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Gender Differences in Slow Expressive Language Development

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THESIS APPROVAL

The abstract and thesis of Cynthia Lee Hare-Blye for the Master of Science in Speech Communication: Speech and Hearing Science were presented October 31, 1994, and accepted by the thesis committee and the department.

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ABSTRACT

An abstract of the thesis of Cynthia Lee Hare-Blye for the Master of Science in Speech Communication: Speech and Hearing Science presented October 31, 1994.

Title: Gender Differences in Slow Expressive Language Development

The contemporary research suggests that some children who present with early language delays as toddlers outgrow their delays while others continue to develop long-term language difficulties. Several studies over the years have focused on factors that might aid in predicting the outcome of late talkers. This current study emphasized exploring gender as a possible predictive factor.

The purpose of this study was to determine if significant differences exist in the rate of growth in language skills, as indexed by scores on the Developmental Sentence Scoring (DSS) procedure (Lee, 1974) of boys versus girls who are late to start talking as toddlers. The research hypothesis was that boys who present as LT toddlers would score significantly higher than LT girls at each age level tested. The DSS is a norm-referenced instrument that assesses age-appropriate morphological

development and syntax. The LT subjects used were part of the Portland Language Development Project, a longitudinal study. Spontaneous speech samples were collected, transcribed, and analyzed using the DSS procedure once each year from the time they were approximately 3 years of age, until the age of 7. Late talking children in this present study were grouped by gender.

A Chi Square test was used to determine if the proportion of males scoring above the 10th percentile on the DSS was significantly different than the proportion of females scoring above the 10th percentile at each age. Results from this analysis indicated that at the age of 3 years, more boys than girls scored above the 10th percentile on the DSS. There were no significant differences found at the ages of 4, 5, 6, and 7.

A t-test was used to compare average DSS scores between the two genders for each year of the study. This test revealed a significant difference between the LT girls' and LT boys' scores at the age of 3 years. No significant differences were found for the subsequent years. However, difference between boys' and girls' scores at age 7 approached significance, with boys again scoring higher.

**GENDER DIFFERENCES IN SLOW
EXPRESSIVE LANGUAGE DEVELOPMENT**

**by
CYNTHIA LEE HARE-BLYE**

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

**MASTER OF SCIENCE
in
SPEECH COMMUNICATION:
SPEECH AND HEARING SCIENCE**

**Portland State University
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CHAPTER I

INTRODUCTION

As speech-language pathologists, the decision whether to treat a toddler or preschooler with delayed language or whether to wait and see if the child will outgrow the problem is a complicated one. According to Rescorla (1989), there is a lack of research suggesting the best age to identify a true language disorder. Because the rate of language acquisition varies highly in young children, unnecessary treatment may result when identifying language delay at too young an age. And yet, children may be deprived of needed intervention if one waits until they are old enough to be identified as delayed. While early facilitative intervention could benefit many children, due to time constraints or scarce intervention resources, ways to prioritize which children are more likely to need intervention by predicting their outcome becomes important.

Reports in the literature have suggested there are gender differences in the prevalence of speech and language disorders in children (Stewart, 1981; Stewart & Spells, 1983). Furthermore, evidence of gender differences with children who are autistic (Lord, Schopler, & Revicki, 1982; Tsai, Stewart, & August, 1981), children with reading difficulties (Ackerman, Dykman, & Oglesby,

1983), and children who stutter (Bloodstein, 1993) have also been documented.

Examining gender differences in girls and boys who present as late talkers as toddlers may help to determine whether children who present with this complaint show gender-specific risk for chronic language delay. Such information would aid in setting priorities for early intervention.

Statement of Purpose

The purpose of this study was to determine whether there is a difference in the rate of growth in language skills of girls versus boys who are late to start talking as toddlers, at the subsequent ages of 3, 4, 5, 6, and 7, as indexed by the Developmental Sentence Score (DSS) (Lee, 1974). The DSS assesses expressive syntax and morphological development in spontaneous speech. The proportion of subjects of each gender scoring above the 10th percentile on the DSS will be computed for each year of the study. Although preliminary, the findings of this study could be helpful in predicting which late-talking children are more likely to overcome their delays through time and maturation and which children should be given a higher priority for early intervention. That is, if it is found, one gender shows a faster rate of recovery from the slow start in language, then perhaps a higher priority for early facilitative intervention should be given to the toddlers of the other gender.

The research hypothesis was: Boys who present as late-talking (LT) toddlers will score significantly higher than LT girls on the Developmental Sentence Score (DSS) at each age level tested. The null hypothesis was: There will be no significant difference between the test scores of boys and girls who present as LT toddlers.

Definition of Terms

1. Late-talking subjects: Subjects who produced fewer than 50 different words, by parent report, at 20-34 months of age.
2. Normal-talking subjects: Subjects who produced more than 50 different words, by parent report, between the ages of 20 and 34 months.
3. Toddlers: Children between 18 and 36 months of age.
4. Developmental Sentence Score (DSS): A norm-referenced instrument which assesses expressive syntax and morphological development in spontaneous speech by analyzing eight specific grammatical categories.

CHAPTER II

REVIEW OF LITERATURE

The prevalence of language delay in children is estimated to be 10% of the population at age 2 and 3-8% at age 3 (Rescorla & Schwartz, 1990). Not all children spontaneously outgrow a language problem. Clinicians are frequently faced with the dilemma of deciding whether young children with slow expressive language development (SELD) will grow out of their delays, or if intervention should be implemented. A discussion of possible consequences of SELD will be presented, followed by studies that identify the prevalence of gender differences in language and related disorders. While gender differences have been shown to exist in normal language development (Helfeldt, 1983; Johnson, 1973-74; Okazaki Smith, 1981), only gender differences with language delay and related disorders will be presented. In addition, literature focusing on factors that might aid in predicting the outcome of late talkers will be reviewed.

Consequences of Language Delay

Several studies have suggested preschool language delay to be a significant risk factor for one or more of the following conditions: psychiatric disorders, later learning disabilities, reading problems,

and chronic language disorders. For instance, in an attempt to determine the types and prevalence of psychiatric disorders, 100 children with speech and language delays were evaluated (Cantwell, Baker, & Mattison, 1979). Results showed that 53, or approximately 50%, of these children were diagnosed with at least one type of psychiatric problem, suggesting that children with speech and language delays have higher prevalence rates than do children in the general population. Although Attentional Deficit Disorder (ADD) was the most common disorder found, no specific type of psychiatric disorder was associated with speech and language delay.

In a related study (Cantwell & Baker, 1980), 25% of the children with speech and/or language disorders failed in at least one subject in school. This "school-failure group" consisted of relatively more females. When these 29 children were matched for age and sex with 29 children with speech and/or language disorders who were not failing any subjects, it was found that 83% of the school-failure group had a diagnosable psychiatric disorder, as compared to 30% of the comparison group. This suggests that children with speech and language disorders who have academic problems are at a higher risk for developing a psychiatric disorder. Another difference between the two groups was that the teachers considered the school-failure children to have more classroom behavioral problems than the other children. In addition, within the school-failure group, significantly more children had language problems as opposed to only speech problems.

