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## A Comparison of Six Structural Analysis Procedures: A Case Study

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# CHAPTER 3



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## A Comparison of Six Structural Analysis Procedures : A Case Study

*Thomas M. Klee and Rhea Paul*

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The speech-language clinician has a number of formal procedures available for analyzing a sample of spontaneous language. These procedures are generally used to determine the nature and extent of any delay present in the child's productive language system. Such a determination is usually made by describing the child's linguistic system and assessing its status relative to that of other children of similar chronological or mental age. Depending, of course, on the child's particular problems, such a description may involve evaluating one or more aspects of production: phonological, semantic, syntactic, or pragmatic. But the majority of formal analysis procedures have only concerned themselves with syntax, and it is to syntax alone that we, too, address ourselves. Syntactic analysis procedures involve parsing each utterance into its constituents and analyzing the grammatical forms and constructions present in it. Each construction is then assigned to a developmental stage, which is derived from research on normal children. By examining the range of stages present in a transcript, a concomitant language-age level is usually assigned. This information is then used to characterize the general nature of the child's linguistic system (i.e., is the child using various forms of language characteristic of younger normal children, or is he or she using idiosyncratic forms?) and to determine the existence and degree of language delay.

A second purpose of language analysis is to develop appropriate goals for intervention, should the diagnosis indicate that remediation is warranted. These goals are usually established by comparing the child's present level of functioning with that of normally developing children of similar chronological or mental age and identifying areas of grammatical discrepancy. These areas are targeted for remediation. The precision of the analytic tool is important, since it is not only used for description and diagnosis but also as a basis for educational planning.

The choice of procedure for grammatical analysis has not ordinarily been thought to be of great importance. Clinicians often simply choose one of the standard tools, develop a familiarity with it, and use it consistently. The assumption underlying this practice has been that the various systems of analysis really yield the same information, and the choice of one over another is merely a matter of personal preference.

The aim of this case study is to put that assumption to the test. By applying six of the most widely used analysis procedures to the grammar of one speech sample, it is possible to determine whether, in

fact, all procedures yield the same general stage assignment and provide descriptive detail comparable in amount, quality, and focus. It is also possible to compare the analyses in terms of clinical efficiency. In addition to the comparison of the results of the analyses, we have also established a set of desirable features by which each of the procedures was rated. The goal has not been to choose the one "best" method but to identify the differences among them.

In addition to the six standard analyses, a grammar based on a transformational model was also written for the speech sample. We believed the grammar would provide the greatest amount of detail against which we could compare results of the other procedures. The intent here is not to suggest grammar writing as an alternative form of speech sample analysis in the clinic. In fact, this analysis is rather poorly suited to clinical purposes because it yields no age equivalent and because few normative data exist for comparative purposes. The detailed grammar will be used instead to illuminate the strengths and weaknesses of the other tools. The purpose of this grammar is to *describe* the child's language production; no attempt has been made to ensure that the proposed grammar is in any way "psychologically real."

#### CASE DESCRIPTION

Jay is a 3-year, 5-month-old boy who had attended a preschool educational program for 7 months at the time of his evaluation. His teacher referred him for an assessment primarily because of her difficulties in understanding his speech. The teacher reported, however, that Jay was "cognitively more advanced" than most of his classroom peers and that he adjusted quickly and easily to the social/academic environment of the classroom.

As part of a comprehensive communication evaluation, four measures of language comprehension were used. The Miller-Yoder Test of Grammatical Comprehension (Miller and Yoder, 1972), which requires a discriminative pointing response to a set of four pictures, showed Jay to be functioning at a 4-year-old level on all items, with the exception of pronoun comprehension. On a test of single-word receptive vocabulary, the Peabody Picture Vocabulary Test (Dunn, 1965), Jay's score fell at the 64th percentile, which is equivalent to a "vocabulary age" of 3;10. On two informal comprehension tests, the Bellugi-Klima object manipulation task (Bellugi-Klima, 1968) and a Wh-question task (Chapman, in preparation), Jay's performance was at age level.

Jay performed above age level by approximately 8–12 months on two measures of cognitive development. On the Slosson Intelligence Test for Children (Slosson, 1974) Jay's mental age (MA) was 4;5. On the McCarthy Scales of Children's Abilities (McCarthy, 1972) Jay's MA was 4;3. (This later test was given when Jay was 3;7).

Because Jay's mental age was not depressed relative to his chronological age, we can expect Jay's linguistic development to be synchronous with chronological age. Had his CA exceeded his MA, indicating a cognitive delay, our criterion would have shifted to judging linguistic development relative to cognitive status.

In summary, both Jay's cognitive level and his level of linguistic comprehension appear at or above expectations for his chronological age.

### THE ANALYSIS PROCEDURES

Six standard structural analysis procedures were applied to a 30-minute free-speech sample recorded on audiotape while Jay played with toys and talked with a clinician. Five of the procedures are "structural" in the sense that they analyze utterances into constituents that are then classified according to their order of emergence in normal acquisition.

These analyses do not, however, specify the hierarchical relations among constituents. For example, a noun phrase (NP) might consist of an adjective, a noun, or a prepositional phrase. That prepositional phrase might, itself, be broken down into a preposition and another NP. The procedures do not incorporate these relationships. Nor do they demonstrate the child's capacity to form stylistic variants (transformations) of base sentences. The grammar written for comparison with the standard procedures provides a finely detailed description of the language sample. It also points out hierarchical relations and stylistic flexibility within the system. However, it has the rather colossal disadvantage of offering no means for comparing the sample with developmental norms.

A brief description of each of the analyses performed on Jay's sample of spontaneous language follows. Procedural aspects of each of the systems is kept to a minimum, since it is assumed the reader has some familiarity with the specifics of sampling, analyzing, and scoring required by each. The discussion focuses instead on the diagnosis of Jay's productive language that each analysis provides.

The transcript on which the analyses are based is found in the chapter appendix, pages 99–110.

### Mean Length of Utterance

Mean length of utterance (MLU) in morphemes (Brown, 1973) is a general index of grammatical development and has been shown to increase with age up to MLUs of 4.00–4.50. De Villiers and de Villiers' (1973a) modification of Brown's five original stages resulted in equal stage intervals of 0.50 morphemes for each of five stages, ranging from 1.00–3.49 morphemes and a sixth stage ranging from 3.50–4.25. Miller and Chapman (pages 25–27) modified this further and established age ranges for each of eight stages (0.50 morphemes per stage) based on 123 normally developing children ranging in age from 17 months to 59 months. From this, two linear regression equations were derived. One predicts MLU given age; the other, age given MLU.

Based on the 167 utterances in Jay's language sample, an MLU of 3.08 was calculated using the rules specified by Brown (1973). This is characteristic of Miller and Chapman's Early Stage IV (35–38 months). Using the Miller and Chapman data, an MLU of 3.08 would predict an age equivalent of 35.0 months, approximately 6 months below Jay's actual age. Given that Jay is 41 months of age, his predicted MLU would be 3.67, or 0.61 morphemes higher than that found in the sample.

When attempting to determine if a particular MLU is within normal limits of development for a given age, a measure of variability is necessary. Miller and Chapman have calculated standard deviations from both predicted age and predicted MLU. Jay's MLU of 3.08 falls within one standard deviation from the mean value predicted for his chronological age. At 41 months of age the predicted MLU range at  $\pm 1$  SD is 2.87–4.47. Based on MLU alone Jay appears within normal limits with regard to general syntactic development (see Figure 3).

The computation of Jay's MLU was derived by a close adherence to Brown's rules (1973, p. 54). However, when attempting to analyze the grammatical system of a child whose language has advanced past the early stages of development, as has Jay's, it becomes obvious that Brown's counting rules are neither comprehensive nor reflective of the child's advancing syntactic system. That is, the clinician is left with the dilemma of making rather arbitrary morpheme assignments to a number of ambiguous grammatical items. It becomes apparent that one's decision as to what morpheme value to ascribe to a given construction should be based not only on grammatical constituents (i.e., the number of free and bound morphemes), but must be based in part on semantic and phonological considerations.

The use to which an MLU count is to be put determines which method of computation should be used. If one's intention is to use MLU to make a structural stage assignment using Brown's (1973) stages, one is restricted to using Brown's counting rules (1973, p. 54). Alteration or modification of those counting rules would invalidate assigning a structural stage of development to the child's language. However, if one's intention is to attempt to account for the child's morpho-syntactic system in terms of which morphemes are "psychologically real" for the child, the following addenda to Brown's original rules may be considered. Again, use of these modified counting rules necessarily precludes assignment to Brown's stages (1973, p. 56). Because we wished to assign Jay's language sample to a specific developmental stage, we adhered to the original rules.

Compound words present an interesting example of the inadequacies of Brown's counting rule #5:

All compound words (two or more free morphemes), proper names, and ritualized reduplications count as single words. Examples: *birthday*, *rackety-boom*, *choo-choo*, *quack-quack*, *night-night*, *pocketbook*, *see-saw*. Justification is that no evidence that the constituent morphemes function as such for these children (1973, p. 54).

Essentially, Brown is arguing that multi-morpheme credit should be withheld since there is no a priori evidence that the child is capable of producing the constituent free morphemes that make up a compound word. However, at some point in the child's development, the child's construction and interpretation of his lexicon becomes "adult-like." That is, the systems of children and adults approach parity.

To illustrate this point, Jay's language sample contains instances of the compound word *fireman*, as well as the constituent free morphemes *fire* and *man*. If Jay had provided no productive exemplars in his discourse of either constituent morpheme, we should feel safe, if not conservative, in classifying *fireman* as one morpheme, assuming like Brown, that this compound word served a labeling function only.

Further evidence for double-morpheme credit may be found in the phonological realizations of the word. Jay's production of this word is [fɜr mæn], unlike the standard adult form [fɜr mən], indicating he is conjoining two separate morphemes.<sup>1</sup>

Similar rationale may be invoked for other words comprised of two conjoined morphemes. For

example, in order to credit a word with two-morpheme status, there must be evidence in the child's language sample (or collateral productive data, if available) that each constituent has been used independently. Otherwise, credit of one-morpheme is justified. This counting rule obtains for negated verbs, reflexive pronouns, and certain phonological alterations such as catenative+infinitive (e.g., *wanna go*).

Let us take the case of judging morpheme (constituent) status for the catenative verbs. Brown's counting rule #8 states:

Count as separate morphemes...all catenatives. These...count as single morphemes rather than as *going to* or *want to* because evidence is that they function so for the children (1973, p. 54).

Again, the question must be asked, at what point in development does the child's use of a syntactic construction function as the adult's? From a structural point of view, the answer is at the time the child demonstrates production capacity to generate the constituent morphemes independently. For example, in the adult's lexicon, we evaluate the construction *gonna go* as being composed of four morphemes (cf, *go+ing+to+go*). Yet the older child is given credit for only two morphemes, according to Brown's rule #8. We feel the conservative estimate is justified only in the case of the child at an earlier stage of development, one not evidencing any of the constituent morphemes in production.

The case of diminutives in the older child deserves comment. Brown states in counting rule #7:

Count as one morpheme all diminutives (*doggie*, *mommie*) because these children at least do not seem to use the suffix productively... (1973, p. 54).

However, it must be recognized that some children (at least) *do* use the suffix productively. For example, if a child produces both *dog* and *doggie*, the suffix results in a distinct phonological form, although this does not alter the semantic representation of the item. Furthermore, because diminutive forms are often among the earliest words to emerge in the child's lexicon (e.g., *mommy*, *daddy*, *doggie*, etc.), and because the bound morpheme /i/ does not alter the morphological structure of the word (only the phonological) in the direction of greater complexity, we take the tack that this phonological epenthesis is undeserving of separate morpheme credit. In sum, we agree with Brown's original decision, albeit with a different rationale.

