the present study, in which there were a small number of instances of five repetition units, and a mean number of repetition units to instances of approximately one unit. The results of the Yairi and Lewis (1984) study caused them to question Adam's (1977) criteria of at least three units per instance for diagnosing stuttering. The results of the Yairi (1981) study and the findings of the present study suggest that although one to two repetition units are most common in the speech of normal

two-year-olds, an occasional occurrence of five repetition units might be expected.

Comparison of Overall Rates of Disfluency

In the previous studies cited concerning disfluency in two-year-olds, revision-incomplete phrases and interjections are among the top four highest ranking disfluencies (see Table IX). In fact, in all of the studies of normal two-year-olds, one of these two types of disfluency ranks highest. The findings of the present study are consistent with these results. Interjections are the highest ranking disfluency among the normal group in the studies by Yairi (1981) and Yairi and Lewis (1984), and the second highest ranking in the studies by Wexler (1982) and Wexler and Mysak (1982). Revision-incomplete phrases are the highest ranking disfluency in the studies by Wexler (1982) and Wexler and Mysak (1982), the second highest in the study by Yairi and Lewis (1984), and the highest ranking disfluency in the present study.

On the other hand, disrhythmic phonations and tense pauses are consistently low in frequency of occurrence among these studies. According to rank order by frequency of occurrence, disrhythmic phonations and tense pauses are among the lowest three types of disfluency in all studies, with the exception of disrhythmic phonations in the Yairi and Lewis (1984) study.

In the studies by Wexler (1982) and Wexler and Mysak (1982), word repetitions occurred approximately one-and-a-half times more frequently than either disrhythmic phonations or tense pauses. In the study by Yairi (1981) both single syllable word repetitions and part-word repetitions occurred three times more frequently than either disrhythmic phonations or tense pauses. In the study by Yairi and Lewis (1984), the highest ranking repetition, part-word repetitions, occurred approximately one-and-a-half times more frequently than disrhythmic phonations and was over ten times more frequent in occurrence than tense pauses. These results are comparable with the findings of the present study, in which both single syllable word repetitions and part-word repetitions were over ten times more frequent in occurrence than disrhythmic phonations or tense pauses.

The results of the Yairi (1981) study revealed that revision-incomplete phrases, interjections, single syllable word repetitions, and part-word repetitions combined made up 76 percent of the disfluencies in the speech of their subjects. The findings of the present study are consistent, in that these four types of disfluency consist of 88 percent of the disfluencies. These findings indicate that the disfluency characteristics of the subjects of the present study and of the Yairi (1981) study were predominately hesitations (interjections and revision-incomplete phrases) and repetitions of one syllable or less (single syllable and part-word repetitions). This is in contrast to the experimental subjects in

the study by Yairi and Lewis (1984). Over 80 percent of the disfluencies of these subjects diagnosed as stutterers consisted of disrhythmic phonations and repetitions of one syllable or less. This supports the conclusion by Yairi and Lewis (1984) that although there is a wide range of variation of disfluency within these two groups, they are still distinctly different.

Implications Regarding the Outcome

The findings of the present study suggest, as have recent studies, that the conclusions of early stuttering research on repetitions in young children need to be reconsidered. Davis (1939) concluded that repetitions are part of the speech patterns of all children. The findings of the present study suggest that although they are a common occurrence, they are not exhibited by all children, at least not during all stages of language development. In the present study, two subjects (10 percent) did not produce a single repetition in 15 minutes, or 200 words, of spontaneous speech.

Davis (1939) also concluded that syllable repetitions show more variability than other types of repetition. The present study found syllable repetitions were made by 50 percent of the subjects, with a range of 0 to 1.33 per 100 words. Thus, the present study did not find syllable repetitions to be more variable than other types of repetition.

Davis also concluded that children use phrase repetitions most often. This is not consistent with the findings

of the present study, in which subjects produced single syllable word repetitions and sound repetitions more often than phrase repetitions.

Davis' (1939) conclusion that the amount of repetition varies from child to child was strongly supported by the findings of the present study. Two of the subjects in this study did not produce a single repetition in 200 words, while the most disfluent subject produced 10.66 repetitions per 100 words.