In King, Jones, and Lasky's (1982) 15-year follow-up report of 50 children who were communicatively impaired aged 3:0 to 5:11 years at intake, subjects were classified into one of five categories: (a) no speech, (b) language disorder/delayed speech, (c) articulation problems, (d) language and articulation, or (e) articulation and fluency. One of the main purposes of the study was to document the continuing communication problems of the subjects. Results showed that the subjects most likely to have continuing communication problems into adolescence and young adulthood were the ones initially categorized as having a language problem, whereas it appears that subjects classified as articulation disordered had the best prognosis for a good outcome. Hall and Tomblin's (1978) follow-up study of 18 language-impaired and 18 articulation-impaired children revealed similar findings. Thirteen to 20 years after the initial evaluations, parents reported that 9 subjects who were language-impaired continued to have communication problems, as opposed to only one subject who was articulation impaired. Academic achievement levels were also shown to be lower with the language-impaired subjects when compared to articulation-impaired subjects.

Silva (1980) conducted a longitudinal study on 937 children who had been born during a one-year time span at the same hospital in Dunedin, New Zealand. The children in this initial study were assessed at 3 and 5 years of age in an attempt to estimate the stability, prevalence, and nature of developmental language delays. The 79 children (53 boys and 26 girls) who were considered

to be delayed in language development were divided into three groups: delayed verbal comprehension only, delayed verbal expression only, and delayed development in both aspects of language. Results from follow-up testing done at 5 years of age indicated that children who had a specific delay (comprehension or expression only) at the age of 3 were not considered to be high-risk for later problems at the age of 5. However, children who had delays in both comprehension and expression at 3 were at high-risk for problems at age 5, and furthermore, accounted for 84% of all children with low intelligence at that age.

Silva, McGee, and Williams (1983) followed-up with this same group of children at the age of 7. Children who were language delayed at ages 3, 5, and 7 were considered 'stable language delayed'. Results from the study indicated that the more stable the language delay, the more likely later low IQ and reading difficulties would be evident. Approximately 60% of the children with general language delays (both expressive and comprehensive) at each age had low IQ and/or reading difficulties at age 7. Specific expressive language delay at age 3 was significantly associated with language delay at 5 and 7 years of age, whereas comprehensive language delay was not. However, 45.8% of this latter group did have reading difficulties and/or low IQ at 7 years.

Silva, Williams, and McGee (1987) extended the study and assessed the same children who were language delayed at 3 years of age, when they were 9 and 11 years old. Results from these assessments lend further support to the conclusions from their

previous studies. Low IQ and/or reading difficulties were evident with 71-86% of children with general language delay. From the ages of 7 to 11, children with general language delay and comprehension delay had significantly higher scores for behavior problems, than did the expressive language delay group.

Aram and Nation (1980) reevaluated 63 children who were language disordered 4 to 5 years after the initial preschool evaluation and found that 40% of the children showed below normal achievement both in reading and in math. Furthermore, 40% of the children continued to present speech and language problems.

Other studies have also shown that some children outgrow their delays while others go on to develop long-term language difficulties. As indicated by several researchers (Paul, 1991; Rescorla & Schwartz, 1990), 40-50% of 2-year-old subjects who were identified as slow in expressive vocabulary development did not "catch up" by 3 years of age. As further indicated by Paul and Bauersmith (cited in Paul, 1991), 57% of their subjects still demonstrated deficits at the age of 4.

In summary, preschoolers who present as language delayed are at risk for future chronic language disorders, reading difficulties, psychiatric problems, and/or later learning disabilities. To prevent or minimize the impact of these possible risk factors, early identification and intervention is a necessity for language delayed children.

Evidence of Gender Differences in Language Disorders

It is a widely accepted fact that males show a greater prevalence of language disorders than do females. Epidemiology studies, such as Silva's (1980), that deal with testing an entire population of a specific area, are not the norm in clinical studies. Subject selection is often limited by the accessibility of populations, or the desired numbers and types of subjects cannot be obtained. Although most of the following studies did not test an entire population, the amount of boy subjects is consistently greater than girl subjects in clinical studies involving children who are language delayed or language disordered.

Prior to Stewart's (1981) prevalence study, very little research had focused on male-to-female ratios. Based on demographic data on the prevalence of communicative disorders in the Nashville public schools, Stewart obtained the following information. Of the 1,939 subjects identified as having communicative disorders, 174 were classified as having language disorders. Of these 174 children, 97 were males and 76 were females, representing a 1.3:1 male-to-female ratio. Ratios for grades 1 through 11 showed little variation, with the exception of grades 4 and 11 which were comprised of more females than males. Possible reasons for this discrepancy were not discussed.

When compared to more current studies, the overall 1.3:1 ratio is low. A 4:1 ratio of boys to girls is commonly reported with incidences of delayed speech (Satz & Zaide, 1983). While studies

involving late talkers and/or language disordered children show varying ratios of males to females (ranging from 2:1 to 9.3:1), the implication that more boys than girls have language disorders is apparent. Possible reasons for the higher incidence of males will be discussed in a later section.

Although many of the following reported studies did not focus on the prevalence of gender differences, examination of the gender and number of subjects used in these studies and computing ratios supports the fact that fewer girls than boys have language disorders.

As previously mentioned, male-to-female ratios among the studies vary. Aram and Nation's (1980) study involved 63 language disordered children. Forty-two subjects were males and 21 were females, indicating a 2:1 ratio of males to females. On the other hand, Rescorla's (1989) longitudinal study consisted of approximately 37 males and 4 females who were language delayed, signifying a 9.3:1 ratio.

A 3:1 male-to-female ratio was evident with the 36 speech delayed subjects (some were also language delayed), 27 males and 9 females, used in the Shriberg and Kwiatkowski (1988) study. This ratio is further evidenced in the following studies: The Thal and Bates (1988) study consisted of 9 late talkers, 7 males and 2 females; Paul's (1993) longitudinal study involved 37 late talkers, 28 males and 9 females; and the King et al. (1982) follow-up study of 50 children who were communicatively impaired entailed 36 males and 14 females. Of these last 50 subjects, 15 males and 3

females were later classified as language disordered/speech delayed, still adhering to the 3:1 ratio.

Gender Differences in Related Disorders

Gender differences have been shown to be evident in other disorders related to language disorders as well. After reviewing the literature, Satz and Zaide (1983) reported that the male to female sex ratios of stuttering, infantile autism, delayed speech, and developmental dyslexia all have approximately a 4:1 ratio.

Stuttering

Although studies vary somewhat, the most consistent male-to-female sex ratio of stuttering is 3:1 (Bloodstein, 1993; Peters & Guitar, 1991). Bloodstein (cited in Peters & Guitar, 1991) reported that disproportioned sex ratios might increase as children become older. His review suggested that by first grade and fifth grade the male-to-female sex ratios are 3:1 and 5:1, respectively. Bloodstein's (1993) contention is that as children age, either the boys start to stutter with greater frequency, or the girls recover with greater frequency. McGlone (cited in Andrews, Craig, Feyer, Hoddinott, Howie, & Neilson, 1983) accounted for a rapid recovery rate in girls because of the girls' tendency to process linguistic material in both hemispheres. Andrews and Harris (cited in Satz & Zaide, 1983) indicated that girls stutter for a much shorter time than boys.

