

MAYAN TELEGRAPHESE: INTONATIONAL DETERMINANTS OF INFLECTIONAL DEVELOPMENT IN QUICHÉ MAYAN

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Data collected from the Mayan language Quiché suggests that considerable differences may exist across languages in the form of children's first words. Several classes of Quiché words, including the verbs and the positional element *k'o:(lik)*, take 'terminations'. Although the termination does not encode a simple semantic or syntactic meaning, the children used it correctly in over 86% of their first verbs. The syllable structure and stress rules conspire in Quiché to promote the early acquisition of terminations, suggesting the primacy of intonation in morphological development.*

One of the most striking characteristics of children's early speech is its 'telegraphic' quality. As Brown (1973:75) says, 'the sentences the child makes are like adult telegrams in that they are largely made up of nouns and verbs (with few adjectives and adverbs) and in that they generally do not use prepositions, conjunctions, articles, or auxiliary verbs.' These last are called 'grammatical morphemes' by Brown, who states: 'like an intricate sort of ivy, [they] begin to grow up between and upon the major construction blocks, the nouns and verbs, to which Stage I is largely limited' (249). This characterization of child language has remained a major paradigm for research on language acquisition, despite some troubling exceptions (cf. Burling 1959, Park 1970, Kunene 1979, Berman 1981). Researchers operating within a 'telegraphic' framework (including Bloom, Lifter & Hafitz 1980; Macnamara 1977; Bowerman 1976; Greenfield & Smith 1976; Leonard 1976; Clark 1974; and Antinucci & Parisi 1973) have concentrated their efforts on discovering the cognitive factors underlying language development, and the order in which the major semantic roles (agent, action, locative etc.) emerge in children's speech. Brown concludes (243-4) that semantic complexity is the major factor determining the development of semantic roles in Stage I, and the acquisition order of grammatical morphemes in Stage II. This approach ignores the difficulty that children face in producing the words to express their meanings; the fact that English-speaking children do not use grammatical morphemes in their early speech may be as much an artifact of the structure of English as a result of the language acquisition process. This paper presents acquisition data from Quiché, a Mayan language spoken in the western highland region of Guatemala, to show that considerable differences exist in the form of children's first words.

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Abbreviations used in glosses below include the following: ASP = aspect; CAUS = causative; COMP = completive; INC = incompletive; PL = plural; TERM = terminative.

Such differences will form the basis for an argument that researchers must consider how children's articulatory development interacts with the intonational structure of the language they are learning.

SUBJECTS AND PROCEDURES

1. I collected longitudinal records from four Quiché Mayan children (aged 2;0 to 3;0 when I began) living in the highland village of Zunil, Guatemala. I visited the children in their homes over a nine-month period, approximately every two weeks, for a one-hour play session during which I recorded their speech. Quiché was the predominant language in all the households, although some of the parents could speak Spanish. The children spoke only Quiché during the play sessions, this being the language that my assistants and I used with them. I transcribed and translated the tapes with the help of two native Quiché speakers. They pointed out any errors that occurred in the children's speech, and told me the correct way of saying such things in Quiché (see Pye 1980a for details).¹

THE QUICHÉ VERB

2. For reasons of space, I cannot discuss all aspects of children's early speech in Quiché; therefore, I will discuss only two related stem classes that made their appearance in Stage I speech: the verb and the positional.² The verb structure of Quiché is complex:

$$(1) \text{ aspect} + B (+ \text{ movement}) + A + \text{root} \\ \left(+ \left\{ \begin{array}{l} \text{transitivizing} \\ \text{intransitivizing} \end{array} \right\} \text{suffix} \right) (+ \text{ termination})$$

