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Language Sampling Analyses: Bridging the Gap between Assessment and Therapy

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Language Sampling Analyses: Bridging the Gap between Assessment and Therapy

by

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Each person whose signature appears below certifies that this thesis in her opinion is adequate, in scope and quality, as a thesis for the degree of Master of Science in Speech-Language Pathology and Audiology.

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CONTENTS

Approval page iii

Acknowledgements iv

Table of contents v

List of tables vii

List of abbreviations ix

Abstract x

Chapter

1. Introduction 1

2. Background 3
   - What is a Language Sample 3
   - Importance of a Language Sample Analysis 4
   - Analysis of Language Samples 5
   - Methods for Gathering a Language Sample 7
     - a. Content 5
     - b. Number of utterances 8
   - Clinical Use 9

3. Statement of the problem 11

4. Methods 12
   - Subjects 12
   - Procedures 12
   - Reliability 14
   - Data analysis 14

5. Results 15
   - Comparison of Data Provided by Each Analysis 15
   - Comparison between 50 and 100 Utterances 17
     - a. MLU/Brown's stage 17
     - b. Grammatical Markers/14Morpheme Analysis 17
     - c. Sentence Development Analysis 18
     - d. Type Token Ratio 18
     - e. Semantic Relations 19
     - f. Language Sampling Analysis and Training 19

Comparison Between Analyses for Length of Administration 20
Goals Generated by Language Samples and Their Analyses 20
a. Language sample 1 21
b. Language sample 2 21
c. Language sample 3 21
d. Language sample 4 21
e. Language sample 5 22
Effectiveness of Language Sample Analyses as Rated by SLPs 22
a. Effectiveness for developing goals 22
b. Effectiveness for showing syntactic language abilities 23
c. Effectiveness for showing use of morphologic structures 23
d. Effectiveness for showing language abilities in the area of semantics 23
e. Effectiveness to develop measureable goals 23
f. Effectiveness as a tool to measure progress 24

6. Discussion 25
Characteristics of Intervention Information Obtained from Language Sampling Analyses 25
Comparison of Limitations and Benefits of Language Sample Analyses Methods 27
Length of Administration of Analyses 29
Clinical Implications 29

References 58

Appendix A: Description of Language Sample Analyses 65
Description of Mean Length of Utterance Analysis 65
Description of Grammatical Morpheme Analysis 65
Description of Sentence Development Analysis 66
Description of Type Token Ratio 67
Description of Semantic Roles/Coding 67
Description of Language Sampling, Analysis and Training 68

Appendix B: Language Sampling Analyses Rating Scale for Speech-Language Pathologists 70

Appendix C: Language Sampling Analyses Questionnaire for Speech-Language Pathologists 72

TABLES

Table Page

1. Rules for segmenting utterances in a language sample 31

2. 14 Grammatical morphemes 32

3. List of semantic categories/roles 33

4. Comparison of general data provided by each analysis 34

5. Comparison between 50 and 100 utterances: MLU/Brown's Stage 35

6. Comparison between 50 and 100 utterances: Grammatical morpheme analysis percentage (%) of use 36

7. Comparison between 50 and 100 utterances: Sentence Development Analysis 37

8. Comparison between 50 and 100 utterances: Type Token Ratios 39

9. Comparison between 50 and 100 utterances: Semantic Roles Percentage (%) of 40

10. Comparison between 50 and 100 utterances: LSAT 41

11. Comparison between analyses for length of administration 43

12. Goals generated from Language Sample 1 44

13. Goals generated from Language Sample 2 45

14. Goals generated from Language Sample 3 46

15. Goals generated from Language Sample 4 47

16. Goals generated from Language Sample 5 48

17. Responses to Question 1: How effective was the information provided for developing appropriate goals? 49

18. Response to Question 2: For the child's syntactic ability, was the information complete, adequate, or insufficient? 50

19. Responses to Question 3: For the child's use of morphological structures, was the information complete, adequate or insufficient? 51

20. Responses to Question 4: Did the information provide you with a sufficient amount of information regarding the child's semantic abilities? 52

21. Responses to Question 5: Is the information from this analysis adequate to make 1-2 intervention goals with measureable benchmarks/objectives? 53

22. Responses to Question 6: Is the information from this analysis effective for measuring progress? 54

23. Rules for assigning morphemes 55

24. Brown's stages of development 56

25. Rules to count number of words for TTR 57

ABBREVIATIONS

GMA	Grammatical Morpheme Analysis
LSAT	Language Sampling Analysis and Training
MLU	Mean Length of Utterance
SDA	Sentence Development Analysis
SLP	Speech-Language Pathologist
SR	Semantic Roles/categories
TTR	Type Token Ratio

ABSTRACT OF THE THESIS

Language Sampling Analyses: Bridging the Gap between Assessment and Therapy

by

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Six language sampling analyses: (a) MLU, (b) Grammatical Morpheme Analysis, (c) Sentence Development Analysis, (d) TTR, (e) Semantic Roles/Categories, and (f) LSAT were performed on language samples elicited from five subjects age range 5:8 – 7:0 years. Efficacy of these analyses were determined by: (a) how well intervention targets could be determined to address identified deficits, (b) effects of length of sample size on assessment findings, (c) precision of the analyses' results, and (d) the validity of the "time-consumption" often associated with language sampling analyses. Results indicated that language sample analyses bridged the gap between assessment and intervention by making goal selection easier and more precise to the client's identified specific language deficits. In addition, 100 utterance samples were found to provide a better linguistic profile of a child. Administration times varied, but were found to be comparable to standardized assessments. Findings support that the value of language sample analyses far outweighs the decision to not perform them based on time concerns.

Introduction

Assessment is a major activity for speech-language pathologists. Currently standardized norm-referenced tests are used to complete these assessments. The enactment of PL 94 – 142 in 1975 requires the identification of children who have language disorders (Huang, Hopkins, & Nippold, 1997). Standardized tests have been determined to be useful assessment tools for speech language pathologists in that they can (a) identify the existence of a disorder; (b) establish eligibility of services, and (c) allow comparison of the individual's performance to that of their appropriate peers in a norming sample (Howlin & Kendall, 1991; Paul, 1995;Wiig, 1995). However, standardized tests do not provide information regarding the individual's mastery of specific language skills (e.g. the use of past tense -ed), nor do they provide a means of bridging the gap between diagnosis and intervention (Howlin & Kendall, 1991;Wiig, 1995). Furthermore, ongoing concerns exist over the bias in such tests (e.g., measures that are affected by subjects' prior knowledge or experience) that decreases their validity (Campbell, Dollghan, Needleman, & Janosky, 1997). Clinicians working in schools currently rely heavily on standardized assessment to determine a child's current level of functioning and to develop appropriate intervention plans (Lund & Duchan, 1993, Wilson, Blackmon, Hall, & Elcholtz, 1991).

A second assessment technique is non-standardized assessment. Non-standardized assessment has been established as a better means of determining intervention targets (Bain & Olswang, 1995; Olswang & Bain, 1991; Olswang, Bain, & Johnson, 1992). One such non-standard assessment tool is language sample analysis. A review of the literature indicates that language sample analysis is recommended because of its relationship to

child development and provision of a thorough description of language abilities that have been considered a better measure of SLI identification than the use of standardized psychometric measures (Dunn, Flax, Sliwinski, & Aram, 1996). Also, language samples allow analyses of natural spontaneous language.

Although non-standardized assessment is preferable to determine intervention targets, school clinicians rarely use these tests. Clinicians are overwhelmed with caseloads of 40-60+ children and usually cannot afford the time to do non-standardized assessment such as language samples (Huang, Hopkins, & Nippold, 1997; Wilson, K.S., Blackmon, R.C., Hall, R.E., & Elcholtz, G.E., 1991). Lund & Duchan (1993) have criticized this practice as unethical and inefficient since goals and remediation procedures are not based on the *nature* of the child's problem. In addition, Paul (1995, pg. 300) states that "language sampling is one of the best methods we have available for establishing productive baseline function, targeting intervention goals, and evaluating progress in the intervention program." However, other researchers question the consistency of information gathered from language due to the variety of methods and stimuli that can be used for language sampling (Bernstein & Tiegerman, 1993; Bloom & Lahey, 1978; Kramer, James, & Saxman, 1979; Lee, 1974; Longhurst & Grubb, 1974; Miller, 1981).

Despite the continued emphasis on the utilization of language sample analyses, research has not determined nor explored which specific language sample analyses methods are most useful to the clinician. The need for clinicians to be thoroughly informed of the powers and limitations of language sample analyses is needed. Therefore, this investigation focuses on applying several sample analyses to gathered language samples to determine which one is the most effective in aiding treatment decisions.

Background

What is a Language Sample?

A language sample is a record of observed language behaviors that is often obtained in a naturalistic setting (Lahey, 1988; Miller, 1981). A variety of language behaviors and abilities can be analyzed, such as narrative abilities, cohesive discourse, subordination, figurative expressions, usage of syntactical and morphological structures, and utilization of semantic features. Observed behaviors and abilities are generally found within the following language parameters: content (semantics), form (morphology, syntax, phonology), and use (pragmatics). These language parameters form the knowledge base upon which differential diagnosis can be made.

A variety of language sampling analysis methods exist. Each method varies in specifying the settings in which interactions and behaviors are elicited and the materials to be used (e.g. toys, picture sequence cards). In addition, the manner in which data are recorded, transcribed, and analyzed varies; this can result in distinctly different data regarding a child's language abilities.

Currently, researchers (Gerard & Carson, 1990; Lahey, 1988; Lund & Duchan, 1993;) recommend that language samples be collected in one or more settings including school, clinic (e.g. therapy room), home, and/or a residential facility (e.g. a ward) using age appropriate materials (e.g. toys and props). The materials can range from picture cards to toy sets (e.g. doll house with dolls and accessories). The child's utterances are recorded through audiotaping, videotaping, and/or writing down interactions during the language sample. The child's utterances are then orthographically transcribed and analyzed for diagnostic purposes and selection of intervention targets.

Importance of a Language Sample Analysis

Language sampling has been encouraged as a necessary and valuable procedure for describing spoken language since the 1930's (Cole, Mills, & Dale, 1989; Lee and Carter, 1971; Loban, 1963; McCarthy, 1930; Muma, 1973; Owens, 1991). It can be used for identifying language impairments and/or present language status in the areas of content, form, or use (Damico, 1993; McCauley & Demetras, 1990; Nippold, 1993). Language samples are vital because they reflect a client's natural communication ability in contrast to standardized tests that assess discrete, decontextualized skills. Therefore, language samples provide a better language profile of the client. This is an important clinical consideration.

Language sampling methods have also been utilized as a means of subject selection (McCauley & Demetras, 1990). They have been used as a procedure in several studies that have advanced our understanding of language acquisition and/or development as well as confirming important clinical implications. For instance, language samples have been used in determining relationships between symbolic play and language development (Kennedy, Sheridan, Radlinksi, & Beeghly, 1991), determining which assessment approach provides the best prediction of language qualities in developmentally delayed children (Sommers, 1991), and assessing information that would predict change and/or progress in language production (Olswang & Bain, 1996).

Clinicians can utilize information gathered from language samples to justify treatment decisions; they provide data that depicts specific behaviors that are missing, deviant, or are necessary for academic success (Damico, 1993; Nippold, 1993; Olswang & Bain, 1994). Criterion referenced tests, such as language samples, are used to assess

an individual's mastery of developmentally appropriate speech and language skills (e.g., use of connectives for production of complex utterances). Language samples can also be used to determine therapy goals as well as monitor progress (Damico, 1993; Nippold, 1993; Paul, 1995).

In sum, the value of language samples is found in their capability to determine (a) a client's natural communication ability, (b) presence of language delays/disorders, (c) therapy intervention targets, (d) baseline language functioning, (e) treatment efficacy through monitoring of progress, and (f) subject selection in research.