Peters and Guitar (1991) suggested that the higher incidence of

stuttering in males is attributable to the possibility that males are more vulnerable to stuttering and females are more resistant. Furthermore, to explain the fact that there are more stutterers among relatives of female stutterers, Peters and Guitar suggested that females who actually do stutter might have inherited a greater "genetic predisposition" for stuttering, and will most likely pass it on to their children.

While social or cultural factors have been suggested by some to account for the greater prevalence of male stutterers, Eisenson (cited in Bloodstein, 1993) visited a kibbutz in Israel where the community made attempts to treat both sexes exactly the same, and he found that out of 15 kibbutz children who stuttered, 12 of them were boys. Based on this discrepancy, Eisenson suggested that rather than the disproportionate sex ratio being due to cultural factors, the sex ratio might have an organic basis.

Other postulated mechanisms for gender differences in prevalence include: (a) females have a higher "threshold" for stuttering and are less susceptible to the influence of a gene that predisposes children to stutter (Kidd, 1977), (b) there is a slower maturation rate in males, thus they are more vulnerable during the early developmental periods (Taylor & Ounsted, cited in Satz & Zaide, 1983), and (c) females have a greater genetic loading than disabled males, due to the assumption that when females acquire a disorder, a greater divergence from the norm transpires (Taylor & Ounsted, cited in Satz & Zaide).

Autism

Gender differences have been shown to be evident in autism. Consistent ratios of three to four boys who are autistic to one girl who is autistic are found in the literature (Janicki, Lubin, & Friedman, 1983; Wing, cited in Lord et al., 1982). Spence, Simmons, Brown and Wikler (1973) questioned whether this preponderance of males with autism is because of their having an increased susceptibility for autism, or whether it is because of a failure of females with autism to survive. Spence et al. (1973) believed that the former condition is more likely, since they did not have an increased rate of loss in the families sampled, which would have happened if the females had not survived.

A study conducted by Tsai et al. (1981) using 102 subjects found that girls with autism had significantly lower IQs, more evidence of neurological impairments, and more relatives affected with autism than did boys with autism. The latter finding suggested to the authors the possibility that the relations of girls with autism have a higher "dose" of genes responsible.

Another study that indicated girls with autism having a significantly lower IQ than boys with autism was done by Lord et al. (1982). Boys with autism were also found to perform better than the groups of girls on receptive vocabulary, Vineland social quotients, eye-hand integration tasks, and perceptual skills. This study supports Tsai's et al. (1981) findings that girls are more severely impaired than boys on measures related to cognitive functions. Furthermore, like Tsai et al. (1981), this study

suggested that autism is due to biological factors and that the specific mechanism may involve multifactorial transmissions.

McLennan, Lord, and Schopler (1993) did not support a multifactorial familial transmission view, because they found no evidence that girls were more severely affected than boys. Twenty-one males with autism and 21 females with autism were involved in their study that focused on sex differences in the severity of characteristics associated with autism in higher functioning people. Based on parental reports, results revealed that males with autism were rated as having more social and communication deficits than females between the ages of 3-5 years. However, the same females had more severe social deficits as adolescents and adults than an IQ-matched group of males. The authors do suggest that different forms of transmission might be working in families with a female autistic than in families with an affected male.

Reading Disorder

Gender differences are also seen in reading abilities of young children. Finucci and Childs (1981) cited data from nine schools that had special programs for children with dyslexia.

Male-to-female dyslexia sex ratios ranged anywhere from 3:1 to 15:1. Overall, the ratio is 5:1. The highest sex ratios in their review belonged to schools that enrolled high school students, suggesting that the sex ratio might be partly dependent on the age of the subject. Finucci and Childs proposed that large sex ratio

ranges might have to do with who is defining the condition of dyslexia. They commented that because dyslexia is familial, a genetic component transmitted by both females and males, is probably involved.

Ackerman's et al. (1983) study involved four groups consisting of (a) hyperactive, (b) reading disabled, (c) both hyperactive and reading disabled, or (d) only attention disordered girls, and four groups of boys with the same conditions. Significant gender differences were found across all groups. There was a higher incidence of hyperkinesis, reading disabilities, and attention disorder in males than in females. Girls with attention and achievement problems scored lower on the Wechsler Intelligent Scale for Children-Revised (WISC-R) than did boys with the same problems, the difference being that the boys had higher verbal and spatial scores. With the exception of the reading-disabled only subjects, boys also had higher Wide Range Achievement Test (WRAT) Arithmetic scores than the girls.

Bakker and Moerland (1981) suggested that gender differences in dyslexia might be related to brain function. They cited studies showing evidence that the right cerebral hemisphere is primarily responsible for mediating scripts of novice readers and the left hemisphere mediates the scripts of experienced readers. Thus, the normal learning-to-read process shifts from a predominantly right to a predominantly left hemispheric involvement. During the first primary school years, Bakker (cited in Bakker and Moerland, 1981) claimed that girls tend to read better than boys, with boys catching

up a few years later. Bakker and Moerland proposed that girls generally switch earlier from a right-hemispheric reading subservience, whereas boys have a prolonged right-hemispheric subservience of reading. Children, mainly boys, who are unable to make this hemispheric shift might rely on right cerebral, or perceptual reading strategies. In contrast, some girls might develop reading problems by switching to left hemispheric, or semantic reading strategies too early.

In summary, although there is a higher prevalence of boys than girls with language disorders, infantile autism, developmental dyslexia, and stuttering, several studies indicate that girls might be more seriously affected than are boys. This may be true of late-talking girls as well.

Research on Late Talkers

Many researchers have focused on establishing patterns of early language development with the intent they might be predictors of continued language delay. Several longitudinal studies have identified factors that might help clinicians predict the outcome of young children with expressive language delays. One such study involved 25 boys who were between 24 to 31 months of age at the time of intake and diagnosed as having slow expressive language development (SELD) (Rescorla & Schwartz, 1990). The SELD children had age-appropriate receptive language, normal nonverbal IQ, no hearing impairments, and very little speech at 24-31 months.

The study concentrated on the outcome of SELD children and possible predictors of outcome. Of the 25 subjects, only 50% had a good prognosis by 3 to 4 years of age, indicating SELD to be a significant risk factor for continuing language delay. Their findings suggested that the older children are when diagnosed (the closer to 31 months), the greater the chance they will be language delayed at the age of 3.

Another possible predictive factor found was that the greater the lag between chronological age and expressive age, the more likely a language delay will continue. Whitehurst, Fischel, Lonigan, Valdez-Menchaca, Arnold, and Smith (1991) also suggested age to be a factor; the older the child, the greater the chance of a continued problem. In addition to age, the wider the gap between receptive and expressive skills, the more likely a child will be expressive language delayed (Whitehurst, et al., 1991).