¹ For the purposes of this paper, I refer to the early samples of the Quiché children's speech as Stage I, even though it differs markedly from Stage I speech as Brown defines it for English. The issue of whether or not comparable stages of language development can be defined for languages as different as English and Quiché awaits further investigation. Brown (7–11) states that Stage I is the time when the child is developing the basic semantic roles and syntactic relations of the simple sentence; Stage II is primarily devoted to the acquisition of grammatical morphemes; Stage III to such 'modalities' of the simple sentence as yes–no questions, constituent interrogatives, imperatives, and negatives; Stage IV to the embedding of one sentence within another; and Stage V to sentence coordination and propositional relations. Quantitatively, Brown defines Stage I as having a mean length of utterance (MLU) of between 1.75 and 2.25 morphemes, with an upper bound of 5 morphemes in the longest utterance (p. 56). MLU has proved to be an unreliable guide to children's competence in English (cf. Garman 1979: 179), let alone cross-linguistically; however, for what it is worth, the first six tapes from two of my subjects had MLU's below 2.25, and upper bounds of less than 5. More qualitatively, the children produced no instances of embedded or coordinated sentences in their first six samples. They did produce instances of yes–no questions, constituent interrogatives, imperatives, and negatives; but they did so without the full adult markers. (Quiché does not have the elaborate verb–auxiliary movement that English does, so the Quiché children's production of interrogatives, imperatives, and negatives was correspondingly much closer to adult models.) Some morphemes that are comparable to the grammatical morphemes that Brown studied in English, such as prepositions meaning 'in' or 'on' and articles, were also missing from the first samples of the Quiché children's speech. As far as I can determine from Brown's characterization of Stage I, the Quiché children appear to be on a comparable level of linguistic competence with his subjects.

² Regarding the definition of verb and positional as stem-classes, see Kaufman 1977.

There are five aspect categories: incomplete, complete, potential, volitive, and perfect. The incomplete aspect marks the non-completion of the action specified by the verb; it is noncommittal as to present, past, or future time. The complete aspect marks the completion of the verb's action; the potential (traditionally called 'future') marks a possible, probable, or hypothetical future truth; and the volitive marks the imperative, optative, and hortative moods. The perfect has much the same interpretation in Quiché as in English. The aspect markers are associated with three STATUS categories—plain, dependent, and perfect—as follows:³

(2) TENSE-ASPECT-MOOD	ASPECT PARTICLE	STATUS CATEGORY
incomplete	<i>ka-</i>	plain
complete	<i>x-</i>	plain
potential	<i>chi-</i>	plain
volitive	<i>chi-</i>	dependent
perfect	∅	perfect

The sentences below show how plain status is associated with the incomplete and complete aspects:

- (3) *k-in-nu:m-ik* 'I'm hungry.'
 INC-B1-hungry-PLAIN
x-in-nu:m-ik 'I was hungry.'
 COMP-B1-hungry-PLAIN

Both the aspect marker and a 'termination' (see below) are required to signal a given aspect/status condition on the verb.

The symbols A and B in ex. 1 refer to person markers. There are two sets: set A (ergative) is used for subject agreement on transitive verbs; set B (absolutive) is used for object agreement on transitive verbs, and for subject agreement on intransitive verbs. (The acquisition of these person markers is described in Pye 1980b.)

A prefix indicating movement may optionally occur before the subject marker. The movement prefixes are derived historically from the verbs meaning 'to go', 'to come', and 'to pass'. If such a prefix is present, the verb takes the dependent status category.

Non-derived transitive verbs have a root consisting of a single CVC syllable. Derived transitive and intransitive verbs may also have roots of the form CV:C and CV?C. (A very few verbal roots may contain two syllables; Terrence Kauf-

³ The phonemic inventory of Quiché consists of the following units, transcribed in a Spanish-based orthography:

CONSONANTS	VOWELS
p t tz ch k q	i i: u u:
b' t' tz' ch' k' q' ?	e e: o o:
s x j h	a a:
m n	
l r	
w y	

The apostrophe (') indicates glottalization. Vowel length is phonemic, and the sound /h/ occurs only in word-final position.

man, p.c.) Next follows a transitivity suffix, if the verb is derived (from a noun or adjective); e.g., the intransitive verb *cha:ku:n-* 'to work' is derived from the noun *cha:k* 'work'. The root plus the transitivity or intransitivity suffix forms the verb stem.