Analysis of Language Samples

Various published methods of obtaining and analyzing language samples include, but are not limited to: (a) *Semantic-syntactic relations language sample analyses method* (Lahey, 1988); (b) *Assigning Structural Stage (ASS)* (Miller, 1981) and/ or *Systematic Analysis of Language Transcripts (SALT)* (Miller and Chapman, 1985); (c) *Language Sampling, Analysis, and Training (LSAT)* (Tyack and Gottsleben, 1974); (d) *Developmental Sentence Types (DST)* (Lee, 1966;1974) and *Developmental Sentence Scoring (DSS)* (Lee, 1974; Lee and Canter, 1971); (e) *Language Assessment, Remediation, and Screening Procedures (LARSP)* (Crystal, Fletcher, and Garman, 1976); (f) *Mean Length of Utterance (MLU)* (Brown, 1973; Miller, 1981; Paul, 1995); and (g) *Grammatical morpheme analysis (GMA)* (Brown, 1973; Miller, 1981; Paul, 1995). Although these methods vary in the language structures analyzed and procedures for analysis, many focus analysis on morphological and syntactical structures (e.g. past tense *–ed*, plural *s*). To a lesser extent semantic abilities are analyzed. Notably, the analysis

methods of Lahey (1988) and Tyack and Gottsleben (1974) include procedures for forming therapy targets based on the information gathered from the analysis.

Miller (1981) conducted the only comparative study of various language sample analysis methods. In a case study, he applied the most widely used analysis procedures to one language sample to examine the specific differences in the data provided. The six analyses were: (a) *MLU* (Mean Length of Utterance); (b) *ASS* (*Assigning Structural Stage*, Miller, 1981); (c) *14 Grammatical Morphemes*; (d) *Developmental Sentence Analysis*; (e) *LARSP* (*Language Assessment, Remediation, and Screening Procedure*; and (f) *LSAT* (*Language Sampling, Analysis, and Training*). Results of his study indicated that:

1) the *ASS*, *14 Grammatical Morpheme*, the *LARSP*, and the *LSAT* provided the most comprehensive description of language abilities in terms of number of forms, constructions, and grammatical categories.
2) *MLU*, the *DSS*, and the *LARSP* provide an age equivalent score.
3) *MLU*, *14 Grammatical Morphemes*, the *DSS* and the *LSAT* assign a language development age stage.
4) all the procedures except for the *ASS* provide detailed instructions for doing the analysis and a worksheet to summarize the information gathered.
5) all the procedures except for *DSS* do not require complete NP-VP (Noun phrase – Verb phrase) sentences for analysis, enabling more of the language sample to be used.

Miller (1981) attributed the differences among the procedures to their varying sensitivity (i.e., the detail of description) to specific language forms. For example, how sensitive is the procedure to provide a description of specific linguistic features such as the use of copula verbs and the ease of implementation of the procedure to arrive at a diagnosis? Miller (1981) indicated that the information gathered was incomplete because it was only preliminary information on one case study examining the sensitivity of various assessment measures in determining the best description of a language disordered child. He suggested clinicians should monitor research advances in this area. In addition, he noted that further research was necessary to determine therapeutic information that is provided by language samples. Unfortunately, limited research has been conducted to answer these questions.

Methods for Gathering a Language Sample

Two main debates exist concerning how a language sample should be gathered. The first debate concerns the effect(s) of language sampling context; the second concerns the number of utterances required for an adequate sample.

Context. Experts in the field of speech pathology have suggested a variety of sampling contexts for collecting language samples. These include story retells, narration, picture sequencing, picture description, free play interactions with toys, and conversation. A review of the literature indicates that the sampling contexts used can affect the accuracy of information it provides. However, no clear evidence is available as to which method is most useful.

Some researchers (Crystal, Fletcher, & Garman, 1976; Lahey, 1988; Miller, 1981; Paul, 1995) contend that language samples elicited by conversational discourse (e.g.,

verbal interactions that are elicited during play) are ideal because (a) more sophisticated language (i.e., marked by longer and/or more complex utterances) is produced, and (b) it is the most unstructured and most natural. Paul (1995) encourages the use of conversational speech because it depicts how a child uses language forms (e.g. uses words and sentences) in real communication. Consequently, it provides a representative sample of an individual's functional communication abilities upon which clinical decisions and research answers can be successfully achieved.

Others have suggested that conversational sampling methods are time consuming (i.e., lengthy sampling and transcription time). Therefore, narration tasks, such as video narration have been presented as a more time efficient method of language sampling that can complement conversational contexts (Dollaghan, et al., 1990).

Evans and Craig (1992) determined that an interview style context was more reliable and valid than a free play context in language sampling for older children age 8 years, 1 month to 9 years, 2 months. Results of their study indicated that interview contexts resulted in increased number of utterances as well as length of utterances. However, they also indicated that there was a smaller number of requests made in conversation as compared to free play.

Masterson & Kamhi (1991) discovered that (a) conversational contexts resulted in more sentence structures used, and (b) contextual support (e.g., pictures, toys) resulted in better sentences for younger children (earlier stages) but not for older children.

Number of utterances. The number of utterances viewed as adequate for language sampling is also debated. Many researchers (Brown, 1973; Lee, 1974; Paul,1995; Shriner, 1967, 1969; Templin, 1957; Tyack & Gottsleben, 1977) have determined that 50

utterances are adequate for language sampling analyses. Contrastively, Crystal, Fletcher, and Garman (1976), Miller (1981), Retherford (1993) and Tyack and Gottsleben (1994) suggested that 100 to 200 utterances are necessary for children functioning at 24 months of age and above. Tyack and Gottsleben (1974) contend that a minimum of 100 utterances provides a better representation of a child's language production and usage than 50 utterances. Retherford (1993) also suggests that a sample of 100 utterances will help curtail problems of questionable analyses data that can result from a small sample, particularly in grammatical morpheme analyses.

Other researchers (Bloom & Lahey, 1978; Crystal, et. al., 1978; Lund & Duchan, 1993) have argued against a need for a specific number of utterances. They suggest that a 30 minute sample is sufficient time to obtain a language sample. This, however, does not appear to be the norm.

Clinical Use

Language samples can provide valuable information to the speech pathologist. Clinicians would be expected to examine the available language sampling methods and choose the one appropriate to the assessment needs of each client. Unfortunately, Huang and her colleagues (1997) found this is not the case. Clinicians viewed language sample analyses as time consuming. Therefore, they typically used the method they are most familiar with and/or is the simplest. It is assumed that *MLU* (mean length utterance) and/or use of Brown's morphemes would be the most used since these are the simplest and quickest to complete. Both provide a number that correlates to a developmental stage that would indicate language status (i.e., normal or delayed language development). Clinicians assume that examination of *MLU* and Brown's morphemes provides sufficient

information regarding a child's language level in the area of morphology. However, this common practice fails to recognize the inherent cautions of interpreting *MLU*. A notable caution is that *MLU* is only reliable when it falls between 1.01 and 4.49, serves only as a general indicator of structural development and is not definitive. It is not a replacement for a more detailed structural analysis (Brown, 1973; Miller, 1981). Furthermore, *MLU alone* does not provide specific intervention targets (Paul, 1995). Therefore the frequent practice of exclusively utilizing *MLU* and Brown's morpheme language sampling analyses would not be adequate for most school clinicians; the implementation of a variety of language sampling analyses is suggested.

Statement of the Problem

Although a variety of language samples can provide invaluable information to the clinician, they are not included in the assessment plans of most speech pathologists (Huang et al., 1997). This may be true because of the lack of clear guidelines for gathering a language sample (e.g., context, length of sample) and insufficient information regarding the most efficient and effective analysis methods. Therefore, the purpose of the present investigation is to evaluate the effectiveness of six language sample analyses, the therapeutic information they provide, the influence of the length of the language sample, and the effectiveness as an assessment tool. Although researchers disagree on the best sampling context (e.g., story retells, narration, picture sequencing, picture description, interview, free play, conversation, etc.) the fact remains that a sufficient amount of language needs to be elicited for any analysis. Since the focus of this study is on analyses methods and length of sample, a variety of sampling contexts were used.

Methods

Subjects

The subjects of this study were 5 children with a Mean Length Utterance (*MLU*) of 1.0-5.0, ages 6 years, 1 month; 5 years, 8 months; 7 years; 6 years, 9months; and 6 years, 5 months. Subjects were identified as SLI (Specific Language Impaired) by a certified SLP prior to participation in the study. Subjects had no hearing loss, no significant behavior or emotional problems, no oral-motor problems, and mild to no phonological/articulation disorders. Subjects were obtained from public schools and private clinics in the Los Angeles metro area where they are currently receiving language therapy.

Procedures

Each subject was video taped and audio recorded for 25-60 minutes in an adult-child interaction. The language samples were video recorded with a remote control video camera mounted in a videotaping studio, or a video camera mounted on a tripod and an audio recorder in a quiet classroom or therapy room. The main context of eliciting language samples was conversational contexts with toys and props. This method was reported to provide the most representative sample of a child's language production and usage. This method has been noted to elicit more sentence structures with children in early development stages.

Each language sample was transcribed orthographically, segmented into two sets of utterances (one that was 50 utterances in length and the other, 100). Utterances were segmented following rules suggested by Lund and Duchan (1993) in Paul (1995, pg. 300) outlined in Table 1.

Each language sample was analyzed according to the following techniques that have been indicated as the most common methods employed by clinicians as supported by a review of the literature. Each method is fully described in Appendix A:

1. *Mean Length of Utterance (MLU) language sample analysis method* (Brown, 1973; Miller, 1981; Retherford, 1993) is a calculation of a child's mean length of utterance (MLU) in words or morphemes.
2. *Grammatical Markers/14 morphemes analysis (GMA)* is a syntactical measure that provides the percentage of grammatical markers/morphemes produced correctly as it correlates to Brown's Stages I – V++. Table 2 depicts the grammatical markers/morphemes analyzed.
3. a combination of *Assigning Structural Stage (ASS)* (Miller, 1981) and *Syntactic Structural Stage Analysis* (Retherford, 1993) methods of analyzing the child's structural development in simple sentences was used and referred to as *Sentence Development Analysis (SDA)* in this study. They were combined since both methods are similar, varying only in the forms used to record the data. These systems analyze form, content, and use.
4. *Type Token Ratio (TTR)* is an analysis that measures general semantic aspects of a sample and also serves as an examination of lexical diversity as described by Templin (1957). This analysis examines the relationship/ratio between the total number of different words used and the total number of words used.
5. *Semantic Roles/Categories (SR)* (Retherford, Schwartz, and Chapman, 1981). This measure is a semantic analysis based on semantic categorization (e.g., agent—object). A list of the semantic roles/categories is listed in Table 3.

6. *Language Sampling, Analysis, and Training (LSAT)* (Tyack and Gottsleben, 1974) analyzes noun and verb phrases as well as complex sentences, negation, and questions.

Reliability

Sentence productions/utterances were transcribed in standard English orthography and analyzed by the investigator. A randomly picked language sample was analyzed by another speech-language pathologist for inter-rater reliability and was also re-analyzed by the investigator after a period of 6 months for intra-rater reliability.

There was 100% agreement in the analyses performed by the investigator at the beginning and 6 months later. Inter-rater agreement was 97.5% for *MLU*, 96.2% for *LSAT* (with no changes in assigned linguistic stages), 93% for *SR*, 100% for *GMA*, 99% for *SDA*, and 98% for *TTR*.

Data Analysis

Each analysis was evaluated to (a) determine if similar results, such as developmental stage indications, mastery of syntactic and morphological structures, absence/presence of specific language forms and skills are obtained across analysis methods; (b) if 50 utterances vs. 100 utterances yield similar information , such as mean length utterance, absence and presence of syntactical and morphological structures, and the mastery of specific language forms and skills; (c) examine the relative length of time it takes to perform the language sample analysis; and (d) determine the type of intervention information each analysis reveals and its probable benefit in determining therapy goals and targets.

Results of each language sample analyses were given to five speech-language pathologists to evaluate sufficiency of therapeutic information provided by each analysis method. A questionnaire and rating scale (see Appendix B and Appendix C) was completed by each speech-language pathologist to determine which information the therapists found to be most useful, clear, and sufficient. Each speech-language pathologist completed a rating scale for each of the analyses for a total of 12 rating scales (a rating scale for 50 and 100 utterances for each of the six analyses). Each speech-language pathologist received all analyses from five language samples for a total of 60 rating scales completed by each. Therapists were also asked to write 2 intervention targets based on the information in each analysis.

Results

Six language sampling analyses were performed on five language samples elicited from five subjects ages 6 years, 1 month; 5 years, 8 months; 7 years; 6 years, 9 months; and 6 years, 5 months. The results are discussed by each of the analyses.

Comparison of Data Provided by Each Analysis

Each language sampling analysis method provided different information regarding a child's language functioning.

