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A Review of Informal Measures Used to Assess Oral Syntactic Ability in Normal-Language and Language-Impaired, School-Aged Children

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A REVIEW OF INFORMAL MEASURES USED TO ASSESS ORAL SYNTACTIC ABILITY IN NORMAL-LANGUAGE AND LANGUAGE-IMPAIRED, SCHOOL-AGED CHILDREN

by

William Eric Strong

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of

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In

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DEDICATION

To my parents,

Dr. William and Dr. Carol Strong,

whose words of

encouragement and love of language

have carried me far

and echo here

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ABSTRACT

A Review of Informal Measures Used to Assess Oral Syntactic Ability in Normal-Language and Language-Impaired, School-Aged Children

by

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This review of the literature was an investigation of informal measures used to assess syntax in normal-language and language-impaired, school-aged children. From the eighteen studies that were researched in this review of the literature, 86 measures and their variants were reviewed. Data concerning the T-unit, the most widely used measure for determining syntactic maturity was reviewed as well. Any findings uncovered regarding the syntactic skills of normal-language and/or language-impaired, school-aged children were summarized (typically on the basis of ability level, age or grade level, and sex). In addition, the strengths and weaknesses in previous studies of oral syntactic maturity in either normal-language or language-impaired, school-aged children was discussed. This was done by systematically reviewing indicators of study quality. (99 Pages)

CHAPTER I

PROBLEM STATEMENT

When assessing language, one needs to have information on phonology, morphology, syntax, semantics, pragmatics, cohesion, and discourse style; language is a system of systems. Each of these individual systems or components (e.g., syntax, semantics, etc.) must be assessed in order to understand an individual's ability to use and process language. The assessment of syntax (i.e., the arrangement of words according to the meaning relations among them) is a necessary and integral part of the assessment procedure (Fey, 1986; Lahey, 1988). Syntax includes the sounds, words, syntactic forms, and morphological inflections that a group of speakers have accepted as a standard means of expressing language content. Thus, syntax refers to the system of rules designed to relate sounds and sequences of sounds to meaning (Fey, 1986; Lahey, 1988; Lund & Duchan, 1983; Wiig & Semel, 1980).

Since syntax is an integral component of language, adequate assessment of this component is necessary when identifying and evaluating the expressive use of language in the language-impaired population.

An enormous body of literature exists concerning the evaluation of syntax in preschool and younger children. Numerous formal and informal syntactic maturity measures are available for this age range (e.g., Crystal, 1982; Lee,

1974; Tyack & Gottsleben, 1974). These instruments assess, for example, basic sentence structure patterns, morphological endings, the appropriateness of function words, mean length of utterance, and subject-verb agreement. In addition to the available syntax measures, there are numerous instruments available for preschool and younger children that sample phonology, morphology, semantics, and pragmatics. The availability, however, of syntactic maturity measures for normally developing and language-impaired, school-aged children is meager (Scott, 1988). The reasons for this discrepancy are described below.

First of all, the concern in assessing school-aged children no longer resides with the presence or absence of high frequency syntactic structures. Examples of high frequency structures are basic clause level structures (e.g., SV, SV-O/C/A, etc.), phrase level structures (e.g., Determiner Noun, Adj Noun, etc.), and morphological endings. Instead, the concern in assessing school-age children resides with the subtle, nearly imperceptible acquisition of low-frequency structures (e.g., manner adverbials, modal auxiliaries, and multifunctional structures such as <u>because</u>, and <u>if</u>) and the ability to form unique structure combinations (Crystal, 1982; Scott, 1988; Wallach & Buttler, 1984). An analysis of mean length of utterance or morphological structure is not a sufficient method for analyzing syntactic maturity in the normal-language and

language-impaired, school-aged population because by the time a child reaches school age, his/her morphology is well developed and the mean length of utterance (MLU) measure is no longer sensitive to the school-aged child's language abilities; MLU is only a good predictor of linguistic ability up to age four (Lahey, 1988).

Secondly, the types of syntax development that occur in normal school-aged children involve more complex development of structures at the phrase and clause level. At the phrase level, for example, postmodification of noun phrases via prepositional phrases, nonfinite clauses, relative clauses and appositive constructions are particularly active growth areas (O'Donnell, Griffin, & Norris, 1967; Scott, 1988). In studies in which authors have analyzed the writing of school-aged children, verb phrase development has been shown through the doubling of modal auxiliaries between fourth and twelfth grade, and greater use of the perfect aspect and the passive voice (Hunt, 1965).

Research has also shown that at the clause level, subordination of nominal, adverbial, and relative clauses increases steadily in school-aged children at the third- through twelfth-grade level. Loban (1976) reported that approximately two to three out of every ten sentences spoken by his nine-year-old subjects contained a subordinate clause.

Statement of the Problem

In a preliminary search of the literature, no reviews were located that contained a summary of all reported measures used to assess oral syntactic maturity in either normal-language or language-impaired, school-aged children (i.e., kindergarten through twelfth grade). An understanding of these measures and their availability is crucial for adequate assessment of language impairment in the school-aged population. Furthermore, no review of the literature concerning findings regarding the nature of the oral syntactic skills of school-aged, language-impaired children was located. The lack of either type of review is the problem underlying this proposed review of the literature.

CHAPTER II

REVIEW OF PREVIOUS REVIEWS

In a preliminary search of the literature, two reviews of the literature were located that summarized a few of the measures used to assess oral syntactic maturity in normal-language children. These reviews will be discussed in turn and critiqued according to Jackson's (1980) criteria for what constitutes a methodologically sound review of the literature. In his article, he discussed six points that need to be addressed in order to provide a quality review. These points were: (a) In order to provide focus for the review, the topic selected for review should be carefully defined; (b) in order to determine the need for a current review, previous reviews should be examined; (c) the articles selected for review should follow specified inclusion and exclusion criteria so that misleading conclusions are not applied to the target population; (d) data collection should be done systematically from all articles on the independent (study characteristics) and dependent variables (study outcomes) so as to draw accurate conclusions; (e) statistics should be used whenever possible in data collection, in order to facilitate data analysis; and (f) the interpretation and reporting of results for an integrative review should be as rigorous as that of a primary research study.

In the first review, entitled Measuring Proficiency in Using English Syntax, Budd (1988) looked at research carried out by Hunt (1970) in which he had examined ways of measuring growth in syntactic proficiency in the writings of American school children. Since it covered only one measure of syntax, the T-unit--defined as "one main clause plus any subordinate clause or non-clausal structure that is attached or embedded within it" (Hunt, 1970)--this review of the literature was judged to be an insufficient source for determining the types of measures available for assessing oral syntax in the school-aged population. Furthermore, Hunt (1970) applied his measure of syntactic maturity to the writings of school-aged children, not their oral syntactic abilities. Due to the scope of this review--the examination of a single measure of syntactic maturity in the context of writing skills (i.e., not oral syntactic ability)--it is an insufficient source for this project's purposes.

The second review, entitled "Spoken and Written Syntax" (Scott, 1988), a chapter from Later Language Development (Nippold, 1988), had four purposes, two of which were related to this proposed review of the literature. These purposes were: (a) to contrast the syntactic abilities of children in the 9-through-19 age range with the syntactic abilities of younger children; (b) to discuss several measures devised over the years to characterize developmental changes in syntactic complexity; (c) to chart

changes in structures at the phrase, clause, and discourse levels, and changes in major types of subordination; and (d) to discuss syntactic development within the broader context of discourse and to show how discourse style affects the types of syntactic structures produced.

The first related purpose concerns three measures of syntactic maturity that several major research authors have developed. Scott (1988), in her review, looked at both spoken and written data taken from nine- to nineteen-year-old children. She summarized data on the following units of analysis: the T-unit as defined above; clause length, defined as the mean number of words per clause; subordination index, a measure of the average number of clauses (main and subordinate) per T-unit; and the multistructural or elaboration index, a 22-variable index in which a set point-value was assigned to various elements of syntax.

In conducting this portion of her review, Scott (1988) summarized the work of eight researchers--some who examined only writing and some who examined both writing and oral syntactic maturity. Due to this mixing of oral and written syntax, Scott only reviewed results from four studies concerning the T-unit as applied to the oral syntax of school-aged children, three studies concerning the subordination index as applied to the oral syntax of youngsters in third through twelfth grades, and one study

concerning the subordination index as applied to spoken language of school-aged children. During a preliminary search of the literature, however, more studies were found per unit of measure than those she had analyzed. Table 1 shows 18 studies in which oral syntactic ability was examined in school-aged children.

This incomplete coverage of the literature is a major shortcoming of Scott's work. For this proposed review of the literature, the following will be completed: (a) Scott's review concerning the oral-syntactic abilities of school-aged children will be replicated and extended to include all measures designed to assess oral syntactic maturity in normal-language and language-impaired, school-aged children--not just those most frequently reported; and (b), all research studies in which a measure of syntactic maturity was obtained were included--not just reports done by major research authors.

Scott's second related purpose concerns changes in syntax structures of normal school-aged children at the phrase and clause level as well as changes in major types of subordination. For her sources, she reported that the majority of the data came from her own published work and a British corpus of spoken language covering the ages of six through twelve published by Fawcett and Perkins (1980).

In this proposed review of the literature, however, a summary of any findings regarding the syntactic skills of

school-aged, language-impaired children was attempted. The data came from all articles reviewed in which any data were presented concerning the nature of syntax skills of school-aged, language-impaired children.

When examining the above reviews according to Jackson's criteria for what constitutes a methodologically sound review of the literature (1980), several problems are apparent with the previous work. Each of the 6 criteria will be discussed in turn.

To begin with, in order to provide focus for a review, the topic selected should be carefully defined. Both authors defined their topic of interest carefully providing a clear focus for the reader but did not define or state the independent and dependent variables that they used throughout their articles.

Secondly, in order to determine the need for a current review, previous reviews should be examined. In neither of the reviews did the authors state they had carried out a systematic search for previous literature reviews.

The third criteria specifies that inclusion and exclusion criteria should be carefully defined. Since the review of the literature by Budd (1988) covered only one research report, no inclusion or exclusion criteria--designed for a large corpus of literature--were specified. Scott's review (1988), in addition, did not include inclusion and exclusion criteria although she summarized a

large body of literature throughout the review. Due to this fact, Scott's conclusions concerning the nature of syntactic development in school-aged children and the effectiveness of each informal measure of syntax discussed may be suspect.

To overcome this weakness, this researcher specified and followed inclusion and exclusion criteria so that reliable conclusions could be made.

The method of data collection--which should be done systematically from all articles on the independent and dependent variables--was not reported for either literature review. Again, this is important in a review of the literature so that reliable conclusions can be made.

The fifth criterion, statistical analysis of the data to facilitate analysis and interpretation of results, was used extensively throughout both of the author's studies.

And lastly, the interpretation and reporting of results for both integrative reviews appeared to be adequate. Tables were provided to summarize results and appropriate comments and conclusions were developed from the data that were present throughout the articles.

CHAPTER III

PURPOSES AND OBJECTIVES

In that no thorough or methodologically sound reviews of the literature concerning informal measures of oral syntactic ability in school-aged children were found, a need arises for acquisition of information in this area.

The general intent of the literature review was to search the literature for informal measures of oral syntactic ability used with school-aged children (kindergarten through twelfth grade) and to discuss authors findings concerning the syntactic skills of school-aged, language-impaired children.

Objectives

To complete this review of the literature, three objectives were followed. These were:

1. To summarize systematically the specific measures used to assess syntax in normal-language and/or language-impaired, school-aged children.

2. To summarize systematically any findings regarding the syntactic skills of normal-language and/or language-impaired, school-aged children by age/grade level and sex with respect to the measures obtained.

3. To describe systematically the strengths and weaknesses in previous studies of the oral syntactic maturity in either normal-language or language-impaired,

school-aged children.

CHAPTER IV

PROCEDURES

Identification of Studies

Articles and information included in this review of the literature had to meet the following guidelines:

1. The literature extracted from a manual search of indexes and abstracts had to have been written in the English language and published after 1979.

2. Supplementary and background literature, written prior to 1979 and in English, was obtained by manually searching the bibliographies of the journal articles, by completing a computer search of Educational Resources Information Center (ERIC) beginning at 1960, and by manually searching the table of contents of five prominent journals in Speech-Language Pathology.

3. Subjects used in each primary report had to be normal-language and language-impaired, school-aged children (i.e., kindergarten through twelfth grade) whose oral language has been analyzed by some informal measure of syntactic maturity. If subjects had disabilities other than or in addition to language-impairment (e.g., hearing-impaired, intellectually handicapped, physically handicapped), these reports were not included in the review.