The 'termination' is the final part of the verb form. Four distinct factors govern its shape: (a) its status category, (b) the transitive vs. intransitive distinction, (c) the root-transitive vs. derived-transitive distinction, and (d) the clause-medial vs. clause-final distinction. Table 1 shows the effect that each factor has on the form of the verb's final syllable. Each termination receives primary stress, except dependent intransitive /-a/.

STATUS CATEGORIES	ROOT TRANSITIVE	DERIVED TRANSITIVE	INTRANSITIVE
PLAIN:	(-oh) ^a	-Vj/(-V:j)	(-ik)
DEPENDENT:	$\left\{ \begin{array}{l} -a\gamma-a.^b \\ -o\gamma-o: \\ -u\gamma-u: \end{array} \right\}$	-Vj/(-V:j)	-a/(-oq)
PERFECT:	-o:m	-Vm	-inaq

TABLE 1. Final-syllable forms on Quiché verbs (simplified from Kaufman 1977).

^a Parentheses indicate that the form is a clause-final termination.

^b -a γ a: are used with verbs whose root V is *i e a*; -o γ -o: when the root V is *o*; and -u γ -u: when the root V is *u*.

I have already discussed how aspect and movement determine the verb's status category. Table 1 shows that different terminations are used with transitive and intransitive verbs. For example, the sentences in 4 show the difference between two contrasting Quiché expressions:

- (4) *k-in-wa γ -ik* 'I am eating.'
 ASP-B1-eat-TERM
k- \emptyset -in-tij-oh 'I am eating (something).'
 ASP-B3-A1-eat-TERM

Likewise, the difference between root-transitive and derived-transitive verbs determines whether an overt termination is appropriate:

- (5) *k-at-e:-in-q'al-u:j* 'I'm going to hug you.'
 ASP-B2-go-A1-hug-TR
 (6) **k- \emptyset -a-k'am-a:j* 'You take it.'
 ASP-B3-A2-take-TR
 (7) **k-at-e:-in-q'al-uj-oh* 'I'm going to hug you.'
 ASP-B2-go-A1-hug-TR-TERM

Ex. 6 is ungrammatical because a transitivity suffix has been added to a root-transitive verb, while 7 is ungrammatical because a derived-transitive verb appears with a termination.

Not all derived-transitive verbs are polysyllabic, as the following common expression shows:

- (8) *xaq k- \emptyset -a-b'i:i:j*
 * only ASP-B3-A2-say-TR
 'You're only saying it.' = 'You're putting me on.'

A rule of vowel elision converts the verb stem to *-b'ij*, which is very close to the root-transitive verb stem *-tij* (cf. ex. 4 above). Children cannot rely upon the number of syllables in the verb root to determine when a termination is required.

The status markers are alternatively referred to as 'terminations' because some of them appear only in clause-final position. The Mayanist literature refers to this position as 'phrase-final', but this is inaccurate, as the following example illustrates:

- (9) *x-e:-ul le: ak'al-a:b'*
 ASP-B6-arrive the child-PL
 'The children arrived.'

This sentence consists of an intransitive verb form and its subject noun phrase. Even though the verb form appears at the end of the verb PHRASE, the intransitive termination is absent. It is possible to put a termination on the verb in 9; but this changes the intonation of the sentence, and brings the verb form into focus. For derived-transitive verbs, the final vowel of the transitivity suffix is lengthened in clause-final contexts. An explicit analysis is yet to be made of the environments in which the termination may appear. For the present, it is enough to say that the termination is obligatory at a clause boundary. Fortunately, it is relatively easy to distinguish between the clause-medial and clause-final environments for the purpose of judging the appropriateness of the children's use of terminations. The presence of the negative marker, directionals, and verb particles indicate that the verb is in clause-medial position, while a verb in isolation is in clause-final position. In ambiguous cases, as when a subject or locative phrase follows the verb, I have relied upon the preceding discourse.