In conclusion, one's decision rules for assigning values of morpho-syntactic complexity to a child's utterances must change as the child changes. This continual adjustment of the assessment procedure

<sup>1</sup>It is interesting to note, however, that [fɜr mæn] might be the later ontogenetic phonological form, being closer to the adult form.

should better reflect the child's gradual progression from a child-to-adult linguistic system, viewing development as a continual rather than a discrete process. The caveat that must be kept in mind at the outset of choosing between MLU computations is that the method of computation should be dependent on the use to which the data will be put.

### Assigning Structural Stage

The Assigning Structural Stage (ASS) procedure is described in detail in Chapter 2. A worksheet that can be used to record data for ASS is shown in Table 1. Each grammatical form from the developmental charts is listed by stage. The language sample is then scanned utterance by utterance, and the constituents within an utterance are noted. Correct usage of a particular constituent is logged in the appropriate column on the worksheet. Examples of attempts that result in incorrect form are logged in the adjacent column.

As Table 1 reveals, Jay's use of syntactic structures ranges from Stage I to Stage V with the greatest portion of structures representing Stages II, III, and IV. Two different stage assignments can be calculated in this analysis. The first is based on frequency of structures produced at each stage and provides an index of mastery for those structures occurring in the transcript. The second method provides an index of acquisition by identifying the most complex utterances of each structural type regardless of frequency. We expect the distribution of structural types across stages to range at least one stage above and below the most frequent stage. Using MLU as the overall indicator, we would expect most of the structural types in Jay's speech to center in Early Stage IV. Miller suggests using this relation between MLU and structural analysis to decide whether a child is delayed or deviant.

Using the first method of stage determination, the mastery criterion, Jay's level of development would be between Stage III and Early Stage IV. The age equivalent for this level of development is estimated to be 35 months of age (Miller, Chapter 2, this volume), and in this case is similar to the MLU assignment. Jay produces few structures above this level, so no stage of emergence can be assigned.

### 14 Grammatical Morphemes

The 14 grammatical morphemes studied by Brown (1973) and by de Villiers and de Villiers (1973b) are scored in Jay's transcript. The number of obligatory contexts and number of realizations for each of the following morphemes were counted:

Stage II	{ -ing plural -s in
Stage III	{ on possessive -s
Stage V	{ irregular past tense articles <i>a, the</i> regular past tense regular third person singular contractible copula <i>be</i>
Post-Stage V	{ uncontractible copula <i>be</i> irregular third person singular uncontractible auxiliary <i>be</i> contractible auxiliary <i>be</i>

The percentage of realizations in obligatory contexts was then computed for each form. The criterion for rule acquisition was 90% correct usage in obligatory contexts. The worksheet for this analysis is shown in Figure 1.

Jay's sample reveals 100% correct usage of all Stage II items. One Stage III item does not appear, the other is 50% correct. Stage V items show variability; some reach 90%, others do not. All Post-Stage V forms except one instance of uncontractible copula are correct less than 90% of the time. Jay's performance falls between Stages III and V by this analysis. This finding corroborates the general stage placement found using both MLU and ASS.

### Developmental Sentence Analysis

The Developmental Sentence Score (DSS) (Lee, 1974) is another procedure often used in evaluating a language sample. In deriving a DSS, 50 utterances from the sample are scored. Usually the last 50 consecutive utterances are analyzed to allow for a "warming-up period." Only utterances that contain both a subject and verb are included in the DSS analysis, although less complete utterances can be analyzed using a related procedure, Developmental Sentence Types (DST). Only intelligible, nonimitative and different utterances are included in the analysis.

The DSS divides utterances and their constituents into eight grammatical categories: indefinite and personal pronouns, primary and secondary verbs, negation, conjunctions, interrogative reversals, and Wh-questions. Each of these categories is broken down into eight developmental levels, and a developmental score is assigned to each construction. Those lexical items and grammatical structures that emerge early in the development of the child's language production earn fewer points; those developed later earn a greater number of points. An additional category awards a "sentence point" for each utterance that meets all *adult* standard grammatical

**Table 1. Assigning Structural Stage: Summary Worksheet**

Syntactic structure	Structural stage	Utterance number	Examples of attempts, <sup>a</sup> or omission in obligatory context
II. Noun Phrase Elaboration			
Plural /s/	II	77	84
Demonstratives: <i>this, that, these, those</i>	III	1, 4, 6, 7, 15, 24, 25, 26, 34, 37, 43, 45B, 47, 48, 53, 54, 55, 56, 57, 58, 60, 61, 64, 75, 80, 83, 84, 92, 97, 99, 113, 116	26
Quantifiers: <i>some, alot, two one, more, other, another</i>	III	43	
Possessives: <i>Is/, her(s), his, mine, my their(s), our(s)</i>	IV	27, 96, 98	
Adjectives	III	67, 103, 107	11, 69
S-V agreement (number)	IV	85, 99	
Mod + Adj + N	Post-V	100	
III. Verb Phrase Elaboration			
Main V unmarked	I		4, 6, 7, 11, 24, 34, 35, 74, 95, 99, 107, 111
V + particle	I	101	
Semi-aux + V	II	101, 108, 117, 118	
Copula appears	II	14, 25, 61, 79, 81, 84, 85, 89, 92	
Aux appears	III	76, 90, 113	75
<i>Can, will, be</i> (present)	III	39, 86, 105	
Regular past <i>-ed</i> overgeneralization	III		33
Semi-aux + V + NP	EIV	19, 48, 62, 72, 110, 115	
Past modals: <i>could, would, should, must, might</i>	IV	104	
IV. Negation			
<i>No, not</i> used to negate	I, EII		
NP + (Neg) + VP (Neg → <i>no, not, can't, don't, won't</i> )	LII, III	10, 22, 31, 49, 50, 51, 71, 88, 94, 112	
<i>Isn't, aren't, doesn't</i>	EIV	15, 97	
<i>wasn't, weren't, wouldn't, couldn't, shouldn't</i>	V		
V. Yes/No Questions			
Rising intonation only	I-III	12, 20, 55, 57, 64, 80, 81a	
Aux inverted	EIV	41a	
VI. Wh-Questions			
What { <i>this</i> } ? { <i>that</i> }	I, EII	56	
What (NP) do(ing)?	I, EII		
Where (NP) go(ing)?	I, EII		
{ <i>What</i> } + Nucleus? { <i>Where</i> }	LII	33, 47, 53, 116	
Wh + Aux (Aux not inverted)	III	58	
Aux inverted at least once	EIV	1, 3,	60, 78
<i>When</i> appears	EIV	1,	
VII. Complex Sentence Development			
<i>Let me</i>	EIV	65	
Simple infinitival clause	EIV	90, 106	
Simple Wh-clause	EIV		
Double-embedding	LIV-EV		
Conjoin + embed	LIV-EV		
Infinitive clause with different subject	LV		
Relative clause	LV		
Gerund	V+		
Wh-Infinitive	V+		
Unmarked infinitive	V+		

<sup>a</sup>"Attempt" signifies syntactic structure is marked, but incorrect by adult standards.

II		-ing		plural		in		III		on		possessive			
	90	✓		77	✓	62	✓	116	✓						
	106	✓		84	✓	64	✓	76	-						
	116	✓			100%	65	✓		50%						
	91a	✓				22	✓								
	75	✓				8a	✓								
	76	✓				85	✓								
		100%				91a	✓								
						91b	✓								
						45b	✓								
							100%								
V		irregular past		articles				regular past		regular third person singular		contractible copula			
	40	✓		4	✓	74	✓	33	-	32	✓	4	-	71	✓
	68	-		5	✓	77	✓	87	✓	109	✓	6	-	74	-
	93	-		6	✓	79	✓		50%		100%	7	-	78	-
		33%		8	-	81a	✓					11	-	79	✓
				8a	✓	82	✓					14	✓	81	✓
				8b	✓	84	✓					24	-	84	✓
				8c	-	85	✓					25	✓	85	✓
				13	✓	86	-					34	-	89	✓
				14	✓	89	✓					35	-	92	✓
				16	✓	92	✓					55	✓	95	-
				25	✓	95	✓					56	-	99	-
				34	✓	96	✓					57	✓	107	✓
				35	✓	100	✓					58	✓	111	-
				36	✓	104	✓					60	-	116	-
				38	✓	106	✓					61	✓		48%
				44	✓	109	✓								
				45	✓	115	✓								
				54	✓	116	✓								
				55	✓	21	✓								
				57	✓	24	✓								
				61	-		91%								
V+		uncontractible copula		irregular third person singular		uncontractible auxiliary		contractible auxiliary							
	25	-		103	-	113	✓	1	✓						
		0%		54	-		100%	3	✓						
					0%			76	✓						
								75	-						
								90	✓						
									80%						

Figure 1. 14 grammatical morpheme analysis. (Morpheme correctly appearing is indicated by (✓); morpheme absent in obligatory context is indicated by (-). Numbers refer to utterance identification from transcript.)



rules. Lee (1974, p. 137) states that this sentence point "is at least a gesture toward acknowledging that there are many more grammatical forms to be considered than the eight categories on the DSS."

A DSS of 4.20 was computed for Jay's sample. This score falls below the 10th percentile for children 41 months of age, indicating that Jay may be a candidate for language intervention. (Of course, collateral assessment data must also be considered in making this decision.) Jay demonstrates a range of developmental levels in all eight DSS categories, but most scores fall in the first and second DSS levels, indicating somewhat limited and immature forms, relative to his age. This is especially characteristic of his use of indefinite and personal pronouns. Jay gets many "attempt" marks in the primary verb category, indicating copula and auxiliary verb omissions as well as inappropriate verb tense and number agreement. Only seven instances of secondary verbs are noted. Finally, Wh-questions are limited to *what* and *where*, with 3 out of 6 instances of failure to invert subject and verb in question forms. Jay earned 26 out of a possible 50 sentence points, indicating he is using sentences that meet adult grammatical standards about half the time. The DSS analysis of Jay's transcript is shown in Table 2.

### Language Assessment, Remediation, and Screening Procedure

The Language Assessment, Remediation, and Screening Procedure (LARSP), developed by Crystal, Fletcher, and Garman (1976), describes the child's productive language from a structuralist orientation. But as the authors point out, this "does not preclude using certain transformational notions; indeed, the grammatical framework on which (this) approach is based frequently incorporates them" (p. 35). The child's language system is segmented for analysis into four levels of structural organization: sentence, clause, phrase, and word types.

Use of the LARSP requires eight scans of the transcript to complete the analysis of the four grammatical levels. The first scan determines the range of sentences that can be analyzed. The second scan establishes the proportion of spontaneous sentences to response sentences. Scan 3 analyzes the level of sentence connectivity. Scan 4 surveys utterances for coordination, subordination, etc. Scan 5 analyzes clause structure (e.g., subject, verb, complement, etc.) and the range of constructional types established (SV, SVA, etc.). Scan 6 analyzes phrase struc-

ture (e.g., NP, VP, etc.). Scan 7 analyzes word-structure patterns (e.g., bound morphemes). And finally, Scan 8 attempts to clarify "problem" utterances identified in Scan 1 (Crystal et al., 1973, pp. 94-98). Information from these scans is then summarized by frequency counts on the Profile Chart in the LARSP handbook (see Figure 2).

Analysis of Jay's production shows the majority of his clause level types to be within LARSP's Stage III (2;0-2;6 years), with some evidence of emerging clausal constructions in Stage IV (2;6-3;0 years). However, developmentally immature clause types characterizing Stage II development continue to occur, as expected, indicating Jay shows a range of constructions across at least three stages of development. Similar conclusions can be drawn about the phrase level of construction.

Elaboration of the noun phrase, verb phrase, and adverbial phrase at least through Stage IV is evident, indicating growing complexity in expansion at this level of sentence structure. For example, Jay uses 14 utterances classified as XY+C/O: NP (Stage IV). This indicates utterances that have either a complement or object which expands as a noun phrase, along with two other elements of clause structure (e.g., a subject and verb).

Data for some phrase and word level constructions are summarized on the LARSP worksheet, using frequency-of-occurrence information for each structure. This gives the clinician no impression of the proportion of correct realization of forms in obligatory context. For example, Jay's profile chart notes five occurrences of the copula (Stage III), but neglects to inform how many instances of obligatory contexts for this structure exist.