Reports were identified by searching a variety of sources. These included, but were not limited to a computer

search of ERIC (1960 through 1989) and manual searches of Current Index to Journals in Education (Jan, 1979 through Dec., 1989), Deaf, Speech and Hearing Abstracts (1979 through 1985), and Language and Language Behavior Abstracts (1979 through Oct., 1989). Key words used in searching these sources included: syntax, language impaired, language handicaps, school-aged, early childhood education, elementary secondary education, elementary education, secondary education, T-unit, language testing, language tests, and language proficiency.

Other sources searched manually were the table of contents for the Journal of Speech and Hearing Disorders (1973-1989), the Journal of Speech and Hearing Research (1973-1989), Language, Speech and Hearing Services in the Schools (1971-1989), Topics in Language Disorders (1980-1989), and Seminars in Speech and Language (1980-1989). Reference lists at the end of located articles were searched for additional relevant reports. Articles were obtained through Merrill Library at Utah State University and through the interlibrary loan system. Because this search was extensive, it is expected that this accessible population of primary research reports was representative of the population of relevant research to date.

Data Collection

In order to analyze the information obtained through a search of the literature, a coding instrument was developed. This coding instrument (see Appendix A) was developed with the intent to extract the same information from each article, so that more accurate conclusions concerning the nature of informal measures of syntactic maturity when applied to normal-language and language-impaired, school-aged children could be delineated from the research material. The coding instrument included the following categories: (a) author(s) and year published; (b) subject variables which included whether the subjects were normal-language or language-impaired children, the number of subjects, mean age, sex, age range, and grade; (c) dependent variables--specifically what was the unit of measure (e.g., T-unit, sentence weights, mean length of utterance (MLU), sentence length clause length, subordination index, etc.), the sample context (e.g., conversational sample, narrative sample, interview, etc.), and the sample type (e.g., interview, retelling of story, etc.); (d) results drawn from the data; and (e) the author's conclusions as to the measure's effectiveness.

A second coding instrument (see Appendix B) was also developed so that data from each study could be summarized by indicators of study quality. Variables in this instrument included: author and year, controls for possible

examiner-expectancy effects, transcription accuracy, syntax-coding accuracy, transcription-segmentation accuracy, and random sampling.

Inter- and Intracoder Agreement

Each of the articles for this review of the literature was coded using the two data-collection instruments described above. The articles were then assigned numbers from one to twenty. A second coder, highly skilled in linguistics, then randomly selected two numbered articles (10% of the available articles) through the use of the random function key on an HP-15 calculator. This second coder then coded the two articles using the categories on the coding instruments. Intercoder agreement was 100%.

This author then randomly selected two articles (10% of the available articles) through the use of the HP-15 calculator and recoded selected articles without the aid of the originally coded information. Intracoder agreement was also 100%.

Data Analysis

Analysis of the data summarized in the coding instruments was both qualitative and quantitative and was summarized in the results section in narrative form. Each of the quality indicators was discussed in turn. Also, most of the variables listed in Appendix B--concerning subject and dependent variables--were summarized in narrative form

and discussed. Furthermore, results concerning the syntactic abilities of language-impaired, school-aged children from the individual studies were detailed and discussed in relation to syntactic abilities of normally developing, school-aged children. Tables were used to display all summary information.

Standardized mean differences (SMDs) were computed to determine the magnitude of the mean differences between language-impaired and normal-language subjects on the dependent variables. SMDs were computed for group-membership, age, and sex differences whenever the necessary data (i.e., means and standard deviations) were reported by the authors. This measure is computed by dividing the difference between the means by a pooled standard deviation. Cohen's (1988, pp. 25-27) standards of .2 as a small effect size, .5 as a medium effect size, and .8 as a large effect size were used as criteria to judge the magnitude of SMDs. These are arbitrary, though reasonable, conventions and must be used with caution. Furthermore, in every instance when SMDs were computed, the mean for the language-impaired subjects was subtracted from that for the normal-language subjects. Consequently, positive SMDs indicate that normal-language subjects obtained a higher mean score than language-impaired subjects. For age level, the means for younger age levels were subtracted from those of higher age

levels. Again, positive SMDs indicate that older subjects obtained a higher mean score than younger subjects.

The last analysis was a review of the threats to validity in reference to this review of the literature. Each validity threat was discussed in turn.

CHAPTER V

RESULTS

In Table 1, the 18 studies included in this review are summarized by (a) subject characteristics, (b) the informal measures used to assess syntactic skills, (c) standard mean differences (when data were available for computation) and statistical significance, and (d) author's conclusions. Of the 18 investigations, 56% (n=10) were published since 1980; the earliest was dated 1963, which is not surprising considering that the T-unit was developed only some time shortly before that date. Twelve of the 18 studies were reported in journal articles (Chabon, Kent-Udolf, & Egolf, 1982; Ciani, 1976; Fox, 1972; Hass & Wepman, 1974; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Merrit & Liles, 1987; Merrit & Liles, 1989; Nutter, 1981; Pope, 1978; Price & Graves, 1980); three reports were monographs (Loban, 1963; Loban, 1976; O'Donnell et al., 1967); one was reported in a Master's Thesis (Cleckler, 1990); one was reported in a dissertation (Stewart, 1973); and one was from published proceedings of a conference (Hess & Konger, 1989). The information in the dissertation by Stewart (1972) was a partial replication of work done by O'Donnell et al. (1967).

Sample size for the 18 studies ranged from 20 to 338, with a mean of 128.75 and a standard deviation of 97.74.

Results are first reported for comparison studies between language-impaired (LI) and normal-language (NL), school-aged children. In this section and the rest of the review, if standardized mean differences (SMDs) are not reported, the data for computation were not available. In addition, a definition for each measure discussed is provided within the glossary of this review.

Normal-Language and Language-Impaired Subjects

The syntactic skills of normal-language and language-impaired, school-aged children were compared in three of the 18 studies (Cleckler, 1990; Merrit & Liles, 1987; Merrit & Liles, 1989).

Mean T-unit length. The most common measure used across all 18 studies, mean T-unit length, was calculated in the study by Cleckler (1990). Her study consisted of 39 NL and 39 LI, 8-, 9-, and 10-year-old, school-aged children. Grade was not reported. Sex of subjects (Ss) consisted of 19 males and 20 females for each of the LI and NL groups. The analyzed data were obtained from narratives that were retold to the examiner. Cleckler (1990) found that for mean T-unit length, the NL Ss had significantly higher mean scores than the LI Ss. The SMD for the difference between the means was .78; that is, on the average, the mean T-unit length of the NL Ss was .78 standard deviations higher than the mean score of the LI Ss, a large difference by Cohen's (1988)

standards. In addition, Cleckler (1990) found that the 10-year-old Ss had significantly higher mean T-unit length scores than did both the 8- and 9-year-old Ss.

Mean clause length. Cleckler (1990) also computed mean clause length for her Ss. On this measure, NL Ss had a greater mean clause length than did the LI Ss. An SMD of .45 was found--a medium effect size. There were, however, no significant age-group differences for this measure.

Subordination ratio. A third measure that Cleckler (1990) examined was the subordination ratio. On this measure, NL Ss had a larger mean ratio than did the LI Ss. An SMD of .56 was calculated. This is also considered to be a medium effect size. Again, no significant age-group differences were uncovered for this measure.

Mean DSS score. Cleckler's (1990) final measure, mean DSS score, resulted in a large effect size (1.04). In addition, the 10-year-old Ss had significantly higher mean DSS scores than did her 9-year-old Ss.

Mean number of clauses per episode. Merrit and Liles (1987, 1989) published two journal articles that contained the same Ss, data and results. These two studies consisted of 20 NL and 20 LI, school-aged children, with a mean age for both groups of 10:2 and an age range of 9:0 to 11:4. Grade for these Ss was not reported. The analyzed data were obtained from both narratives retold to the examiner and from unique stories generated by the children and told to

the examiner. The researchers reported that the NL Ss had a significantly higher mean number of clauses per episode than did the LI Ss for the retelling of narratives only; groups did not significantly differ on the story-generation task. The SMD for the retelling of narratives was .75--a high effect size; whereas, the SMD for the story generation task was .13--a low effect size.

Mean number of clauses. A second measure that Merrit and Liles (1987, 1989) examined was mean number of clauses. They found that the NL Ss had a significantly higher mean number of clauses than did the LI Ss for retelling of narratives only; groups did not differ significantly on the story-generation task. The SMD for the retelling of narratives was .77; whereas, the SMD for the story generation task was .35--a relatively low effect size.

Mean number of clauses per incomplete episode. The final measure that Merrit and Liles (1987, 1989) examined in their studies was the mean number of clauses per incomplete episode. As expected, they found that the LI Ss had a higher mean number of clauses per incomplete episode than did the NL Ss. The differences, however, were not statistically significant. An SMD of -.2 (a low effect size) was obtained for the retelling-of-narratives task. An SMD could not be computed, however, for the story generation task.

Normal-Language Subjects

The syntactic skills of normal-language, school-aged children were investigated in 13 of the 18 studies (72%) (Chabon et al., 1982; Ciani, 1976; Hass & Wepman, 1974; Hess & Konger, 1989; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Loban, 1963; Loban, 1976; O' Donnell et al., 1967; Pope, 1978; Price & Graves, 1980; Stewart, 1972). The findings from two additional studies (Fox, 1972; Nutter, 1981) will be included in this section. Because group membership--whether the researchers were assessing normal-language or language-impaired children--was not reported in these two studies, their results will be treated with caution.

Mean T-unit/C-unit length. Of the 13 studies in which only normal-language subject were investigated, ten authors (77%) reported mean T-unit length (Ciani, 1976; Fox, 1972; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Nutter, 1981; O' Donnell et al., 1967; Pope, 1978; Price & Graves, 1980; Stewart, 1972) and two (15%) reported mean C-unit length (Loban, 1963; Loban, 1976). Both mean T-unit and C-unit length will be discussed in this section since the two measures are so similar. As has been mentioned, most of the investigators used the T-unit for their unit of analysis. Hunt (1970) defined the T-unit as "one main clause plus any subordinate clause or non-clausal structure that is attached to or embedded within it." All

main clauses that begin with coordinating conjunctions (and, but, or) initiate a new T-unit unless there is co-referential subject deletion in the second clause (Scott, 1988). The C-unit on the other hand, which was devised by Loban (1963) is identical to the T-unit except that in segmenting oral language into C-units, units are included that do not have clausal status. Many of these researchers, however, did not specify how nonclausal units were analyzed.

Mean T-unit/C-unit as a variant of grade. Nine of the authors listed in Table 1 reported results for mean T-unit/C-unit length as a function of grade level (Ciani, 1976; Fox, 1972; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Loban, 1963; Loban, 1976; O' Donnell et al., 1967; Pope, 1978; Stewart, 1972). Loban (1963, 1976) reported results as a function of mean C-unit length.

Three researchers (Fox, 1972; Loban 1963; O' Donnell et al., 1967) found that first-grade students had a significantly higher mean T-unit length than did their kindergarten counterparts. An SMD of .92 (a high effect size) was computed from the data provided by Loban (1963). In addition to this data, two researchers (Ciani, 1976; Klecan-Aker & Lopez, 1985) reported that third-grade Ss had significantly higher mean T-unit length scores than did their first-grade counterparts. An SMD of .89 was computed from the data presented by Klecan-Aker and Lopez (1985); this is considered a high effect size. And one researcher

(Stewart, 1972) showed that his third-grade Ss had significantly higher mean T-unit length values than did his second-grade Ss; no SMDs could be computed, however.

The two authors who examined the relationship between first- and second-grade Ss on this measure obtained conflicting results. The second-grade and first-grade Ss in Ciani's (1976) study did not differ for mean T-unit length; the second-grade Ss in Loban's (1963) study had significantly higher mean C-unit length values than did his first-grade Ss. An SMD of .89 (a high effect size) was obtained from the data.

The rest of the data for mean T-unit/C-unit length as a function of grade level was inconsistent. This author, however, will present each individual study's results and then discuss generalities that can be drawn from all studies combined.

Klecan-Aker and Hedrick (1985) found that their ninth-grade Ss had a significantly higher mean T-unit length than did their sixth-grade Ss. O'Donnell et al. (1967), on the other hand, found that in addition to the significant difference between kindergarten and grade one, there was a significant difference on this measure between seventh-grade and fifth-grade Ss, favoring the seventh-grade Ss. These were the only two sets of grade levels (i.e., kindergarten-first and fifth-seventh) where he found that a significant difference existed on the mean T-unit length measure.