The specific information provided by each analysis method is described in Table 4. In general, the analysis methods assess the following areas of language:

Method	*Area of Language Assessed*
Mean Length of Utterance	morphology/sentence length
Grammatical Morphemes Analysis	morphology
Sentence Development Analysis	syntax
Semantic Relations	semantics
Type Token Ratio	semantics
Language Sampling, Analysis, & Training	syntax and morphology

In this study the Brown's stage assigned to the *MLU* analyses was 2 stages higher than *GMA* and *SDA*. This indicated that the subjects were not using grammatical (*GMA*) and sentence (*SDA*) structures expected of them based on the Brown's stage (*MLU*). However, the stages assigned to the *GMA* and SDA were similar for all the subjects. This indicates that the subjects had similar deficits in morphology and syntax. Therefore, results indicated that *MLU* alone does not suffice to establish that language production is age appropriate.

The *LSAT* assesses syntax and morphology. The forms and constructions identified as mastered corresponded to the assigned linguistic level for all subjects.

For semantics, 4 of the 5 samples indicated vocabulary diversity (TTR) that was within normal limits as they were not significantly below 0.5 (Retherford, 1993). For the SR, language samples from child 1, child 2, and child 3 had a high percentage (81% - 94%) of utterances that were semantically coded, but a small percentage (less than 20%) of utterances that were coded complex as would be expected for children in this age group. A high percentage of utterances are expected to be coded complex for a child between the ages of 5 years, 5 months and 7 years. Child 4 and 5 had fewer utterances that were coded (50% and 74% respectively); however, they had a higher number of utterances that were coded complex as was expected.

Comparison Between 50 and 100 Utterances

MLU/Brown's stage. The *MLU* and assigned Brown's stage for each subject is presented in Table 5. For each subject, the *MLU* was different based on 50 and 100 utterances. It was not possible to determine if this difference was statistically significant because of the limited number of subjects. Therefore, it was important to see if the *MLU* for 50 and 100 utterances resulted in the same Brown's Stage assignment. For 3 of the children (1, 2, and 5), the same Brown's stage was assigned. Thus, for these children, it would not have mattered whether 50 or 100 utterances were used. However, for 2 of the children (3 and 4) a different stage was assigned. For both of these children, the Stage difference was one.

Grammatical Markers/14Morpheme Analysis. Percentages of correct production for the morphological structures are presented in Table 6. For all subjects, the 100 utterance language sample resulted in 1-2 more morphological structure(s) that were identified as obligatory than in the 50 utterance language sample. There were four

instances (subjects 1, 3, 4, and 5) in which 50 utterances identified at least 1 morphological structure as mastered whereas in the100 utterance sample it was considered an emerging skill. There were 2 instances (subjects 5 and 4) in which the results indicated the exact opposite: 100 utterances identified at least 1 morphological structure as mastered while in 50 utterances, the same morphological structure was considered to be an emerging skill. Despite these differences for identifying emerging and mastered skills (i.e., skills that would not be treatment targets) this did not hold true for delayed structures. In fact, all structures identified as delayed in the 50 utterance sample were also identified in the 100 utterance sample.

Sentence Development Analysis. The assigned stages for the *SDA* for each subject are presented in Table 7. More sentence types were identified in a 100 utterance sample than in a 50 utterance sample for 4 of the subjects (subjects 2, 3, 4, and 5). To determine if this would affect interpretation of the analysis, each sample was examined to determine if different stage assignments would be made. For three of the children (subjects 3, 4, and 5) the stage assignments for 2 of the 4 sentence types (negation and/or wh-questions) differed by one stage. For subject 2, 1 of the 4 sentence types (complex sentences) differed. There was no difference for subject 1. Therefore, it is not clear whether 50 or 100 utterances were sufficient.

Type Token Ratio. TTRs for each subject are presented in Table 8. TTRs for 100 utterances were smaller than for 50 utterances. This difference may be a result of a decreased number of a variety of different words found in a 100 utterance language sample as compared to a 50 utterance language sample. Nonetheless, TTRs were within normal limits for 4 children (subjects 1, 2, 3, and 5). The 100 utterance language sample

for subject 4 provided a smaller TTR which requires attention and possible remediation as opposed to the 50 utterance language sample that provided a TTR within the normal range. Therefore, it appeared that 50 utterances was sufficient for most children.

Semantic Relations. Semantic role percentages for all subjects are presented in Table 9. There was a larger percentage of use of approximately ½ of the semantic roles in the 100 utterances as compared to 50 utterances. Nonetheless, the majority of the differences ranged from .1 – 4 % and were not large enough to change identification of deficient semantic category usage for 4 subjects (subjects 1,2, 3, and 5). Further analysis indicated that 100 utterance samples resulted in 1-2 more semantic roles/categories being coded for 3 children (subjects 1, 3 and 5) and up to 4 more semantic roles/categories being coded for 2 children (subjects 2 and 4). Therefore, 100 utterances samples provided more information than 50 utterances.

Language Sampling Analysis and Training. Results for all subjects are presented in Table 10. More forms and constructions were identified as mastered in the 100 utterances (range: 1-3) for all subjects. For 4 children (subjects 1, 3, 4, and 5), more forms and constructions were identified as not mastered in the 100 utterances (range: 1-13). Furthermore, a higher linguistic level was assigned for subjects 2 and 3 in the 50 utterance language samples. This difference may be attributed to differences in forms and constructions identified as mastered. For instance, child 2 did not have locatives (*here*) as an identified form of mastery in a 50 utterance language sample, but in the 100 utterance language sample that form is considered at mastery level. For this analysis, a 100 utterance sample provided more information than the 50 utterance sample.

Comparison Between Analyses for Length of Administration

The average time of transcription of the language samples was about 67.6 minutes (Table 11). The analysis method that took the shortest amount of time was the *SDA* with an average administration time of 22 minutes. Two analyses took less than 60 minutes: *MLU* and *SR*. The remaining 3 analyses (*GMA*, *TTR*, and *LSAT*) took over an hour to complete. The *LSAT* was by far the most time consuming; however, it also examined a higher number of linguistic items as compared to the other analyses. In addition, the *LSAT* also included a worksheet to aid in an intervention goal selection and progress monitoring that the other analyses did not have. Completion of all six analyses was on average 8.42 hours not including transcription time. Transcription time added an additional 1.13 hours.

Goals Generated by Language Samples and Their Analyses

Five SLP's were asked to review the language sample analyses and indicate two goals that would be appropriate for therapy. The specific goals recommended by each SLP for both 50 and 100 utterance language samples are presented in Tables 12 - 16. Although the clinicians picked similar goals, rarely was there complete agreement between SLP's or between 50 and 100 utterance language samples. As a result of this variability, summary statements were difficult to assert. In reviewing the data, it was determined that the best analysis would be to determine what percentage of the 10 goals written (i.e., two goals written by five therapists for each language sample) was similar. That is, if the percentage was 100% it indicated that all five therapists wrote the same two goals for the language sample. A percentage of 80 indicated that the two most commonly

written goals were recommended eight times and other goals were recommended two times. It should be noted that *MLU* was not included in this examination as all therapists wrote a goal of increasing *MLU* for each subject despite sample size

Language sample 1. For 50 utterances, only the *GMA* had 100% agreement. All other analysis procedures had 70-80% agreement with the exception of the TTR that was 60%. For 100 utterances, *GMA* and *LSAT* had 100% agreement and the other procedures had 70-90% agreement. When comparing 50 and 100 utterances, there was complete agreement on only the *GMA*. For all other procedures, agreement was less than 70%.

Language sample 2. For 50 utterances, only *LSAT* had 100% agreement. All other analysis procedures had 70-90% agreement with the exception of TTR that was 60%. For 100 utterances, only *GMA* had 100% agreement while all other analysis procedures had 70-80% agreement, with the exception of TTR that was also 60%. When comparing 50-100 utterances, there was never complete agreement for any of the methods of analysis. However, when looking at agreement on only one goal, there was 100% agreement on the *LSAT*.

Language sample 3. For 50 utterances, only *GMA* had 90% agreement. All other analysis procedures had 70-80% agreement, with the exception of *SDA* that had 50%. For 100 utterances, only *LSAT* had 90% agreement while all other analysis procedures had either 50% or 70% agreement. When comparing 50-100 utterances, there was not complete agreement for any of the methods. However, there was 90% agreement on at least one goal for three of the analysis procedures (*GMA*, *SR*, and *LSAT*).

Language sample 4. For 50 utterances, only *GMA* had 90% agreement. All other analysis procedures had 70-80% agreement, with the exception of *SDA* that had 60%. For

100 utterances, only *LSAT* had 100% agreement. All other analysis procedures had 70-80% agreement, with the exception of *SDA* that had 60% again. When comparing 50-100 utterances, there was not complete agreement for any of the methods. However, there was 90-100% agreement on at least one goal for three of the analysis procedures (*GMA*, *SR*, and *LSAT*).

Language sample 5. For 50 utterances, only *LSAT* had 90% agreement. All other analysis procedures had 60-70% agreement. For 100 utterances, only the *LSAT* had 100% agreement while all other analysis procedures had 60-70% agreement, with the exception of *SDA* that had 50%. When comparing 50-100 utterances, only *SR* and *LSAT* had 90-100% agreement on both goals. Meanwhile, the remaining three analysis procedures had 70% or less agreement on both goals and on at least one goal.

As stated previously, it was difficult to make generalization. However, for all language samples, the *GMA* and *LSAT* had the highest level of consistency in goal chosen across SLPs despite sample size. *TTR* yielded the lowest percentages of agreement (consistently 50-60%).

Effectiveness of Language Sample Analyses as Rated by SLPs

Speech-language pathologists (SLPs) rated each language sample analysis by its completeness and sufficiency for developing goals, ability to be used to measure progress, and its completeness of identifiying a child's language abilities in the areas of syntax, morphology, and semantics. Six questions were asked (Appendix B).

Effectiveness for developing goals. GMA, *TTR*, and *LSAT* were rated to be the most effective in providing complete and sufficient information to develop clear goals. Meanwhile, *MLU*, *SDA*, and *SR* were rated as providing adequate information to develop

clear goals. Notably 16% of the responses rated MLU as insufficient to develop clear goals. Specific results are provided in Table 17.

Effectiveness for showing syntactic language abilities. Only the LSAT was rated as providing complete and sufficient information on syntactic language abilities. The GMA and SDA were rated as providing adequate information on syntactic abilities. As was expected, MLU, TTR, and SR had nearly 100% of the responses rating them as insufficient measure of syntactic abilities. Specific results are provided in Table 18.

Effectiveness for showing use of morphologic structures. Only the *LSAT* and *GMA* were rated as providing complete and sufficient information on use of morphologic language structures. Notably, the *GMA* had nearly 100% of its responses rating it as complete and sufficient. *MLU* was the only analysis rated as providing adequate information on use of morphologic structures. As was expected, *SDA*, *TTR*, and *SR* had nearly 100% of their responses rating them as insufficient analyses for use of morphologic structures. Specific results are provided in Table 19.

Effectiveness for showing language abilities in the area of semantics. Only the *TTR* was rated as providing complete and sufficient information on language abilities in the area of semantics; whereas, the SR was rated as adequate. As was expected *SDA*, *MLU*, *GMA*, and *LSAT* had nearly 100% of their responses rating them as insufficient analyses for providing information on language abilities in the area of semantics. Specific results are provided in Table 20.

Effectiveness to develop measureable goals. GMA, TTR, SR (only for a 50 utterance sample), and *LSAT* were rated as providing complete and sufficient information to develop goals with measureable benchmarks/objectives. *SDA, SR* (for a 100 utterance

sample), and *MLU* were rated as providing adequate information to develop goals with measureable benchmarks/objectives. Notably, *MLU* had 16% of its responses rating it as insufficient. Specific results are provided in Table 21.

Effectiveness as a tool to measure progress. *GMA*, *TTR*, and *LSAT* were rated as the most effective for measuring progress with nearly 80-100% of their responses rating them as such. *MLU*, *SDA*, and *SR* were rated as adequate for measuring progress. Specific results are provided in Table 22.

Strengths and weaknesses of all the analyses methods were revealed with the rating scales. Some were rated as more sufficient than others in providing information in various areas. *LSAT* was rated as complete and sufficient for all questions except for question 4 regarding information on semantic abilities. *GMA*, *TTR*, and *LSAT* were consistently rated as complete and sufficient in providing information to develop clear goals, develop goals with measureable benchmarks/objectives, and to measure progress. *TTR* was the only analysis method rated sufficient to provide information regarding language functioning in the area of semantics.