The verb form that I have described is in the active voice; but there are four other voices, with different structures. There are also derivational suffixes for causatives etc. None of these will be discussed here.⁴

THE QUICHÉ VERB AT STAGE I

3.1. SYLLABLE STRUCTURE. The Quiché verb presents a child with a complex structure, one that he must use in talking about everyday events. After transcribing several tapes, I realized that the children did not use the entire verb in their early speech. The following utterances are typical of their speech from this period:

- (10) A: *la: utz kawiloh* 'Do you like it?'
 Al Tiya:n (2;2): *jah, loh* (= *jah, kinwiloh*) 'Huh? I like it.'
 ...
 A: *kawarik* 'He's sleeping.'
 Al Tiya:n: *lik* (= *kawarik*)
 (11) Al Cha:y (2;9): *loq' ech wa?* (= *kaqaloq' qe:ch wa?*)
 'We'll have to buy one of our own.'

⁴ For other references to the structure of Quiché, see Mondloch 1978, Kaufman 1977, or Norman 1976.

Mother: *kaqaloq' qe:ch wa?e:*

chata: chare: le: mu?s, a: kasipaj chuweh, cho?qa chareh 'Ask the white man, "Will you give it to me?"', say it to him.'

Al Cha:y: *paj weh* (= *a: kasipaj chuweh*) 'Will you give it to me?'

The Quiché verb often undergoes resyllabification so that the syllable boundaries do not match the boundaries between morphemes; but the children always observed the syllable divisions in their words, not the morpheme boundaries. Thus, in 10, A (an assistant) asked Al Tiya:n whether she liked her doll, using the Quiché idiom 'Is it good to see?' The morphemes of the verb, *k-Ø-aw-il-oh* ASP-B3-A2-see-TERM ('you see it'), resyllabify as *ka-wi-'loh* (where ' indicates primary stress). Al Tiya:n used only the last syllable, which contains the final consonant of the verb root plus the termination. In her next utterance (again talking about her doll), Al Tiya:n reduced the verb *kawarik* to its final syllable. (At this stage in her phonological development, Al Tiya:n regularly substituted /l/ for /r/ in all environments.) This syllable is again composed of the final consonant of the verb root and the termination.

In 11, Al Cha:y tells her mother that they will have to buy a plastic duck like the one that I had brought. Her first utterance uses the final syllable of the verb *kaqaloq'*, which in this instance happens to be the verb root. Al Cha:y then imitates her mother and asks me to give the duck to her, using the final syllable of the verb *kasipa:j*. This syllable contains the final consonant of the verb root plus the transitive suffix of derived-transitive verbs.⁵

The processing of speech in syllabic units carries important implications for morphological development. Inflectional morphemes which consist of segments, not syllables, could be expected to pose difficulties for children in the

⁵ The children's use of syllables is interesting in light of recent speculations on the importance of the syllable in phonological development (Ingram 1978, Macken 1977, Menyuk 1976, Waterson 1971, Moskowitz 1970). Ingram (p. 151) points out that some phonological processes, such as deletion of unstressed syllables and reduplication, operate on entire syllables—while others, such as consonant cluster reduction and the deletion of final consonants, function primarily to simplify syllables. Menyuk (1976:93) notes:

'The child appears to organize his production in terms of the features of syllables rather than the features of the segments in the syllable. Co-articulation effects can be observed in that both forward (*pop* for *pot*) and backward (*tot* for *pot*) assimilation occurs.'

Lise Menn (p.c.) notes, however, several instances in her data where a child combines a consonant from a preceding syllable with the stressed vowel and consonant of the following syllable. This phenomenon also occurs in the Quiché data (see Al Cha:y's final utterance in ex. 13, below), and indicates that children are also sensitive to structure at the level of individual segments.