In addition to the results described above by Loban (1963), he also found that the mean C-unit length was progressively larger at each grade level. Loban (1963) found that fourth graders had a significantly higher mean C-unit length than third graders; an SMD of .78 (a high effect size) was computed between these two grade levels. His fifth-grade Ss had higher mean C-unit length values than did his fourth-grade Ss; the difference, however, was not significant, and an SMD of only .14 (a small effect size). At the next age levels, his sixth-grade Ss had higher mean C-unit length scores than did his fifth-grade counterparts; the difference, again, however, was not significant, and an SMD of .35 (a small effect size) was computed.

Loban's (1976) study was a continuation of his 1963 study. In the more recent study, he examined grades seven through twelve, inclusively, and reviewed the data from his previous study. However, SMD values cannot be computed from the data provided in his second study and statistical significance is not reported. Thus, this researcher has chosen the word "trends" to describe the incremental change in mean C-unit length values for grades one through twelve that Loban (1976) presented. In addition, this researcher will present only Loban's (1976) data for mean C-unit length taken from random Ss (see Table 1); data will not be discussed--although it is provided in table format--for his high and low Ss. The primary reason for excluding this data

is that Loban (1976) gave no indication of what high and low meant or how these Ss were selected. It is felt by this researcher that his randomly chosen Ss (n=35 out of 211) are more representative of the normal school-aged population.

Loban (1976) found that mean C-unit values developed in the following way when examined from a random sample of the total sample being studied: first-grade students had a lower mean C-unit length than second-grade students; second-grade students had a lower but almost equivalent mean C-unit length than third-grade students; third graders had lower mean C-unit length values than did the fourth graders; at the fifth-grade level, however, there was a slight decrease in mean C-unit length values; in the sixth grade, Ss' mean C-unit length values rose once again, but the increase was slight; from sixth to seventh grade, mean C-unit length values once again decreased slightly; seventh-grade students had a lower mean C-unit length than eighth-grade students; from eighth to ninth grade, students' mean C-unit length increased only slightly; from ninth to tenth grade, however, there was a slight decrease in mean C-unit length values; and lastly, from tenth to twelfth grade mean C-unit length scores increased steadily.

Pope (1978) researched mean T-unit length in relation to students at higher grade levels. The researcher found that twelfth graders had significantly higher mean T-unit length values than eighth-grade Ss; this latter group, in

turn, had significantly higher mean T-unit length values than sixth graders. An SMD of .78 (a large effect size) was calculated for the difference between the means for sixth- and eighth-grade Ss on this measure. In addition, an SMD of .80 (a large effect size) was computed for the difference between the means for the twelfth- and eighth-grade Ss.

Nutter (1981) compared the use of mean T-unit length and sentence weights (see glossary for definition). She examined samples of "adolescent" language in a variety of set-up situations (i.e., descriptive narrative, narrative, explanation language sample, and argumentation language sample). Nutter found that mean T-unit length had a high correlation with sentence weight. Furthermore, she considered T-units to be an easier measure to use than sentence weights. Her research must be interpreted with caution, however, since group characteristics (i.e., type), mean age, sex, range, and grade were not reported.

In sum, the studies in which mean T-unit/C-unit length values have been reported indicate that the measure may be useful when comparing kindergarten and first-grade, second- and first-grade, third- and first-grade students, fourth- and third-grade students, sixth- and eighth- or ninth-grade students, and when comparing eighth-grade students to twelfth graders.

Mean clause length. Of the thirteen studies in which normal-language Ss were used, five authors (38%) reported

mean clause length (Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Pope, 1978; Price & Graves, 1980). Mean clause length is discussed here in relation to grade level.

Mean clause length as a function of grade. Authors of three of the five studies (60%) researched mean clause length as a function of grade level (Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Pope, 1978). Mean clause length increased in two of the three studies (Klecan-Aker & Hedrick, 1985; Pope, 1978) and decreased in the research study by Klecan-Aker and Lopez (1985). Pope (1978) found that mean clause length increased from grades six to eight and again in grades eight to twelve (SMDs = 1.15 and .70, respectively).

Klecan-Aker and Hedrick (1985) found similar results in that ninth graders had a larger mean clause length than did their sixth-grade Ss. Klecan-Aker and Lopez (1985), however, found that mean clause length decreased from grade one to grade three. An SMD of -.86 was calculated between the means for the two grade levels; this is considered a high, negative effect size; that is, on the average, the mean clause length of the third-grade Ss was -.86 standard deviations lower than the mean score of the first-grade Ss.

Subordination ratio. Of the thirteen studies in which only normal-language Ss were investigated, four authors (31%) investigated the subordination ratio (Klecan-Aker,

1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Price & Graves, 1980). The subordination ratio is discussed here in terms of grade level.

Subordination ratio as a variant of grade. Authors of two of the four studies (50%) researched the subordination ratio as a function of grade level (Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985). In both studies grade-level groups did not differ on this measure. Klecan-Aker and Hedrick (1985) investigated sixth- and ninth-grade Ss while Klecan-Aker and Lopez (1985) investigated first- and third-grade Ss. An SMD of .06 (a small effect size) was computed between the means for the groups in the latter research study.

Verb extensions. Klecan-Aker and Hedrick (1985) investigated verb extensions as a variant of grade level. The investigators, who studied sixth- and ninth-grade Ss, found that their Ss did not differ on this measure when compared by grade level.

Mean word length within T-units. Two authors (15%) investigated mean word length within T-units as a function of grade level (Fox, 1972; Stewart, 1972). Both investigators found that there was a significant increase in mean word length within T-units from kindergarten to first grade. Stewart (1972) also found a significant increase in this measure from second to third grade; whereas Fox (1972) found no significant difference for these grades.

Mean MLU-morpheme. Chabon et al. (1982) investigated mean MLU-m (mean length of utterance using morphemes) as the unit of segmentation. They investigated the stability of this measure over a three-day period in 5:6-6:6 year-old children and in 8:6-9:6 year-old children. The researchers found that the mean MLU-m values for the total three days investigated were significantly unstable; the values fluctuated from sample to sample. Chabon et al. (1982) then examined MLU-m for the total three days. Again, they found that MLU-m values were unstable within each group studied.

Verb ratio. Ciani (1976) investigated the verb ratio in first- through third-grade children. The investigator found that the third-grade Ss had higher mean verb ratio values than did the first- or second-grade Ss. An effect size could not be computed and statistical significance was not reported.

Number of subordinate conjunctions. Hess and Konger (1989) investigated the number of subordinate conjunctions in spontaneously generated narratives from children aged 7:6 to 11:1. These researchers found that the eleven-year-old Ss had a significantly higher number of subordinate conjunctions than did either the seven- or nine-year-old children. An effect size, however, could not be computed.

Subordination index. One author (15%) investigated the subordination index (Loban, 1963; Loban, 1976). Loban studied noun clauses, adjective clauses, and adverbial

clauses. Each of these subclasses of the subordination index will be discussed in turn.

For noun clauses, Loban (1963) found that his kindergarten Ss had a higher mean index value than did his first- grade Ss. His first-grade Ss in turn had a lower mean index value than did the second-grade Ss. In addition, from third- to sixth-grade, Loban (1963) found a steady increase in the index values.

In his second study, Loban (1976) again examined the nominal subordination index in relation to high-language, low-language, and randomly chosen Ss. For the randomly chosen Ss, he found that his fourth-grade Ss had a higher subordination index value than did his fifth- through seventh-grade Ss. Loban (1976) also found that from eighth- to twelfth-grade, his randomly chosen Ss had increasingly larger index values for nominal clauses.

For adjective clauses, Loban (1963) found that his kindergarten Ss had higher index values than did both the kindergarten or first-grade Ss. From second grade to sixth grade, however, he found a steady increase in the index values for adjective clauses.

In his second study, Loban (1976) again examined the subordination index for adjectives in relation to high-language, low-language, and randomly chosen Ss. For his randomly chosen Ss, there was no increase on this measure.

In fact, his first-grade Ss had higher index values than did his twelfth-grade Ss.

With the adverbial clauses, Loban (1963) found that his second-grade Ss had higher index values than did his first-grade Ss. His fifth-grade Ss had lower index values than did his fourth-grade Ss on this measure. And from fifth- to sixth-grade, the subordination index for adverbial clauses increased again.

In his second study, Loban (1976) again examined the subordination index for adverbs in relation to high-language, low-language, and randomly chosen Ss. On this measure, he found that his randomly chosen sixth-grade Ss had higher index values than did his seventh-, eighth-, and ninth-grade Ss. He also found that his tenth-grade Ss had higher index values than did his eleventh- or twelfth-grade Ss. And lastly, it is important to note that overall Loban's (1976) randomly chosen Ss showed no increase on this measure; his first-grade Ss had higher index values than did his twelfth-grade Ss.

Mean elaboration index. For the variable mean elaboration index, this researcher will present only Loban's (1976) data taken from his random Ss (see table 1); data will not be discussed--although it is provided in table format--for his high and low Ss. Again, the primary reason for excluding this data is that Loban (1976) gave no indication of what high and low meant or how these Ss were

selected. It is felt by this researcher that his randomly chosen Ss (n=35 out of 211) are more representative of the normal school-aged population.

Loban (1976) found the following trend to exist when he compared mean age-level elaboration index scores of his random Ss: from first to ninth grade, the mean elaboration index increased at each grade level; at grade ten, however, the mean elaboration index dropped slightly; and at grades ten through twelve the mean elaboration index for his Ss increased once again. Also, Loban (1976) found the mean elaboration index to be approximately equal to the mean C-unit length measure for all three ability groups (i.e., random-, high-, and low-language subjects).

Mean clause embedding transformations per T-unit. One author (8%) investigated the mean number of clause embedding transformations per T-unit (Pope, 1978). This researcher found that for sixth graders, one in seven T-units had embedding; for eighth graders, one in six T-units had embedding; and for twelfth graders, one in every four T-units had embedding. The differences between the scores for the grade levels, however, were not significant. SMDs of .21 and .16 were calculated between means for the sixth- and eighth-grade Ss and eighth- and twelfth-grade Ss, respectively.

Mean number of coordinated predicate transformations per T-unit. Pope (1978) investigated the mean number of

coordinated predicate transformations per T-unit in sixth-, eighth-, and twelfth-grade Ss. The researcher found that the eighth-grade Ss had a significantly higher mean number of coordinated predicate transformations per T-unit than did the sixth-grade Ss who were being investigated. An SMD of .93 (a high effect size) was obtained between the mean scores for these two groups. The researcher also found that the twelfth-grade Ss had only a slightly higher number of coordinated predicate transformations per T-unit; An SMD value, however, of .92 (a high effect size) was computed between the twelfth- and eighth-grade Ss.

Mean total embedding transformations per T-unit. Pope (1978) investigated the mean total embedding transformations per T-unit in sixth-, eighth-, and twelfth-grade Ss. The researcher found that his twelfth-grade Ss had a significantly greater mean number of transformations than did the eighth graders and that the eighth graders, in turn, had a significantly greater mean number of transformations than did the sixth-grade Ss. SMD values for the two groups (i.e, twelfth-eighth and eighth-six) were .97 (a high effect size) and .64 (a moderate effect size), respectively.

Mean number of other less-than-clause embedding transformations per T-unit. One author (8%) researched the mean number of other less-than-clause embedding transformations per T-unit (Pope, 1978). This researcher found that twelfth-grade Ss obtained a significantly higher

mean number of other less-than-clause embedding transformations per T-unit than did the eighth graders examined on this measure. An SMD of .92 was calculated (a high effect size). The investigator also found that the eighth-grade Ss had a greater number of other less-than-clause embedding transformations per T-unit than did the sixth-grade Ss. The SMD for the difference between the mean scores on this measure was .47 (a medium effect size).

Mean number of sentence combining transformations per T-unit. One research team (8%) investigated the mean number of sentence combining transformations per T-unit (O' Donnell, et al., 1967). The researchers found that their first- and seventh-grade Ss had a significantly higher mean number of sentence combining transformations per T-unit than did their kindergarten and fifth-grade Ss, respectively. No other age groups demonstrated significant differences. Furthermore, the researchers also found that the mean scores for males and females did not differ on this variable. Effect sizes could not be computed.

Mean Number of dependent clauses per C-unit. Loban (1976) investigated the mean number of dependent clauses per C-unit in first- through twelfth-grade children; the data was developmental in nature. He found that the mean number of dependent clauses per C-unit increased from grades one through four and from grades seven through twelve. At grade

five and seven, however, there was a slight drop in the use of dependent clauses.

Number of words in dependent clauses as a percentage of the number of words in C-units. One researcher (8%) investigated the number of words in dependent clauses as a percentage of the number of words in C-units (Loban, 1976). The investigator found similar results on this measure for his randomly chosen Ss as he did with the number of dependent clauses per number of C-units measure. Again, he found that on this measure, the mean scores for his randomly chosen Ss increased from grades one through four and from grades seven through twelve. At grade five and seven, however, there was a drop in the number of words in dependent clauses as a percentage of the number of words in C-units.