The conclusion of Wexler and Mysak (1982) that occasional multiple repetitions in the speech of males should not be considered evidence of early stuttering is also supported by the findings of this study. For example, the mean number of repetitions of the fourth quartile subjects was 5.66 per 100 spoken words, and repetition units occurred as many as five per instance for single syllable word and sound repetitions.

The conclusion of Yairi (1981) that two-year-olds are very heterogeneous in respect to disfluency tends to be supported by the findings of the present study, at least in regard to frequency of revision-incomplete phrases, interjections, repetition instances, and repetition units. However, frequency of occurrence of tense pauses and disrhythmic phonations are consistently low among subjects in the studies reviewed, as well as in the present study.

Implications for Diagnosis

The results of the study of Yairi and Lewis (1984), in which the number of part-word repetition units rarely exceeded one unit per instance, led Yairi and Lewis to question Adam's (1977) criterion of at least three part-word repetition units per instance for diagnosing stuttering. The findings of the present study tend to support this criterion of Adam's. Although there are several instances of up to five repetition units per instance, most repetition units in the present study consist of one unit per instance.

Another criterion of Adam's (1977) for diagnosing stuttering is at least ten disfluencies per 100 words. The present study revealed a mean of 4.9 for total number of disfluencies per 100 words, which is easily within Adam's limit. However, the present study also revealed a range of 1 to 4.33. Although part-word repetitions occurred less frequently than word and phrase repetitions combined, part-word repetitions were the third highest ranking disfluency, following revision-incomplete phrases and single syllable word repetitions. These findings suggest that part-word repetitions in the speech of two-year-old males should not be considered a strong indicator of early stuttering.

Findings of the present study support Van Riper's (1971) criteria of more than two syllable repetition units per word, more than two repeated syllables per 100 words spoken, frequent occurrence of the intrusive schwa, and more than one prolongation per 100 words for diagnosing stuttering. The

findings of the present study revealed a maximum number of two repetition units per instance of syllable repetition, a range of 0 to 1.33 for syllable repetitions, a range of 0 to 3 for the intrusive schwa, and a range of 0 to .66 for disrhythmic phonations. These findings are all consistent with Van Riper's criteria.

The findings of the present study are consistent with Costello's (1983) criteria, with one modification. Her criteria include: (1) disfluencies occurring on approximately 5 percent of syllables or more; and (2) presence of part-word repetitions and/or silent or audible prolongations. The mean of 4.9 total disfluencies per 100 words in the present study is not consistent with the 5 percent limit, for it implies on the average that they are as apt to be over 5 as under. However, the findings of the present study indicate that the occurrence of disrhythmic phonations and tense pauses (i.e., audible or silent prolongations) may be a much stronger indication of early stuttering than the presence of part-word repetitions.

The findings of the present study indicate that repetitions, particularly single syllable word repetitions, along with revision-incomplete phrases and interjections, are common occurrences in the speech of two-and-a-half- to three-year-old males. Within this age group, both frequency of occurrence and extent of disfluency is variable. These findings also indicate that while repetitions are a common occurrence, disrhythmic phonations and tense pauses are rare. These findings

are consistent with results of recent studies which also found that repetitions, revision-incomplete phrases and interjections are common occurrences in the speech of two-year-old males, while occurrence of disrhythmic phonations are rare. This characteristic of the speech of normal two-year-olds is in contrast to the findings of the experimental group study by Yairi and Lewis (1984). In their study the children diagnosed as stutterers exhibited a ten times greater number of disrhythmic phonations than the control group. These findings suggest that the occurrence of disrhythmic phonations in the speech of two-year-old males is a more reliable indicator of incipient stuttering than the occurrence of repetitions.