LARSP handles this "problem" by use of an "error box" at Stage VI. At this point in the profile chart, the developmental summary is directed to an analysis of the child's "errors" (which, as Crystal (1979, p. 97) points out, indicate "sign(s) of development, not of failure"). The apparent problem is resolved then, by counting the number of copulas omitted from obligatory contexts, for example, and noting them in the Stage VI error box under *Other*. Crystal (1979, 96ff) cautions that the "negative features" listed at Stage VI are invoked only when there is independent evidence in the language sample that the particular grammatical feature has begun to be acquired. In Jay's case, the copula form has begun to emerge (Stage III: Cop 5) but has not developed into consistent adult-like usage (Stage VI: - Cop 13), and this aspect of his development is reflected in the LARSP profile (Crystal, personal communication, 1980).

## Language Sampling, Analysis, and Training

The Language Sampling, Analysis, and Training (LSAT) procedure (Tyack and Gottsleben, 1974), unlike the tools used so far, does not yield an age-equivalent score. Instead, it provides the clinician with a set of baseline data and a group of constructions to be used in establishing therapy goals. A sample size of 100 utterances is suggested for analysis. After scoring each sentence for number of words and morphemes, a word-morpheme index is computed, which is an average of words/sentence and morphemes/sentence measures. One-word/one-morpheme utterances are excluded from the index. This results in a somewhat higher value than does the method for MLU computation, particularly in Brown's Stages I and II. Forms and construction in the transcript are scored and sorted into categories on a "Sequence of Language Acquisition" worksheet. Each is marked correct, incorrect, or absent in obligatory context. Forms and constructions are finally assigned to six categories relative to the level assigned the child by the word/morpheme index. Those present that are at or above the child's level are considered baseline structures. Those whose usage is below the assigned level are considered goals for remediation. Jay's baseline and goal worksheets are shown in Figure 3.

Jay's word/morpheme index is 3.68 by this analysis and is assigned to Level III. The forms and constructions that appear on his goal data worksheet are:

Pronouns:	<i>she*</i> , <i>them*</i> , <i>I</i> , <i>he</i> , <i>they</i> , <i>mine</i>
Plurals:	<i>/s/</i> *, <i>/z/</i> , <i>/əz/</i> *
Conjunctions:	<i>and*</i>
Modals:	<i>hafta*</i> , <i>will</i>
Particles:	<i>up</i> , <i>down</i>
Copula:	<i>is</i> , <i>'s</i> , <i>is are</i>
Auxiliary:	<i>is</i>
Third person singular:	<i>/s/</i> , <i>/z/</i> , <i>does</i>
Past tense:	regular, irregular

The items marked with an asterisk\* do not appear in the transcript; the others appear but are used inconsistently. The LSAT contains no caveat on this score, but caution should be used in developing remedial procedures for structures that simply do not appear in the transcript. The transcript is, after all, only a sample. One would not necessarily expect everything the child knows to appear in it. This is particularly important considering that the recommended sample size is 100 utterances. Only with a larger sample taken in a variety of contexts, including attempts to elicit missing constructions, could the absence of a form be considered a definite problem.

## GRAMMAR WRITING

In addition to comparing the LARSP, DSS, ASS, MLU, 14 morpheme, and LSAT methods of grammatical analysis, a generative grammar for the speech sample under investigation was written. The original purpose in writing the generative grammar was to compare the grammar, which was thought to represent the most complete form of analysis, with the other methods of analysis that were felt to be "shortcuts" in the sense that they classified sentences into predetermined categories. With an individual grammar it is possible to observe and describe the structures that actually appear in the speech sample and to devise a unique formalization for them. There are, however, problems inherent to the grammar writing process.

The first arises from the fact that we are dealing with a *sample* of the child's speech. This is related to what linguists call the competence/performance distinction. That is, we assume that a speaker has some implicit knowledge of the rules of the language (competence) that underlies the production of sentences. For a variety of reasons, this knowledge is not always applied perfectly in the act of talking (performance). Linguists have considered speech to be a somewhat unreliable indicator of knowledge of a language, since people make mistakes, get careless, and operate under certain memory and attention constraints when talking. A linguist would not want to conclude that a person does not "know" a rule simply because he or she does not use it in a short sample of speech or even because he or she occasionally uses it incorrectly.

In studying Jay's transcript, we are repeatedly faced with the problem of deciding whether he lacks particular rules of adult grammar simply because we do not see them used in this sample. We also face the problem of deciding how to treat variability in the rules Jay uses. In the early studies of child language, Brown (1973) and Cazden (1968) set the criterion for rule acquisition at 90% correct usage in obligatory contexts. In other words, only when a child used a grammatical form correctly in 90% of the situations in which adult grammar requires it, was the child given credit for having acquired the rule. But considering the competence/performance distinction especially in children just acquiring rules, it would not be surprising if factors such as memory and attention had a good deal of influence over whether or not rules in the process of being mastered were allowed to operate. If a rule appears to operate correctly some of the time, we might want to give the child credit for its productive use, since the child's grammar does in

**Table 2. DSS analysis of transcript**

Name: Jay Recording Date: 3-9-78 Birth Date: \_\_\_\_\_  
 CA: 3;5 DSS: 4.20 (<10th percentile)

Transcript Number	31	40	59	17	19	3	3	12	26	210
	Indefinite Pronoun	Personal Pronoun	Primary Verb	Secondary Verb	Negative	Conjunc- tion	Interrogative Reversal	Wh-Q	Sentence Point	Total
19										
20										
22										
23										
25										
26										
31										
32										
*33										
37	1		—					2	0	2
39	1	3	4						1	3
40	1	1	—						1	9
42			1						0	2
43		1,3	1						1	2
47	1		—				—	2	1	9
49	1	1	4		4				0	3
51		1	inc.		4				1	11
54	1		—						1	6
55	1		1				↑		0	1
57	1		1				↑		0	2
58	1		1				1	2	1	6
60	1		—				1	2	0	4
61	1		1						0	2
62		1	—	2					0	3

65	Let me get in there.	1	1	2	1	1	5
67	Me hurt my arm.	-	1	2	0	2	2
68	Danny give me it. (For "Danny gave it to me.")	1	1	-	0	2	2
71	There ain't no more.	-	1	-	0	3	3
73	Turn it around!	1	1	-	1	3	3
75	This going up.	1	1	-	0	1	1
76	It's getting fire.	1	1	-	0	2	2
78	Where is them?	-	1	-	0	3	3
79	Oh, there's the fire.	1	1	-	1	2	2
80	See that fire hat?	1	inc.	-	1	2	2
81	It's a fire.	1	1	-	1	3	3
81A	See the fire?	1	inc.	-	1	1	1
84	These are the firemans.	3	2	-	0	5	5
85	It's a big man in there.	1	1	-	1	3	3
86	I'll get fire.	1	4	-	0	5	5
89	Here's the fireman.	1	1	-	1	2	2
90	He's trying to get him out.	2,2	1	5	1	11	11
92	This is the elevator.	1	1	-	1	3	3
95A	Now her getting off the elevator.	-	-	-	0	0	0
96	Bring the other people.	3	1	-	1	5	5
97	That doesn't go.	1	6	7	1	15	15
103	No, her momma say, "No."	2	-	-	0	2	2
104	Then the fire would kill him.	2	6	-	1	9	9
105	You can jump.	1	4	-	1	6	6
108	Me wanna go outside.	-	1	2	0	3	3
108A	"Doggie, come up," and now, okay.	-	1	-	0	4	4
109	The fire comes up.	-	2	-	0	2	2
110	You gotta go to bed right now!	1	-	2	0	3	3
112	"('Cause) I don't want to."	1	4	4	1	10	10
113	This guy is.	1	inc.	-	1	2	2
114	He hurt himself.	2,5	1	-	1	9	9
116	What that fire engine doing up on the roof?	1	inc.-	-	0	3	3
117	They wanna sleep together.	3	1	2	1	7	7
118	I wanna get out now.	1	1	2	1	5	5

\*The last 50 S-V utterances of sample used for DSS (Lee, 1974, p. 67).

<b>A</b>	<b>Unanalysed</b>	1 Unintelligible 10 2 Symbolic Noise 3 Deviant			<b>Problematic</b>			1 Incomplete 4 2 Ambiguous 1					
<b>B</b>	<b>Responses</b>	Stimulus Type	Totals	Repetitions	Normal Response				Abnormal		Problems		
					Elliptical Major				Full Major	Minor		Structural	Ø
					1	2	3	4					
121	Questions	87	3	16	7	4		21	35	2	21	2	
103	Others	16	4	1	1			3	5	1	1		
<b>C</b>	<b>Spontaneous</b>	70		8	Others		62						

<b>Stage I</b> (0;9-1;6)	Sentence Type	Minor		Social		Stereotypes		Problems			
		Major		Sentence Structure							
		Excl.	Comm.	Quest.	Statement						
<b>Stage II</b> (1;6-2;0)		"V"	"Q"	"V"	"N"	Other		Problems			
			6	2	3	4					
		Conn.	Clause		Phrase		Word				
<b>Stage III</b> (2;0-2;6)		Vx	Qx	SV	VC/O	DN,	VV	-ing			
		1	2	10	2	24		6			
				8	2	8		9			
<b>Stage IV</b> (2;16-3;0)		+S	QVS	SVC/OA	AAXY	N Pr NP	Neg V	'cop			
				4	1	Pr D Adj N	Neg X	5			
				1		cX	2 Aux	'aux			
<b>Stage V</b> (3;0-3;6)	how what	tag	and	Coord. 1	1+	Postmod. 1	1+	-est			
			c	Subord. 1	1+	clause		-er			
			s	Clause: S		Postmod. 1+	phrase		-ly		
<b>Stage VI</b> (3;6-4;6)	Other	(+) NP		VP		Clause		(-) NP		VP	Clause
		Initiator	Complex	Passive	Complement	Pron 7	Adj Seq	Modal 1	Concord 2		
		Coord				Det 2	N Irreg 1	Tense 5	A position		
<b>Stage VII</b> (4;6+)	Discourse	A Connectivity		it		Other		Cop 13		Aux 2	
		Comment Clause		there		Style					
		Emphatic Order		Other							
Total No. Sentences		153		Mean No. Sentences Per Turn		1.22		Mean Sentence Length		2.82	

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Figure 2. LARSP Profile chart: Developmental stages. (©D. Crystal, P. Fletcher, and M. Garman, 1975 University of Reading, reprinted by permission.)

**Language Sampling, Analysis, and Training: Baseline Analysis**

D. Tyack and R. Gottsleben

Child Jay Age 3;5 Sex (M) F Sample Date \_\_\_\_\_

Referral Source \_\_\_\_\_ Clinician \_\_\_\_\_ Level: III

Reasons for Referral:

Background Information:

Data for items A through F on this form are obtained from the Sequence of Language Acquisition form. With the child's Level as a reference point, list below forms and constructions mastered; list on the reverse side, forms and constructions which appear inconsistently or not at all in his language sample. In planning for training on Negatives, Questions, and Complex Sentences, refer directly to the SLA form since these categories are not summarized on this form.

**BASELINE DATA**

A. Forms and constructions mastered\* at and below assigned level.

<u>Forms:</u>			
<u>Pronouns</u>	<u>Demo:</u>	<u>Modals</u>	<u>Constructions</u>
II me	I that	I wanna	I N, Mod+N, Quant+N
my	II this	II gonna	Poss+N, V+N, N+V
it	III these	Pres progressive	N+Ø cop + N/adj.
III you	<u>Locatives:</u>	II -ing	II V+Mod+N
<u>Prep</u>	I here, there		N+V+N
II in	<u>Articles</u>		III V+N+N, M+V+N
on	II a, the		N+V+N+N
III with			
to			

B. Forms and constructions mastered\* above assigned level:

<u>Forms:</u>		
<u>Pronouns:</u>	<u>Demo:</u>	<u>Constructions:</u>
II him	II those	IV N+M+V
we	<u>Modals</u>	N+M+V+N(+N)
V her (poss.)	II can	
<u>Prep</u>	II can't	
IV up	don't	
V down, off, of, at	gotta	
	won't	

C. Unclassifiable forms and constructions:

right over there  
 my too little  
 the other ( ) over there  
 This is where the gas...  
 down the bathroom  
 right here  
 get burned

\*Mastery is defined as correct occurrence of the structure 90% or more in obligatory contexts.