Coordination types per one hundred T-units. For one study (8%), coordination types per one hundred T-units were investigated (O' Donnell et al., 1967). These researchers found that their third-grade Ss had a significantly higher mean number of coordination types per one hundred T-units than did the second graders. In addition, the second graders had a significantly higher mean number of coordination types than did the first-grade Ss. In the upper grades, however, O' Donnell et al. (1967) found that the mean number of coordination types per one hundred T-units decreased; specifically, fifth graders had a

significantly greater mean number of coordination types than did the seventh-grade Ss.

Number of nominal constructions per one hundred T-units. O' Donnell et al. (1967) also examined the number of nominal constructions per one hundred T-units in kindergarten through seventh-grade children. They reported that their first- and seventh-grade Ss used a significantly greater mean number of nominal constructions than did their kindergarten and fifth-grade Ss, respectively. Effect sizes could not be computed.

On this measure, the researchers also examined the individual types of nominal constructions. The findings for each type are delineated below and in Table 1. Effect sizes could not be computed for any of the measures.

For noun adjuncts, noun + adjective, and noun + prepositional phrase, O' Donnell et al. (1967) reported that their seventh-grade Ss used a significantly greater mean number than did their fifth-grade Ss. The mean scores for other grade levels were not significantly different.

For Noun + genitive, second-grade Ss used a significantly greater mean number than the first-grade Ss. In addition, the researchers found that this measure showed an overall growth trend. The mean scores for noun + participle or participle phrase were found by O' Donnell et al. to be similar to the mean scores for the noun + genitive measure, only the growth trend was much slower. Their

seventh-grade Ss, however, used three times as many noun + participle or participle phrases than did their kindergarten Ss.

A surprising result was discovered by O' Donnell et al. (1967) in regard to the measure noun + relative clause. They discovered that their kindergarten Ss used a significantly greater mean number of noun + relative clause forms than did all other grades. No explanation was given for this finding by the researchers.

For all of the following nominal construction types, mean scores for grade-level groups did not differ significantly: non-headed nominals, subject nominals, subject complements, indirect object nominals, object complement nominals, appositives, and adverbial nominals. In fact, the latter four types of nominal constructions occurred infrequently in O' Donnell et al.'s (1967) data. Another researcher, Loban (1963), examined subject nominals and object complement nominals, both for nouns and pronouns. He, too, found that the mean scores for grade-level of his random subject group did not differ significantly on these measures.

Both Loban (1963) and O' Donnell et al. (1967) studied their Ss' use of infinitive phrases. The mean grade-level scores of Loban's (1963) Ss did not differ on this measure. O' Donnell et al. (1967) replicated this finding. They discovered that their Ss' use of infinitive phrases changed

relatively little from kindergarten to grade seven, even though significant growth occurred at grade one and that the measure fluctuated throughout the school grades.

Lastly, O' Donnell et al. (1967) examined direct object nominals and object of preposition nominals. Loban (1963) also studied nominals as objects of prepositions and, in addition, nominals as objects of verbals, N+N, and modifiers. O' Donnell et al. (1967) found an overall growth trend; on the latter measure, seventh graders used a higher mean number than did kindergartners by two and a half times. In addition, second- and fifth-grade Ss used a significantly greater mean number of object of preposition nominals than did first- and seventh-grade Ss, respectively. Loban's (1963) random Ss, however, demonstrated no differences on this measure with respect to nouns and pronouns. With direct object nominals, O' Donnell et al. (1967) found that their first-grade Ss used a higher mean number than did their kindergarten Ss.

Number of adverbial constructions per one hundred T-units. One investigation team (8%) studied the number of adverbial constructions per one hundred T-units (O' Donnell et al., 1967). These researchers found that their seventh- and first-grade Ss had a significantly higher mean number of adverbial constructions per one hundred T-units than did their fifth-grade or kindergarten Ss, respectively. In addition, they found an overall general increase in the use

of this measure from kindergarten to grade seven. Effect sizes could not be computed.

O' Donnell et al. (1967) also examined individual types of adverbial constructions; each type is delineated below. For adverbial clauses, O' Donnell et al. found that their seventh-grade Ss used the measure twice as frequently as their kindergarten Ss, but overall, the mean scores for the grade-levels did not differ significantly. In addition to this discovery, they found that their third grade, female Ss used adverbial clauses more frequently than did their second grade, female Ss. Effect sizes could not be computed.

Next, O' Donnell et al. (1967) examined sentence adverbials. They found that their seventh-grade Ss used a significantly greater mean number of sentence adverbials than did their fifth-grade Ss. In addition, the investigators found an overall general increase in use of this construction from kindergarten to grade seven. Effect sizes could not be computed.

O' Donnell et al. (1967) also investigated adverbial infinitives. On this measure they discovered that an overall general increase occurred in use of this construction from kindergarten to grade seven, although not a statistically significant increase. Effect sizes could not be computed for this measure.

Number of coordinate constructions per one hundred T-units. O' Donnell et al. (1967) investigated the number of

coordinate constructions per one hundred T-units in kindergarten through seventh-grade children. They discovered a significant increase in the number of coordinate constructions from kindergarten to seventh grade. In addition, there were specific significant increases for their Ss on this measure from grade one to grade two and from grade three to grade five to grade seven. Specific coordination types are delineated below; effect sizes could not be computed for any of these measures.

When O' Donnell et al. (1967) researched coordinate nominals, they found the following two results: first, their seventh-grade Ss used a significantly greater mean number of coordinated nominals than did their fifth-grade Ss; and secondly, the investigators found an overall general increase in the use of these constructions from kindergarten to grade seven by two and a half times.

O' Donnell et al. (1967) also investigated coordinated modifiers and coordinated predicates. For both measures, there was a significant increase in usage of the constructions from kindergarten to grade seven. Individual grades for the coordinated modifiers, however, did not differ significantly at any level. The researchers showed, on the other hand, that the mean scores for coordinated predicates increased from grade five to grade seven.

Structural patterns of main clauses. Two investigators (15%) studied the structural patterns of main clauses in

the mean grade-level scores for his Ss did not differ significantly on this measure. As a final note, Loban (1963) considered subject-verb-indirect object-direct object to be a rarely occurring structure in his Ss' oral language.

A third structural pattern that both Loban (1963) and O'Donnell et al. (1967) examined was passive constructions. O'Donnell et al. (1967) reported that the mean scores for all grades did not differ significantly. Similarly, Loban (1963) indicated that passive constructions were infrequently used by his Ss.

On the following measures, O'Donnell et al.'s (1967) Ss did not differ significantly among the age levels for mean frequency of usage. These were: subject-verb-object, subject-verb-predicate adjective, subject-verb-object-complement, subject-verb-object-adjective, adverb-verb-subject, and explicative-verb-subject. O'Donnell et al. (1967) noted, in addition, that only at kindergarten and grade seven did his Ss use all clausal patterns described (see Table 1). Furthermore, these researchers discovered a decreasing trend for the structural pattern subject-verb-predicate nominative; his kindergarten Ss used this structural pattern more frequently than all other groups.

Loban (1963) researched the following additional structural patterns: subject-linking verb, subject-verb (transitive or intransitive)-direct object, subject-linking verb-complement, subject-linking verb-subject, subject-verb

(transitive or intransitive)-direct object-object complement, WH-questions, requests/commands, movables, and partials. Unfortunately, the author did not report data or conclusions on all the measures listed above. And the results he did present were for either high- or low-language Ss. Thus, this author has chosen not to present any of the results from these measures. Instead results for the high- and low-language Ss can be found in table format (Table 1).

Loban (1963) reported high- and low-language Ss' results for the following structures: subject-linking verb, movables, and partials. Movables were described by Loban (1963) as being less essential structures that had freedom to shift in sentences (e.g., usually, in the meantime, if you don't really like it, etc.). Partials were defined by Loban (1963) as being any incomplete unit; whereas O'Donnell et al. (1967), who also studied partials, defined this structure as being only incomplete clausal patterns. For this latter structure, O'Donnell et al. (1967) found that from kindergarten to grade seven there was a general significant decrease in the existence of incomplete clausal patterns.

Factorial design for 57 syntactic variables. The final study to be discussed in which normal-language Ss were used is different from all previously reported studies. Hass and Wepman (1974) used a factorial analysis to examine 57 syntactic variables on five dimensions of syntactic usage.

(See Table 1 for the Study Characteristics of this research and Appendix C for a correlation matrix of all 57 syntactic variables and five dimensions of syntactic usage). This type of analysis is useful because it allows the researcher to see how many variables can be reduced to a few factors by combining variables that are moderately or highly correlated with each other. For the purposes of this study, this researcher was interested in only three of five dimensions of syntactic usage. These were: embeddedness (factor 2--column three), part-of-speech measures (factor 3--column four), and noun phrase structure (factor 4--column five). The other two dimensions, fluency and qualified speech, were not relevant to the purposes of this study.

Hass and Wepman (1974) indicated that factor two, embeddedness, suggested a dimension of general surface-structure elaboration existed and that age had a high positive loading (i.e., .70). These researchers also found that embeddedness was also significantly related to noun-phrase variety (.63), length (.81), as well as number and proportion of postmodified noun phrases (.65 and .84, respectively). Additional high positive loadings on the embeddedness factor included sentence variety and the relative distribution of sentence variety (.64 and .76--respectively), and the number of clausal components per sentence (.73).

For factor three, part-of-speech measures, there were only three variables that had high loadings, two of which were negative. These three loadings were: proportion of nouns (-.74), proportion of articles (-.67), and verb variety (.65). In other words, only verb variety correlated strongly with the part-of-speech measure. Because of the negative loadings for proportion of nouns and articles, Hass and Wepman (1974) concluded that these part-of-speech measures were strongly independent of factor three.

Factor four, in Hass and Wepman's (1974) analysis, had no high, positive or negative correlations. In addition, most of the correlated variables had negative loadings. Those that had moderate, negative loadings were proportion of relative forms (-.41), verb markers (-.41), and relative noun phrase uncertainty (-.39). On the other hand, those variables that had moderate, positive loadings were number and proportion of indefinites (.46 and .41, respectively), proportion of common words (.48), proportion of prepositions (.40), and number and proportion of present participles (.43 and .44, respectively).

Oral-Syntactic Measures as a Function of Sex

Seven researchers investigated male-female differences in relation to oral syntactic ability on the following measures: mean T-unit length, mean word length within T-units, mean clause length, verb extensions, the verb ratio,

the Subordination Ratio, the number of coordinate constructions per one hundred T-units, the number of adverbial infinitives per one hundred T-units, and the usage index (see Table 3). All authors but one, found that male-female groups did not differ on the particular oral-syntactic measure being investigated. Individual results of these studies are delineated below.

Five researchers reported that mean T-unit length did not differ with sex of subject (Ciani, 1976; Fox, 1972; Klecan-Aker, 1984; Price & Graves, 1980; Stewart, 1972). An SMD of .08 (a small effect size) was obtained from Price and Graves's (1980) study. Findings from the study by O'Donnell et al. (1967), however, indicated that males had significantly higher T-unit values than did females except at grade five.

Two authors (15%) investigated mean word length within T-units as a function of sex in kindergarten through grade three children (Fox, 1972; Stewart, 1972). When the means for males and females were compared for this measure, both researchers found that their Ss did not differ significantly.

In two studies, researchers investigated mean clause length as a variant of sex (Klecan-Aker, 1984; Price & Graves, 1980). Both authors found that male-female groups did not differ significantly when compared on this measure. Klecan-Aker (1984) looked at both sixth- and ninth-grade Ss

while Price and Graves (1980) studied eighth-grade Ss. An SMD of .41 (a small effect size, favoring males) was calculated between the means for the male and female eighth-grade Ss.

One author investigated verb extensions (see glossary for definition) as a function of sex (Klecan-Aker, 1984). The investigator, who studied sixth- and ninth-grade Ss, found that they did not differ by gender when compared on this measure.

Ciani (1976) investigated male-female differences in regard to the verb ratio in first- through third-grade children. This researcher found that male-female groups within grades did not differ significantly on this measure.

The subordination ratio was investigated as a variant of sex (Klecan-Aker, 1984; Price & Graves, 1980). Again, both authors found that male-female groups did not differ significantly when compared on this measure. Klecan-Aker (1984) investigated intra-group differences in both sixth- and ninth-grade Ss while Price and Graves (1980) studied eighth-grade Ss. An SMD of only -.11 (a small effect size, favoring females) was calculated between means for the male and female eighth-grade Ss in Price and Graves (1980). Effect sizes could not be computed for Klecan-Aker's (1984) research.