Bishop and Edmundson (1987) conducted a study using 87 language impaired children each assessed at the ages of 4, 4 1/2, and 5 1/2 years, with the intent of identifying the children most likely to have persisting language disorders from the children whose disorders are "transient." By the age of 5 1/2 years, 44% of the subjects no longer had a language disorder. The authors were able to predict the correct outcome (good or bad) for 90% of subjects on the basis of a one-hour language assessment administered at the age of 4. Results, comparable to the Rescorla and Schwartz (1990) study, indicated that the more severe the initial language impairment, the poorer the prognosis. Bishop and

Edmundson stated the following conclusions. First, the more types of impaired language functions a child has, the more likely the child will have continued language impairments. Second, poorer outcome might also be expected of 4-year-olds who are unable to retell sequential events of a story with the aid of picture. In fact, the Bus Story Test, a story retelling task, was reported to give the best prediction of outcome. Paul and Smith (1993) also found that narrative skills are not as developed in late talkers as they are in normal talkers.

Scarborough and Dobrich (1990) studied four children with early language delay (ELD) from when they were 2 1/2 to 8 years of age. The children initially were severely impaired in phonological, syntactic, and lexical production. By age 60 months, they exhibited only mild receptive and productive language problems. However, when evaluated at the end of 2nd grade, all four had poor receptive vocabulary skills and only one child had become a normal reader. This led Scarborough and Dobrich to question the possibility that children with a narrower range of problems and milder delays are less likely to have persistent language problems. Instead, they proposed the "illusory recovery" hypothesis to account for their findings. They suggested that the development of normal language progresses in stepwise growth patterns, with spurts in the third and sixth year of life, and so children appearing to recover in the preschool period may in actuality be just as much delayed as before. When normal children's language development slows down and reaches a temporary plateau, many children with language

delays appear to “catch up” and move into the normal range. However, when normal children undergo their next spurt of rapid developmental growth, the language delayed children’s differences become apparent again.

Thal, Tobias, and Morrison (1991) did a one-year follow-up study on the subjects used in the Thal and Bates (1988) study, with the intent of determining which late talkers remained delayed (truly delayed) and which ones “caught up” (late bloomers). Of the 10 subjects, 4 late talkers remained truly delayed and 6 were late bloomers at the time of follow-up. Results from the one-year follow-up suggested to Thal et al. that two possible predictive factors of continued language problems in toddlers as young as 18 months are a delay in vocabulary comprehension and poor production of symbolic gestures in familiar scripts.

Paul (1993) recommended that the clinician weigh all the child’s various risk factors when assigning priority for early intervention. The more deficits or medical risk factors present, the higher the priority should be assigned. Based on data from a longitudinal study of 37 late-talkers evaluated yearly since 20-34 months of age, Paul (1993) cited two possible factors in predicting outcome of language delayed children. One factor suggested similar to Rescorla and Schwartz (1990) findings, is that of age at intake. The older children are at intake, the greater the chance they will not recover spontaneously. The longer children produce less than 50 words, the more likely they will have long-term deficits. A second possible predictive factor is gender. Although there is

less prevalence of late-talking girls than late-talking boys, in this study the chances of spontaneous recovery occurring during the preschool period are less for the girls, and might thus be given higher priority.

Summary

Studies were presented indicating a higher prevalence of males displaying delayed language development. The literature suggested that male-to-female sex ratios of 3:1-4:1 are very common. Other related conditions, such as stuttering, infantile autism, and developmental dyslexia have also been shown to have remarkably similar male-to-female ratios. While hereditary, genetic, neurological development, and social environmental factors have all been suggested over the years as possible causes for these sex ratios, no theory of causation has yet been consistently supported.

Studies indicating long term consequences of early language delay suggest children with language delays might develop psychiatric disorders, reading disabilities, academic problems and chronic language disorders. Language delay might also be predictive of longer term low intelligence. Results from several studies suggested that children with language disorder generally have more long term difficulties than do those with only articulation problems.

Over the years, there have been several longitudinal studies that have focused on groups of late talkers in an attempt to determine possible predictive outcomes for these children. Present findings

suggest that some or all of the following factors might be related to a child's having continued language problems: (a) the older the child at intake, (b) a lag between chronological age and expressive age, (c) a wide gap between receptive and expressive skills, (d) the severity of the initial language impairment, (e) the more types of impaired language functions, (f) the inability to retell a sequential story, (g) a delay in language comprehension, and (h) poor production of symbolic gestures.

This present study will attempt to analyze any differences in rate of language development of late talker girls and late talker boys, with the intent of presenting another possible operative factor to aid clinicians when prioritizing children for early intervention.

CHAPTER III

METHODS

Subjects

Subjects for this study were drawn from those participating in the Portland Language Development Project (PLDP), a longitudinal study of outcome of early language delay. Although the PLDP has both normal and late talkers, only subjects classified as late talkers (LT) were involved here. This present study spans 5 years and consists of the same subjects from when they were 3 years of age to 7 years. Although the subjects all had an opportunity to participate each year, the number of subjects varied (see Table 1).

Table 1

n of LT Subjects Per Year

Subjects	Age 3	Age 4	Age 5	Age 6	Age 7
Boys	16	16	21	21	24
Girls	8	6	6	7	7

Subject Description at Intake: 20 to 34 Months

Subjects were initially recruited through newspaper and radio

advertisements and notices in three local pediatricians' offices when they were 20-34 months of age (see Appendix A). The Human Subjects Research Review Committee granted approval for both the PLDP and this specific study (see Appendix B). Preliminary questionnaires regarding the child's expressive vocabulary size were filled out by the parents (see Appendix C). A total of about 300 questionnaires were collected. Parents of each child were asked to provide information on the questionnaire regarding the child's date of birth, parental occupation, and if they would be interested in participating in later parts of this study. The child was then classified as a late talker (LT) if parents reported use of less than 50 words on this questionnaire. Children were classified as normal if parents reported use of over 50 words.

All LT subjects indicating interest in continuing the study were contacted and invited to come to Portland State University for an initial evaluation. At the first evaluation, parents signed a permission form and completed Rescorla's (1989) Language Development Survey (LDS) describing the child's expressive vocabulary (see Appendix D). The LDS is a checklist containing 300 words that are commonly used by 2-year-olds. The LDS was used to confirm diagnostic group placement. A group of normal subjects, those whose parents reported expressive vocabularies greater than words, was selected from the pool of families who filled out the initial questionnaire. The normal and late talker groups were matched on the basis of chronological age, race, birth order, and socioeconomic status, based on Myers and Bean's (1965)

adaptation of Hollingshead's four-factor scale of social position. This socioeconomic status scale ranges from 1 to 5, with 1 being the highest SES level and 5 the lowest. Once again, this present study only consists of the LT subjects (see Table 2).

Table 2

LT Demographic Information at Intake (mean)

Subjects	n	Age (mos)	Gender %	SES	Race	LDS Vocabulary
Boys	25	25.2	76%	2.4	96% white 4% mixed	20.48 words
Girls	8	24.8	24%	3.2	88% white 12% black	37.25 words

All subject's passed a hearing screening at 25 dB in a sound field and received a score of 85 or above on the Bayley Scales of Infant Mental Development (Bayley, 1969), indicating normal intelligence. Subjects were screened observationally for neurological disorders and autism.