**Figure 3.** Language Sampling, Analysis, and Training: Baseline analyses and goal. (Reproduced by special permission from Language Sampling, Analysis and Training by Dorothy Tyack and Robert Gottsleben, © Copyright 1974, published by Consulting Psychologists Press, Inc.)

Language Sampling, Analysis, and Training: Goal Analysis

D. Tyack and R. Gottsleben

GOAL DATA

D. Forms and constructions at or below the assigned level which do not appear:

Forms:

<u>Pronouns:</u>	<u>Modals</u>	<u>Constructions</u>
III she, them	III hafta	I Adj.+N
<u>Plurals:</u>	<u>Particles</u>	V
II -s, -z	I up, down	
III -əz		
<u>Conjunctions</u>		
III and		

E. Forms and constructions at or below assigned level which appear *inconsistently* (i.e., less than 90% in obligatory contexts). Show these as fractions with no. of correct responses over no. of obligatory contexts.

Forms:

<u>Pronouns:</u>	<u>Copula</u>	<u>Constructions</u>
I I	III is, 's is aux	III N+is+N/adj.

F. Forms and constructions above the assigned level which appear *inconsistently*:

Forms:

<u>Pronouns:</u>	<u>Copula</u>	<u>Constructions</u>
IV he, they	IV are	
IV mine	3rd pres	
<u>Modals</u>	IV -s, -z, does	
IV will	Past	
	IV /d/, irreg.	

Other factors relevant to training program:

Figure 3. (continued)

fact sometimes generate well-formed sentences by means of this rule. We could then hypothesize that correct sentences were generated by a grammatical rule that is sometimes prevented from operating by performance constraints. If the rule is a fairly recent acquisition, we might conjecture that it would require extra attention, focusing, or planning and would therefore be more susceptible to violation than stable rules. Such performance factors might account for some of the variability with which the rule is used.

Whether or not this speculation as to the reason for variable application of grammatical rules is correct, the fact that the transcript reveals several cases of variable use requires a grammar to describe this variation in some way. It would not be satisfactory merely to accept the criterion of 90% correct usage and say that Jay does not "have," for example, a contractible copula. He clearly *has* it, since he uses it about 50% of the time, and in writing a grammar we must assume that it is generated in these instances by a rule. We want the grammar to provide a mechanism for generating variable forms, although we may set aside for the moment the question of why they are used only variably.

For these reasons, we have made the decision to abandon the traditional criterion for acquisition. In cases where there is greater than 90% but less than 100% correct usage, we will revert to the usual procedure and consider these forms stable acquisitions, rather than including them among the variable rules. (We have only one instance of less than 100% but greater than 90% correct usage—the articles *a* and *the* in obligatory contexts.) For those forms or constructions used in 50%-90% of the obligatory contexts, we will hypothesize the existence of a grammatical rule that is applied variably because of unspecified performance constraints. The lower limit is arbitrary. In Jay's sample all the forms that appeared were used in at least 50% of their obligatory contexts. Also, we would not want to attribute knowledge of a rule to the child if the rule were applied only once. We would want to see some repeated use in a variety of lexical and situational contexts in order to hypothesize that the rule is in fact productive.

Another problem with grammar-writing involves the assumption of the model of adult grammar. This assumption is made because the adult grammar is the language children are learning. To write a grammar, we formalize the rules we see operating, using the same conventions used to formulate rules for adult grammar, and note similarities and departures when they occur. There are two

dangers in this approach, however. The first is that the formal characterization of many aspects of adult grammar is still a matter of debate among linguists. There is no complete adult grammar that is universally accepted to which we can refer. The model used here has been a relatively standard transformational approach (Akmajian and Heny, 1975) that is generally accepted among linguists, although points of disagreement still exist in many of its details. The model proposes that there are a set of phrase structure rules that specify the constituents of base sentences and show the hierarchical order and relations among these constituents. Transformations are hypothesized to act on these base sentences to produce derived structures, or variants of deep structures. These transformations may reorder elements ("I called up Jan" → "I called Jan up"), insert elements ("Three kids are on tape" → "There are three kids on tape"), or delete elements ("Give it to me" → "Give me it"), and copy elements into another part of the sentence ("She doesn't like yogurt" → "She doesn't like yogurt, *does she?*"). This much of the model is generally accepted, but when it comes to formalizing some of the phrase structure and transformational rules, disagreements occur. We have simply accepted the Akmajian and Heny formulations as representative of a fairly conservative linguistic position. However, we must bear in mind that these rules, to which we are comparing those we can write for children, are not "proven" in any sense. There is always a risk that the model to which the child's grammar is being compared is in error.

A second danger in comparing the child's grammar to the adult's lies in the possibility that the child does not acquire adult grammar directly during the language-learning period. It is possible that children construct a preliminary set of rules that will later be reanalyzed into the adult system. Ingram (1975) suggests, for example, that the preoperational child may develop only a phrase structure grammar that generates complex sentences by juxtaposition of simple sentences, not by transformational rules. The phrase structure grammar is not reorganized to include transformations, according to Ingram, until the child achieves concrete operations. The grammar written for Jay ignores the possibility of this kind of restructuring and assumes that adult grammar is a valid model for describing the child's system. However, we should be aware that this assumption may be incorrect.

### Mechanics of Writing a Grammar

In order to write a grammar, we must first choose sentences to include in it. We decided to use only



those that contained both a noun phrase and a verb phrase (unless the sentence was a command), since this is the standard definition of a sentence. We did not want to be in the position of saying that the child had "omitted" a complete subject or predicate because these "omissions" are often the correct form of answering questions in conversation. To avoid penalizing Jay for answering questions in the pragmatically appropriate way, we simply excluded those utterances that consisted of either a noun phrase or verb phrase alone.

Next we assigned each word in the sentence to one of the following categories:

- noun (N)
- personal pronoun (pron)
- verb (V)
- adjective (adj)
- demonstrative pronoun (demo pron)
- preposition (prep)
- adverb (adv)
- determiner (det)

Under the verb category there were certain sub-classifications:

- auxiliaries (aux): modals (M), catenatives (cat)
- copula (cop): *be* and its forms

As the words were labeled, the following sentence constituents were also identified:

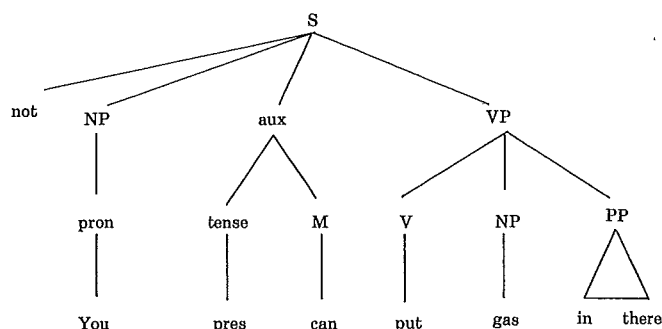
- sentence (S)
- noun phrase (NP)
- verb phrase (VP)
- auxiliary (aux)

The NP, VP, and aux of each sentence were then listed. For example, the sentence "We can get the firetruck" would be described as follows:

- NP → pron
  - aux → M
  - VP → V det N
- (The symbol → is read: "is expanded as")

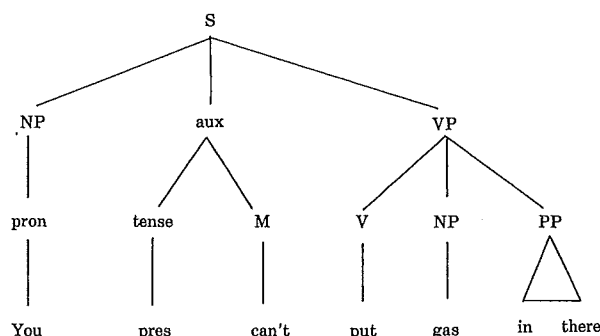
After the constituents of each sentence had been listed, the various expansions of NP, aux, and VP were collapsed into a set of phrase structure rules. When the phrase structure rules had been written, another pass was made through the transcript to look for transformations. This was done by simply identifying sentences that did not exhibit the standard NP-aux-VP form. In each case, the base structure of these sentences was identified and written out, and the type of transformation that appeared to generate the surface sentence was noted. Negative

sentences and questions were considered to include obligatory transformations to place the negative and question elements. For example, the sentence "You can't put gas in there" would be analyzed as follows:



(Read: apply negative insertion and contraction transformations)

→ negative insert,  
contraction



Each transformed, or nonkernel, sentence was analyzed to discover whether or not it fit the adult model. When a sentence did not, an attempt was made to write a new rule that could systematically generate utterances like the ones present in the transcript.

The following symbols were used in writing the phrase structure rules:

- { } rows within the braces are mutually exclusive. If one row is chosen, no other can be.
- ( ) what is inside the parentheses is optional; i.e., it may or may not be chosen.
- { { } } either one row within the braces or nothing may be chosen.
- < > % We have borrowed Labov's (in Wolfram and Fasold, 1974) angle-brace notation to indicate variable usage of a constituent, and have noted its percentage of occurrence.

Elements not enclosed in braces or parentheses are obligatory.

The following are the phrase structure (PS) rules for Jay's grammar:

- S → ((not)) NP aux VP  
 NP → (det) (adj) N (pp)  
 aux → tense
- $$\left( \begin{array}{l} M \\ \text{cat}_1 \\ \langle \text{be} \rangle_{67\%} \left\{ \begin{array}{l} \text{ing} \\ \text{cat}_2 \end{array} \right\} \end{array} \right)$$
- VP →  $\left\{ \begin{array}{l} \langle \text{cop} \rangle_{50\%} \text{ NP} \\ -\text{cop} \left\{ \begin{array}{l} \text{adj} \\ \text{adv} \end{array} \right\} \\ V \text{ (NP)} \left\{ \begin{array}{l} \text{(NP)} \\ \text{(pp) (adv) (adv)} \end{array} \right\} \end{array} \right\}$
- det →  $\left\{ \begin{array}{l} \text{possessive pron} \\ \text{article} \\ \text{quantifier} \\ \text{demo adj} \end{array} \right\}$
- adj → (adv) adj
- N →  $\left\{ \begin{array}{l} \text{demo pron} \\ \text{pron} \\ \text{noun} \\ \text{present} \\ \langle \text{past} \rangle_{60\%} \end{array} \right\}$
- tense →  $\left\{ \begin{array}{l} \text{can} \\ \text{will} \end{array} \right\}$
- M →  $\left\{ \begin{array}{l} \text{gotta} \\ \text{wanna} \\ \text{lemme} \end{array} \right\}$
- cat<sub>1</sub> →  $\left\{ \begin{array}{l} \text{gonna} \\ \text{trynta} \end{array} \right\}$
- cat<sub>2</sub> →  $\left\{ \begin{array}{l} \text{gonna} \\ \text{trynta} \end{array} \right\}$
- cop → be
- pp → preposition NP

### Analyzing the Phrase Structure Rules

Our analysis reveals that it is possible to write a phrase structure grammar for Jay that closely resembles the phrase structure grammar we would write for an adult. At the sentence level, Jay's grammar contains at least three sentence types: statements, negative statements, and questions. Adults may have a greater variety of underlying sentence types in their repertoire, and indeed Jay may have more than those we find in this sample. But he is at least able to produce sentences that negate and question.

Jay's NP elaborations are similar in form to those of adults. The NP contains optional determiner and adjective elements that always occur before the noun and an optional prepositional phrase that follows it. An adult grammar would contain a greater variety of NP elaboration, including embedded sen-

tences. We will consider the matter of embedding more fully in the analysis of the auxiliary system. As we will state many times in this section, we cannot be sure that Jay cannot embed simply because he does not in this sample. We do have some evidence for not giving him credit for complex sentences, however, which we will explore in the next section.