O'Donnell et al. (1967) examined the number of nominal constructions, adverbial infinities, coordinated predicates,

and coordination types (all per one hundred T-units), as well as partials as a variant of sex in kindergarten through seventh-grade children. They found that their fifth grade, male Ss used a significantly greater mean number of nominal constructions than did their fifth grade, female Ss; their third grade, female Ss used a significantly greater mean number of adverbial infinitives than did their second grade, female Ss; and their males Ss used a significantly greater number of coordinated predicates at grades five and seven. Overall, however, the mean scores for males and females did not differ significantly for these three measures. In addition, for both coordination types per one hundred T-units and partials, O' Donnell et al. (1967) noted that the mean scores for males and females did not differ significantly at any grade level on these measures. Effect sizes could not be computed for any of the above measures.

Lastly, Price and Graves (1980) investigated the usage index as a variant of sex (see glossary for definition). The investigators found that their eighth-grade male-female Ss did not differ on this measure. An SMD of .41 was calculated (a small effect size, favoring males).

Sample Characteristics

Authors of all of the studies discussed in this review of the literature (n=18) reported how the oral-language data were obtained. Ten of the researchers (56%) indicated that

they had taken language samples of their Ss' speech (Chabon et al., 1982; Ciani, 1976; Fox, 1972; Hass & Wepman, 1974; Loban, 1963; Loban, 1976; O'Donnell et al., 1967; Pope, 1978; Price & Graves, 1980; Stewart, 1972). In addition, of these ten studies, seven researchers obtained data from an interview format (Chabon et al., 1982; Ciani, 1976; Loban, 1963; Loban, 1976; O'Donnell et al., 1967; Price & Graves, 1980; Stewart, 1972), four from retelling of a familiar past event (Fox, 1972; O'Donnell et al., 1967; Pope, 1978; Stewart, 1972), and one investigator indicated that his language samples were spontaneously generated (Hass & Wepman, 1989).

A second method authors used to gather data was by having their Ss tell a story (i.e., narrative). Of the 18 studies, seven researchers (44%) collected data in this fashion (Hess & Konger, 1989; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Merrit & Liles, 1987; Merrit & Liles, 1989; Nutter, 1981). The two primary methods in which these narratives were collected was either through retelling of a story (n=4) (Cleckler, 1990; Merrit & Liles, 1987; Merrit & Liles, 1989; Klecan-Aker & Lopez, 1985) or by having the child create a narrative spontaneously (n=5) (Hess & Konger, 1989; Merrit & Liles, 1987; Merrit & Liles, 1989; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985). Nutter (1981), who also examined narratives samples, collected them during interviews with his Ss. In

addition, Nutter (1981) also investigated syntax in language samples where the subject was asked to describe, explain, and present an argument. All samples were collected during an interview with each subject.

Quality Indicators

As noted previously, data were collected from each study on a number of indicators of study quality: examiner- and coder-expectancy effects, transcription accuracy, syntax-coding accuracy, and transcript-segmentation accuracy. In addition, whether or not the researchers used random sampling techniques was noted also. These data, summarized in Table 2, are discussed below.

Examiner expectancy. The question of possible expectancy effects was whether the person obtaining the oral-language samples was aware of group membership or age (or grade level) of the subject whose language sample was being recorded. Only three of the 18 authors (17%) specified that this variable had been controlled (Ciani, 1976; Cleckler, 1990; O'Donnell et al., 1967).

Transcript accuracy. Whether authors checked the accuracy of the transcriptions was a concern because random errors in transcription would reduce both the reliability and validity of individual Ss' scores. For 44 percent (n=8) of the investigations, the authors specified that the transcriptions had been checked for accuracy. Only one

author reported the degree of agreement between coders (Chabon et al., 1982).

Syntax-coding accuracy. Whether authors checked the accuracy with which they coded their Ss' segmented language samples into the appropriate syntactic measure that they were analyzing was also a concern. Of the 18 investigations, twelve authors (67%) reported that they had checked their samples for accuracy of syntactic classification (Chabon et al., 1982; Ciani, 1976; Cleckler, 1990; Fox, 1972; Hass & Wepman, 1974; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Merrit & Liles, 1987, 1989; O' Donnell et al., 1967; Stewart, 1972). In seven of the these twelve studies (58%), authors reported either inter- or intra-coder agreement data. If the method in which the authors coded the syntactic units was identical to the method in which they segmented the language samples or narratives into units of analyzable speech, then the inter- or intra-coder agreement data is provided under segmentation accuracy.

Segmentation accuracy. The accuracy with which transcripts were segmented into defined units (e.g., T-units) was a concern because the validity of the observed scores would be influenced by such errors. In 56 percent (n=9) of the studies, the authors specified that the accuracy of transcription had been checked (Chabon et al., 1982; Ciani, 1976; Cleckler, 1990; Fox, 1972; Hass & Wepman,

1974; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; O' Donnell et al., 1967). For only five of these ten studies, however, did authors report inter- or intra-coder agreement. The reported percentages of agreement ranged from 90.8% to 99% for inter-coder agreement and 99% to 100% for intra-coder agreement.

Random sampling. Whether or not the Ss in the eighteen studies were selected through the process of random sampling was a concern, because random samples yield research data that can be generalized to a larger population within margins of error that can be determined statistically. Furthermore, random sampling permits the researcher to make inferences about population values (e.g., mean, standard deviation, correlation coefficients) on the basis of sample values obtained (Borg & Gall, 1989). For the studies in this review of the literature, five researchers (33%) reported that they had used random sampling in selecting their Ss (Ciani, 1976; Cleckler, 1990; Fox, 1972; Price & Graves, 1980; Stewart, 1972). In nine of the eighteen studies (50%), however, the investigators did not use random sampling (Chabon et al., 1982; Hass & Wepman, 1974; Hess & Konger, 1989; Klecan-Aker, 1984; Klecan-Aker & Hedrick, 1985; Klecan-Aker & Lopez, 1985; Merrit & Liles, 1987; Merrit & Liles, 1989). Thus, the findings from 50% of the studies in this review cannot be as easily generalized to a

larger population; also, any inferential statistics reported in these studies must be interpreted with caution.

Stratified sampling was used by three authors (17%) (Loban, 1963; Loban, 1976; Pope, 1978). Loban (1963) reported that his Ss were matched on sex, socio-economic status, intelligence, and race. Stratified sampling assures the researcher that certain subgroups in the population will be represented in the sample in proportion to their numbers in the population itself (Borg & Gall, 1989). Pope (1978), however, did not identify the variable on which he had stratified his 60 Ss. Lastly, it should be noted that two of the eighteen researchers (11%) did not report how their Ss were obtained (Nutter, 1981; O'Donnell et al., 1967). This makes their data difficult to generalize to the general population.

CHAPTER VI

SUMMARY AND DISCUSSION

Historical Perspective

In the past, researchers of oral, syntactic maturity were primarily concerned with total length of response, mean length of response, sentence length and sentence complexity (Lehnert, 1983). It was not until the early 1960s, when new techniques of linguistic analysis were developed, that novel measures of syntactic maturity were developed (e.g., the T-unit). And now, with the aid of computers, researchers of oral, syntactic maturity can analyze large bodies of data and examine numerous syntactic variables to determine which are the most productive or useful indices of syntactic development throughout a child's school years (see Hass & Wepman, 1974, discussed in prior section and Appendix C).

Present Perspective

It was argued in Chapter I that if inappropriate assessment of the syntactic abilities in school-aged children occurs, clinicians may fail to identify children who are having difficulty learning to use language orally. It was pointed out that an analysis of mean length of utterance or morphological structure is not a sufficient method for identifying or analyzing syntactic maturity in normal-language and language-impaired school-aged children; MLU is only a good predictor of linguistic ability up to age

four. Chabon et al. (1982) confirmed this researcher's suspicions that MLU and MLU-m were not reliable measures over time or discourse style. Instead, assessment of syntax in school-aged children needs to focus on low frequency structures (e.g., manner adverbials, modal auxiliaries, and multifunctional structures such as because and if) (Crystal, 1982; Scott, 1988; Wallach & Buttler, 1984). Among the syntactic skills that might also be assessed in school-aged children are the frequency with which subordination occurs, the types of subordination (e.g. nominal, adverbial, adjective, and coordinate constructions), and growth at the phrase and clause level.

Scott (1988) concluded in her review of the literature (see Chapter II) on this topic that confusion existed because of the tendency to equate measured increases in syntactic complexity with increases in syntactic maturity, and then to conclude that language so characterized is qualitatively superior. Longer T-units do not necessarily mean better language skills (Scott, 1988). This researcher agrees that longer T-units do not equate with better language skills. Her earlier point, however, may be misleading. Kindergarten and first-grade children have different language abilities than do upper-grade level children. The subordination skills of twelfth graders are quite advanced in comparison to those of kindergarten children. This measured increase, whether obtained by using

T-units or some syntactic index, demonstrates a (hopefully) positive change in syntactic ability and thus growth in syntactic maturity.

Eighteen studies were located in which the oral-syntactic ability of school-aged children was investigated. In three of the 18 studies, comparisons were made between the syntactic skills of language-impaired and normal-language Ss. Also, Loban (1963) and Loban (1976) examined the oral-syntactic ability of high- and low-language Ss. The low-language Ss in his two monograph studies could be considered language-impaired children. The author, however, never classified them as such and no data were provided on their intellectual ability or the manner in which they were determined to be low-language ability children. For that reason, this researcher has not classified Loban's (1963 and 1976) children as language-impaired. In addition to the five studies described above, this researcher located thirteen studies in which the authors examined the oral, syntactic ability of normal-language children. The lack of a thorough review of the literature--in which all informal measures of syntactic maturity are analyzed for both normal-language and language-impaired, school-aged children--was the primary purpose of this work. In addition, the author was interested in examining the subtle changes in the syntactic skills of school-aged children and discovering at what age this subtle acquisition of syntax most readily

occurred. Lastly, information about the stability of the T-unit (and other informal syntax measures as well) across age, sex, and ability was a concern of this author.

In this chapter, a brief overview of the purpose and design of the study is provided. Next, the results for each objective of this review of the literature are summarized. Finally, conclusions drawn from the findings and several implications for clinical practice are presented, followed by recommendations for future research.

Study Overview

Purposes and design. The general purpose of this present study was to investigate measures of oral-syntactic ability in normal-language and language-impaired, school-aged children (kindergarten through twelfth grade). Differences in syntactic maturity across ability level, sex, and age were also investigated. To accomplish this task, the author followed three objectives. These were: first, to summarize systematically the specific measures used to assess syntax in normal-language and language-impaired, school-aged children; second, to summarize systematically any findings regarding the syntactic skills of language-impaired, school-aged children; and lastly, to describe systematically the strengths and weaknesses in previous studies of oral syntactic maturity in either normal-language or language-impaired, school-aged children. This latter

objective was accomplished through looking at indicators of study quality (see Table 2).

Summary of results. The first objective of this review of the literature was to summarize systematically the specific measures used to assess syntax in normal-language and language-impaired, school-aged children. This was done first by comparing the findings of studies in which normal-language and language-impaired subject were used and then by examining the findings in which only normal-language Ss were used.

For the normal-language and language-impaired Ss, seven measures of syntactic maturity were reported: mean T-unit length, mean clause length, the subordination ratio, mean DSS score, mean number of clauses per episode, and mean number of clauses.

Twenty-seven measures and their variants were obtained from the normal-language subject studies. These measures were (variants not included): (a) mean T-unit, (b) C-unit length, (c) mean word length within T-units, (d) mean clause length, (e) mean MLU-morpheme, (f) number of subordinate conjunctions, (g) the subordination index, (h) the subordination ratio, (i) the verb ratio, (j) verb extensions, (k) the mean elaboration index, (l) the usage index, (m) transformation type, (n) total, (o) mean, or (p) number per T-unit (i.e., (q) clause embedding, (r) coordinated predicate, (s) other less-than-clause), (t)

Number and (u) percentage of dependent clauses per C-units, (v) coordination types, (w) nominal, (x) adverbial, (y) adjectival constructions, (z) structural patterns of main clauses, and (aa) incomplete clausal patterns.

This author's second objective was to summarize systematically any findings regarding the syntactic skills of normal-language and/or language-impaired, school-aged children by age/grade level and sex with respect to the obtained measures. A summary of the results for the informal syntax measures most frequently studied (presented in Chapter V) is provided below. Results for those measures infrequently studied can be found in Chapter V.