Discussion

The present study was completed to examine the effectiveness of six commonly used language sample analyses as determined by: (a) how well intervention targets could be determined to address identified deficits, (b) effects of length of sample size on assessment findings, (c) precision of the analyses' results, and (d) the validity of the "time-consumption" often associated with language sampling analyses.

Characteristics of Intervention Information Obtained from Language Sampling Analyses

The findings of this study indicated that *MLU* can provide a goal to increase *MLU* to a certain number, but it does not provide how to do that nor does it provide specific morphemes to target to increase the *MLU*. *MLU* does provide an indication of Brown's stage of linguistic development. However, it does not provide specific information regarding what linguistic forms need to be targeted to move the child to another Brown's stage of development. Furthermore, *MLU* would not be useful for children whose utterance lengths were at or approaching age appropriate lengths, yet still had language impairments. Results from the SLPs rating scales showed that *MLU* could be an insufficient measure of syntactic abilities and that there are better measures available. Interestingly, all five raters employed *MLU* as an analysis method they used often.

Another finding was that both the *LSAT* and the *SDA* provided information on sentence types needed to be targeted for intervention as a result of their absence or low percentage of use within the samples. Both the *GMA* and the *LSAT* provide information on specific morphemes to be targeted for intervention. However, the *LSAT* provided a more detailed analysis of specific forms to target. For instance the *GMA* may indicate a

need to target articles; whereas, the *LSAT* also indicated which specific articles that need to be targeted (e.g., the). Results from the SLPs rating scales indicated that both the GMA and *LSAT* were the most effective in that they provided the most complete and sufficient information to develop goals, assess the area of syntax and morphology, and to measure progress. Interestingly, all five of the raters reported using *GMA* often, but had not used *LSAT*.

In addition, the present study supported that both *SR* and *TTR* provide information about goals in the area of semantics that is more detailed than that which could be determined from the more widely used standardized assessments (.e.g, *Expressive One Word Picture Vocabulary Test*). For instance, *SR* and *TTR* could provide specific vocabulary goals written as roles (e.g., agents) and types of words (e.g., adverbs) to be targeted. Whereas, a specific goal to target vocabulary would be difficult to write based on results from the *EOWPVT* alone. *SR* provided goals on semantic roles that were not present or had a low percentage of use within the language sample. Furthermore, it was designed for both one-term and multi-term utterances. Consequently, it would be particularly useful for determining intervention targets for a child with one-word utterances. *TTR* provides goals on specific different word types (e.g., adjectives) that may not be evident or have a low occurrence and contribute to a low *TTR*, which would indicate a lack of lexical diversity. Information on such specific vocabulary needs are expected to be very useful as it relates to academic success in the area of language arts. Both *SR* and *TTR* are helpful when a child appears to have an adequate utterance length, yet lacks a diverse vocabulary to express thoughts and to communicate. Results of the SLPs rating scales indicated that *TTR* was the most effective for providing complete

information regarding a child's ability in the area of semantics. Interestingly, four of the five raters reported using *TTR* somewhat as an assessment. This suggests that *TTR* may have received a more favorable rating as it was more familiar to the raters than *SR*.

Effects of sampling size on assessment data: 50 Vs. 100 utterances

For three of the analyses (*GMA*, *SR*, and *LSAT*), 100 utterances provided more clinical information than 50 utterances. For *MLU* and *SDA*, the results were inconclusive. For some of the subjects, 50 and 100 utterances provided similar information. However, for others 100 utterances provided more information. For *TTR*, 50 utterances was adequate. Therefore, it was not possible to state that is better: 50 or 100 utterances. This differs from previous studies that state that only 50 utterances are sufficient for *MLU* (e.g., Brown, 1973; Lee, 1974; Paul, 1995). These results confirm Tyack and Gottsleben's (1974) recommendation that at least 100 utterances are needed for their analysis (*LSAT*). Additionally, the results correspond with Retherford (1993) who suggested that 100 utterances were necessary for use of the *GMA*.

Comparison of Limitations and Benefits of Language Sample Analyses Methods

With the differing opinions that exist regarding the benefits of one method over another and the procedures to be used in language sampling, clinicians would be expected to examine their language sampling methods and use the various analyses according to the assessment needs of each client. Unfortunately, this is not the case, and clinicians typically use language sampling and analyses methods learned through graduate studies prior to certification and/or professional development workshops. Therefore, another goal of this study has been an examination of the type of information provided by each of the language sampling methods and to determine if there is consistency across methods.

MLU was found to have Brown's stage assignment different from *GMA* and *SDA*; while *GMA* and *SDA* had similar results for Brown's stage assignment. This finding suggests that *MLU* may not be a reliable measure of Brown's stage of development and that a *MLU* that is not age appropriate warrants further syntactical and morphological measures to determine the nature of the language deficits attributing to the deviant *MLU*.

The *TTR* resulted in sufficiently diverse lexicons for all the language samples except one (child 4's 100 utterance language sample). *TTR*, although lengthy to administer, is quite useful for the child with suspected vocabulary difficulties. The *TTR* would also be helpful in increasing *MLU* lengths, since it identify word types that the child may not be using. Meanwhile, the *SR* provided another look at a child's abilities in the area of semantics in terms of their understanding of the semantic relations between the words. The *SR* provided a clear view of specific semantic roles and categories a child may need to use and currently is not that is affecting his/her effective communication and language skills. It may also indicate the need for the increased production of complex utterances that are expected but are not present. This analysis is particularly helpful for children who have single term or two-term utterances when they are expected to be making multi-term utterances. The *SR* serves as a guide for determining which semantic roles/categories to target for therapy as opposed to just a need to improve vocabulary.

Perhaps the most complete analysis was the *LSAT*, which was also the most time consuming. It, too, provides an *MLU* and a corresponding Linguistic stage. The *LSAT* provided similar information to the *GMA* and *SDA*. However, its specificity of exact linguistic forms made it easier to distinguish and determine baseline functioning (those linguistic forms mastered) and goals for therapy (those linguistic forms that were not

mastered). However, the amount of time needed to complete the *LSAT*, may make it impractical for school-based clinicians who have time constraints.

Length of Administration of Analyses

SLPs have time limitations which influence their assessment choices. Lengthy administration times have been associated with language sampling analyses. The findings of this study revealed that the length of time needed to complete individual analyses was often comparable to administration and scoring of various standardized norm-referenced assessments. The purposes of a standardized, norm-referenced test is only to determine disordered vs. not disordered. They are not sufficient for determining specific goals and objects or monitoring progress. Given the needs of the SLP to determine presence of a language disorder, determine goals, and monitor progress, an SLP may find that gathering a language sample would be more time efficient.

Clinical Implications

No single assessment option can satisfy all assessment objectives. However, language sample analyses can be applied more broadly to validate norm-referenced test results, determine targets for intervention and education objectives, and establish baseline and progress or educational outcomes. Language sample analyses are not substitutes for standardized assessments; rather, they complement assessments in ways that may be extremely informative to clinicians and researchers alike. The value of language sample analyses is found in their role as a bridge between assessment and therapy. The language profile defined from the language sample provides the context for individualized goal planning. This characteristic is often missing in standardized assessments which has often left many clinicians dissatisfied with their usefulness (Huang, et. al., 1997). In addition,

language sample analyses have a place in dynamic and authentic assessments that call for functional contexts and cultural sensitivity. This study supports that the value of language sample analyses far outweighs the decision to not perform them based on time concerns. It is hoped that more clinicians will seek further training if needed on analyses and will attempt to perform them in their assessments, intervention planning, and monitoring of progress. Further investigation is needed on more language sample analyses available to increase the knowledge base for clinicians on the analyses' efficacy and precision of identifying therapy goals and providing language profiles. In addition, more information is needed to support and or expand on the effects on data sample size has.

Table 1

Rules for segmenting utterances in a Language Sample (Lund & Duchan, 1993 in Paul, 1995, pg. 300)

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1. The end of an utterance is indicated by a pause preceding by a rising or falling intonation.
2. The end of a grammatical sentence is the end of an utterance.
3. A group of words, such as a noun or prepositional phrase, that cannot be divided without losing meaning is an utterance, even though it is not part of a complete sentence.
4. A sentence with two independent clauses joined by a coordinating conjunction (e.g., and, but, or) is counted as one utterance. If the sentence contains more than two such independent compound clauses, it is segmented so the third cluase, beginning with the conjunction, is a separate utterance.
5. Sentences with subordinate, embedded, or relative clauses are counted as single complex sentences.

Table 2

14 grammatical morphemes (Retherford, 1993, pg. 101)

1. –ing
2. plural –s
3. IN
4. ON
5. possessive –s
6. regular past tense –ed
7. irregular past
8. regular third person singular
9. articles
10. contractible copula
11. contractible auxiliary
12. uncontractible copula
13. uncontractible auxiliary
14. irregular third person singular

Table 3

List of semantic categories/roles (Retherford, 1993, pgs. 46-48 and 60-61)

1. action
2. entity (one-term)
3. entity (mulit-term)
4. locative
5. negation
6. agent
7. object
8. demonstrative
9. recurrence
10. attirbute
11. possessor
12. adverbial
13. quantifier
14. state
15. experiencer
16. recipient
17. beneficiary
18. created object
19. comitative
20. instrument
21. other
22. communication device
23. communication routine
24. complex

Table 4

Comparison of general data provided by each analysis

Language Analysis Method	1. MLU	2. Grammatical Markers/14 morpheme	3. Sentence Development Analysis	4. Type Token Ratio	5. Semantic Relations	6. LSAT
Data provided	Mean length of utterance in morphemes which indicates expected Brown's stage of language dvpt. to be assigned	Mastery of grammatical morpheme usage/acquisition of the following grammatical morphemes: a. –ing b. plural –s c. preposition IN d. preposition ON e. possessive –s f. regular past tense –ed g. irregular past tense h. regular 3rd person singular i. articles a, an, the j. contractible copula k. contractible auxiliary l. uncontractible copula m. uncontractible auxiliary n. irregular third person singular	Presence of sentence types in correlating Brown's stage, MLU, and chronological age. Sentence types: a. negation b. yes/no questions c. wh – questions d. complex sentences	Total number of different words listed: a. nouns b. verbs c. adjectives d. adverbs e. prepositions f. pronouns g. conjunctions h. negative/ affirmative i. articles j. wh-words k. misc. Ratio of total different words and total number of words	Percentage of semantic roles used a. action b. entity (one-term) c. entity (mulit-term) d. locative e. negation f. agent g. object h. demonstrative i. recurrence j. attirbute k. possessor l. adverbial m. quantifier n. state o. experiencer p. recipient q. beneficiary r. created object s. comitative t. instrument u. other	Index of Linguistic Level based on word to morpheme mean. Also provides matrix of forms and constructions present. Forms: a. pronouns b. prepositions c. possessive marker e.demonstratives f.articles g.plurals h.locatives i.conjunctions j.modals k.copula l.present progressive m.present tense 3rd person n.past tense Constructions: a.noun phrases b.verb phrases c.combinations of noun + verb phrases d.complex sentences e.negation f.questions g.wh-questions *Goal analysis for intervention

Table 5

Comparison between 50 and 100 utterances: MLU/ Brown's Stage

	Child 1	Child 2	Child 3	Child 4	Child 5
50 utterances	3.04 – IV	3.17 – IV	4.42 – V	4.46 – V	3.78 – V
100 utterances	3.28 – IV	3.22 – IV	3.74 – IV	4.75 – V+	3.82 – V
difference	0.24	0.05	0.68	0.29	0.04

Table 6

Comparison between 50 and 100 utterances: Grammatical morpheme analysis Percentage (%) of use