CHAPTER V

SUMMARY AND IMPLICATIONS

SUMMARY

Development of fluency has always been an important focus of stuttering research. However, to date there are no standardized norms on the development of fluency. Reliable and valid information regarding the normal development of fluency is necessary in order to differentially diagnose normal disfluency from incipient stuttering. Establishment of norms for part-word repetitions is especially important since this type of disfluency has traditionally been considered an indicator of early stuttering. The present study sought to contribute to the investigation of the development of fluency by examining the frequency of occurrence of repetitions in 30- to 36-month-old males.

Twenty male subjects ranging in age from 30 to 36 months were chosen. Subjects were videotaped for fifteen minutes during free play with toys and during conversation with the examiner. Speech samples were analyzed for the following types of disfluencies: sound repetitions, syllable repetitions, single syllable word repetitions, multisyllable word repetitions, phrase repetitions, revision-incomplete phrases, interjections, disrhythmic phonations, tense pauses, and intrusive schwas. A one-tailed t-test revealed that whole

word and phrase repetitions combined occurred significantly more frequently than part-word (sound and syllable) repetitions. The rank order of repetitions, from most frequent to least frequent, was single syllable word repetitions, sound repetitions, phrase repetitions, syllable repetitions, and multisyllable word repetitions. Among subjects, mean frequencies of occurrence of repetitions varied from 0 to 10.66 per 100 words. The highest ranking repetition, single syllable word repetition, was produced by 85 percent of the subjects. When subjects were placed in rank order and divided into quartiles it was revealed that the total rate of repetitions of the fourth quartile alone was greater than the sum of the total rate of repetitions of the other three quartiles. No significant difference in frequency of occurrence of repetitions was found when an analysis of variance test was applied to subjects with high verbal output and low verbal output.

The findings of the present study indicate that the occurrence of multiple repetitions in the speech of 30- to 36-month-old males is common, particularly for part-word and single syllable word repetitions. While some children rarely exhibit repetitions, approximately 25 percent exhibit 10 times more repetitions than others. Disrhythmic phonations and tense pauses are consistently low in frequency of occurrence. The findings of the present study are consistent with recent studies which found that the occurrence of part-word repetitions, single syllable word repetitions, revision-incomplete

phrases, and interjections are common in the speech of normal two-year-old children. The findings of the present study are also consistent with results of recent studies which found that the occurrence of tense pauses and disrhythmic phonations is rare in the speech of normal two-year-old males. This suggests that other factors besides frequency and types of repetitions be considered in the differential diagnosis of stuttering. This finding, and that of the Yairi and Lewis (1984) study in which stuttering children exhibited ten times the number of disrhythmic phonations as 500 normal speaking children, indicate that the occurrence of disrhythmic phonations is a much stronger indication of early stuttering than the presence of part-word repetitions.

IMPLICATIONS

Clinical Implications

The findings of the present study suggest the following concerning the use of traditional guidelines such as those of Adams (1977) and Van Riper (1971) for differential diagnosis of stuttering: (1) the range of variability of disfluency among two-year-old children should be considered; (2) less emphasis should be placed on occurrence of part-word repetitions as an indicator of early stuttering; and (3) more emphasis should be placed on occurrence of disrhythmic phonations as an indicator of early stuttering.

Research Implications

Replications of the present study with older children as well as with children of the same age would contribute to the establishment of developmental norms regarding development of fluency. Longitudinal studies would assist in determining if the repetitions in the speech of two-year-olds continue at the same rate, and for what length of time. This information would assist in supporting Starkweather's (1985) hypothesis that repetitions are normal characteristics of the disfluency of preschool children, but reflect immaturity in older children. Data from longitudinal studies would also determine relevancy of Starkweather's assertion that part-word repetitions are the most immature type of disfluency.

It would be interesting to follow the subjects in the fourth quartile from the present study to determine if they continue to produce more repetitions than their peers, and for what length of time.

Eliciting speech samples in the children's own homes, and with their mothers would contribute to present knowledge regarding development of fluency. It would be interesting to determine if results of studies using these methods of eliciting speech samples are consistent with the findings of the present study.

Because most studies combine sound and syllable repetitions into one type of repetition, part-word, more research is needed on the frequency of these two individual types of repetition including production of the intrusive schwa.