--For mean T-unit length, this measure may be effective in discriminating between normally developing, upper-elementary, school-aged children and language-impaired children of the same age. Cleckler (1990) obtained an effect size of .78 on this measure when she compared normal-language and language-impaired, 8-, 9- and 10-year-old children. Replication of this result is essential.

--When comparing normal-language subjects by grade level with the mean T-unit length measure, a wide range of results were found. The most consistent results, however, indicated that this measure may be useful when comparing kindergarten and first-grade, second- and first-grade, third- and first-grade students, fourth- and third-grade

students, sixth- to eighth- or ninth-grade students, and when comparing eighth-grade students to twelfth graders.

--When 8-, 9- and 10-year-old, normal-language and language-impaired children were compared on the measure of mean clause length, no significant differences were found (groups did not differ). However, a medium, positive effect size of .45 was calculated for the difference between eight- and nine- or ten-year-old children.

--When normal-language, school-aged children were compared on the measure mean clause length as it varied by grade, conflicting results were found. A large and medium effect size (1.15 and .70) occurred for the differences between means for grade six and eight and grade eight and twelve, respectively, in one study. A second researcher reported similar results--finding that mean clause length increased significantly from grade six to grade nine. From grade one to grade three, however, mean clause length appeared to decrease significantly. A high, negative effect size was calculated for the difference between the means for these two grade levels.

--The subordination ratio was investigated in one study between normal-language and language-impaired, 8-, 9- and 10-year-old children. No significant differences were found to exist between mean scores for the two groups; an SMD of .45 was calculated. Also, mean subordination ratios for normal-language children in first, third, sixth, and ninth

grade were found to not differ significantly. An effect size of only .06 was calculated for one study reported. Thus the subordination ratio for both the language-impaired and normal-language, school-aged children (at the age and grade levels discussed previously) does not appear to be a worthwhile measure. The effect sizes calculated were small and of little practical significance.

--Verb extensions also appears to be a measure of little practical value. Mean scores of grade-level groups compared on this measure (sixth- and ninth-grade children) did not differ significantly. Research for this measure needs to continue at lower grade levels and for language-impaired children.

--Mean word length within T-units was a productive measure when normal-language children were compared by grade level; significant increases were occurred on this measure in the early elementary grades. One researcher reported a significant increase from kindergarten to grade one, while another researcher indicated that a significant increase occurred from second to third grade. Research for this measure needs to continue at the upper grade levels.

--Seven researchers investigated male-female differences in either normal-language and/or language-impaired subjects in relation to oral syntactic ability on the following measures: mean T-unit length, mean word length within T-units, mean clause length, verb extensions,

the verb ratio, the Subordination Ratio, the number of coordinate constructions per one hundred T-units, the number of adverbial infinitives per one hundred T-units, and the usage index. All authors but one, found that male-female groups did not differ on the particular oral-syntactic measure being investigated.

The final objective for this literature review was to describe systematically the strengths and weaknesses in previous studies of the oral syntactic maturity in either normal-language or language-impaired, school-aged children. This was accomplished by summarizing data on indicators of study quality.

A number of methodological weaknesses were obvious in the 18 studies. Included were the failures to control for possible expectancy effects, and failures to check the accuracy of transcriptions, coding of syntactic units, and transcript segmentation. In addition, there were failures to obtain generalizable data; this occurred for authors who failed to use random sampling techniques.

For examiner expectancy, only three authors reported that this variable had been controlled. This makes a large portion of the data presented in this review of the literature suspect; researcher bias may arise, whether deliberate or nondeliberate, when dealing with subject ability, sex, or age.

Transcript accuracy was reported in 39% of the studies that were investigated. The findings from those studies in which authors did not report that this measure was controlled (61%) are suspect because random errors in transcription reduce both the reliability and validity of individual Ss' scores. This being the case, the two detailed monograph reports by Loban (1963, 1976) are not as reliable as would be hoped.

Two-thirds of the investigators reported that they had checked their samples for accuracy of syntactic classification. In addition, for seven of the these twelve studies (58%), authors reported either inter- or intra-coder agreement data.

Ten researchers specified that the accuracy of transcription had been checked. Only five of these ten studies, however, reported inter- or intra-coder agreement. Of those that were reported, inter-and intra-coder agreement was high.

Five researchers (33%) reported that they had used random sampling and three authors (17%) reported they had used stratified samples when selecting their Ss. Thus, data from approximately 50% of the studies in this review cannot be as easily generalized to a larger population.

Conclusions and Implications

The major purpose of this study was to investigate the varying informal measures of syntax and to report findings of syntactic ability in normal-language and language-impaired, school-aged children when compared on these measures. The evidence from this review of the literature indicates that no one informal measure of syntactic maturity is sufficient across all age or grade levels. In addition it appears that male-female differences only play a minor role in syntactic development. Furthermore, the findings indicate that mean T-unit length, as a measure of syntactic maturity, may only be effective for discriminating among grade levels at certain grade levels. Significant differences on this measure occurred from kindergarten and first-grade, second- and first-grade, third- and first-grade students, fourth- and third-grade students, sixth- to eighth- or ninth-grade students, and when comparing eighth-grade students to twelfth-graders. More conclusive data on this measure, however, needs to be obtained. The disparity between the age levels at which there are significant differences in mean scores in the upper grade levels is quite large (e.g., there was a four-year difference between eighth-grade and twelfth-grade students; and even with such a wide age range, only medium effect sizes were reported). Thus, according to the data at hand, in the upper grade

levels, mean T-unit length is not a sensitive or reliable measure for detecting delays in syntactic maturity.

In addition, if mean T-unit length is going to be the tool of choice for measuring syntactic ability, researchers must decide how to treat the non-clausal elements that exist in oral language samples. Scott (1988) supports this point of view. Loban (1963), of course, developed the C-unit which is identical to the T-unit except that it includes, in addition, all the non-clausal elements. Little research, however, has been done using the C-unit as the measure of syntactic ability.

Recommendations for Future Research

During the course of this investigation into the informal measures of syntax used with normal-language and language-impaired children, several questions were raised that merit consideration in future research. These are listed below.

1. No prior research reports were located in which the stability of mean T-unit length across time for age, ability, or sex was investigated. Mean T-unit length stability across time is crucial if researchers, clinicians, and educators are going to continue using this measure (out of tradition) for assessment of school-aged language disorders. Since replication is the most effective way to determine whether results are reliable (Campbell & Jackson,

1979), further studies are needed to establish the reliability and generalizability of the findings reported here.

2. The samples reviewed in this study were limited to normal-language and language-impaired, school-aged children (kindergarten through grade twelve). The extent to which the conclusions drawn here regarding their syntactic skills can be generalized to other populations (e.g., learning disabled) should be investigated.

3. The sample of studies concerning language-impaired, school-aged children in this review of the literature is small. They were limited to the investigation of 8-, 9-, 10-, and 11-year old children. The extent to which the conclusions drawn here regarding mean T-unit length or other syntactic measures can be generalized to children in kindergarten, early elementary, middle school, and high school grades should be investigated.

Concluding Statement

From this study, it appears that syntactic ability in school-aged children is a slippery thing; measures of syntactic ability are effective at some ages but not at others: the syntactic skills of school-aged children are dynamic--changing with time. To informally assess these children's syntactic ability then may require varying the measures of syntax at different age or grade levels. In

conclusion, then, this review of the literature has provided important information regarding the number of informal syntactic measures that are available other than mean T-unit length. In addition, this review provides a thorough synopsis of syntactic skills that normal-language and language-impaired, school-aged children possess. This review, however, has also raised some important issues for researchers and clinicians interested in either conducting research or in adequately assessing the syntactic ability of school-aged children.

Table 1

Study Characteristics

Author & Year	Subject							Dependent Variable			SMDs	Conclusions
	Tp	N	x Age	Sex M	Sex F	Range	Gr	Measure	Sample	Type		
Chabon, Kent-Udolf, & Egolf (1982)	ND	20	NR	5 5	5 5	5:6-6:6 8:6-9:6	NR	$\bar{x}$ MLU-m MLU-m temporal	Lg S	Intvw	CNC*	$\bar{x}$ MLU-m instability for total 3 days MLU-m instability for total 3 days
Ciani (1976)	ND	60	NR	10 13 12	10 7 8	NR	1 2 3	$\bar{x}$ T-unit length Verb Ratio	Lg S	Intvw	CNC	3>2 & 1; 1 & 2 3>2 & 1
Cleckler (1990)	ND LI	39 39	9 9	19 19	20 20	8:0-10:11 8:0-10:11	NR	1. $\bar{x}$ T-unit length 2. x clause length 3. Subordination Ratio 4. x DSS score	Narr	Retell	1=.78 2=.45 3=.56 4=1.04	1. ND>LI; 10> 8 & 9 2. ND>LI; Groups DND 3. ND>LI; Groups DND 4. ND>LI; 10>9
Fox (1972)	NR	80	NR	10 at EGL	10	NR	k-3	a. $\bar{x}$ T-unit length b. x word length of T-units	Lg S	Retell	CNC*	a. 1>k b. 1>k
Hass & Wepman (1974)	ND	180	NR	15 at EAL	15	5-13	NR	57 syntactic variables (See Appendix A)	Lg S	Spont	CNC	Embeddedness significantly related to age, NP Length development, Number of clausal components/sentence Embeddedness loadings suggest general surface structure elaboration Part of Speech measures strongly interdependent
Hess & Konger (1989)	ND	36	9:4	6 at EAL	6	7:6-11:1	NR	# of Subordinate Conjunctions	Narr	Spont	CNC*	11>7 & 9 yr olds
Klecan-Aker & Hedrick (1985)	ND	48	NR	12 at EGL	12	NR	6,9	1. $\bar{x}$ T-unit length 2. Subordination Ratio 3. x claus extensions 4. verb extensions	Narr	Spont	CNC	1. 9 > 6 2. Groups DND 3. 9 > 6 4. Groups DND
Klecan-Aker & Lopez (1985)	ND	40	NR	20 at EGL	20	NR	1,3	1. x T-unit length 2. Subordination Rule 3. x clause length	Narr	Retell	.89 .06 -.86	1. 3 > 1 2. Groups DND 3. 3 < 1

Table 1 (continued)

Author & Year	Subject						Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M F	Range	Gr	Measure	Sample	Type		
Loban (1963)	ND	338	NR	NR	Develop.	$\bar{k}$	1. x C-unit length Lg S	Intvw		1-k=.92	1a. 6>5>4>3>2>1>k
		260				1	a. between grades			2-1=.89	1b.
		261				2				3-2=.06	
		259				3	2. Structures:			4-3=.78	2. Based on percentage of occurrence-frequency
		246				4	a. $S+V_{T,I}$			5-4=.14	2a. High>low
		243				5	b. S+Link V			6-5=.36	2b. High>low
		236				6	c. $S+V_{T,I}$ + D.O.			K_H-K_L=1.12	
							d. S+Link V+Comp			1_H-1_L=1.56	2d. 3rd Q. H>1st Q. H, Low did not use
							e. S+Link V+S			2_H-2_L=1.31	2e. increases for K_H-2 then decreases 2-6
							f. $S+L_{T,I}$+I.O.+D.O.			3_H-3_L=1.04	2f. H > L; 3rd Q. H & L > 1st Q. H & L; Rare
							g. $S+L_{T,I}$+D.O.+Obj Comp			4_H-4_L=2.06	
							h. Wh-questions			5_H-5_L=2.07	
							i. Passive			6_H-6_L=2.27	2i. infrequently used by both groups
							j. Requests/Commands			.....	
							k. Movables		2. CNC		2k. H>L in clauses & multiples used as movables
							l. Subj. Nominals for Noun & Pronoun, verbals, infinitives				2l. Groups DND for N & ProN - High > Low for both
							Prepositional Phrase, Clauses				- High > Low for both
							m. Comp. Nominals for Noun & Pronoun, Infinitives, clauses				2m. Groups DND for N & ProN - High > Low for both
							n. Nominals as object of preposition and Verbals, N+N modifiers, clauses, infinit.				2n. Groups DND for N & ProN - High > Low for all
							o. partials				2o. Low > High
							3. Subordination index		3. CNC		3. Noun Clauses: K>1<2, 3<4<5<6 Adj. Clauses: K>1>2, 2<3<4<5<6 Adv. Clauses: 1<2, 4>5<6 --Low boys < Low girls for all types --High boys > high girls in K, 1, 3, 5
Loban (1976)	ND	NR	NR	NR	Develop	7	1. $\bar{x}$ C-unit length Lg S	Intvw	CNC		Trends:
		NR				8	2. N dep cl/N C-unit				1. Rnd: 1<2<=3<4>=5<=6>=7<8<=9>=10<11<12
		NR				9	3. words in dep cl. as				2. Rnd: 1<2<3<4 > 5<6 > 7<8<9<10<11<12
		NR				10	a %age of words in				3. Rnd: 1<2<3<4 > 5<6 > 7<8<9<10<11<12
		NR				11	C-units				4. R: 1<2 >3 <4 >5>6>7 8<9<10<11<12; 1<12
		211				12	4. Subordination index				4 adj. R: No increase; 1 > 12
		35=Low				k-6	5. x elaboration index/				4 adv. H:
		35=High			(prev. data)		C-unit				R: 1>2>3 <4 >5 <6 >7>8>9 <10 >11>12; 1>12
											5. R: 1<2<3<4<5<6<7<8<9 >10 <11<12 x elabor. index/C-unit app.= mean C-unit lngth