		Child 1		Child 2		Child 3		Child 4		Child 5	
Stage II MLU 2.0 – 2.5		50 utt	100 utt	50 utt	100 utt	50 utt	100 utt	50 utt	100 utt	50 utt	100 utt
	1. –ing	100%	100%	----	----	0%	0%	100%	100%	33%	33%
	2. plural –s	60%	70%	100%	100%	100%	100%	100%	100%	100%	87%
	3. IN	100%	60%	67%	71%	100%	100%	----	0%	100%	100%
Stage III MLU 2.5– 3.0	4. ON	100%	100%	----	----	100%	100%	100%	100%	50%	75%
	5. possessive –s	0%	0%	0%	0%	----	----	25%	50%	80%	80%
Stage IV MLU 3.75 – 4.5	6. regular past tense –ed	----	----	----	100%	0%	0%	33%	25%	50%	50%
	7. irregular past	100%	100%	100%	100%	100%	60%	44%	63%	75%	60%
	8. regular 3rd person singular	----	0%	20%	11%	0%	0%	100%	83%	0%	0%
	9. articles	11%	11%	29%	25%	75%	74%	75%	84%	50%	27%
	10. contractible copula	0%	5%	0%	0%	36%	24%	0%	60%	33%	10%
Stage V MLU 4.5 +	11. contractible auxiliary	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%
	12. uncontractible copula	----	0%	0%	0%	----	0%	50%	50%	----	-----
	13. uncontractible auxiliary	----	----	----	----	----	----	60%	57%	0%	0%
	14. irregular 3rd person singular	----	----	0%	0%	----	----	100%	100%	0%	0%

Table 7

Comparison between 50 and 100 utterances: Sentence Development Analysis

	Sentence types:	Negation	Yes/no questions	Wh-questions	Complex sentences
Child 1	50 utt	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: II MLU: 2.00-2.49 Age:27-30 mos./21-35 mos.
	100 utt	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: II MLU: 2.00-2.49 Age:27-30 mos./21-35 mos.
Child 2	50 utt	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	***no sentence types found
	100 utt	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: II MLU: 2.00-2.49 Age:27-30 mos./21-35 mos.
Child 3	50 utt	Stage: III MLU:250-2.99 Age: 31-24 mos./24-41 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	***no sentence types found	Stage: Early IV MLU: 3.00-3.49 Age: 35-38mos./28-45 mos.
	100 utt	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	Stage:Late I/Early II MLU:1.5-1.99 Age: 22-36 mos./18-31 mos.	Stage: Early IV MLU: 3.00-3.49 Age: 35-38mos./28-45 mos.
Child 4	50 utt	**1 sentence type found in each stage: Stage: Early IV & Early I	**1 sentence type found in Stage: Early IV	**1 sentence type found in Stage: Late I/Early II	Stage: Early IV MLU: 3.00-3.49 Age: 35-38mos./28-45 mos.
	100 utt	Stage: III MLU:250-2.99 Age: 31-24 mos./24-41 mos.	**1 sentence type found in Stage: Early IV	**1 sentence type found in Stage: Late I/Early II	Stage: Early IV MLU: 3.00-3.49 Age: 35-38mos./28-45 mos.

Table 7 continued

Child 5	50 utt	Stage: III MLU:250-2.99 Age: 31-24 mos./24-41 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	***no sentence types found	Stage: II MLU: 2.00-2.49 Age:27-30 mos./21-35 mos.
	100 utt	Stage: III MLU:250-2.99 Age: 31-24 mos./24-41 mos.	Stage: Early I MLU: 1.01 –1.49 Age: 12-22 mos./16-26 mos.	**1 sentence type found in Stage: Early I	Stage: II MLU: 2.00-2.49 Age:27-30 mos./21-35 mos.

Table 8

Comparison between 50 and 100 utterances: Type Token Ratios

	Child 1	Child 2	Child 3	Child 4	Child 5
50 utterances	0.58	0.59	0.52	0.47	0.55
100 utterances	0.45	0.55	0.44	0.39	0.41
Difference	0.13	0.04	0.08	0.08	0.14

Table 10

Comparison between 50 and 100 utterances: LSAT

		Assigned linguistic level	Forms & constructions mastered at or below linguistic level		Forms & constructions not mastered needing intervention at or below linguistic level	
Child 1	50 utt	II	I.	*locatives*: here; *modals*: wanna	I.	*pronouns*: I; *locatives*:there
			II.	*pronouns*: me, my; *prepositions*: in; *plurals*: -s	II.	*present progressive*: -ing
	utt	III	I.	*locatives*: here; *modals*: wanna	I.	*pronouns*: I; *demonstratives*: that; *locatives*
			II.	*plurals*: -s,-z;	II.	*pronouns*: me; *prepositions*: in; *demonstratives*: a, the; *present progressive*: -ing; *articles*: a, the
			III.	*pronouns*: them; *conjunctions*: and; *modals*: gonna	III.	*pronouns*: you, your; *copula*: is
Child 2	50 utt	III	I.	*modals*: want	II.	*prepositions*: in; *pronouns*: my, it; *articles*: the
			II.	*plurals*: -s,-z		
			III.	*pronouns*: she		
	100 utt	II	I.	*locatives*: here; *modals*: want, wanna	II.	*prepositions*: in; *pronouns*: my, it; *articles*: the
			II.	*pronouns*: me; *plurals*: -s, -z		
Child 3	50 utt	IV	I.	*pronouns*: I;	II.	*articles*: a
			II.	*pronouns*: my, it; *prepositions*: on; *articles*: the; *plurals*: -z	IV.	*copula*: 's
			III.	*pronouns*: you, your, she, them; *prepositions*: with; *copula*: 's;		
			IV.	*pronouns*: he, his; *prepositions*: at; *modals*: can		
	100 utt	III	I.	*pronouns*: I; *demonstratives*: that; *modals*: want	I.	*locatives*: here, there
			II.	*pronouns*: me, my, it; *prepositions*: in, on; *demonstratives*: this; *plurals*: -z	II.	*articles*: a, the; *present progressive*: -ing
			III.	*pronouns*: you, your, she, them; *prepositions*: with	III.	*copula*: 's

Table 11

Comparison between analyses for length of administration

	Child 1	Child 2	Child 3	Child 4	Child 5
transcription	73 min.	70 min.	70 min.	60 min.	65 min.
1. MLU	35 min.	25 min	25 min.	20 min.	20 min.
2. Grammatical morpheme analysis	120 min.	100 min.	50 min.	50 min.	51 min.
3. Sentence development analysis	23 min.	20 min.	20 min.	25 min.	22 min.
4. Type token ratio	128 min.	130 min.	120 min.	125 min.	121 min.
5. Semantic relations	42 min.	40 min.	40 min.	45 min.	43 min.
6. LSAT	185 min.	180 min.	175 min.	177 min.	170 min.
Total minutes/hours NOT including transcription	533 min./ 8.88 hours	500 min./ 8.33 hours	500 min./ 8.33 hours	502 min./ 8.37 hours	492 min./ 8.20 hours
Total minutes/hours including transcription	606 min./ 10.1 hours	570 min./ 9.50 hours	570 min./ 9.50 hours	562 min./ 9.37 hours	557 min./ 9.28 hours

Table 12

Goals generated from Language Sample 1

	SLP 1	SLP 2	SLP 3	SLP 4	SLP 5
MLU 50 utt	increase MLU to 4.0	increase MLU to 4.0	increase MLU to 4.0	increase MLU to 4.0	increase MLU to 4.0
MLU 100 utt	increase MLU to 4.5	increase MLU to 5.0+	increase MLU to 4.5	increase MLU to 4.5	increase MLU to 4.5
GMA 50 utt	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula
GMA 100 utt	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula
SDA 50 utt	1. complex sent. simple infinitives 2. complex sent. conjunction *and*	1. WH questions – what 2. negation sentences – NP + aux +neg. + VP	1. complex sent. simple infinitives 2. complex sent. conjunction *and*	1. complex sent. simple infinitives 2. complex sent. conjunction *and*	1. complex sent. conjunction *and* 2. WH questions – what
SDA 100 utt	1. complex sent. Simple infinitives 2. complex sent. Conjunction *and*	1. WH questions – why, who, how 2. complex sentences – NP object	1. complex sent. conjunction *and* 2. complex sent. Simple infinitives	1. complex sent. conjunction *and* 2. complex sent. simple infinitives	1. complex sent. conjunction *and* 2. WH questions – why, who, how
TTR 50 utt	1. pronouns 2. prepositions	1. pronouns 2. articles	1. pronouns 2. prepositions	None- adequate vocabulary	1. pronouns 2. articles
TTR 100 utt	1. pronouns 2. articles	1. pronouns 2. articles	1. pronouns 2. articles	None – adequate vocabulary	1. prepositions 2. articles
SR 50 utt	1. agent 2. attributes	1. complex sentences 2. agent	1. agent 2. attributes	1. agent 2. adverbial	1. agent 2. adverbial
SR 100 utt	1. agent 2. object	1. complex sentences 2. agent	1. agent 2. object	1. agent 2. object	1. agent 2. object
LSAT 50 utt	1. pronouns 2. present progressive - ing	1. articles 2. present progressive - *ing*	1. pronouns 2. present progressive - *ing*	1. articles 2. pronouns	1. pronouns 2. present progressive - *ing*
LSAT 100 utt	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. present progressive– *ing*	1. articles 2. present progressive– *ing*

Table 13

Goals generated from Language Sample 2

	SLP 1	SLP 2	SLP 3	SLP 4	SLP 5
MLU 50 utt	increase MLU to 4.5	increase MLU to 4.0	increase MLU to 4.5	increase MLU to 4.5	increase MLU to 4.5
MLU 100 utt	increase MLU to 4.5	increase MLU to 4.0	increase MLU to 4.5	increase MLU to 4.0	increase MLU to 4.0
GMA 50 utt	1. articles 2. contractible copula	1. articles 2. 3rd person singular	1. articles 2. contractible copula	1. articles 2. contractible copula	1. articles 2. contractible copula
GMA 100 utt	1. articles 2. 3rd person singular	1. articles 2. 3rd person singular	1. articles 2. 3rd person singular	1. articles 2. 3rd person singular	1. articles 2. 3rd person singular
SDA 50 utt	1. complex sentences simple infinitives 2. complex sentences conjunction *and*	1. complex sentences object NP 2. complex sentences conjunction *and*	1. complex sentences simple infinitives 2. complex sentences conjunction *and*	1. complex sentences simple infinitives 2. complex sentences conjunction *and*	1. WH questions – why, who, how 2. complex sentences conjunction *and*
SDA 100 utt	1. WH questions – why, who, how 2. complex sent. conjunction *and*	1. complex sentences object NP 2. complex sent. conjunction *and*	1. WH questions – why, who, how 2. complex sentences conjunction *and*	1. complex sentences simple infinitives 2. complex sentences conjunction *and*	1. WH questions – why, who, how 2. complex sentences conjunction *and*
TTR 50 utt	1. adverbs 2. prepositions	1. adverbs 2. articles	1. adverbs 2. prepositions	None TTR is appropriate	1. articles 2. prepositions
TTR 100 utt	1. articles 2. prepositions	1. articles 2. adverbs	1. articles 2. prepositions	None TTR is appropriate	1. pronouns 2. prepositions
SR 50 utt	1. action 2. agent	1. action 2. agent	1. action 2. agent & object	1. agent 2. object	1. agent 2. object
SR 100 utt	1. action 2. agent	1. agent 2. object	1. action 2. agent	1. object 2. locative	1. object 2. agent
LSAT 50 utt	1. articles 2. pronouns	1. articles 2. pronouns	1. articles 2. pronouns	1. articles 2. pronouns	1. articles 2. pronouns
LSAT 100 utt	1. articles 2. pronouns	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. pronouns	1. articles 2. present progressive - *ing*	1. articles 2. pronouns