Such research is needed to determine the validity of Wingate's (1964a) contention that inclusion of smaller units in research and diagnosis will lead to more accurate differential diagnosis of stuttering.

Continued research is also needed regarding the amount of verbal output and frequency of repetitions. No significant difference was found in the present study between subjects with high verbal output and low verbal output. However, a significant difference might be found with a larger sample size, or if females were included in the sample.

It is to be hoped that research will continue to analyze the speech of preschool children identified as stutterers, as was done by Yairi and Lewis (1984). Only when speech/language pathologists and/or researchers develop specific, age-appropriate normative data regarding the development of fluency, will speech/language pathologists have a reliable method with which to differentially diagnose stuttering in young children.

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APPENDIX A

RECRUITMENT LETTER

Dear _____,

I am a graduate student at Portland State University in the Department of Speech Communication, and I am conducting a study on repetition in preschool children's speech.

I would like to videotape your child during 15 minutes of play and conversation with me. This would be done at Portland State University at a time that is good for both you and our department. Following the videotape session, your child would be given a brief test of word meanings, called the Peabody Picture Vocabulary Test - Revised.

In addition to the videotape, I need to have you complete a short questionnaire about your child's speech and language development, medical history, the size of your family, and any stuttering you have observed in family members.

Your child's name will not be used in reporting the results of this study, and the videotape will be used only for study purposes. Your child may be withdrawn from this study at any time without penalty.

If you are willing to participate in this study, please complete the attached form and return it to me as soon as possible in the envelope provided.

After receiving the form, I will call you to schedule a taping session. Please call me if you have any questions (287-1645). I greatly appreciate your cooperation.

If you have any problems as a result of your participation in this study, please contact Victor D. Dahl, Office of Graduate Studies and Research, 105 Neuberger Hall, Portland State University, 229-3423.

Sincerely,

Stephanie Herrick

APPENDIX B

INFORMED CONSENT

CHILD'S NAME: _____ NICKNAME: _____

BIRTHDATE: _____ AGE: _____

1. Has your child ever been diagnosed as demonstrating any of the following:

developmental delay yes ____ no ____

neurological impairment yes ____ no ____

hearing loss yes ____ no ____

mental retardation yes ____ no ____

orthopedic or physical handicap yes ____ no ____
2. Has your child ever received speech therapy for stuttering?

yes ____ no ____
3. Is your child able to attend to 2 low stress tasks in 15 minutes?

yes ____ no ____

I hereby give my permission for my child _____ to participate in this study. My child may attend a video-taping session and participate in the above mentioned evaluation at an agreed upon date and time.

I will complete the questionnaire and I understand I may withdraw my permission at any time during this study without a penalty.

Signature_____
Relationship_____
Date

APPENDIX C

QUESTIONNAIRE

Child's Name: _____ Birthdate: _____

Address: _____ Telephone (day): _____

Relationship of person completing the questionnaire _____

What language is spoken mostly in your home? _____

Does your child speak another language? yes ___no___; if so
what language? _____

What is your child's ethnic background? _____

I. List the children and adults living in your home.
NAMES AGE RELATIONSHIP TO CHILD

II. Does your child stutter? yes ___no___ (if no, go to
section III).

When did you first notice that your child stutters? _____

Has anyone else commented on this? yes ___no___; if so,
who? _____

Have you consulted other professionals about your child's
stuttering? yes ___no___. If so, what were their recom-
mendations? _____

What things have you tried, if any, to change your
child's speech? _____

Does your child's speech change when he talks with: (Answer yes or no)

A friend____ A younger sibling____ An older sibling____

A parent____ A familiar adult other than parent____

A teacher (or authority figure)____ In a small group____

Describe other times when you notice changes in your child's speech_____

When is your child's speech the best?_____

When is your child's speech the worst?_____

When your child stutters, what do you do?_____

When your child stutters, what does he do?_____

Describe what your child does when he stutters_____

Does it bother your child? yes____no____

Does it bother anyone else? yes____no____

Does your child ever do any of the following when stuttering?

a. stretch sounds out? (ex. mmmmmmy ball) yes____no____

b. "get stuck: in the middle of words?