As mentioned previously, subjects were seen for yearly follow-up as part of the PLDP. There were 25 boys and 8 girls in the LT group at intake. The sex ratios were male-to-female ratios of: 2:1, 2.7:1, 3.5:1, 3:1, and 3.4:1 for 3, 4, 5, 6, and 7 years of age, respectively. The average age of subjects at each follow-up appear

in Table 3.

Table 3

Mean Age in Months (LT)

Group	Age 3	Age 4	Age 5	Age 6	Age 7
Boys	37.6	48.4	71.0	83.7	97.0
Girls	38.6	51.8	71.0	82.1	94.9

Instrumentation and Procedures

Late talkers were identified at intake and seen yearly for reevaluations. The following pages contain the standard procedures and instruments that were administered as part of the yearly PLDP evaluation. The present study only involved this researcher analyzing DSS data collected by graduate student assistants over the last 5 years. The procedures involved for this current study will be discussed under the heading of Data Analysis.

Intake Procedure: 20 to 34 Months

Because the DSS analyzes syntax and morphological development, and children do not generally produce many sentences containing a noun and verb at 20-34 months, a DSS was not attempted at intake. In addition to the Bayley Scales of Infant Mental Development, the LDS, and observational screenings for neurological disorders and autism, the initial assessment also

involved tests for adaptive behavior, receptive language, and oral motor function (See Table 4).

Table 4

Intake Evaluation Procedures

Assessment Instruments
<ul style="list-style-type: none"> * Vineland Adaptive Behavior Scales * Modified Maladaptive Behavior Scale * Uzgiris-Hunt Scales of Infant Psychological Development * Reynell Developmental Language Scale * Oral-Motor imitation protocol (on videotape) * Ten minute mother-child interaction * Chapman-Miller comprehension procedure * Hearing Screening * Bayley Scales of Infant Development

Follow-up Procedures: Ages 3, 4, 5, 6, and 7

At each follow-up assessment, standard measures of expressive and receptive language, adaptive behavior, and phonological productivity were obtained by graduate student assistants. At kindergarten and first grade, standardized measures of academic abilities were also collected. Also, conversational speech samples were collected during mother-child free play interactions at each follow-up. Intelligibility was rated and level of syntactic

production, as indexed by DSS, was derived from the speech sample for each follow-up assessment. At age 4 and at each subsequent evaluation, a sample of narrative production in a structured story telling task was also collected. See Table 5 for a list of procedures done at the yearly evaluations. Only data from the DSS were used for this present study.

Table 5

Follow-up Evaluation Procedures

Age	Assessment Instruments
3 Years	<ul style="list-style-type: none"> * Receptive and expressive vocabulary * <i>Developmental Sentence Score</i>, (DSS) * <i>Goldman Fristoe Test of Articulation</i> , (GFTA), single words * Intelligibility in connected speech * <i>Vineland Adoptive Behavior Scores</i>, measures socialization skills
4 Years	<ul style="list-style-type: none"> * <i>Test of Language Development-Primary</i>, (TOLD-P) * Free speech and narrative samples * <i>DSS</i> * Rating of intelligibility in connected speech
5 Years	<ul style="list-style-type: none"> * <i>Test of Language Development-Primary</i> (TOLD-P) * Free speech and narrative samples * <i>DSS</i>

Table 5 (continued)

Follow-up Evaluation Procedures

Age	Assessment Instruments
5 Years (cont.)	<ul style="list-style-type: none"> * Rating of intelligibility in connected speech * <i>Developmental Skills Checklist</i>, (DSC), an assessment of academic readiness
6 Years	<ul style="list-style-type: none"> * <i>Test of Language Development-Primary</i>, (TOLD-P) * Free speech and narrative samples * <i>DSS</i> * Rating of intelligibility in connected speech * <i>Developmental Skills Checklist</i>, (DSC) * <i>Goodenough Draw-a-man</i> * <i>Peabody Individual Achievement Test</i>, (PIAT) * Phonemic segmentation tasks
7 Years	<ul style="list-style-type: none"> * <i>Vineland</i> * <i>TOLD</i> * <i>PIAT</i> * <i>Goodenough Draw-A-Man</i> * Free speech and narrative samples * On-line intelligibility rating * <i>DSS</i> * <i>Lindamood</i> * Phonological production task

Instrumentation: Ages 3, 4, 5, 6, and 7

During each follow-up evaluation at the ages of 3, 4, 5, and 6, spontaneous speech samples were obtained by audiotaping a free play interaction between the parent and child, each lasting approximately 15 minutes, using a Sony BM-80 Dictator/Transcriber tape recorder with a Sony dictation cassette DC-30N. An Electret Condenser solar ECM-D8, Imp 16kQ microphone was placed near the carpeted play area of a small classroom at Portland State University where the interaction took place. Through the use of toys including a Fisher-Price house, furniture, people, cars, Duplo blocks, colorforms, and play dishes, the parent was instructed to "Play with your child as you do at home." For the 7-year old evaluation, an interview format, following Craig and Evans (1993), was used to collect the language sample.

The spontaneous speech samples of each subject at each evaluation period were analyzed through the use of the DSS. The DSS (Lee, 1974) is a norm-referenced instrument that can be used to determine whether a spontaneous speech sample contains age-appropriate syntactic complexity, by assigning weighted scores to complete sentences that consist of a noun and a verb in a subject-predicate relationship. Fifty different complete noun-verb utterances are recommended for scoring the DSS.

The DSS assesses expressive syntax and morphological development in spontaneous speech by evaluating and scoring eight syntactic categories which include (a) indefinite pronouns or noun modifiers, (b) personal pronouns, (c) main verbs, (d) secondary

verbs, (e) negative markers, (f) conjunctions, (g) interrogative reversals, and (h) Wh-question forms (Lee, 1974). Lee and Canter (1971) have shown these eight categories to be the most developmentally significant in the acquisition of language. Each category receives a weighted score, based on its developmental level of complexity, with a score of one being the lowest, and a score of eight being the highest.

Each audiotaped speech sample was transcribed by a trained graduate research assistant who was present during the collection of the sample. Following the rules and procedures of the DSS recommended by Lee (1974), a graduate student then analyzed the typed transcription containing 50 different subject-verb sentences (sentences could be ungrammatical) and assigned a score to each sentence based on the previously mentioned eight categories.

When scoring, sentences were not analyzed word by word, but rather in the context of their semantic unit. A score from 1 to 8 in each category is possible. Lower scores indicate earlier appearing forms, whereas higher scores suggest more complex syntactic forms are being used by the child. See Appendix E for examples of the scoring criteria. Because Lee (1974) noted the DSS does not contain all the possible developmental syntactical forms, a sentence point can be added to the point total if the sentence is in adult-like form. An attempt mark is used instead of a point score if a structure is attempted, but lacks the appropriate feature, suggesting that although the particular structure is not yet acquired, the form might be beginning to develop.