In discussing NP elaboration, we are being somewhat less complete and explicit than we would be in the ASS procedure. We have not specified the inclusion of particular prepositions, for instance. We have merely noted the appearance of *classes* of words. A complete grammar would include lexical (word) insertion rules for each of the grammatical classes. We have not gone this far, except in cases where errors of lexical insertion are committed (in the case of pronouns), or where a very limited number of words is involved (catenatives). By looking at lexical insertion rules for only a few word classes, we do lose some information.

The auxiliary component of English is one constituent of adult grammar that is acquired over the course of several stages of language development. We would expect, then, to see some variation from adult grammar in Jay's auxiliary system. The auxiliary PS rule for adult grammar is usually written as follows:

aux → tense ((M) (have -en) (be -ing))

indicating an obligatory tense element (expanded as *past* or *present*) that may be followed by a modal (*can*, *will*, *must*, or *may*), *have* and its accompanying perfective affix (-en), and *be* with the progressive affix (-ing). In the generative model, these affixes are placed on the verb following each auxiliary element by a transformation called "affix hopping." Since the last three elements are in parentheses, one, two, all, or none of them may be chosen, but those used will be placed in the order specified in the rule. Therefore, sentences like the following are possible in adult grammar:

She pres will have en be ing live here for a year → (affix hopping)

She will have been living here for a year.

He past have en be ing wash dishes → (affix hopping)  
 He had been washing dishes.

It past may be ing rain → (affix hopping)  
 It might be raining.

They past get a new car → (affix hopping)  
 They got a new car.

The rule for Jay's auxiliary system is quite different, however. The first obvious difference is the

absence of *have* and its perfective affix. There is no evidence of this form anywhere in the transcript, although, of course, we cannot be sure it does not exist in Jay's grammar. There are obligatory contexts for auxiliary *have*, however, in which it never appears. Nor does the catenative *hafta* show up. These facts lend some credence to the assertion that *have-en* is absent from the system.

The second major difference between Jay's rule and the traditional adult formulation lies in the inclusion of catenatives in the auxiliary. Most researchers in child language (Brown, 1973) have considered catenatives to be unanalyzed wholes rather than combinations of affixed verb and infinitives (e.g., *gonna*=going to). To consider the catenatives as main verbs requires us to analyze the verb phrases that follow them as embedded sentences, because the definition of a simple sentence requires that it takes only one main verb. Since there is no evidence of any other form of complex sentence in Jay's sample if we exclude sentences containing catenatives, and since the catenatives appear to function more like modals than like main verbs, we have decided to include them within the auxiliary.

We have subcategorized the catenatives into two groups. The first set includes *gotta*, *wanna*, and *lemme*. Although *lemme* is not usually considered a catenative, we have placed it in this group because it appears to function as an unanalyzed whole and because to consider it a main verb would require us, again, to give credit for complex object complements that is not justified by other evidence in the transcript. The words in this group are similar in that they appear to contain no affix. They are simply "stuck in," as modals are, before main verbs. They have no effect on the form of the following verb. They are also never preceded by another aux constituent. The second set of catenatives, *gonna* and *trynta*, shows evidence of being analyzed by the child as containing an affix *-ing*. This evidence lies in the fact that a form of auxiliary *be* sometimes precedes these words, just as it sometimes precedes other progressive forms. This distinction between catenative groups reveals a relationship of possible interest in auxiliary development. It appears that the forms containing implicit *-ing* begin to be analyzed before *gotta*, which contains implicit *-en* and requires a preceding *have*. We have pointed out that the auxiliary *be* appears frequently, although variably, in the transcript, while the auxiliary *have* does not appear at all. There may be a relationship between the child's analysis of catenative forms and the degree to which he controls the other auxiliaries that accompany them. This implies that the transition from catena-

tives to analyzed forms may take place individually, in accordance with relations to other aspects of the auxiliary system, rather than as a class. This would not be surprising because many other aspects of child grammar develop in this way (Slobin, 1973).

Note that in the LSAT, Jay is given credit for complex sentences containing *trying to*, simply because the catenative *trynta* does not appear in their list. It is clear from the transcript, however, that *trynta* only appears as an incompletely analyzed form, that sentences containing it parallel other catenative-containing sentences, and that there are no other instances of complement-taking verbs in the sample. Other differences between Jay's auxiliary system and that of adults are the absence of the modals *may* and *must* and the variable use of the auxiliary *be* with progressive verbs and catenatives.

There is some justification for postulating a *tense* element in Jay's auxiliary system. He marks verbs for *past* inconsistently (67% of the irregular past forms are marked in obligatory context, as are 50% of the regular verbs). Since there is some indication of this distinction between tenses, we hypothesize that Jay's grammar contains a *tense* element and that the *past* markers are used variably.

Expansion of the verb phrase for verbs other than the copula *be* is again very similar to the grammar we would write for adults, and as we saw in the noun phrase, the main difference is the absence of embedded sentences. Jay can string two NPs together in an indirect object-direct object construction ("Give me it."). Prepositional phrases and adverbs appear in the VP, and it is possible to choose any, all, or none of the forms in a VP expansion.

Jay's use of the copula does depart from adult usage, however. When adult grammar requires a form of *be* before an adjective or adverb ("The girl *is* happy"; "Mommy *is* home"), Jay omits it consistently, at least in this sample. The situation is more complicated when an NP follows the copula, however. *Be* appears variably in this case. Length of sentence does not appear to be the determining factor, since the copula appears in some of the longer sentences and is absent in some of the shortest. In examining the transcript it becomes clear that there is a difference between its first and second halves in terms of *cop-NP* use. In the first 80 utterances scored, the copula was present in 12% of the obligatory contexts preceding an NP. In the second 80 utterances however, it was present in 75% of the *cop-NP* contexts. (There were approximately equal numbers of obligatory contexts in each half of the transcript.) One might hypothesize on the basis of these data that a practice or modeling factor is

operating. Jay may be hearing the clinician's use of *cop-NP* constructions and modeling them in his own speech. We would expect something like this to happen with a form whose use is in transition, so that its appearance in input language might be particularly salient. It is interesting to note in this regard that Jay sometimes uses the wrong forms of the copula ("What are this thing?"; "Where is them?") in the second half of the sample. This fact, too, lends support to a "transitioning" hypothesis. As Jay attempts to expand the use of the copula in his speech, he is not yet in control of the forms required for particular linguistic contexts.

If this "transitioning" hypothesis is correct, it indicates that Jay is highly stimulable for the *cop-NP* construction. The LSAT suggests that this form be taught as part of a remedial program. But since Jay's usage implies that the copula (at least in the NP context) is highly stimulable, a wiser approach might simply be to model *cop-NP* constructions for the child and to expand them for him when they appear incomplete in his speech. When the NP becomes stable following the copula, a similar approach could be used with *cop* {<sub>adv</sub><sup>adj</sup>}. Structured remedial work can be reserved for constructions that show less spontaneous stimulability (pronouns, perhaps). Here it seems clear that a detailed analysis, including a search for constraints governing use of variable constructions in the child's speech, yields information with important remedial implications that would be overlooked by other analysis tools.

The next PS rule in the grammar involves the expansion of the element *determiner*. Here we note at least two major departures from adult grammar. We would expect to see a possessive form for nouns (NPs) in this category. Although Jay uses possessive pronouns, the possessive morpheme is never attached to nouns in this sample. Adult rules for the determiner might also include more combinations of elements, for example:

det → (art.) (ordinal no.) (cardinal no.) (adj) ...  
           the       first           three       red   ones...

But Jay only uses combinations of article and adjective ("a big man").

The adjective component in Jay's grammar reveals that he can optionally modify an adjective with an adverb ("That how many"). This is also common in adult usage.

The forms that can function as pronouns in Jay's grammar encompass those that function similarly in adult grammar. However, his lexical insertion rules for this category depart somewhat from those of adults. Standard English rules require that pronouns [+subjective] (*I, we, he, she, it, you, they*) be

placed in subject position, while those marked [-subjective], or perhaps [+objective] (*me, him, them, her*), must be used as objects of verbs and prepositions. All Jay's errors with pronouns involve using a [-subjective] pronoun in subject position. This substitution is not consistent, however (22% *me/I*; 100% *her/she*; 50% *them/they*). Examination of the transcript reveals no overriding regularity that governs these substitutions. We might formalize this fact in this way:

Personal Pronoun $\left[ \begin{array}{l} \{ +\text{subjective} \} \\ \{ -\text{subjective} \} \\ + \text{_____ VP} \end{array} \right]$	}	Personal Pronoun $\left[ \begin{array}{l} -\text{subjective} \\ +[\text{NP V _____}] \end{array} \right]$
---	---	--

A subject or object pronoun may occur in subject position, while only an object pronoun can occur in object position. Although the grammar is not able to specify the context in which the object/subject substitution takes place, it does point out the systematic nature of Jay's pronominal errors.

The prepositional phrase in Jay's system has the same form as it does for adults, although the range of prepositions that appear in the sample is somewhat limited. As pointed out above, this grammar does not distinguish among the prepositions or score the ones Jay uses for order of acquisition. We merely give him credit for controlling this class of words.

The PS rules, then, have revealed a number of facts that were not evident from our other forms of analysis. First of all, they point out a lack of embedding, or complex sentence formation, in the elaboration of either noun or verb phrases. Jay's use of the copula is variable, with certain constraints. It never appears before an adjective or adverb alone. Its appearance before an NP increases in frequency in the second half of the transcript. We take this to indicate that Jay is modeling the clinician's use of copulas. Jay's errors in the use of personal pronouns consist only of substitutions of object for subject forms in subject position. His use of the auxiliary *be* with present progressive forms is variable (57%), although the *-ing* is realized in all cases. Jay's grammar appears to contain a tense element. The *past* aspect of tense is realized variably, however. Catenatives (*gonna, gotta, trynta, and lemme*) seem to function more like auxiliaries than main verbs, since there is no evidence in the transcript of any other main verbs that can take object complements to form complex sentences. However, there do seem to be subclasses within the catenatives. *Gonna* and *trynta* show evidence of being analyzed as containing an *-ing* affix since they are sometimes preceded by *be*. *Gotta, wanna, and lemme* show no such evidence.

## Transformational Rules

In accordance with the decision to write a generative grammar for Jay's speech sample, we have made use of the notion of transformational rules. These rules add, delete, reorder, or copy elements in base sentences to produce stylistic variations in surface utterances. Any utterance that does not exhibit the kernel NP-aux-VP form is hypothesized to be the result of one or more transformations performed on an underlying sentence.

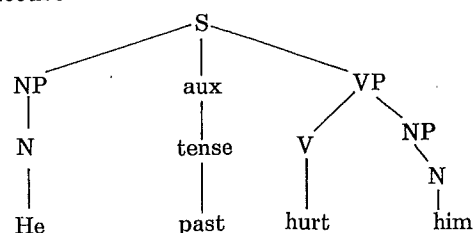
The use of transformational rules in this sample is not meant to imply that these rules are considered "psychologically real" for the child. We have made no attempt whatsoever to address the question of how the grammar actually operates. Our purpose is only to *describe* a child's speech by means of the same conventions that have proved useful in describing the language of adults. To do so, we have taken a rather conservative generative model of adult grammar and simply asked, "Could these same hypothetical rules be used to describe the sentences seen in this transcript?" The intent of this grammar is to describe the child's system in as much detail as possible, and to compare it to the language of adults. No attempt has been made to explain the actual mechanisms by which the child's sentences are generated.