(ex. b: aseball) yes____no____

c. repeat words (ex. I-I-I- want the ball) yes____no____

d. repeat sounds (ex. I want the b-b-ball) yes____no____

e. repeat phrases (ex. I want I want the ball) yes____no____

f. change a sentence (ex. I seen, I saw a cat) yes____no____

Does your child repeat: a lot____ a little____ never____

Does your child repeat easily or with effort? easily____

with effort____

III. Does your child do any of the following when speaking?

(yes or no) Make faces____ Move the head____ Move arms/
legs____ Noisy breathing____ Lip smacking____ Tongue
clicking____ other____ (describe)

When did your child say his first word?_____

What was your child's first word?_____

When did your child first walk?_____

When was you child toilet trained?_____

Describe how your child learned to talk compared to other
children in your family. early____ late____ slow____
easy____ hard____

Has your child ever attended school? yes____ no____

If so, where?_____

How long has your child attended school?_____

IV. Does any other member of your family stutter now or have
they ever stuttered? yes____ no____

If so, who? Name Relationship to child

(Optional)

What was the last grade completed in school by the pri-
mary caretaker of this child?_____

Occupation of caretaker?_____

APPENDIX D

LIST OF STIMULI

TOYS

1 toy watch
2 cars
1 telephone
2 medium-sized rubber toys (Gumby and Pokey)
1 wind-up toy
3 puppets
2 dolls
1 doll comb
Fischer Price Farm Set with extra animals
tea set

QUESTIONS

Where is your Dad/Mom/sister/brother/dog today?
What are they doing?
What toys do you have at your house?
Does your Dad/Mom have a car like this one?
Do you go to school?
What do you do at school?
Tell me about your birthday party.
Have you ever been to a real farm?
What did you see there?
What are you going to do when you go home?

PROMPTS

You do/did?
Tell me about it.
Why?
Hmmm.
Oh.
Pretending to talk on telephone
Pretending to drink coffee
Modeling puppetry
I wonder if the animals are hungry/sleepy.

APPENDIX E

RULES FOR CALCULATING WORD SAMPLES

1. Contractions of a verb form and "not" such as "won't" and "can't" are counted as one word. Contractions of a noun or pronoun and a verb, such as "I'm" and "they're" are also counted as one word. (Branscom et al., 1955)
2. Hyphenated words which must occur together to convey thought are scored as one word, such as "teeter-totter." (Branscom et al., 1955)
3. Nonsense syllables are not counted as words.
4. Interjections, such as "ah," and "um," and extraneous words such as "well" and "you know" are not included in total word count. Interjections are referred to as "stallers" by Branscom et al. (1955).
5. For each instance of repetition, only the last complete form is included in the total word count. For example: "can-can-can" or "c-c-can" is counted as one word: "I can go, I can go" is counted as 3 words.
6. For each instance of revision-incomplete phrase, all words are included in the total word count. Part-words are also counted in this instance when the production was intentionally revised. For example: "She I mean he ran away" is counted as 6 words; "You ca- you could do that" is counted as 6 words.
7. Isolated "yes" and "no" responses are deleted from the total word count to prevent inflating the speech samples with single word utterances. "Yes" or "no" followed immediately by another word or phrase, however, are retained. (Yairi and Lewis, 1984)
8. Utterance segmentation should be based on terminal intonation contour, rising or falling.
9. Words that are used to initiate more than two utterances in succession and are not associated with meaningful text, are not included in the total word count. Examples: "Hey," "oh," "and."

10. Words used to represent animal noises, such as "meow," "oink," or "buck, buck" are only included in the total word count when used within phrases. Examples: "Buck, buck" would not be counted; "the dog says woof" would be counted.