Table 1 (continued)

Author & Year	Subject							Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M	Sex F	Range	Gr	Measure	Sample	Type		
Merrit & Liles (1987, 1989)	ND	20	10:2	11	9	9:0-11:4	NR	a. $\bar{x}$ N Cls/episode b. x clauses/ i complete episode c. x N. of clauses	Narr	Retell Story Generation	a=.75 b=-.2 c=.77 a=.13 c=.35	Retell: NL > $\bar{x}$ N clauses NL > x N cls/episode Story Gen.: Groups DND
	LI	20	10:2	11	9	9:0-11:4	NR					
Nutter (1981)	NR	32	NR	NR		Adolesc.	NR	1. Sentence Weight 2. x T-unit length	Descr. Narr. Expl. Argue	Intvw	CNC	Correlation Coefficient = .88 T-units easier to use
			Males			**Males**						
O'Donnell, Griffin, & Norris (1967)	ND	180	5:10	15	15 k	5:4-6:4	k	1. $\bar{x}$ T-unit length 2. x N SC transform/ T-unit 3. Coordination types/ 100 T-units 4. N of Nominal Const./ 100/T-units 5. N of Adv. Const./ 100 T-units 6. N of Coordinate Const./100 T-units 7. Structural Patterns of main clauses 8. Incomplete clausal Patterns	Lg S	Retell Intvw	CNC*	1. 1>k, 7>5; M > F, except at gr. 5 2. 1>k, 7>5 3. 1<2<3, 7<5 4. 1>k, 7>5 4a. N adjuncts: 7>5 4b. N+Adj: 7>5 4c. N+Prep P: 7>5 4d. N=Genetive: 2>1, overall growth trend 4e. N=Particip/ Particp Phrase: 7>k by 3x slow overall growth 4f. N+Rel. cl: k>all other grades 4g. Non-Headed Nominals: Groups DND 4h. Infinitive Phrases: 1>k, 2<1, 7 apprx. = k Fluctuating 4i. Subj. Nominals: Groups DND 4j. Subj. Compl.: Groups DND 4k. D.O. Nominals: K<1, overall growth trend 4l. Obj. of Prep Nominals: 1<2, 5>7, overall growth trend; 7 > k by 2.5x 4m. I.O. nominals: Groups DND; Infrequent 4n. Obj. Comp. Nom: Groups DND; Infrequent 4o. approsítives: Groups DND; Infrequent 4p. Adv. Nominals: Groups DND; Infrequent 5. 1>k, 7>5; overall general increase 5a. adv clauses: 7>k by 2x; Groups DND 3rd F > 2nd F 5b. Sent. Advbials: 7>5; overall gen. increase 5c. Adverbial Inf: 3rd F > 2nd F Overall general increase
			6:7	15	15 1	6:3-7:4	1					
			7:11	14	16 2	7:5-9:3	2					
			8:9	14	16 3	7:8-10:2	3					
			10:10	16	14 5	10:2-11:8	5					
			13:3	17	13 7	12:5-14:6	7					
			Females			**Females**						
			5:10		k	5:3-6:2						
			6:9		1	6:3-7:2						
			7:10		2	7:2-8:4						
			8:8		3	7:4-9:9						
			10:10		5	10:5-11:2						
			12:8		7	12:2-13:3						

Table 1. (continued)

Author & Year	Subject						Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M F	Range	Gr	Measure	Sample	Type		
O'Donnell, Griffin, & Norris (1967)											6. k to 7 significant increase; 2>1, 7 > 5 > 3 6a. Coord. Nominals: 7>5; 7 > k by 2.5x 6b. Coord. Modifiers: k to 7 sig. Increase Groups DND 6c. Coord. Pred.: 7>5; k to 7 sig. increase M > F in grades 5 & 7 7a. SV: 2>1; 2 to 7 general increase 7b. SVO: Groups DND 7c. SV+Pred. Adj.: Groups DND 7d. SV+Pred. Nom.: K > all other groups; Decreasing trend 7e. SV+IO+DO: Groups DND 7f. SVO+Comp: Groups DND 7g. SVO+Adj: Groups DND 7h. Adv+V+S: Groups DND 7i. Expl+V+S: Groups DND 7j. Passive Constr.: Groups DND 7k. All Clausal Patterns: k & 7 only grades that contained all clausal patterns 8. k to 7 general sig. decrease
Pope (1978)	ND	60	17:11 13:11 12:0	12 8 11 9 9 11	NR	12 8 6	a. $\bar{x}$ clause lngth Lg S b. x T-unit lngth c. clause embedding transform./T-unit d. Coord. pred. transform./T-unit e. Total embedding transform./T-unit f. other less-than-clause embedding transform./ T-unit	Retell	a 6-8=1.15 8-12=.70 b 6-8=.78 8-12=.80 c 6-8=.21 8-12=.16 d 6-8=.93 8-12=.92 e 6-8=.64 8-12=.97 f 6-8=.47 8-12=.92	a. b. c. d. e. f.	12>8>6 12>8>6 6th gr: 1 in 7 T-units had embedding 8th gr: 1 in 6 T-units had embedding 12th gr: 1 in 4 T-units had embedding 8>6, 12th slightly greater than 8th 12>8>6 12>8>6
Price & Graves (1980)	ND	80	NR	40 40	NR	8	a. $\bar{x}$ T-unit length Lg S b. x clause length c. Subordination Ratio d. Usage Index	Intvw	a=.08 b=.41 c=-.11 d=.41		

Table 1. (continued)

Author & Year	Subject							Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M	Sex F	Range	Gr	Measure	Sample	Type		
Stewart (1972)	ND	80	M 6:2 k 7:0 1 8:4 2 9:5 3	40	40	5:7-6:8 6:4-8:0 7:7-10:9 8:5-10:5	K 1 2 3	a. $\bar{x}$ T-unit length b. x word length/ T-units	Lg S	Retell Intvw	CNC*	a. 3>2 b. 1>K, 3>2

Note: Tp=Subject Type. Gr=Grade. Rs=Results. ND=Normally Developing. LI=Language Impaired. Sup=Superior Subjects. NR=Not Reported. Develop.=Subject Data was developmental. Adolesc.+Adolescent Subjects. N=Number. cls=clauses. Const.=Constructions. Transform.=Transformations. Coord. Pred.=Coordinated Predicate. Lg S=Language Sample. Narr=Narrative. Descr=Descriptive story. Expl=Explanation Language Sample. Argue=Argumentation Language Sample. Intvw=Interview. Retell=Retelling of Story. Spont=Spontaneous Language Sample. CNC=Can Not Compute. *=p significant at the .05 level. Subscript$_{H,L}$=High and Low scoring subjects. DND=Did Not Differ. Sig.=Significant. Gen.=General

Table 2

Quality Indicators

Author & Year	Examiner Expectancy	Transcript Accuracy	Syntax Coding Accuracy	Segmentation Accuracy	Random Sampling
Chabon, Kent-Udolf, & Egolf (1982)	NR	Yes 98.7%	Morphemes 98.2%	Utterances 94.3%	No
Ciani (1976)	Yes	Yes	Yes	Yes	Yes
Cleckler (1989)	Yes	Yes	All Measures	Inter Intra DSS 97% 100% Clauses 98% 100% Words 99% 100% T-units 98.7% 99%	ND Yes LI No
Fox (1972)	NR	NR	Yes	Yes T-units	Yes
Hass & Wepman (1974)	NR	Yes	Yes	Yes	No
Hess & Konger (1989)	NR	NR	NR	NR	No
Klecan-Aker (1984)	NR	NR	Yes	$\bar{x}$ T-unit length 92.6% x Clause length 93.1% Subord. Ratio 90.8% Total T-Units 96.7%	No
Klecan-Aker & Hedrick (1985)	NR	NR	Yes	$\bar{x}$ T-unit length 92.6% x Clause length 93.1% Subord. Ratio 90.8% Total T-units 96.7%	No
Klecan-Aker & Lopez (1985)	NR	NR	Yes	$\bar{x}$ T-unit length 96.3% x Clause length 94.2% Subord. Ratio 90.8% Total T-units 94.5%	No

Table 2 (continued)

Author & Year	Examiner Expectancy	Transcript Accuracy	Syntax Coding Accuracy	Segmentation Accuracy	Random Sampling
Loban (1963, 1976)	NR	NR	NR	NR (C-units, & Phonological Unit)	Stratified: Sex, SES, IQ Race
Merrit & Liles (1987, 1989)	NR	NR	Yes (85.9%-94.3%)	NR (Statements)	No
Nutter (1981)	NR	NR	NR	NR (T-units, Sentence Weights)	NR
O'Donnell, Griffin, & Norris (1967)	Yes	Yes	Yes	Yes (T-units, Number of words	NR
Pope (1978)	NR	Yes	NR	NR (T-units)	Stratified
Price & Graves (1980)	NR	NR	NR	NR	Yes
Stewart (1972)	NR	Yes	Yes	NR (T-units)	Yes

Note: NR=Not Reported

Table 3

Study Characteristics (Male/Female Difference)

Author & Year	Subject							Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M	Sex F	Range	Gr	Measure	Sample	Type		
Ciani (1976)	ND	60	NR	10	10	NR	1	$\bar{x}$ T-unit length	Lg S	Intvw	CNC	M-F DND
				13	7		2	Verb Ratio				M-F DND
				12	8		3					
Fox (1972)	NR	80	NR	10	10	NR	k-3	a. $\underline{x}$ T-unit length	Lg S	Retell	CNC*	a. M-F DND
				at EGL				b. x word length of T-units				b. M-F DND
Klecan-Aker Hedrick (1985)	ND	48	NR	12	12	NR	6, 9	1. x T-unit length	Narr	Spont	CNC	1. Sex DND for 6 or 9
				at EGL				2. Subordination Ratio				2. Sex DND for 6 or 9
								3. x claus extensions				3. Sex DND for 6 or 9
								4. verb extensions				4. Sex DND for 6 or 9
			Males			**Males**						
O'Donnell, Griffin, & Norris (1967)	ND	180	5:10	15	15	k 5:4-6:4	k	1. $\bar{x}$ T-unit length	Lg S	Retell Intvw	CNC*	1. M > F, except at gr. 5
			6:7	15	15	1 6:3-7:4	1	2. x N SC transform/ T-unit				2. Sex DND
			7:11	14	16	2 7:5-9:3	2	3. Coordination types/ 100 T-units				3. Sex DND
			8:9	14	16	3 7:8-10:2	3	4. N of Nominal Const./ 100/T-units				4. M > F at grade 5, Sex DND overall
			10:10	16	14	5 10:2-11:8	5	6. N of Coordinate Const./100 T-units				6. M > F in grades 5 & 7
			13:3	17	13	7 12:5-14:6	7	8. Incomplete clausal patterns				8. Sex DND
			Females			**Females**						
			5:10			k 5:3-6:2						
			6:9			1 6:3-7:2						
			7:10			2 7:2-8:4						
			8:8			3 7:4-9:9						
			10:10			5 10:5-11:2						
			12:8			7 12:2-13:3						
Price & Graves (1980)	ND	80	NR	40	40	NR	8	a. $\underline{\bar{x}}$ T-unit length	Lg S	Intvw	a=.08	a. M-F groups DND
								b. x clause length			b=.41	b. M-F groups DND
								c. Subordination Ratio			c=-.11	c. M-F groups DND
								d. Usage Index			d=.41	d. M-F groups DND
			M									
Stewart (1972)	ND	80	6:2	k 40	40	5:7-6:8	K	a. $\bar{x}$ T-unit length	Lg S	Retell Intvw	CNC*	a. Sex DND
			7:0	1		6:4-8:0	1	b. x word length/ T-units				b. Sex DND
			8:4	2		7:7-10:9	2					

Table 3

Study Characteristics (Male/Female Difference)

Author & Year	Subject						Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M	Sex F	Range	Gr	Measure	Sample	Type		
			M									
Stewart (1972)			9:5	3		8:5-10:5	3					
			F									
			6:3	k								
			7:2	1								
			8:4	2								
			9:1	3								

Note: Tp=Subject Type. Gr=Grade. Rs=Results. ND=Normally Developing. LI=Language Impaired. Sup=Superior Subjects. NR=Not Reported. Develop.=Subject Data was developmental. Adolesc.+Adolescent Subjects. N=Number. cls=clauses. Const.=Constructions. Transform.=Transformations. Coord. Pred.=Coordinated Predicate. Lg S=Language Sample. Narr=Narrative. Descr=Descriptive story. Expl=Explanation Language Sample. Argue=Argumentation Language Sample. Intvw=Interview. Retell=Retelling of Story. Spont=Spontaneous Language Sample. CNC=Can Not Compute. *=p significant at the .05 level. Subscript$_{H,L}$=High and Low scoring subjects. DND=Did Not Differ. Sig.=Significant. Gen.=General

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Appendix A. Data-Collection Instrument

Study Characteristics

Author & Year	Subject						Dependent Variable			Rs	Conclusions
	Tp	N	x Age	Sex M F	Range	Gr	Measure	Sample	Type		

Appendix B. Data-Collection Instrument

Quality Indicators

Author & Year	Examiner Expectancy	Transcript Accuracy	Syntax Coding Accuracy	Segmentation Accuracy	Random Sampling

Appendix C
Factorial Design for 57 Syntactic Variables

TABLE 1. Factor loadings for all children.