After obtaining a score for each of the 50 sentences, the sentence scores are added together and the sum is then divided by 50. This number is then considered the developmental sentence score. The score is compared to normative data provided by Lee (1974) for assigning a percentile rank to each score (see Appendix F).

Reliability

Reliability computations were completed by trained graduate students in the Speech and Hearing Sciences Program. Each year, 10% of the audiotapes taken during evaluations were randomly selected and independently transcribed by two graduate research assistants. The words contained on the two transcriptions of each tape were compared to obtain transcription reliability. Using this procedure, point-to-point reliability for the transcripts taken at ages 3, 4, 5, 6, and 7 was 91%, 97%, 89%, 95%, and 92% respectively.

Interrater reliability was used to assess the reliability of DSS scoring of the transcribed utterances. A second rater (a trained graduate student) independently rescored 10% of the samples collected at each age level. Interrater reliability was determined using a point-to-point comparison of the transcribed sentences by calculating the percentage of agreement of the two scorers for each sentence scored. Using this procedure, interrater reliability was 89%, 92%, 93%, 92%, and 94% at ages three, four, five, six, and seven, respectively.

Data Analysis

The present study only involved subjects from the late talker group (Refer back to Table 1 for yearly $\bar{n}$). Using norm-referenced DSS information (see Appendix F), a cutoff score for the normal range of DSS for each year was set at the 10th percentile for that age level (with the exception of age 6), as Lee (1974) indicated. For ages 3 and 4, Lee provided cutoff scores for 36/42 and 48/54 months. When the subjects were 3, their cutoff score was determined by whether their age was 36-41 or 42-48 months. Similarly at age 4, the DSS cutoff score was 5.70 for 48-53 month olds and 6.01 for 54-60 month olds. Based on Lee's data, the DSS cutoff scores used are listed below in Table 6.

Table 6

DSS Cutoff Scores by Age

Age	3 Years		4 Years		5 Years	6 Years	7 Years
	3.0	3.6	4.0	4.6			
Cutoff							
Score	3.40	5.38	5.70	6.01	6.36	6.36 *	8.11

*7.42 is the DSS score at the 10th percentile for 6 year olds; however, language samples taken at this age were weak due to sampling problems, and even many 'normal' speakers had DSS

scores below 7.42, so the 5 year cutoff was used.

Male subjects were either assigned to the male ≥ 10 th %ile or the male < 10 th %ile group, depending on their individual DSS score for each year. Female subjects were either assigned to the female ≥ 10 th %ile or the female < 10 th %ile group, depending on their individual DSS score.

A Chi Square test was used to determine if the proportion of males above the 10th percentile is different than the proportion of females above the 10th percentile at each age. This procedure was followed for each consecutive age, each year independent of the others. Furthermore, for each year, an independent one-tailed t-test was done to test for differences of female DSS scores versus male DSS scores.

CHAPTER IV

RESULTS AND DISCUSSION

Results

The purpose of this study was to determine whether there is a difference in the rate of growth in language skills of girls versus boys who are late to start talking as toddlers, as indexed by the Developmental Sentence Score (DSS), at the subsequent ages of 3, 4, 5, 6, and 7. The research hypothesis of this study was that boys who present as LT toddlers will score significantly higher than LT girls on the DSS at each age level tested.

Table 7 provides the percentages of males and females who scored above the 10th percentile and below the 10th percentile for each year. The means, standard deviations, and ranges of the DSS score for each group and year are reported in Table 8.

Table 7
Percentages of Subjects Scoring Above
and Below the Cutoff Score by Age

Age	Cutoff Score	Boys	Girls
3.0 years	≥ 3.40	76%	25%
	or		
3.6 years	≥ 5.38		
3.0 years	< 3.40	24%	75%
	or		
3.6 years	< 5.38		
4.0 years	≥ 5.70	69%	57%
	or		
4.6 years	≥ 6.01		
4.0 years	< 5.70	31%	43%
	or		
4.6 years	< 6.01		
5 years	≥ 6.36	71%	100%
	< 6.36	29%	0%
6 years	≥ 6.36	81%	71%
	< 6.36	19%	29%
7 years	≥ 8.11	87%	71%
	< 8.11	13%	29%

Table 8

Means, Standard Deviations, Ranges of Proportion of
DSS Scores, and % Scoring $\geq$ 10th %ile

Age	n	Group	Mean	SD	Range	% Scoring $\geq$ 10th %ile
3 yrs	17	Boys	4.709	1.606	4.99	76%
	8	Girls	3.390	1.753	5.21	25%
4 yrs	16	Boys	6.299	1.622	5.59	57%
	6	Girls	5.857	1.431	3.90	50%
5 yrs	21	Boys	7.338	1.549	6.70	71%
	6	Girls	7.785	1.331	3.66	100%
6 yrs	21	Boys	7.323	1.448	5.73	81%
	7	Girls	6.821	0.784	2.50	71%
7 yrs	24	Boys	9.845	1.745	7.14	87.5%
	7	Girls	8.821	1.160	3.03	71%

A Chi Square test was used to determine if the proportion of males above the 10th percentile was different than the proportion of females above the 10th percentile at each age (See Table 9).

Table 9

Chi Square Values Between Male and FemaleGroups by Age

Age	3 Years	4 Years	5 Years	6 Years	7 Years
Chi Square					
Value	6.005*	0.282	2.204	0.283	1.035

* Significant at $p < .05$ level

The Chi Square value computed from the data for the 3-year-olds was 6.005 with 1 degree of freedom (Table 9). Using an alpha level of .05, this exceeds the critical value of 3.84, indicating a significant difference was found. Thus, more LT boys than would be expected by chance scored higher than the girls on the DSS.

There were no significant differences found at the ages of 4, 5, 6, and 7. However, Chi Square values at the ages of 5 and 7 were somewhat greater than the values at ages 4 and 6.

The data were then analyzed utilizing a one-tailed independent samples t -test to determine if significant differences existed in DSS scores between the LT females and LT males. The results are displayed in Table 10.

Table 10

Summary of t-Test Pooled Variances of Boy
Versus Girl DSS Scores for Each Age Group

Age	t-	DF	p <
3 years	1.862	23	.05*
4 years	0.246	20	NS
5 years	0.641	25	NS
6 years	0.867	26	NS
7 years	1.452	29	.10

* Significant at $p < .05$ level

A significant difference between means was found at 3 years of age ($t_{- [23]} = 1.862$, $p \leq .05$). There were no significant differences found between mean scores at the ages of 4, 5, and 6 years; although boys' scores were generally higher. At the age of 7 years, the difference in DSS scores approached a significant level ($t_{- [29]} = 1.699$, $p \leq .05$). Thus, it appears that girls' DSS scores at age 3 were significantly lower than boys' DSS scores. A non-significant trend toward higher scores for boys was also seen at age 7. Boys' scores were higher each year, except at age 5.