APPENDIX F

RULES FOR IDENTIFYING REPETITIONS

1. The insertion of any nonidentical remark between identical remarks cancels the repetitions. This includes words such as "yes," "no," and personal names. For example: "Put it in the wagon, no, put it in the wagon," or "We won't go down. Watch. We won't go down."
2. A phrase repetition may occur as part of one response, or may involve the repetition of a total response. For example: "What are these things, what are these things?" or "What are these, what are these things?" (Branscom et al., 1955)
3. The calling of an individual's name over and over does not count as a repetition. For example: "Mary, Mary, Mary!"
4. The absence of the definite or indefinite article does not cancel the response as a repetition, because of the difficulty of detecting it in rapid speech. For example: "You sleep in the doghouse, you sleep in doghouse." (Branscom et al., 1955)
5. A neutral vowel interjected between two utterances of a part-word, word, or phrase does not negate the repetition. The neutral vowel is counted as an interjection. With or without the interjection, it is still an instance of repetition. For example: "Are you, uh, are you going?" (Johnson, 1961)
6. Repetition of words of one syllable, such as "I" and "a" is considered word repetition rather than syllable repetition. (Branscom et al., 1955)
7. Repetition of part of a contraction is considered a part-word repetition. For example: "I - I - I'm."
8. Sounds made in imitation of motors, rushing water, etc., are not scored as repetitions, since the child is attempting to imitate a continuous sound. (Branscom et al., 1955)
9. Repetitions which are obviously part of a quotation are scored as repetitions. For example: "Ba, ba black sheep,

have you any wool? Yes sir, yes sir, three bags full." (Branscom et al., 1955)

10. Repetitions that are definitely self-corrections as far as they involve a change of thought are not counted as repetitions. For example: "Thirty . . . thirty-four." (Branscom et al., 1955)
11. Repetitions of either meaningful or nonsensical syllables, words, or phrases for the apparent enjoyment of rhythm are not counted as repetitions. Due to the fact that this is a subjective judgment on the part of the investigator, the context will be the deciding factor.
12. Words that are repeated for emphasis are not counted as repetitions. For example: "very, very clean." (Johnson, 1963)

APPENDIX G

CODING SYMBOLS

Interjection	I
Sound repetition	Sd R
Syllable repetition	Sy R
Single syllable word repetition	SSWR
Multisyllable word repetition	MSWR
Phrase repetition	Ph R
Revision-incomplete phrase	RIP
Disrhythmic phonation	DP
Tense pause	TP
Intrusive schwa	IS

APPENDIX H

INSTRUCTIONS FOR SELECTION OF CONTENT
TRANSCRIPTS FOR RELIABILITY TESTING

Videotapes have been made of a child and an adult interacting in a parallel play situation. The children's conversations in these videotapes have been transcribed verbatim, and these transcripts are what you will be working from. You are responsible for extracting ten utterances from each of the five transcripts you are given, and forming a content transcript for each one. A content transcript can be defined as the basic information of an utterance provided by the child, with disfluencies deleted, and without any additional words that the child did not specifically speak. There are specific guidelines that you need to follow when developing these content transcripts.

GUIDELINES

1. Use utterance 10 through 19 from each of the five transcripts to form content transcripts.
2. Additional words should not be added to the utterances. Use only those words that are present in the original transcripts.
3. Some utterances will be included in their entirety in the content transcripts. This is especially true if the

original utterances are very short and do not include any disfluencies. For example, the following utterance would be included in the content transcripts in full:

- a. Hi.
- b. And those.
- c. Her name is Sally.

- 4. Disfluencies in the original transcript should not be included in the content transcript. This includes any repetitions, interjections, revision-incomplete phrases, tense pauses, and disrhythmic phonations. For example, "I-I-I am going" would be written "I am going," and "Uh, I need, uh, I need to talk," would be written "I need to talk."
- 5. In transcribing revision-incomplete phrases into content utterances, only the most complete form of the utterance is included. For example, "It is a ze- it is a giraffe," would be written "It is a giraffe."
- 6. The following words were not counted in the original language samples and should not be included in the content transcripts: unintelligible utterances; utterances including unintelligible words; single "yes" and "no" responses; isolated words used for animal noises; "oh"; and "hey."
- 7. Any additional sounds or pulses at the beginning, middle, or end of an utterance should not be included in the content transcript.