Variable	*1*	*2*	*3*	*4*	*5*	*Communality*
Total words	0.97	−0.14	−0.03	0.14	0.01	0.98
Prop. common words	−0.60	0.01	0.16	0.48	0.16	0.64
No. N	0.95	−0.13	−0.15	0.14	−0.04	0.96
No. V	0.92	−0.13	0.01	0.17	−0.05	0.90
No. P	0.93	−0.20	0.08	0.07	0.05	0.92
No. A	0.93	−0.05	−0.17	0.06	−0.00	0.91
No. D	0.92	−0.21	−0.05	0.16	0.10	0.93
No. R	0.90	−0.02	0.02	0.04	−0.18	0.85
No. T	0.85	−0.16	−0.21	0.09	−0.00	0.80
No. I	0.51	0.16	0.15	0.46	0.21	0.57
No. X	0.90	−0.11	0.04	0.22	0.03	0.87
No. Q	0.90	−0.21	−0.17	−0.01	−0.01	0.89
No. O	0.95	−0.01	−0.01	0.22	−0.02	0.95
No. C	0.93	−0.18	0.01	0.11	0.05	0.91
No. G	0.54	−0.04	0.17	0.22	0.14	0.39
Prop. N	−0.16	0.00	−0.74	0.11	−0.36	0.71
Prop. V	0.24	−0.09	0.50	−0.10	−0.40	0.49
Prop. P	0.27	−0.18	0.60	−0.35	0.25	0.66
Prop. A	0.24	0.23	−0.42	−0.32	0.02	0.39
Prop. D	0.14	−0.32	−0.05	−0.03	0.41	0.29
Prop. R	0.42	0.16	0.23	−0.41	−0.33	0.52
Prop. T	−0.39	−0.01	−0.67	0.17	−0.35	0.74
Prop. I	−0.28	0.35	0.18	0.41	0.09	0.40
Prop. X	−0.51	0.00	0.07	0.26	0.10	0.34
Prop. Q	0.18	−0.25	−0.39	−0.34	0.01	0.37
Prop. O	−0.16	0.59	0.10	0.40	−0.08	0.55
Prop. C	0.37	−0.14	0.26	−0.14	0.35	0.37
Prop. G	0.00	0.15	0.35	0.18	0.31	0.27
NP length	0.12	0.81	−0.13	−0.15	0.20	0.75
NP H	0.45	0.63	−0.28	−0.34	0.20	0.83
NP H_{rel}	0.11	0.20	−0.25	−0.39	0.22	0.31
No. det. NP	0.10	−0.46	0.17	0.15	0.11	0.29
No. postmod. NP	0.17	0.65	−0.11	−0.10	0.20	0.51
Prop. det. NP	−0.40	−0.53	0.38	0.32	−0.15	0.71
Prop. postmod. NP	0.09	0.84	−0.16	−0.13	0.20	0.79
V markers	0.47	−0.15	0.18	−0.41	−0.22	0.50
V H	0.13	0.32	0.65	0.04	−0.04	0.55
V H_{rel}	−0.39	0.34	0.50	0.14	−0.13	0.56
S cl. comp.	0.39	0.73	0.25	−0.05	−0.09	0.76
Sent. H	0.55	0.64	0.23	−0.07	−0.09	0.78
Sent. H_{rel}	0.08	0.76	0.20	−0.05	−0.16	0.65
No. N clause	0.82	−0.01	0.07	0.05	−0.33	0.79
No. adj. clause	0.77	0.03	−0.09	0.06	0.04	0.60
No. adv. clause	0.79	−0.07	0.03	0.11	0.13	0.65
No. mod. clause	0.56	−0.22	−0.10	−0.06	0.10	0.38
Prop. N clause	−0.03	−0.20	0.14	−0.19	−0.52	0.36
Prop. adj. clause	0.02	0.01	−0.17	−0.33	0.35	0.26
Prop. adv. clause	0.01	−0.15	0.12	0.05	0.49	0.28
Prop. mod. clause	0.36	−0.17	−0.12	−0.24	0.13	0.25
No. infin.	0.61	0.12	0.11	−0.01	−0.22	0.45
No. gerund	0.69	0.22	−0.02	0.04	−0.12	0.54
No. pres. part.	0.37	0.46	−0.24	0.43	−0.07	0.60
No. past part.	0.50	0.19	−0.14	0.27	−0.18	0.39
Prop. infin.	0.00	0.13	0.40	−0.13	−0.24	0.26
Prop. gerund	0.25	0.31	−0.01	−0.18	−0.03	0.20
Prop. pres. part.	−0.39	0.20	−0.54	0.44	0.02	0.69
Prop. past part.	−0.06	0.21	−0.19	0.18	−0.04	0.12
Age	0.16	0.70	0.08	0.12	−0.01	0.54

GLOSSARY OF TERMS

C-unit. Identical to the T-unit (see T-unit below) except that it includes units that do not have clausal status.

Coordination types per one hundred T-units. Excluding the coordination of main clauses, this measure includes coordinate nominals, coordinate modifiers, and coordinate predicates (O' Donnell et al., 1967).

Mean clause length. The number of words divided by the number of T-units/C-units plus the number of dependent clauses (Price & Graves, 1980).

Mean DSS score. For DSS, values from one to eight are assigned to syntactic structures based on developmental difficulty. The values per sentence are totaled and divided by the number of sentences providing a mean score.

Mean elaboration index. The use of all strategies by which C-units are expanded beyond simple one-word subjects and predicates. This includes modification and coordination, not only through dependent clauses but also through adjectives, adverbs, prepositional phrases, infinitives, appositives, gerunds, and all other means of expansion. Index weightings ranging from one-half of a point to five points are assigned to various parts of speech (Loban, 1976, p. 17 & p. 57).

Mean length of utterance-morpheme. The number of morphemes per utterance divided by the number of utterances within the sample.

Mean number of clause embedding transformations per T-unit. The clausal embedding transformations included relative, adverbial, and noun clauses (Pope, 1978).

Mean number of clauses. The total number of clauses per designated unit of measure (e.g., sentence, utterance, T-unit) divided by the total number of units of measure within the sample.

Mean number of clauses per episode. The total number of clauses per episode divided by the number of episodes. An episode is defined as a unit of meaning that encompasses a complete idea/thought on a particular subject.

Mean number of clauses per incomplete episode. Identical to Mean number of clauses per episode except for the fact

that the episode or idea/thought remains incomplete or unfinished.

Mean number of coordinated predicate transformations per T-unit. The average number of conjoined predicates within a T-unit. A predicate is defined as that part of a sentence or clause which expresses something about the subject. It consists of a verb and may include objects, modifiers, or complements of the verb.

Mean number of dependent clauses per C-unit. Total number of dependent (subordinate) clauses divided by the total number of C-units.

Mean number of other less-than-clause embedding transformations per T-unit. This measure included present and past participles, compound nouns, adjectives, appositives, reduced relative clauses, noun possessives, prepositional phrases attached to nouns; infinitival and -ing nominalizations; adverbial infinitives and with (paraphrased "uses" phrases; and coordinated verbs, noun phrases, and predicate adjectives (Pope, 1978).

Mean number of sentence combining transformations per T-unit. Kernel sentences (often, though not always, in reduced form) that are embedded into another by ways determined by the rules of grammar (O'Donnell et al., 1967).

Mean total embedding transformations per T-unit. The sum of both clausal embedding transformations per T-unit (defined above) and other less-than-clause embedding transformations per T-unit (defined above) (Pope, 1978).

Mean T-unit/C-unit length. The number of words divided by the number of T-units/C-units (Price & Graves, 1980).

Mean word length within T-units. The total number of letters within a T-unit divided by the total number of words within a T-unit.

Number of adverbial constructions per one hundred T-units. Subtypes include adverbial clauses, sentence adverbials, and adverbial infinitives. The term "adverbial clauses" covers reduced comparisons and expressions like "the more the merrier," as well as clauses that modify (or complement) adjectives and those that modify predications. Sentence adverbials include interjected clauses such as "I think", and absolute constructions and other modifications

affecting a sentence as a whole but not related directly to a constituent in it. And the italicized portion of "the ant went out to get some food," exemplifies adverbial infinitives (O' Donnell et al., 1967, p. 67).

Number of coordinate constructions per one hundred T-units. The number of nominal, verbal, adjectival, and adverbial elements per one hundred T-units (O' Donnell et al., 1967, p. 57).

Number of nominal constructions per one hundred T-units. Nominal constructions include: Noun adjuncts, noun + adjective, and noun + prepositional phrase, Noun + genitive, noun + participle or participle phrase, noun + relative clause, non-headed nominals, subject nominals, subject complements, indirect objects nominals, object complement nominals, appositives, and adverbial nominals

Number of subordinate conjunctions. The total number of subordinate conjunctions per language sample. Examples of subordinating conjunctions are: after, although, as, because, before, if, how, since, so that, unless, until, when, where, and while.

Number of words in dependent clauses as a percentage of the number of words in C-units. The total number of words in a dependent (subordinate) clauses divided by the total number of words in C-units. A dependent clause is a clause that cannot stand alone as a full sentence and that functions as a noun, adjective, or adverb within a sentence.

Sentence weight. Base clause (i.e., subject, verb, objects) major words have a weight of one. All modifiers of base clause have a sentence weight of two. Modifiers of the second weight words receive a weight of three--and so on. Exclude prepositions and articles. Add all numbers together and divide by the number of words used in each sentence (Nutter, 1981).

Subordination index. This measure is computed through the following procedure: 1 point for each dependent clause (first-order dependent clauses), 2 points for any dependent clause modifying or within another dependent clause (second-order dependent clause), 2 points for any dependent clause containing a verbal construction such as an infinitive, gerund, or participle, and 3 points for any dependent clause within or modifying another dependent clause which, in turn, is within or

modifies another dependent clause (third-order dependent clause) (Loban, 1963, p. 61).

Subordination ratio. Number of T-units/C-units plus the number of dependent clauses divided by the number of T-units/C-units (Price & Graves, 1980).

Structural patterns of main clauses. These include: subject-verb structures in main clauses, subject-verb-indirect object-direct object, passive constructions, subject-verb-object, subject-verb-predicate adjective, subject-verb-predicate nominative, subject-verb-object-complement, subject-verb-object-adjective, adverb-verb-subject, explicative-verb-subject, subject-linking verb, subject-verb (transitive or intransitive)-direct object, subject-linking verb-complement, subject-linking verb-subject, subject-verb (transitive or intransitive)-direct object-object complement, WH-questions, requests/commands, movables, and partials.

T-unit. "One main clause plus any subordinate clause or non-clausal structure that is attached to or embedded within it." All main clauses that begin with coordinating conjunctions (and, but, or) initiate a new T-unit unless there is co-referential subject deletion in the second clause (Scott, 1988).

Usage index. Derived by dividing the total number of derivations from standard usage by the total number of words produced.

Verb extension. Using a modification of the Language Assessment Remediation Screening Procedure each word, phrase, or clause following the main verb is placed in one of the following categories: simple adverbials, complex adverbials, infinitives, complex complements, and infinitive complements.

Verb Ratio. Computed by segmenting a language sample into T-units and then counting the number of verbs per T-unit (Ciani, 1976).

VITA

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