Table 14

Goals generated from Language Sample 3

	SLP 1	SLP 2	SLP 3	SLP 4	SLP 5
MLU 50 utt	None	none	increase MLU to 5.0+	increase MLU to 5.0+	increase MLU to 5.0+
MLU 100 utt	increase MLU to 5.0	increase MLU to 5.0	increase MLU to 4.5	increase MLU to 4.5	increase MLU to 4.75
GMA 50 utt	1. *-ing* 2. contractible copula	1. 3rd person singular 2. contractible copula	1. 3rd person singular 2. contractible copula	1. 3rd person singular 2. contractible copula	1. 3rd person singular 2. contractible copula
GMA 100 utt	1. *-ing* 2. regular past tense - *ed*	2. 3rd person singular 3. contractible copula	1. *–ing* 2. contractible copula	1. 3rd person singular 2. contractible copula	1. 3rd person singular 2. contractible copula
SDA 50 utt	1. negation sent. – not + N or V 2. WH questions - *what*	1. negation sent. – not + N or V 2. WH questions - *what*	1. WH questions – what, where 2. complex sent. conjoined & embedded clauses	1. WH questions – what, where 2. negation sentences – NP + aux+neg.+VP	1. WH questions – what, where 2. negation sentences – NP + aux+neg.+VP
SDA 100 utt	1. negation sent. – not + N or V 2. WH questions - *what*	1. negation sent. – not + N or V 2. WH questions - *what*	1. negation sentences – NP + aux+neg.+VP 2. complex sent. conjoined and embedded clauses	1. negation sentences – NP + aux+neg.+VP 2. WH questions – why, who, how	1. WH questions – why, who, how 2. complex sent. conjoined and embedded clauses
TTR 50 utt	1. conjunctions 2. adjectives	1. conjunctions 2. adjectives	1. conjunctions 2. adjectives	None TTR is appropriate	1. articles 2. adjectives
TTR 100 utt	1. conjunctions 2. articles	1. conjunctions 2. prepositions	3. conjunctions 4. adjectives	None TTR is appropriate	1. prepositions 2. adjectives
SR 50 utt	1. attribute 2. complex sentences	1. attribute 2. complex sentences	1. locative 2. attribute	1. negation 2. attribute	1. attribute 2. complex sentences
SR 100 utt	1. attribute 2. complex sentences	none	1. attribute 2. complex utterances	1. attribute 2. adverbial	1. attribute 2. complex sentences
LSAT 50 utt	1. articles 2. copula – *is, am, are*	1. articles 2. copula – *is, am, are*	1. articles 2. present progressive -ing	1. articles 2. copual *is, am, are*	1. copual *is, am, are* 2. 3rd person singular
LSAT 100 utt	1. present progressive *–ing* 2. copula – *is, am, are*	1. present progressive *–ing* 2. copula – *is, am, are*	1. copula *is, am, are* 2. present progressive -ing	1. copula *is, am, are* 2. present progressive - ing	1. copual *is, am, are* 2. articles

Table 15

Goals generated from Language Sample 4

	SLP 1	SLP 2	SLP 3	SLP 4	SLP 5
MLU 50 utt	increase MLU to 5.0+	none	none	increase MLU to 5.0+	increase MLU to 5.0+
MLU 100 utt	none	none	none	increase MLU to 5.0+	increase MLU to 5.0+
GMA 50 utt	1. preposition IN 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*
GMA 100 utt	1. preposition IN 2. regular past tense *-ed*	1. preposition IN 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*	1. contractible copula 2. regular past tense *-ed*	1. possessive –s 2. regular past tense *-ed*
SDA 50 utt	1. negation sentences – no + N or V 2. WH questions – where + NP or VP	1. negation sentences – no + N or V 2. complex sentences conjunction *and*	1. negation sentences – NP +neg.+VP 2. complex sentences conjunction *and*	1. complex sentences conjunction *and* 2. WH questions – why, who, how	1. complex sentences conjunction *and* 2. WH questions – why, who, how
SDA 100 utt	1. negation sentences – no + N or V 2. WH questions – where + NP or VP	1. complex sent. conjoined embedded clauses 2. complex sent. relative clauses	1. WH questions – why, who, how 2. complex sent. conjoined & embedded clauses	1. WH questions – why, who, how 2. complex sent. conjoined & embedded clauses	1. WH questions – why, who, how 2. complex sent. conjoined & embedded clauses
TTR 50 utt	None – vocabulary appropriate	1. adjectives 2. adverbs	1. adjectives 2. pronouns	None TTR is appropriate	1. adjectives 2. prepositions
TTR 100 utt	1. prepositions 2. conjunctions	1. adjectives 2. adverbs	1. prepositions 2. adverbs	1. prepositions 2. adverbs	1. prepositions 2. adverbs
SR 50 utt	1. attribute 2. state/experiencer	1. attribute 2. object	1. attribute 2. adverbial	1. attribute 2. negation	1. complex utterances 2. adverbial
SR 100 utt	1. attribute 2. negation	1. attribute 2. object	1. attribute 2. locative	1. attribute 2. adverbial	1. attribute 2. complex utterances
LSAT 50 utt	1. copula *is, am, are* 2. possessive -s	1. copula *is, am, are* 2. present progressive – aux -ing	1. copula *is, am, are* 2. possessive –s	1. copula *is, am, are* 2. present progressive aux – is – ing	1. copula *is, am, are* 2. possessive –s
LSAT 100 utt	1. copula *is, am, are* 2. present progressive aux – *is – ing*	1. copula *is, am, are* 2. present progressive aux – *is – ing*	1. copula *is, am, are* 2. present progressive aux – *is – ing*	1. copula *is, am, are* 2. present progressive aux – *is – ing*	1. copula *is, am, are* 2. present progressive aux – *is – ing*

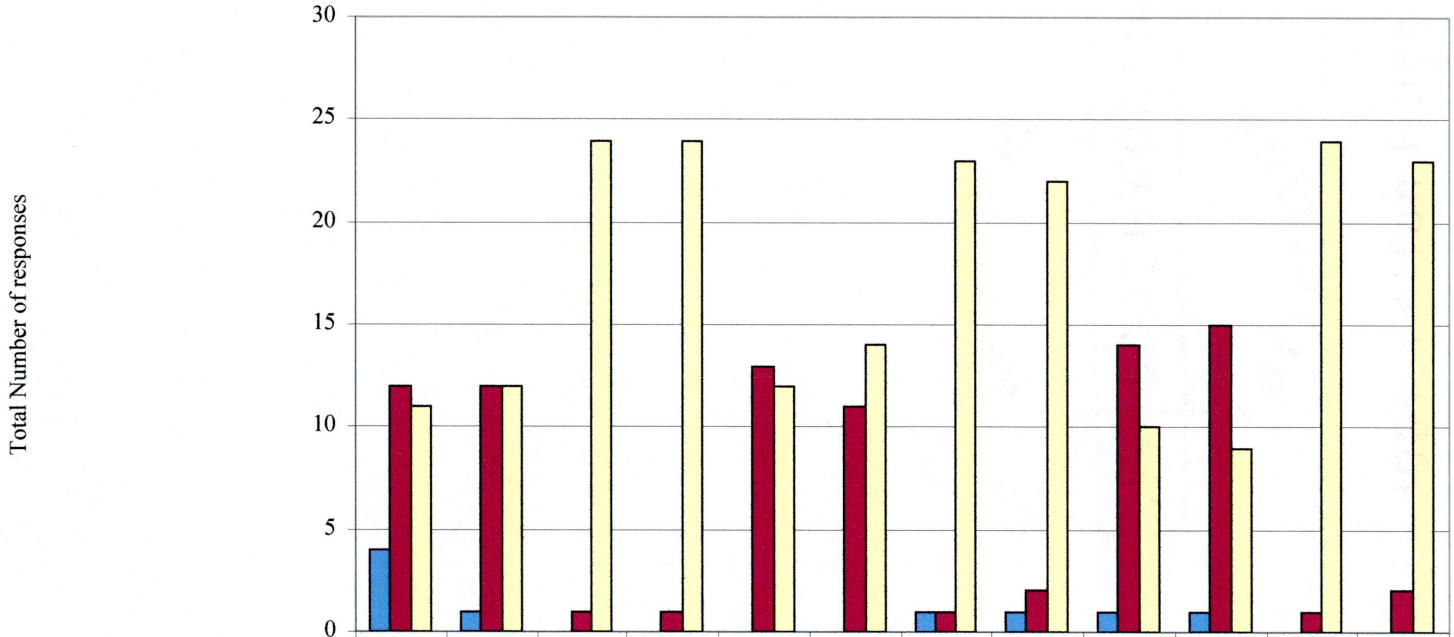
Table 16

Goals generated from Language Sample 5

	SLP 1	SLP 2	SLP 3	SLP 4	SLP 5
MLU 50 utt	increase MLU to 5.0+	increase MLU to 5.0	increase MLU to 4.5	increase MLU to 4.5	increase MLU to 4.75
MLU 100 utt	increase MLU to 5.0+	increase MLU to 5.0	increase MLU to 5.0	increase MLU to 4.5	increase MLU to 5.0+
GMA 50 utt	1. *-ing* 2. preposition ON	1. *–ing* 2. articles	1. *–ing* 2. 3rd person singular	1. *–ing* 2. contractible copula	1. *–ing* 2. articles
GMA 100 utt	1. *-ing* 2. regular past tense *-ed*	1. *–ing* 2. articles	1. 3rd person singular 2. articles	1. 3rd person singular 2. articles	1. 3rd person singular 2. articles
SDA 50 utt	1. WH questions – what + NP or VP 2. complex sentences – object NP	1. complex sent. simple infinitives 2. complex sent. conjunction *and*	1. complex sent. simple infinitives 2. complex sent. conjunction *and*	1. complex sent. conjunction *and* 2. WH question – what, where	1. complex sent. simple infinitives 2. WH question – what, where
SDA 100 utt	1. WH question – where 2. complex sentences – object NP	3. complex sent. simple infinitives 4. complex sent. conjunction *and*	1. complex sent. simple infinitives 2. WH question – what, where	1. complex sent. conjunction *and* 2. WH question – why, who, how	1. complex sent. conjunction *and* 2. WH question – why, who, how
TTR 50 utt	None adequate vocabulary	1. conjunctions 2. prepositions	1. conjunctions 2. prepositions	None TTR is appropriate	1. articles 2. prepositions
TTR 100 utt	1. conjunctions 2. adverbs & adjectives	1. conjunctions 2. adverbs	1. conjunctions 2. prepositions	1. adverbs 2. prepositions	1. articles 2. prepositions
SR 50 utt	1. attribute 2. locatives & negation	1. adverbial 2. locative	1. attribute 2. locative	1. negation 2. locative	1. attribute 2. locative
SR 100 utt	1. adverbials 2. locative	1. complex utterances 2. locative	1. attribute 2. locative	1. adverbial 2. locative	1. attribute 2. locative
LSAT 50 utt	1. pronouns 2. present progressive – ing	1. articles 2. present progressive – *ing*	1. articles 2. present progressive – ing	1. articles 2. present progressive – *ing*	1. articles 2. present progressive – *ing*
LSAT 100 utt	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. present progressive aux – *is* – *ing*	1. articles 2. present progressive - *ing*	1. articles 2. present progressive - *ing*	1. articles 2. present progressive - *ing*

Table 17

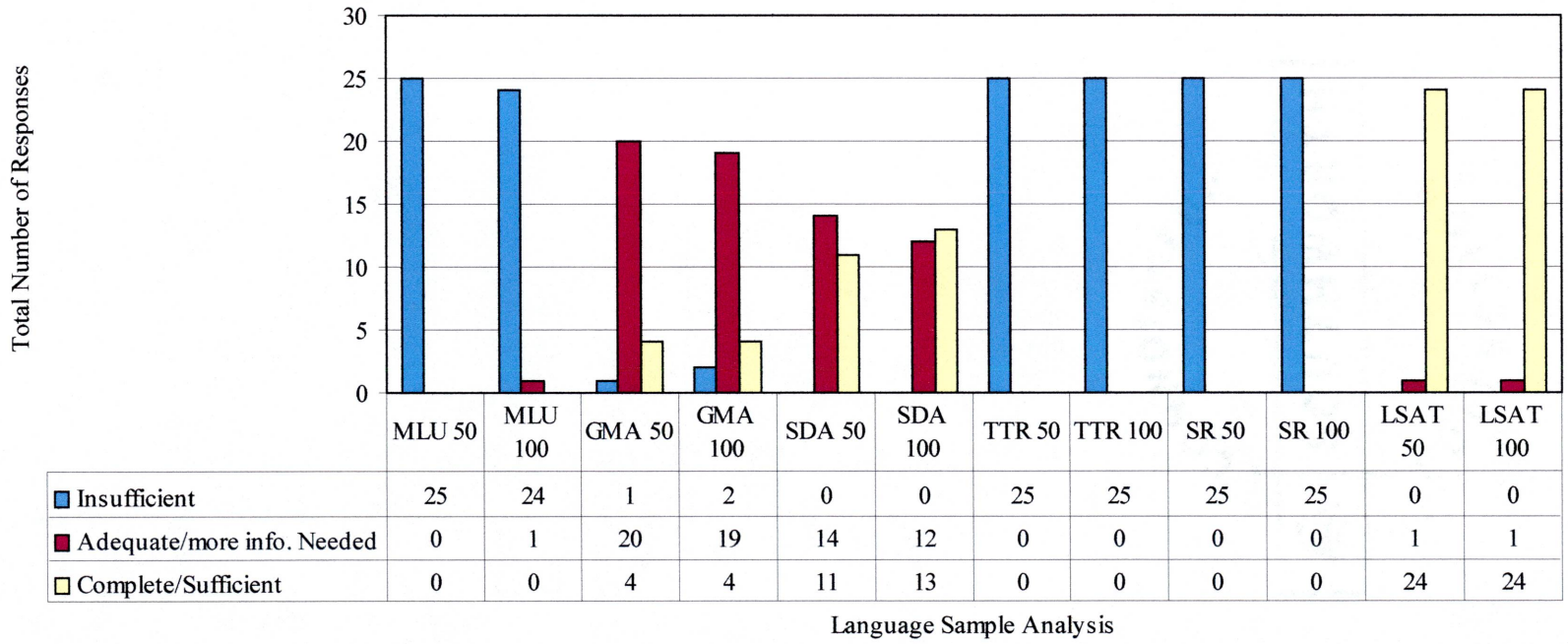
Responses to Question 1: How effective was the information provided for developing appropriate goals?