Discussion

The purpose of this study was to determine if LT boys score significantly higher than LT girls on the DSS at the ages of 3, 4, 5, 6, and 7. Results of the Chi Square test showed that the only significant difference between the proportion of LT boys versus LT girls scoring above the 10th percentile occurred at the age of 3 years. This difference reflects that a higher proportion of LT boys over girls scored above the 10th percentile of the DSS.

Furthermore, results of the t -tests also show a significant difference between LT girls' DSS scores and LT boys' DSS scores at the age of 3 years. The boys' mean test score was significantly higher than the girls' mean score on the DSS.

Results from both the Chi Square and t -test suggest that at the age of 3 years, a difference in the rate of expressive language skills between girls and boys is evident. Girls appear to have been more severely affected than the boys at that age.

t -test results at the ages of 4, 5, and 6 show no significant differences between test scores of the males and females. At the age of 7 years, however, the test results are approaching significant. With 29 df, a t -test value greater than 1.699 is required at the .05 level of significance to reject the null hypothesis. The t -test value in this present study is 1.452, which is close to 1.699.

The "illusory recovery" hypothesis (Scarborough & Dobrich, 1990) might help explain the following pattern evident with the

t-test results from the present study: the boys scored significantly higher than the girls on the DSS at the age of 3 years; the girls “caught up” to the boys at the ages of 4, 5, and 6 years; and the boys’ higher scores approach significance at the age of 7 years. In other words, it appears the boys were recovering at a faster rate than the girls at the age of 3, followed by a period during which boys’ rate of language growth slowed, as it does in normal development. At 6 years or so, when boys underwent another normal developmental language growth spurt, girls again began to lag behind.

Although preliminary, these findings suggest girls with a history of LT may show a slower rate of language growth than their male counterparts. However, the small number of girls involved in this study and the failure of the trend in the 7-year data to reach significance make it difficult to draw definitive conclusions. Also, other possible differences that were not accounted for in this study might be related (e.g., amount of treatment, interactions with peers, educational placement, race of family, etc.).

CHAPTER V

SUMMARY AND IMPLICATIONS

Summary

The contemporary research suggests that some children who present with early language delays as toddlers outgrow their delays while others continue to develop long-term language difficulties. Several studies over the years have focused on factors that might aid in predicting the outcome of late talkers. Because gender differences in the prevalence of speech and language disorders in children have also been reported in the literature throughout the years, the current study emphasized exploring gender as a possible predictive factor.

The purpose of this study was to determine if significant differences exist in the rate of growth in language skills, as indexed by scores on the Developmental Sentence Scoring (DSS) procedure (Lee, 1974) of boys versus girls who are late to start talking as toddlers. The research hypothesis was that boys who present as LT toddlers would score significantly higher than LT girls on the DSS at each age level tested. The LT subjects used were part of the Portland Language Development Project, a longitudinal study. Spontaneous speech samples were collected, transcribed, and analyzed using the DSS procedure once each year

from the time they were approximately 3 years of age, until the age of 7. Although various tests were administered to the subjects, only scores from the DSS were utilized in this specific study. Late talking children in this present study were grouped by gender. The proportion of subjects of each gender who scored above the 10th percentile on the DSS for each year of the study was computed.

A Chi Square test was used to determine if the proportion of males scoring above the 10th percentile was significantly different than the proportion of females scoring above the 10th percentile at each age. Results from this analysis indicated that at the age of 3 years, more boys than girls scored above the 10th percentile on the DSS. There were no significant differences found at the ages of 4, 5, 6, and 7.

A t -test was used to compare average DSS scores between the two genders for each year of the study. This test revealed a significant difference between the LT girls' and LT boys' scores at the age of 3 years. No significant differences were found for the subsequent years. However, difference between boys' and girls' scores at age 7 approached significance, with boys again scoring higher.

Implications

Research

Future research is needed to aid the clinician in identifying possible predictive outcomes in the area of language delayed

children. Because results from the t -test approach significance at the age of 7, a follow-up study on these same children is suggested. It would be interesting to know how this group does at the age of 8, and if the “illusory recovery” hypothesis is evident. Also, the small number of girls in the study make finding significant differences difficult. A larger sample of girls, followed as the girls in this study have been, could disambiguate this result.

Clinical

At the age of 3 years, LT boys scored significantly higher on the DSS than 3 year old LT girls. The boys appear to show a greater rate of spontaneous recovery than do the girls at this age. Clinically this suggests the SLP consider giving LT 3-year-old girls higher priority for early intervention. The non-significant trend toward significance at age 7 suggests an “illusory recovery” may be evident at 4, 5, and 6 years of age, but that the LT girls’ rate of spontaneous recovery at the age of 7 might once again be lesser than it is for the LT boys. If further research finds this to be the case, it is recommended that the SLP regard gender when assigning priority for intervention.

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APPENDIX A

OREGONIAN ARTICLE

Toddlers with delayed speech sought

A Portland State University researcher is looking for otherwise normal toddlers who begin talking late to serve as subjects in a study of delayed speech and its connection, if any, to later language problems.

Rhea Paul, a PSU assistant professor of speech communication, said the reasons for delayed speech in "late-blooming" young children and the early identification of toddlers who later will suffer chronic language delay had not been well-investigated, although perhaps 10 percent of American children may fall into those categories.

Paul is interested in studying children between the ages of 18 and 30 months in the Portland-Vancouver area who can say only five or fewer words, instead of the 50 or so most children can speak by that age. She

hopes to monitor their progress in speech development for two to five years, using such tools as speech tests and videotaped play sessions with their parents, to determine whether the children are indeed late-bloomers or whether their lack of early communication skills signals the start of severe speech and language delays.

Early identification of such children may allow early intervention and prevent future speech deficits, she said.

Paul's research is funded by the Fred Meyer Charitable Trust, the American Speech, Language and Hearing Foundation, and PSU. Parents who are interested in allowing their children to participate may contact Paul through the PSU Department of Speech.

The Oregonian, Portland, Oregon

APPENDIX B

**HUMAN SUBJECTS RESEARCH REVIEW COMMITTEE
APPROVAL MEMOS**

DATE: July 12, 1993

TO: Cynthia Hare-Blye

FROM: Laurie Skokan, Acting Chair, HSRRC, 1993-94 *Laurie Skokan / AS*

RE: HSRRC Waived Review of Your Application titled "Language Growth Rate Differences...."

Your proposal is exempt from further HSRRC review, and you may proceed with the study.

Even with the exemption above, it was necessary by University policy for you to notify this Committee of the proposed research and we appreciate your timely attention to this matter. If you make changes in your research protocol, the Committee must be notified.

c. Office of Graduate Studies

*HUMAN SUBJECTS RESEARCH
REVIEW COMMITTEE*

MEMORANDUM

OFFICE OF GRANTS AND CONTRACTS

DATE: May 24, 1991
TO: Rhea Paul, SP
FROM: Joan Shireman, Chair, HSRRC *JSP*
RE: Your students' thesis/dissertation projects

With regard to your graduate students working with data from your research project entitled "Predicting Outcomes of Early Expressive Language Delay", application for Human Subjects Research Review may be unnecessary due to their procedures which involve the use of secondary data. However, if human subjects can be identified as data is handled, the Committee will need to review procedures for risk as there may be some in some studies.