One example of a transformational rule that can be applied successfully both to the adult's and to Jay's grammar is called *reflexivization*. It has been formalized in the following way (Akmajian and Heny, 1975):

Reflexivization (obligatory)  
 SD: NP-aux-V-X-NP  
     1 2 3 4 5  
 SC: 1 2 3 4 5 [+reflexive] Condition: 1=5

The formalization can be read as follows: SD (structural description) describes what we assume to be the underlying form of the sentence. In this case, it contains the familiar constituents noun phrase, auxiliary, verb, and an *x* that represents "anything or nothing." In other words, what comes between the main verb and the NP to be reflexivized is irrelevant to the reflexivization rule. The condition on the transformation states that element 1 must refer to the same person or thing as does element 5. The fact that the rule is obligatory tells us that when the structural description, including the condition 1=5, is met, the transformation must operate to produce the given SC (structural change). It changes element 5 to a reflexivized form. Since the only reflexivized forms in English are pronouns, the rule implies pronominalization. For the sentence from Jay's tran-

script "He hurt himself," we postulate the underlying structure



which is transformed by reflexivization to "He hurt himself." This rule can be said to operate for Jay as it does in adult grammar.

There is similar evidence for several other transformations that appear to function in this transcript as they do in adult speech. These include the placement of the negative element, the insertion of *there*, the placement of indirect objects, the formation of imperative sentences, and the contraction of negatives and verbs. Some of these appear only once or twice, so that it is difficult to know whether they function as rules or can only be used in a few memorized contexts. The "affix-hopping" transformation operates as it does in adult grammar only for those auxiliaries that have been fully analyzed by the child's system. The *-en* affix is never placed correctly, and past affixes are used inconsistently. The affix *-ing* is placed correctly in all contexts, even when the required form of *be* does not appear.

There are at least three contexts in which Jay's grammar cannot be described by the same transformation that applies to the adult system. The first involves number agreement, which in adults, chooses verb forms that agree with subjects in person and number. In Jay's sample, however, we sometimes find incorrect forms in these slots, for example, "Where is them?". Since there are instances of number agreement in the transcript both with forms of *be* and third person singular, we can conjecture that Jay does apply a number agreement transformation, but again, uses it variably, perhaps as a result of performance constraints. (The 14 morpheme analysis also deals in part with this issue, in looking at third person singular forms. It is a more limited analysis, however, because it only looks at a particular set of instances of agreement and not at the various forms of *be*. In doing the 14 morpheme analysis, we count only the correct appearance of *be* and do not distinguish between absent and incorrect forms.) The variability of this rule in Jay's grammar might be interpreted either to mean that the rule is not stable and so is not always applied, or that the particular forms to be used in agreement have not been fully analyzed. We cannot really choose an interpretation on the

basis of this sample, but the existence of the general agreement rule and its variability is of interest in planning a remedial program.

There are two other transformations that appear to operate as unstable acquisitions in the sample. They are the Wh-question and "do-support" transformations. Yes/no questions appear to be marked only by rising intonation, although we cannot be sure Jay never inverts subject and auxiliary to form the adult yes/no question. Jay is sometimes able to form Wh-questions but it is interesting to note that in three of the six instances of these questions, something else "goes." "Where is them?" and "What are this thing?" involve incorrect number agreement. "What happen?" shows absence of past tense affix. In other Wh-questions, the auxiliary or copula is simply omitted, although there are two instances of correct inversion.

Jay's use of the "do-support" transformation is related to his use of questions. "Do-support" provides for *do* to be inserted when an affix is "stranded" without an immediately following verb by the insertion of *not* or the formation of a question. Although its description is not a matter of complete agreement among linguists, it can be tentatively formalized as follows:

SD:	x	tense	
	1	2	
SC:	1 do #	2	Conditions: x is not M or V

In other words, "do-support" will only operate when *tense* is not adjoined to a verb. This situation occurs after a negative insertion or question transformation has operated. For example:

He pres go → (neg insertion) He pres not go  
 (affix hopping) → He pres not go (The transformation is blocked because no V follows *tense*.) insert *do*  
 (affix hopping) → He does not go.

Jay inserts *do* correctly in all negative sentences that require it. In questions requiring *do*, he consistently omits it.

It appears from this analysis that in forming questions, Jay sometimes abandons rules that are at least somewhat stable when he forms statements. The question transformation itself does not appear to be completely formulated in Jay's system, and its application seems to have the effect of disrupting the application of other rules that can apply in conjunction with it; most notably number agreement, "affix-hopping," and "do-support." In the case of "do-support" there is evidence that it is violated only in the context of questions and is relatively stable in negative statements.

All this leads to a rather simple conclusion: Jay has trouble forming Wh-questions. Although this point would probably be clear from the other forms of analysis as well, the examination of transformations does reveal that not only is Wh-question transformation itself a problem, but it also appears to affect the application of other rules that may accompany it. We might go so far as to say the application of the question transformation decreases the probability of correct application of number agreement, "affix-hopping," and "do-support."

Our analysis of Jay's use of transformations reveals that those that are most unstable are those that concern auxiliaries and their effects on main verbs. This corroborates our analysis of Jay's PS grammar in that there, too, the greatest departures from the adult system were seen in the auxiliary component. This should not come as any surprise since we know from research in child language that the English auxiliary system takes a long period of time to develop.

In general terms, then, the grammar we have written for Jay points out the same areas of difficulty as do some of the other analyses. But the grammar also gives information about constraints on particular constructions, environments in which constructions are more or less likely to occur, and the interaction of some linguistic processes with others. The ASS and the LSAT come closest to the grammar in providing descriptive information about the structures that turn out to be most important for making remedial decisions for Jay. When we compare the level of detail afforded by the grammar with that of the other tools, the descriptive advantages of ASS and LSAT become clear. This high degree of descriptiveness is most useful in planning a remediation program. There may even be times when a clinician interested in prescribing remedial activities would write a partial grammar for those aspects of the system identified as problems by another analysis. This procedure could highlight such qualities as stimulability or influence of some structures on others, and might help determine the order of remedial targets.

### COMPARING ACROSS ANALYSES

The purpose in comparing these structural analyses has not been to select the one best procedure for all children. The goal is rather to discover how the analyses differ in the detail of description they yield. For example, how sensitive is a given procedure to the development of the auxiliary verb system? What information does it provide about question formation? In addition to comparing descriptive power we will

also examine the analyses in terms of mechanical efficiency, since efficiency, too, is an important consideration in clinical work.

One way to compare the measures is to examine Jay's performance on each of them. Figure 4 illustrates Jay's scores with reference to chronological age on four of the measures. Note that the LSAT and generative grammar analysis provide no metric for estimating age-equivalence. The 14 morpheme analysis has not been included in Figure 4.

The first measure, MLU, was plotted using the MLU-age linear prediction equation derived by Miller and Chapman (Chapter 2, this volume). Based on Jay's MLU of 3.06 morphemes, the equation would predict an age equivalent of 35 months. The vertical index for this measure represents  $\pm$  one standard deviation plotted for the predicted age of 35 months, resulting in a range of normal variation between 33 and 46 months. Thus it is evident that Jay's MLU falls within normal limits, even though his age predicted from MLU is 6 months below his CA. The Assigning Structural Stage analysis was plotted against CA, and a similar picture resulted. Jay's grammatical system, as viewed through the ASS analysis, resulted in an Early Stage IV level of development. The major portion of grammatical structures centered at Early Stage IV, with expected variability below this stage, but only two grammatical structures present above it.

Finally, Figure 4 shows that Jay's performance on both DSS and LARSP falls outside the range of normal variability. The variability limits for DSS are interpolated from measures of standard deviation around DSS. Lee also provides percentile data for comparison. Jay's DSS of 4.20 is below the 10th percentile for his CA.

The LARSP is not a standardized procedure, as the DSS is, and therefore provides no statistical measure of variability. However, Crystal et al. (1976) note that "a spread of  $\pm$  6 months is quite tolerable within the notion of 'normal age range'" (p. 84). Thus, we have placed this "normal age range" between 35 and 47 months for the LARSP. We estimate Jay's level of development on the LARSP to be between Stages III-IV (about 2;6 years). No conventions are given for stage placement; thus, our overall stage assignment is only our "best guess." Jay's grammatical level of approximately 30 months is below LARSP's range of normal variability by 5 months.

To summarize the first comparison (Figure 4), age-equivalence data are lacking for two of the procedures (LSAT and generative grammar), and the others yield differing interpretations of Jay's

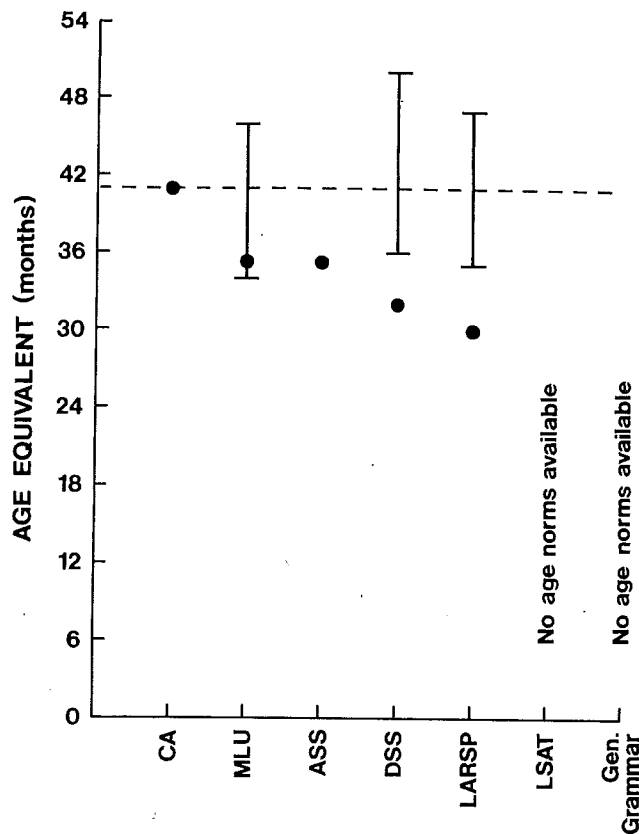
language functioning. Both MLU and the ASS place Jay's productive language system within normal bounds, while the DSS and LARSP conclude that Jay's language is below the range of normal variability.

There are several reasons for this discrepancy. As Miller outlines the procedure for assigning overall stage in ASS, the stage of usual performance, or most frequent stage, should be accompanied by variation in constructions both above and below this level. Jay does use structures below his usual level, but we see very few instances of constructions above it. Miller's procedure instructs us to assign Jay's sample to this usual level of performance, and does not give us a method for taking the lack of higher level structures into account. Miller warns, however, that performance, such as Jay's, with little evidence of emerging complex structures should alert the clinician to the need for follow-up assessment. Miller's procedure, because it gives the child credit for the highest level structures in the transcript, can result in a somewhat liberal stage assignment, although the stage assignments for individual constructions may be conservative. This tendency in ASS stage assignment procedure to compensate for conservative placement of individual structures by a more generous standard for overall stage assignment may explain the discrepancy between the ASS results and the DSS. Comparing ASS to the LARSP reveals that both analyses paint a similar picture of Jay's performance. Structures appear below the most frequent stage, but few appear above it. The age range predicted for Jay's stage of usual performance on the LARSP, however, is lower than the age data for ASS. This fact may be the result of the lack of standardization for both ASS and LARSP. Each procedure is based on the authors' interpretation of studies of normal language development, which are usually derived from small longitudinal samples. Large-scale cross-sectional studies to validate stage placements and age-equivalents are needed to resolve these discrepancies.

There are, then, differences among the results of the various procedures. ASS places Jay around age level although it points out a need for follow-up assessment. LARSP and DSS find him significantly delayed.

#### COMPARING FEATURES OF ANALYSIS PROCEDURES

Table 3 displays a set of features by which the analysis procedures can be compared. We chose those that contribute either to clinical efficiency or to descrip-



**Figure 4.** Summary scores for each analysis plotted relative to client's age of 41 months. Expected upper and lower limits of normal variability, plotted relative to age are represented by vertical bars. Each author's criterion for estimating normal variability was used. These are as follows:

- MLU: -1 SD from 41 months (Miller, this volume, p. 26)
- DSS: between upper and lower 10th percentile for 41 months (Lee, 1974, pp. 168-170)
- LARSP: 6 months above and below client's age (Crystal, Fletcher, and Garman, 1976, p. 84)

tive power and scored each analysis as either containing (+) or lacking (-) each feature. We exclude the generative grammar from our discussion of mechanical properties, since we are only using it to compare details of specific grammatical information, not for its ease or efficiency of use.