	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	4	1	0	0	0	0	1	1	1	1	0	0
Adequate/more info. Needed	12	12	1	1	13	11	1	2	14	15	1	2
Complete/Sufficient	11	12	24	24	12	14	23	22	10	9	24	23

Table 18

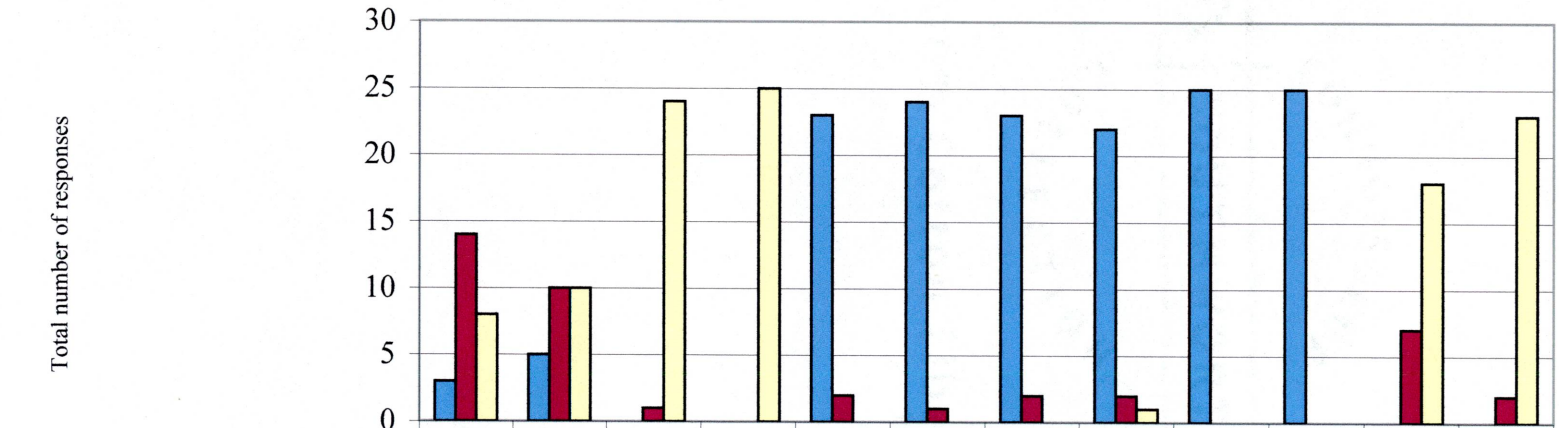
Responses to Question 2: For the child's syntactic ability, was the information complete, adequate, insufficient?



	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	25	24	1	2	0	0	25	25	25	25	0	0
Adequate/more info. Needed	0	1	20	19	14	12	0	0	0	0	1	1
Complete/Sufficient	0	0	4	4	11	13	0	0	0	0	24	24

Table 19

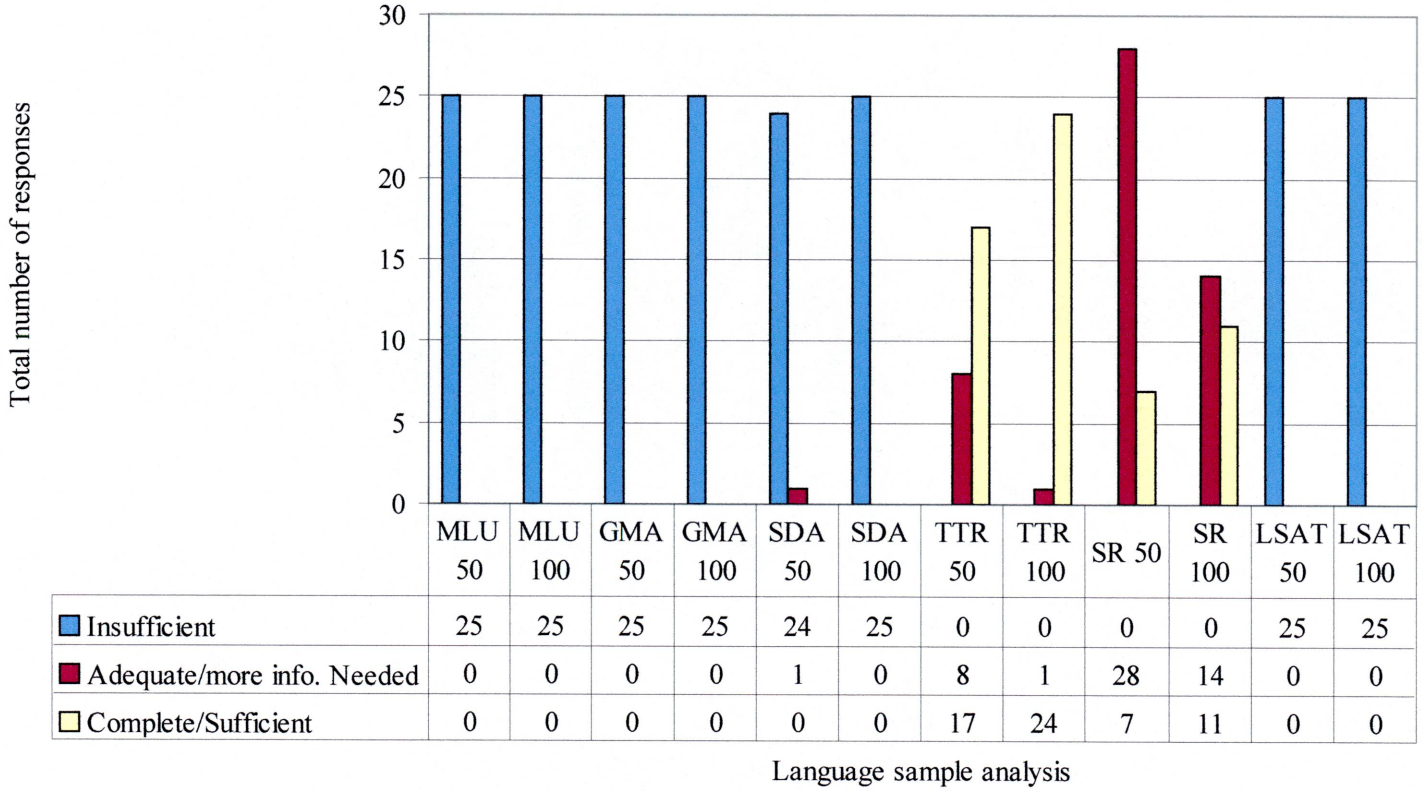
Responses to Question 3: For the child's use of morphological structures, was the information complete, adequate, or insufficient?



	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	3	5	0	0	23	24	23	22	25	25	0	0
Adequate/more info. Needed	14	10	1	0	2	1	2	2	0	0	7	2
Complete/Sufficient	8	10	24	25	0	0	0	1	0	0	18	23

Table 20

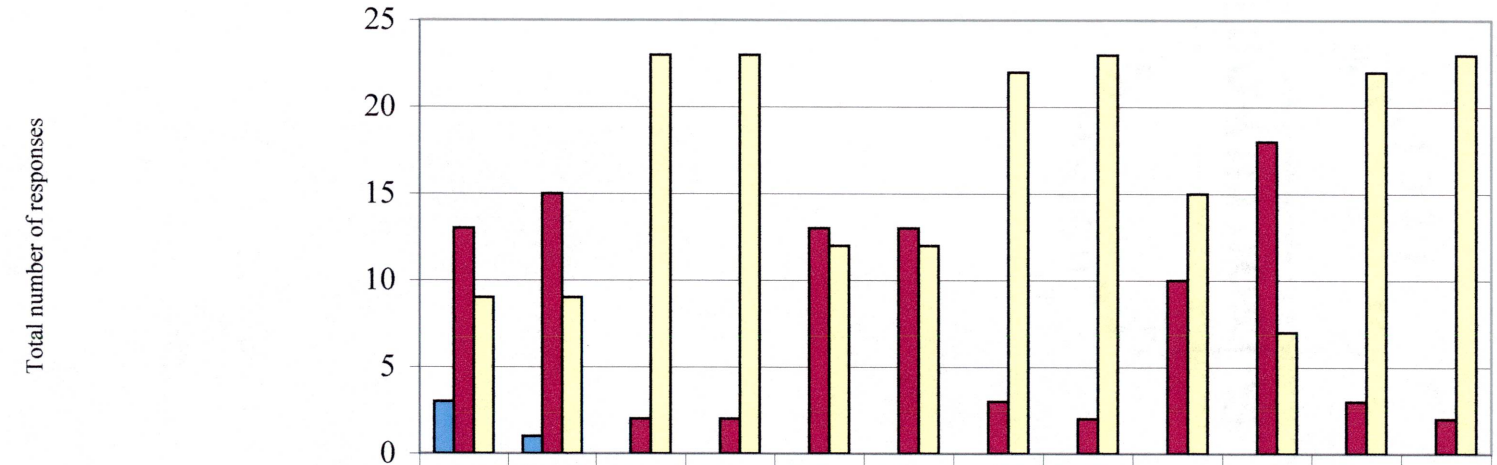
Responses to Question 4: Did the information provide you with a sufficient amount of information regarding the child's semantic abilities?



	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	25	25	25	25	24	25	0	0	0	0	25	25
Adequate/more info. Needed	0	0	0	0	1	0	8	1	28	14	0	0
Complete/Sufficient	0	0	0	0	0	0	17	24	7	11	0	0

Table 21

Responses to Question 5: Is the information from this analysis adequate to make 1-2 intervention goals with measureable benchmarks/objectives?

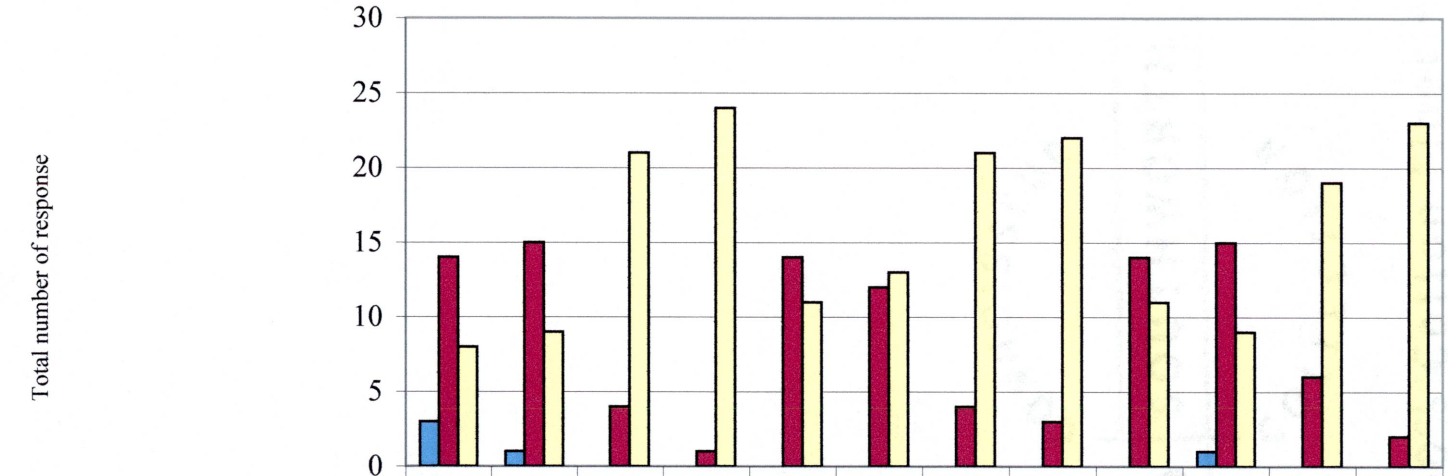


	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	3	1	0	0	0	0	0	0	0	0	0	0
Adequate/more info. Needed	13	15	2	2	13	13	3	2	10	18	3	2
Complete/Sufficient	9	9	23	23	12	12	22	23	15	7	22	23

Language sample analysis

Table 22

Responses to Question 6: Is the information from this analysis effective for measuring progress?