If you have questions, please call me at X5-5005. Thank you.

c. Office of Grants and Contracts

APPENDIX C

QUESTIONNAIRE FOR PARENTS OF CHILDREN 15-30 MONTHS OLD

QUESTIONNAIRE FOR PARENTS OF CHILDREN 15-30 MONTHS OLD

What is your child's:

first name? _____

date of birth? _____

Mother's (or primary parent's) full name? _____

Mother's (or primary parent's) phone number? _____

Mother's occupation _____

Father's occupation _____

How many different words can your child say? (It's OK if the words aren't entirely clear, as long as you can understand them).

none _____ 10-30 _____

less than five _____ 30-50 _____

5-10 _____ more than 50 _____

If your child says fewer than ten words, please list them

here:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Does your child put words together to form short "sentences"?

Yes _____ No _____

If yes, please give three examples here:

Would you be interested in participating in later parts of this study?

Yes _____ No _____

APPENDIX D

LANGUAGE DEVELOPMENT SURVEY

Language Development Survey

Please check off each word that your child says SPONTANEOUSLY (not just imitates or understands)
It's okay to count words that aren't pronounced clearly or are in "baby talk" ("baba" for bottle)

FOODS	ANIMALS	ACTIONS	HOUSE- HOLD	PERSONAL	CLOTHES	MODIFIERS	OTHER
apple	bear	bath	bathtub	brush	belt	all gone	A, B, C, etc.
banana	bee	breakfast	bed	comb	boots	all right	away
bread	bird	bring	blanket	glasses	coat	bad	booboo
butter	bug	catch	bottle	key	diaper	big	bye-bye
cake	bunny	clap	bowl	money	dress	black	excuse me
candy	cat	close	chair	paper	gloves	blue	here
cereal	chicken	come	clock	pen	hat	broken	hi, hello
cheese	cow	cough	crib	pencil	jacket	clean	in
coffee	dog	cut	cup	penny	mitten	cold	me
cookie	duck	dance	door	pocketbook	paajamas	dark	meow
crackers	elephant	dinner	fork	tissue	pajamas	dirty	my
drink	fish	doodoo	floor	toothbrush	shirt	dry	myself
egg	frog	down	fork	umbrella	shoes	good	night/night
food	horse	eat	glass	watch	slippers	happy	no
grapes	monkey	feed	knife		sneakers	heavy	off
gum	pig	finish	light	PEOPLE	socks	hot	oh
hamburger	puppy	fix	mirror	aunt	sweater	hungry	out
hotdog	snake	get	pillow	baby		little	please
icecream	tiger	give	plate	boy	VEHICLES	mine	Sesame St.
juice	turtle	go	potty	daddy	bike	more	shut up
meat		have	radio	doctor	boat	nice	thank you
milk		help	room	girl	bus	pretty	there
orange	BODY	hit	sink	grandma	car	red	under
pizza	PARTS	hug	soap	grandpa	motorcycle	sunk	welcome
pretzel	arm	jump	spoon	lady	plane	this	what
raisins	bellybutton	kick	stairs	man	stroller	tired	where
soda	bottom	kiss	table	mommy	train	wet	why
soup	chin	knock	telephone	own name	trolley	white	wool/wool
spaghetti	ear	look	towel	pet name	truck	yellow	yes
tea	elbow	love	trash	uncle		yucky	you
toast	eye	lunch	T.V.	Ernie, etc.			yummy
water	face	make	window				1, 2, 3, etc.
	finger	nap					
TOYS	foot	open					
ball	hair	outside					
balloon	hand	patty cake					
blocks	knee	peekaboo					
book	leg	peek-ee					
crayons	mouth	push					
doll	neck	read					
picture	nose	ride					
present	teeth	run					
slide	thumb	see					
swing	toe	show					
teddybear	tummy	shut					
		sing					
OUTDOORS	PLACES	sit					
flower	church	sleep					
house	home	stop					
moon	hospital	take					
rain	library	throw					
sidewalk	park	tickle					
sky	school	up					
snow	store	walk					
star	zoo	want					
street		wash					
sun							
tree							

Please list any other words your child uses here:

Does your child combine two or more words into phrases?
(e.g. "more cookie," "car byebye," etc.) yes _____ no _____

Please write down three of your child's longest and best sentences or phrases.

1. _____

2. _____

3. _____

APPENDIX E

DEVELOPMENTAL SENTENCE SCORE: SCORING CRITERIA

Source: Lee, L. (1974). Developmental sentence analysis.

Evanston, IL: Northwestern University Press

CHART 1. THE DEVELOPMENTAL SENTENCE SCORING (DSS) CHART

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

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

APPENDIX F

DEVELOPMENTAL SENTENCE SCORE:

NORMS

Source: Lee, L. (1974). Developmental sentence analysis.

Evanston, IL: Northwestern University Press

CHART II. NORMS FOR DEVELOPMENTAL SENTENCE SCORING (REWEIGHTED)

APPENDIX G

RAW DATA

RAW DATA

BOYS

Subject	DSS Scores				
	Age 3	Age 4	Age 5	Age 6	Age 7
006	3.74	6.60	5.94	7.28	10.98
007	2.82	6.44	6.74	9.07	10.26
015	---	---	---	5.23	6.84
039	5.44	---	7.41	6.50	11.22
041	---	7.96	9.64	7.82	9.56
053	6.60	8.18	9.02	---	---
084	5.50	8.50	---	9.17	10.06
085	4.12	5.70	5.82	7.28	10.08
086	2.94	7.02	6.87	7.02	8.22
087	4.96	7.90	8.96	8.74	8.66
090	---	---	---	---	13.98
091	---	---	---	---	8.60
092	6.52	4.10	7.38	8.32	12.24
093	---	---	6.68	4.53	6.84
094	---	2.91	6.06	5.00	9.88
097	2.21	---	4.46	6.72	6.96
098	5.56	6.90	6.82	6.42	8.84
100	---	7.40	6.23	6.26	11.96
103	---	---	7.40	000	10.54

BOYS (Continued)

Subject	DSS Scores				
	Age 3	Age 4	Age 5	Age 6	Age 7
105	4.80	6.68	9.06	10.26	10.24
107	4.08	4.68	8.50	8.62	9.90
109	7.04	---	6.78	7.02	9.14
114	2.05	---	11.16	7.94	12.04
119	4.66	5.26	6.86	7.92	9.92
142	7.02	4.56	6.30	6.66	9.32

GIRLS

Subject	DSS SCORES				
	Age 3	Age 4	Age 5	Age 6	Age 7
012	2.80	5.20	7.44	7.14	8.52
019	4.52	6.78	8.11	6.98	6.91
029	0.43	4.24	6.62	5.38	9.40
052	2.04	---	---	---	---
057	5.16	8.22	6.82	7.88	9.94
101	5.64	---	---	6.85	7.68
111	4.00	5.70	7.44	6.34	9.84
122	2.53	5.00	10.28	7.18	9.46