The first category, prescribed analysis procedure, refers simply to whether or not there is a set of precise, detailed instructions available for doing the analysis, including worksheets for various sections. Such a set of instructions will make the procedure not only easier to use but also more reliable, since it will ensure that the analysis is done the same way for each child. The ASS, while containing a procedural outline, is less detailed in its mechanical aspects than the other procedures reviewed. This feature has been placed first on the list because we consider it to be of primary importance. In order to have confidence in an assessment tool we would want to be sure that each clinician performs the analysis in exactly the same way. Although the ASS is described in the manual we find the instructions to be less precise than those for other analyses. The set of categories to be analyzed is left up to the clinician's discretion, as is the choice of constructions within categories.

One might raise the objection that to prescribe the procedure precisely is to offer a "cookbook" approach that limits the clinician's ability to tailor the assessment to the needs of individual children. But because placement and treatment decisions may be made on the basis of the outcome of ASS, it is crucial to ensure that the procedure is reliable. Different clinicians should arrive at the same results when employing the analysis. A precise description of the format for choosing utterances to score, identifying constituents, and organizing them for stage assignment would not only decrease the time and effort required to complete the procedure, but would also increase its reliability in the hands of clinicians with varying levels of training and expertise. All the other procedures reviewed provide adequate procedural descriptions.

The next row in the table shows simply whether or not a worksheet summarizing the information in the procedure is provided. Such a worksheet makes analysis and stage determination quicker and easier, since the information is collapsed into a compact format. All of the procedures under investigation except the ASS provide this summary worksheet. Table 1 in this chapter presents one possible form for



**Table 3. Features of language analysis procedures**

Category	ASS						Generative grammar
	Structural	MLU	14 Morpheme	DSS	LSAT	LARSP	
Prescribed analysis procedure	+	+	+	+	+	+	-
Summary worksheet	-	NA	-	+	+	+	-
Age equivalent	-	+	-	+	-	+	-
Developmental stage-assignment criteria							
Per constituent type	+	NA	+	+	+	+	-
Overall level	-	+	-	+	+	-	-
Measure of SD	-	+	-	+	-	-	-
Informal measure of variability	+	NA	+	NA <sup>a</sup>	+	+	-
Does not require NP-VP for analysis	+	+	+	-	+	+	-
Linguistic comprehensiveness (i.e., broad range of constructions)	+	NA	-	-	+	+	+
Can incorporate new data	+	NA	-	-	-	-	NA
Specific grammatical categories							
Auxiliaries	+	-	+	+	+	+	+
Copula	+	-	+	+	+	+	+
Question forms	+	-	-	+	+	+	+
Determiners	+	-	+	+	+	+	+
Pronominalization	-	-	-	+	+	+	+
Verb inflections	+	-	+	+	+	+	+
Other morphological markers	-	-	+	-	+	+	+
Negation	+	-	-	+	+	+	+
Embedding	+	-	-	-	+	+	+
Adjectives	+	-	-	-	+	+	+
Required sample size for analysis		(15-30 minutes)		50 utterances	100 utterances	30 minutes	unspecified

+ = Feature present  
 - = Feature absent  
 NA = Not applicable  
<sup>a</sup>Percentile norms included

a summary worksheet appropriate for a child at Jay's language level. Miller also gives a sample worksheet (see Table 9, Chapter 2), but no complete, all inclusive, standard form is given.

In the category labeled "age equivalent," we see that MLU, the DSS and the LARSP yield a direct age score. The DSS and MLU age scores are based on normative data. The ASS derives age from CA-MLU predictions and the LARSP draws age information from the developmental literature. Although the intent of the LSAT is to program for remediation, some measure of developmental equivalent score is essential in a language-analysis instrument. Without it the task of deciding whether or not the child really has a language problem that requires remediation becomes very difficult. After doing the LSAT we only discover which structures fall at or above the child's baseline and which fall below. We have no idea whether or not that baseline and variation around it correspond to age expectations. Some measure of developmental equivalent score, we believe, is an essential feature of a diagnostic tool.

Another feature of language assessment procedures identified as desirable is the assignment of various utterance constituents into stages of development. This is useful in identifying those structures, e.g., auxiliaries and question forms, in which the child may be delayed. By assigning a level or stage to each structure, the range of function across grammatical categories can be easily seen.

In addition, we have found it useful to assign a general stage of development to the child. Again, procedures for accomplishing this task should be explicitly specified by the author of the procedure. Procedures that provide explicit instructions for assigning overall stage of development are MLU, the DSS, and the LSAT. The LARSP and the ASS provide the raw data and guidelines for determining an overall stage of functioning, but lack an explicit convention for summarizing and interpreting the data by means of an overall stage assignment.

A measure of standard deviation is an extremely useful feature in a clinical tool, since it shows the range of difference from mean performance that can

forms change with subsequent research, these data can replace present stage assignments. For example, information concerning personal pronoun development is not a part of the current child literature. As studies in this area emerge, the data can be incorporated into the charts. A second example is the case of Wh-question development. Stage placement of these constructions in the DSS is not congruent with current findings by Tyack and Ingram (1977) and by Chapman, Paul, and Wanska (in preparation). The ASS allows the clinician to make stage changes consistent with the most recent information available and thus keep the charts updated.

The rest of Table 3 can be seen as the set of elements that determines the larger category of linguistic comprehension. A set of sentence constituents that we have found most useful in looking at language samples of children between Brown's stages II and V is specified. These structures are the ones in which developmental change is most likely to be seen. Again, the ASS, the LARSP, and the LSAT come closest to encompassing all the grammatical categories we would like to examine.

As Table 3 reveals, there are differences among the six standard analyses. These differences appear in both the mechanics and the content of the procedures. However, Table 3 is not meant to be used in a quantitative fashion. That is, it was *not* our intent that readers sum the pluses in each column and choose the procedure with the greatest number of features marked (+). This list of features is by no means complete, and the individual features may differ in importance. While mechanical efficiency is certainly a consideration in the clinic, a concern for linguistic comprehensiveness may often override it. Age-equivalence is certainly essential in diagnosis, but if we know a problem exists, remedial information, as offered by the LSAT, may be more useful than a description whose aim is age prediction. The clinician must determine the relative importance of each feature and choose the constellation of features that best suits each child in the caseload.

still be considered within limits of normal variability. Unfortunately, this measure has been very difficult to calculate for grammatical structures, because the data from which the developmental information is drawn has been gathered longitudinally from a small number of children. Only DSS and Miller and Chapman's data on MLU provide information on standard deviation. But MLU is, of course, only a general index of complexity in terms of utterance length and not a means of structural description.

Even an informal measure of variability is helpful. The LSAT and the LARSP each gives some indication of acceptable variation around the general developmental stage, but the measure of variability has not been standardized. The ASS proposes that one stage above and below MLU stage assignment represents normal variability.

Most speech samples will be drawn from conversation, and conversation characteristically contains incomplete sentences. An instrument that does not require a complete NP-VP sentence for analysis has the advantage of being able to use more of the sample in gathering information. All of these procedures except the DSS have this property.

The next category is labeled, rather vaguely, "linguistic comprehensiveness." By this we mean whether or not an analysis allows us to look at a broad spectrum of forms and constructions rather than limiting our view to a few selected constituents. The ASS analysis, the LARSP, and the LSAT provide the most comprehensive look at a language sample in terms of number of forms and constructions—with the exception, of course, of the individualized grammar.

Since all of these procedures rest upon a developmental model of language assessment, the capability for modification in light of new developmental research data is highly desirable. Norm-referenced procedures are not suited to this kind of modification. The ASS provides this flexibility. As new developmental information becomes available, clinicians can add it to the charts. Similarly, should placement of

# APPENDIX

## Jay's Transcript

Name of child: Jay  
 DTU number: 35  
 Chronological age: 3/9/78  
 Date of evaluation: \_\_\_\_\_  
 Examiner: T. K.

Child MLU: 3.08  
 SD: 1.95  
 Number of utterances: 167  
 Sources of transcription: Audiotape  
 Examiner MLU: 5.68  
 SD: 3.08  
 Number of utterances: 224

Key:  
 T = Tom (examiner)  
 J = Jay  
 [ ] = Unintelligible utterance  
 [ ] syllable = Unintelligible, but number of syllables estimated from prosodic features  
 [MLU] = Morpheme count for child, based on Brown (1973).  
 \* = Spontaneous utterances; nonresponses (inc.) = Incomplete utterances, not counted in MLU. Morpheme count for all adult utterances based on adult morphological criteria.

Situation variables: \_\_\_\_\_  
 Time of day: 2:00 p.m.  
 Setting: W/CMR  
 Materials used: Small toys, people, Playskool firehouse, etc.  
 Length of interaction: 30 minutes  
 Participants/Type of interaction: 1. T.K.—dyadic interaction  
2. \_\_\_\_\_  
3. \_\_\_\_\_  
4. \_\_\_\_\_

Pragmatics		Speaker	Utterance Number	Dialogue	Morpheme Count		Syntax	Semantics
Child	Adult				Child	Adult		
	J	T	1.	*When are we gonna do that? Do you know what that's called?	6	8		
	J	T	2.	What? That's called a "tape recorder."	1	8		
	J	T		Oh.	1	10		
	J	T		Do you know what a tape recorder does?	1	3		
	J	T		Yeah.		6		
	J	T		Look at this. I want to show you this. Can I pin this on your shirt?		7		

Pragmatics		Speaker	Utterance Number	Dialogue	Morpheme Count		Syntax	Semantics
Child	Adult				Child	Adult		
		T		Would you like to wear this?				
		J	Yeah.		1	6		
		T		How about that!		3		
		T		Isn't that neat?		4		
		J	3. *What are we gonna do with it?		7	6		
		T		Just leave it on your shirt.		11		
		T		I'll let you wear it while you're in here.		6		
		T		Would you like that?	1	1		
		J	Yeah.					
		T		Okay.		11		
		T		I want to show you a book here that I have.				
		T		You wanted to look at Paul's book and I want to show you this book.		17		
		T		This is a picture book.		5		
		T		Okay, I'd like you to tell me...		—		
		J	4. *That a house.		3	3		
		T		What is it?				
		J	5. A house.		2	2		
		T		Very good.		3		
		T		What's this?				
		J	6. That a farm.		3			
				[Artic. test administered at this point]				
		T		You did a good job on that.		7		
		T		Now, I've got some toys we wanna play with.		12		
		J	Okay.		1	9		
		T		You stay here and I'll bring them over.				
		J	Okay.		1	9		
		T		Don't you want to wear this anymore?				
		J	No.		1	8		
		T		We'll just set that right on here.				
		T		Let me go get some of these toys.		9		
		T		I bet you've never seen one of these before; have you?		12		