EXAMPLES OF ORIGINAL TRANSCRIPTION AND CORRESPONDING CONTENTTRANSCRIPTION:

Original Transcription

1. I don't know.
2. I, he, I already tell him.
3. W-w-w-where is she?
4. I think, I think she got it.
5. I have, uh, car at home.

Content Transcription

1. I don't know.
2. I already tell him.
3. Where is she?
4. I think she got it.
5. I have car at home.

APPENDIX I

INSTRUCTIONS TO RELIABILITY JUDGES

GENERAL INSTRUCTIONS

You will be given five partially complete transcripts of ten utterances each. The transcripts do not include any type of disfluency. They contain only the content of the utterances. It is very important to remember that these transcripts may not be correct, and that mistakes may have been made even in determining the content of the utterances. Do not accept the utterances as correct just because you are cueing into key words. Listen to the entire utterance and see if you agree with all the words that have been included, and then add the additional words you hear along with all the disfluencies.

The purpose of this reliability testing is to determine the investigator's accuracy at identifying syllable, sound, single syllable word, multisyllable word, and phrase repetitions. The following are definitions of these repetitions:

1. Multisyllable word repetitions: refers to the repetition of a complete word consisting of two or more syllables.

Example: "Maybe-maybe"

2. Phrase repetition: refers to the repetition of two or more words, or of one or more words plus part of another word.

Example: "I want-I want" or "He was g- was going"

3. Single syllable word repetition: refers to the repetition of a complete word consisting of one syllable.

Example: "Ball-ball-ball"

4. Sound repetition: refers to the repetition of a single speech sound.

Example: "s-s-see"

5. Syllable repetition: refers to the repetition of one or more syllables which are less than the entire word. This includes speech sounds followed by a schwa.

Example: "Ba-ba-baby" or "buh-buh-ball" or "eleph-elephant"

PROCEDURES FOR TRANSCRIPTION AND IDENTIFICATION OF DISFLUENCIES

An individual not involved with this study has prepared five randomly selected content transcripts. Reliability raters will be given these transcripts. A technician will then play the corresponding segment of the videotape that matches the content transcripts. The technician will initially show the reliability raters all ten utterances at once while the raters observe the utterances in their entirety. The technician will then play the videotape segment again, showing the raters one utterance at a time. The raters will be responsible for filling in all missing parts of the transcripts, including words that have been deleted, and all disfluencies. The raters will then identify the target disfluencies. It should be noted that the raters are responsible for making

any changes in the transcripts due to errors made by the individual selecting content transcripts.

The raters may at any time ask the video technician to replay the utterance. It is necessary that this be the only talking during reliability testing, and that raters not discuss utterances with one another.

The following rules should be used when transcribing and identifying disfluencies.

1. Raters are only responsible for identification of sound, syllable, single syllable word, multisyllable word, and phrase repetitions.
2. Identify repetitions with the following markings over the repetitions:
 - Sd R sound repetition
 - Sy R syllable repetition
 - SSWR single syllable word repetition
 - MSWR multisyllable word repetition
 - Ph R phrase repetition
3. No matter how many times a sound, syllable, word, or phrase is repeated in a single incidence, it is only credited as one disfluency.
4. An utterance may have a combination of any of the five types of repetitions, and should be credited as separate disfluencies if this occurs. Example: "Ky-Kyle-Kyle" would be scored as one syllable repetition and one single syllable word repetition.

5. Repetitions of the first part of a contraction, such as "it-it's" and "I-I'm" should be credited as syllable or sound repetitions.
6. Sounds, syllables, words, or phrases that are repeated, but are separated by interjections, are still credited as repetitions. Example: "They, uh, uh, they"
7. Interjection repetitions are not credited as either syllable, sound, or word repetitions. Examples: "Uh, uh" or "um, um" or "well uh, well uh"

RELIABILITY TRAINING

A training session will be conducted prior to the actual reliability testing, by the investigator, using the same procedures as outlined above. The training session will include practice identification of three different content transcripts. The reliability raters must be 100 percent in agreement with each other to begin testing. A difference will be discussed until everyone is in agreement over disfluency identification.