	MLU 50	MLU 100	GMA 50	GMA 100	SDA 50	SDA 100	TTR 50	TTR 100	SR 50	SR 100	LSAT 50	LSAT 100
Insufficient	3	1	0	0	0	0	0	0	0	1	0	0
Adequate/more info. Needed	14	15	4	1	14	12	4	3	14	15	6	2
Complete/Sufficient	8	9	21	24	11	13	21	22	11	9	19	23

Language sample analysis

Table 23

Rules for assigning morphemes (Retherford, 1993, pg. 86)

1. Morphemes are assigned only to utterances that are completely intelligible.
2. Repetitions within an utterance as a result of stuttering or false starts are assigned morphemes (e.g. "my dad dad is big", count only "my dad is big").
3. Repetition of a word for emphasis or part of a phrase for clarification are counted each.
4. Fillers such as *um, well,* or *oh* are not assigned morphemes.
5. Compound words are treated as single words, even though they consist of two or more free morphemes.
6. Proper names and ritualized repeated words (e.g., choo-choo, night –night) are treated as single words.
7. Diminutive forms of words (e.g., mommy, doggie) are assigned only one morpheme
8. Auxiliary verbs are assigned one morpheme as are catenative forms (gonna, wanna, hafta)
9. All inflections are assigned a morpheme
10. Negative contractions (e.g., cant') are assigned two morphemes ONLY if there is evidence within the transcript that the child uses each part of the contraction separately; if not, the negative contraction receives one morpheme.
11. Indefinite pronouns (e.g. anybody, somebody, someone) are assigned one morpheme.

Table 24

Brown's stages of development (Brown, 1973 in Owens, 1992, pg. 308)

Stage	MLU	Approximate Age (months)	Characteristics.
I	1.0 – 2.0	12 – 26	Linear semantic rules
II	2.0 – 2.5	27 – 30	Morphological development
III	2.5 – 3.0	31 – 34	Sentence form development
IV	3.0 – 3.75	35 – 40	Embedding of sentence elements
V	3.75 – 4.5	41 – 46	Joining of clauses
V+	4.5 +	47 +	

Table 25

Rules to count number of words for TTR (Retherford, 1993, pg. 79)

1. Contractions of subject and predicate, like *it's*, are counted as two words.
2. Contractions of the verb and the negative, such as *can't*, are counted as one word.
3. Each part of the verbal combination is counted as a separate word (e.g., *has been crying* is counted as 3 different words).
4. Hypenated words and compound nouns are one word.
5. Expressions that function as a unit are counted as one word (e.g. all right).
6. Articles (*a, the, an*) count as one word.
7. Bound morphemes and noun and verb inflections are not counted as separate words.

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APPENDIX A

Description of Language Sample Analyses

Description of Mean Length of Utterance Analysis

A morpheme is the smallest unit of a language (Miller, 1981). For example, *mouse* or past tense *–ed* are each a morpheme. Procedures for assigning morphemes (i.e., "counting morphemes") are presented in the literature (Brown, 1973; Bloom and Lahey, 1978; Miller, 1981; Retherford, 1993). Table 23 summarizes the rules for assigning morphemes to utterances that were employed for this study.

In order to determine *Mean Length of Utterance* (*MLU*) the number of morphemes from each utterance of a language sample is totaled and divided by the total number of utterances. Each language sample's *MLU* is interpreted by assigning one of Brown's Linguistic Stages (see Table 24). Expected age ranges are available to determine if a child's *MLU* is appropriate for his/her age.

Description of Grammatical Morpheme Analysis

This analysis helps to determine which of 14 morphological structures are being correctly produced in a child's language. The 14 structures are listed in Table 4. To complete this analysis, each utterance of the language sample is read to determine if one of the 14 morphological structures should have been used (this is identified as "obligatory"). Then it is determined if the child used the structure correctly (identified as "used"). Once all utterances have been reviewed and tallied, the percentage of correct use is determined for each morphological structure. Then it is determined which of the structures have been mastered. In order to be identified as a mastered structure, the client is expected to use the structure at least 3 times with 90% accuracy. If the child has

between 50-90% accuracy, the skill is considered to be emerging. A percentage below 50% would be considered delayed and a possible target for remediation. It is expected that the child will use the morphological structures that develop in and above the Brown's stage assigned based on *MLU*. For instance, children that are in Stage III for *MLU* are expected to use the Stage II morphological structures (i.e., -ing, plural –s, and in) as well as those that develop in Stage III (i.e., on and possessive –s).

Description of Sentence Development Analysis

The *SDA* analyzes use of the following syntactic structures: (a) negation, (b) yes/no questions, (c) *wh-* questions, and (d) complex sentences. For this analysis, each utterance is read to determine if any of the above structures were used. Then it is determined to which Stage the utterances should be assigned. For instance, for *wh-* questions, the possible assigned Stages would be:

Stage	What child will say
Early I	*what* + this/that
LateI/EarlyII	*what* + noun phrase or verb phrase *where* + noun phrase or verb phrase
II	No change
III	Wh-word + sentence
Early IV	Inversion of subject and verb

A child is expected to be using the syntactic structures analyzed in the *SDA* at the same stage assigned for *MLU*. For instance, if a child is identified as being in Stage III for *MLU*, then the child is expected to be using *wh*-questions that develop in Stage III (i.e.,

wh-word +sentence). Those children who are not using the appropriate sentence structures are considered to be disordered.

Description of Type Token Ratio

The *TTR* is an analysis of vocabulary diversity. For this analysis, each word produced by the child is read and placed into a category (e.g., noun, verb, adjective). The specific categories used for this analysis are provided in Table 4. Specific rules for counting each word is provided in Table 25. If a word is used more than once in a sample, a tally mark is placed next to that listed word. Then the total number of words used and total number of different words used are determined. The *TTR* is calculated by dividing the total number of different words by total number of words expressed. According to Templin (1975) normally developing children between the ages of 3 and 8 have TTRs of .45-.50. A *TTR* below .45 reflects a lack of diversity and may indicate a vocabulary disorder (Miller, 1981; Retherford, 1995).

Description of Semantic Roles/Coding

The SR provides information on the complexity and diversity of the concepts and connections children can talk about. The specific semantic roles coded are listed in Table 4. To complete this analysis, each utterance is read and coded for the semantic roles used. If a semantic role is used more than once in the sample, a tally of the frequency of occurrence is completed. Then the number of each individual semantic role is divided by the total number of semantic roles counted and multiplied by 100 (to convert to a percentage). For instance, if ACTION is used 25 times in a language sample that had a total of 129 semantic roles, the percentage would be 19.4%. As children develop

language, the number of utterances that can be coded should decrease with an increase in the number of complex sentences used.

Description of Language Sampling, Analysis and Training

The *LSAT* assesses syntax and morphology by identifying specific *forms* and *constructions* used. *Forms* are "specific word forms and morphological endings" (Tyack & Gottsleben, 1977, p.7). For example, noun phrase forms such as pronouns and verb phrase forms such as copula *be*. Whereas, *constructions* are "the linear arrangement in which forms occur" (Tyack & Gottsleben, 1977, p.7) such as complex sentences, noun phrases, verb phrases, and combinations of noun and verb phrases. Specific *forms* and *constructions* analyzed are presented in Table 4. These *forms* and *constructions* are listed in five linguistic developmental levels (Level I, II, III, IV, & V) that are based on Morehead and Ingram's (1973) cross-sectional study of normal language development and a word-morpheme count of the child's language sample. For this analysis, an *MLU* is determined and a "linguistic level" is assigned based on the *MLU*. The "linguistic level" is similar to Brown's Stages discussed previously. The "linguistic levels" are as follows:

2.0 –2.5 = Level I

2.5 – 3.0 = Level II

3.0 – 4.0 = Level III

4.0 – 5.0 = Level IV

5.0 – 6.0 = Level V.

The language sample is further analyzed to determine whether the appropriate *form* and *constructions* that are developmentally expected to appear within the linguistic

levels are mastered. When *forms* and *constructions* are not mastered at the expected linguistic level of the child, they are to be chosen as intervention targets. Unlike the other analyses, the *LSAT* provides very specific linguistic forms (e.g., article *a,* pronoun *she*, etc.) that should be targeted in therapy.

APPENDIX B

Language Sampling Analyses Rating Scale for Speech-Language Pathologists

Examiner : 1 2 3 4 5
Language Sample: 1 2 3 4 5
Analysis:

	❑ SDA50	❑ LSAT50	❑ SDA100
❑ MLU50	❑ TTR50	❑ MLU100	❑ TTR100
❑ GMA50	❑ SR50	❑ GMA100	❑ SR100

Write 2 interventional targets/goals based upon the information provided:

GOAL 1:_____

_____

GOAL 2:_____

_____

RATING INSTRUCTIONS

For the following questions, please circle the number for the best answer. For answers that indicate more information is needed, please provide specific information by filling in the blank.

1. How effective was the information provided for developing appropriate goals:
   3- Complete; Sufficient information provided to develop clear goals
   2- Adequate information is provided to develop some goals, although more information is still desired:_____
   1- Insufficient information provided; unable to develop clear goals
2. For the child's syntactic ability, was the information:
   3- Complete; Sufficient information provided
   2- Adequate information is provided, although more information is still desired:_____
   1- Insufficient information provided
7. For the child's use of morphological structures, was the information:
   3- Complete; Sufficient information provided
   2- Adequate information is provided, although more information is still desired:_____
   1- Insufficient information provided
8. Did the information provide you with a sufficient amount of information regarding the child's semantic abilities?
   3- Complete; Sufficient information provided
   2- Adequate information is provided, although more information is still desired:_____
   1- Insufficient information provided
9. Is the information from this analysis adequate to make 1-2 intervention goals with measureable benchmarks/objectives?
   3- Complete; Sufficient information provided
   2- Adequate information is provided, although more information is still desired:_____
   1- Insufficient information provided

10. Is the information from this analysis effective for measuring progress?
    3- Complete; Sufficient information provided
    2- Adequate information is provided, although more information is still desired:_____
    1- Insufficient information provided
11. Place other comments here:_____

APPENDIX C

Language Sampling Analyses Questionnaire for Speech-Language Pathologists

Examiner : 1 2 3 4 5

1. Which language sampling analyses have you had training (check all that apply):
   - ❑ MLU (Mean Length Utterance)
   - ❑ TTR (Type Token Ratio)
   - ❑ Semantic Coding (Semantic roles/relations/categories)
   - ❑ LSAT (Langauge Sampling Analysis and Training)
   - ❑ DSS (Developmental Sentence Structure)
   - ❑ Grammatical Morpheme Analysis (Brown's morphemes)
   - ❑ Other _____
2. How long does it take you to administer and score standardized assessments on average? (mark one)

___30 min. ___40 min. ___60 min. ___90 min. ___2 hrs. ___3hrs. ___4hrs. ___>4hrs

3. How often do you use MLU? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used
4. How often do you use TTR? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used
5. How often do you use Semantic Coding? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used
6. How often do you use LSAT? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used
7. How often do you use DSS? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used
8. How often do you use Grammatical Morpheme Analysis? (circle one)
   2 – Used often
   1 – Used somewhat
   0 – Not used

9. What are your reasons for NOT using language sampling analyses? (check all that apply)
   - ❑ Not helpful for diagnosis
   - ❑ Need more training
   - ❑ Not helpful for intervention and goal planning
   - ❑ Length of time to administer too short
   - ❑ Length of time to administer too long
   - ❑ Other _____

10. What are your reasons for using language sampling analyses? (check all that apply)
   - ❑ Helpful for diagnosis
   - ❑ Had adequate training
   - ❑ Helpful for intervention and goal planning
   - ❑ Length of time to administer too short
   - ❑ Length of time to administer too long
   - ❑ Other _____

11. Which do you find most useful in planning goals for therapy? (check all that apply)
   - ❑ Standardized assessments
   - ❑ Language sample analyses
   - ❑ My own assessments
   - ❑ Other:_____