J	T	7.	*That good. What is it? What is that big thing?	2	3
J	T	8.	Car	1	5
J	T	8a.	*Hey, the other [1] in over there.	7	
J	T	8b.	*Get the other [1] over there. Get the other what?	6	4
J	T	8c.	Other [1]. I don't see it.	2	5
J	T	9.	*Yeah, right over there. Why don't you get it? Can you reach your hand over there? Mine are too big.	4	6
J	T	10.	I can't. You can't?	3	4
J	T	11.	No, my too little. That's a toilet. Your hands are too little?	4	6
J	T	12.	Yeah. *See? What is that?	1	3
J	T	13.	A toilet. I don't think so. I think it looks like a barber chair.	1	5
J	T	14.	It is a barber chair. Where do you suppose it goes?	5	9
J	T	15.	*No, this doesn't work. Do you see a barber shop? It doesn't work. Is that supposed to open a door?	5 <sup>a</sup>	7
J	T		Yeah.	1	6
J	T	16.	You try it. It doesn't work, does it? Yeah. (laughter) What is that?	1	5
J	T	17.	A stop sign. You know what that says on there?	3	8
J	T	18.	What? That says, "Police Station."	1	8
J	T	19.	Oh, Police Station. *I gotta leave it up there. You're gonna leave it up there?	3	5
J	T			6	9

continued

Pragmatics	Utterance Number	Dialogue	Morpheme Count		Syntax	Semantics
			Child	Adult		
J	20.	Yeah. *See? Why do you put it up there?	1			
J		'Cause. Can you see anything else?	1	7		
J	21.	A gas. A gas.	2	6		
J	22.	*You can't put gas in there. Why can't you put gas in there?	7	2		
J		'Cause. Can't you see an opening for gas?	1	8		
J	23.	No, watch.	2	9		
J	24.	*That a toy. Well, how does the car go if it can't use gas?	3			
J	25.	'Cause. *This is where the gas. This is where you gas?	1	13		
J		Yes. [ ] Tell me again.	5	5		
J	26.	*Turn it this 'round.	1	3		
J	27.	*Another bath. Another?	4			
J	28.	Bathroom. Another bathroom. *What does this... (inc.) What does this say? This says "Firehouse."	2	1		
J	29.	[sigh] Firehouse! Where is the firehouse?	1	2		
J	30.	Right here. Jay... what happens when you turn this red handle?	2	5		
J	31.	I don't know.	1	5		
J	32.	It gets fire. Why don't you turn it and see.	2	10		
J	33.	*What happen? I don't know.	4	8		
J	34.	*That the fire. That's the fire?	3	4		
J			4	4		

J	Yeah.	That's a siren. That's not a fire truck.	1	4	
J	35. No, it's a Volkswagen. it's a what?		4	6	
J	36. A Volkswagen. A Volkswagen, right! I don't see the fire truck. Where is it?		2	4	
J	37. *Look at that hole. Look at that hole. Where does it go?		4	3 7 3	
J	38. Down the bathroom. Down the bathroom?		3	4 5	
J	Yeah. There's somebody up in here.		1	4	
J	39. *We can get it out. You can get him out.		5	7	
J	40. *I got it. You got it?		3	5	
J	Yeah. Good work.		1	3	
J	41. *Here! Thank you. Can he fit in your car?		1	2	
J	No! That's too bad.		1	2	
J	42. *Lookit. 43. *I want some of those people. You want some of those people. Who is that?		1 6	4	
J	44. A girl. A girl? And who is that?		2	6 3	
J	45. A dog. *I'm gonna be... (inc.) *This can fit in my... (inc.) Hey—do bears drive cars?		2 — —	2 4	
J	Yeah. They do? Have you ever seen a bear drive a car?		1	7	
J	Yeah. You know what I'd like you to tell me?		1	2 9	
J	46. What?		1	10	

continued

Pragmatics		Utterance Number	Dialogue	Speaker	Morpheme Count		Syntax	Semantics
Child	Adult				Child	Adult		
			Tell me about your monkey.	T				
		47.	*What this say?	J	3	5		
			That says, "Firehouse."	T		5		
			Can you tell me about the monkey at home?	T		9		
			What are you doing now?	T		6		
		[ ]	What's wrong?	J	—	3		
		48.	Gotta get this outta there.	J	5 <sup>b</sup>	7		
			You gotta get this out of there?	T		1		
			Yeah.	J		1		
		49.	Maybe this man can give you some help.	J	5	8		
			*I can't do it.	T		3		
			Sure you can.	T		2		
			Watch this.	T		12		
			This man is gonna push it out the other way.	T		6		
			Here—use this to do it.	T		—		
			Whoops!	T		1		
		50.	Can't.	J	2	1		
		51.	I can't.	J	3	3		
			You can't.	T		2		
			Watch this.	T		3		
			Push it back.	T		3		
		52.	*There!	J	1	2		
		53.	*What this say?	J	3	—		
			Barber shop.	T		5		
			*Oh!	J	—	5		
		54.	*This say the barber shop.	J	5	5		
		55.	*This is the fire house?	J	5	5		
			This is the fire house.	T		2		
		56.	*What this?	J	2	5		
			That's the mail house.	T		5		
			That's the post office.	T		5		
		57.	*This is the fire thing?	J	5	3		
		58.	*What's this?	J	3	8		
			That says "mail," and you know what?	T		1		
		59.	What?	J	1			



T	J	That's a letter you can mail.	4	7	
T	J	*What are this thing? That's a barber shop.	5	5	
T	J	No, this is barber shop. Right!	5	1	
T	J	*You gotta fit in here. That's a letter.	5	4	
T	J	Can you mail the letter? See the stamp?	5	5	
T	J	Where do you mail letters? Right here.	2	6	
T	J	Okay, there's the mail box. *Put this one in?	4	6	
T	J	Now, how do you get them out? *Let me get in there.	5	7	
T	J	*There. *Me hurt my arm.	1	3	
T	J	That's one. Oh, let's see.	4	4	
T	J	What happened? Danny give me it.	4	3	
T	J	How did Danny do that? With <i>her</i> arm.	4	5	wrong use of pronoun gender
T	J	Yeah. *Two.	1	3	
T	J	You got two? *There <i>ain't</i> no more.	1	3	
T	J	I think your car needs some more gas. What are you gonna do?	4	9	scored as unanalyzed negation (III)
T	J	Gotta turn it around. Gotta turn it around.	4	7	
T	J	Turn it around! I'll help you.	3	5	
T	J	Can you help me? *There the stop sign.	4	4	
T	J	*This going up. What's happening?	4	4	
T	J	It's getting fire. Why?	5	4	
T	J	'Cause. Is the car broken?	1	1	
T	J	Yep. Who's gonna fix it?	1	5	
T	J	The driver . . . the fire engines. The fire engines?	6	7	
T	J		6	4	

continued

Pragmatics	Utterance Number	Speaker	Dialogue	Morpheme Count		Syntax	Semantics
				Child	Adult		
	78.	J	*Where is there? Where is there?	3	3		
		T	Yeah.	1	4		
		T	I don't know. Where are they?	3	3		
	79.	J	*Oh, there's the fire! But where is it?	4	4		
		T	Where's the truck?	4	4		
	80.	J	*See that fire hat?	4	1		
		T	Uh-huh.	4	8		
	81.	J	*It's a fire. But I don't see the fire truck.	3	7		
	81.a	J	*See the fire? What are you trying to do?	4	4		
	82.	J	Get the guy out.	2	5		
	83.	J	*This guy.	5	7		
	84.	J	*These are the firemans.	3	3		
	85.	J	*It's a big man in there. You know what? Let's pretend. Do you like to pretend?	1	5		
		T	Yeah.	4	16		
		T	Let's pretend that this lady is in the house, and this house is on fire. Now, what are we gonna do?	4	8		
	86.	J	I'll get fire. Okay, first we have to make a siren. Now, what happens?	3	8		
		T	Get burned.	3	4		
	87.	J	Get burned? Yeah.	1	3		
		T	You better get her out before she dies. Send the fireman up. Where's the fireman?	4	9		
	88.	J	I don't know.	4	5		
	89.	J	Here's the fireman! Now, what's he doing?	4	5		
		T	He's trying to get him out.	8	6		

T	He's gonna get him out, good!			9
T	Hurry, because the flames are getting higher and higher!			13
T	Hurry!			1
T	We don't want her to burn.			7
T	Good work!			2
T	What does she say?			5
J	91. Nothing.	1		
T	Doesn't she even say, "Thank you"?			8
J	Yeah.	1		
T	Boy, that fireman did a good job.			8
J	Yep.	1		
J	(unintell.)	—		
T	Tell me again.			3
J	91a. Going up in the, [up in the, up in, up in the] [one syllable] get in bed. They're going up where?	9		
T	91b. Up in the [one syllable], get in bed. And they're gonna get in bed?	7		
T	I bet they'd like to ride on the elevator.			9
J	92. *This is the elevator.	4		
T	There's another one in the building.			10
J	Now . . .	1		
T	93. Now what happened?			4
J	Get fire.	2		
T	How do they get down?			5
J	94. I don't know.	4		
T	Did they like that?			4
J	Yeah.	1		
J	*The girl happy.	3		
T	The girl happy.			3
T	That's great.			3
T	The dog wants to go.			6
T	He wants a turn.			5
T	Can he go?			3
J	Yeah.	1		
T	How does that work, Jay?			6
J	Gotta [one syllable].	2		
T	Gotta what?			3
J	95a. *Now her getting off the elevator.	7		
J	95b. *No, this elevator.	3		

continued

Pragmatics		Speaker	Utterance Number	Dialogue	Morpheme Count		Syntax	Semantics
Child	Adult				Child	Adult		
		T	96.	Uh-huh. *Bring the other people.	4	1		
		J	97.	*That doesn't go. Why not? What are you doing now?	4	2		
		J	97a.	The girl wanna go up in... (inc.) Up in...?	—	6		
		J		That her [one syllable]	3	2		
		J	98.	*Three people.	2			
		J	99.	*That how many.	3			
		J	100.	*The other three people. What about the little bear?	4	5		
		J	101.	Gotta sit down. Why?	3	1		
		T	102.	'Cause—at home. At home? Can he come out to play, too?	3	2		
		J	103.	No, her mommy say, "No!" Why?	5	7		
		J		Because. The bear says, "I wanna come outside!"	1	1		
		J	104.	*Then the fire would kill him. "I'll be real careful." He says, "How can I get down off this high roof?"	6	9		
		T	105.	You can jump. But he might hurt himself. Can he take the elevator down?	3	6		
		J	106.	What's he doing? Trying to put the elevator.	6	6		
		J	107.	*Her momma home. And now momma says, "It's time to go to bed." All the little bears have to go to bed.	3	5		
		T		Okay. What's the bear say? What's the bear say? Me wanna go outside.	1	12		
		J	108.	"Me wanna go outside." Me wanna go outside.	4	10		
		T				5		
		T				4		

	T			14	
	J	108a.	And he calls down to the dog, and what does he say? "Doggie, come up and now, okay?" So, the doggie goes up, and then what happens? The fire comes up. How's he gonna get up? Are they all going to bed? Yep.	6	11
	J	109.	He says, "I don't wanna go to bed yet." What's mommy say? "No, why?" "Why do I have to go to bed?"	1	12
	J	110.	"You gotta go to bed right now!" "No, why?" "Why do I have to go to bed?"	7	4
	J	111.	"Because you naughty!" "I'm not naughty." "I put out the fire and saved you." And he says, "Mommy, when are you going to bed?"	3	2
	J	112.	"Cause, I don't want to." <i>When</i> are you going to bed? Are they all sleeping?	6	8
	J	113.	This guy is. Is mommy going to let him sleep on top of the roof like that? No.	3	4
	J	114.	He hurt himself. Right, so we better put him to bed. *Gotta get the girl out. Gotta get the girl out. Don't get your hand caught.	1	9
	J	115.	*What that fire engine doing up on the roof? You mean the fireman? Yeah.	3	12
	J	116.		10	7
	J			1	5
	J			1	15
	J			3	15
	J			5	8
	J			1	6
	J			10	6
	J			1	5

gloss: would hurt

Pragmatics	Utterance Number	Speaker	Dialogue	Morpheme Count		Syntax	Semantics
				Child	Adult		
		T	He's sleeping.		4		
		T	He says, "I'm sleeping; leave me alone."		10		
	117.	J	*They wanna sleep together.	4	5		
		T	They wanna sleep together.		3		
		T	That's nice.		6		
		T	What if he rolls off?				
	118.	J	*I wanna get out now?	5	6		
		T	You wanna get out now?		2		
		T	How come?				
		T	Shhhh! Everybody's sleeping.		4		

<sup>a</sup>Doesn't is counted as two morphemes. Following Brown's counting rule #6 (1973, p. 54), the constituent *does* is an irregular verb form that is treated as a single morpheme. The negated form (*n't*) also is treated as a single morpheme, as suggested by Brown (1973, p. 53), "...almost every new kind of knowledge increases length (such as) the addition of negative forms...."

<sup>b</sup>*Outta* is not accounted for in Brown's (1973) morpheme counting rules. It is arbitrarily counted here as representing one morpheme.