Some experimental evidence shows that the syllable is a more natural unit of linguistic perception than the phonological segment. Savin & Bever 1970 found that subjects responded to whole-syllable targets more quickly than to single-segment targets. When asked to press a switch as soon as they heard the word *bat* or *sit*, or when they heard the sound /s/ or /b/, the subjects responded more quickly to the syllables. Mehler et al. 1981 found that subjects responded more quickly to a target when it was not divided by a syllable boundary. They used pairs of words sharing the first three phonemes, but having different syllable structures (e.g. *pa-lace* and *pal-mier*). They found that subjects reacted more quickly to targets which corresponded to the first syllable of the word than to those which did not, independently of the target size. Mehler et al. conclude that the syllable constitutes a unit of speech processing.

early stages of phonological development. Languages like Quiché, in which the morphemes frequently do not correspond to the syllables, because of extensive resyllabification, would pose additional problems for language learners. The children were still in the early stages of syllable development when the examples in 10–11 were recorded. In Al Cha:y's first five samples, 91% of the verbs are monosyllabic, while 70% of Al Tiya:n's verbs in her first eight samples contain only one syllable. Their verbs had a CVC form—or, in exceptional cases, a CV-CVC form. As their language developed, the children's verbs gradually increased in the number of syllables contained; see Table 2 (cf. Ingram).

		PERCENTAGES			
		NUMBER OF VERBS	MONO- SYLLABLES	DI- SYLLABLES	MORE THAN TWO SYLLABLES
Al Tiya:n					
Sample:	1 (2;1.7)	17	85.7	14.2	0
	2 (2;1.17)	2	100	0	0
	3 (2;1.22)	16	46.1	53.8	0
	4 (2;1.30)	24	80	20	0
	7 (2;3.10)	41	93	7	0
	9 (2;7.8)	40	63.1	31.5	5.2
	12 (2;7.28)	86	53.3	44.4	2.2
	15 (2;10.13)	152	33	53.3	13.6
Al Cha:y					
Sample:	1 (2;9.3)	19	88.8	5.5	5.5
	2 (2;9.8)	27	83.3	16.6	0
	3 (2;9.16)	55	92.3	5.1	2.5
	4 (2;9.28)	64	80	15.5	4.4
	7 (2;10.21)	86	73.2	22.1	4.6
	10 (3;0.8)	97	56.7	38.1	5.1
	14 (3;1.5)	120	60	32.5	7.5
	19 (3;3.28)	74	32.4	52.7	14.8

TABLE 2. The syllable-structure development of two Quiché children.

The Quiché children added new syllables to the front of those they were already producing, in effect working from the back of the verb to the front.

3.2. SEMANTIC COMPLEXITY. The agglutinative nature of the Quiché verb makes it possible to evaluate diverse acquisition theories which, for English, predict similar outcomes. One theory (which dominates the research on language acquisition, and comes in many different versions) is that of semantic complexity: children start with a basic set of semantic roles (agent, patient, action etc.), and then go on to produce different combinations and modulations of these roles. Thus Brown predicts that 'the primary determinants of acquisition order will prove to be cumulative complexity, both semantic and grammatical' (404). 'Cumulative complexity' is the notion that, if one word encodes the meaning x , and another the meaning y , then both should be less complex than a word encoding the meaning $x + y$. The theory makes no prediction about the relative complexity of the individual meanings x and y , because no objective measure of their complexity is available. Other versions sometimes

replace (or even confuse) cognitive with semantic complexity, but all reach similar conclusions (cf. Bloom, Lifter & Hafitz; Greenfield & Smith; Leonard; Clark; and Antinucci & Parisi). Slobin 1973 also assumes that semantic complexity plays the major role in language development; but he recognizes the role that other factors may play in accelerating or slowing down the pace of acquisition. He cites the relatively late development of yes-no questions in Finnish and the noun plural in Egyptian Arabic as relevant examples. Slobin casts these factors in the form of operating principles that describe children's initial assumptions about the structure of language.

The complexity theories need adjustment before they can be applied to the Quiché verb. The theories as stated make predictions only about the order of acquisition of major lexical classes, or of various grammatical morphemes. None makes explicit predictions about how children would acquire the different parts of a single word. This is not surprising, given that most of the available developmental data come from 'isolating' languages such as English, which have relatively impoverished word structures. Yet one should be able to apply the same principles to the morphemes within a word that one applies to groups of free and bound morphemes in a sentence, to predict with which part of the word a child would start.⁶ The telegraphic paradigm automatically assumes that a word's root is less complex semantically than its inflections, and then discusses the acquisition of word roots separately from that of inflections. This defect could be remedied if researchers would discuss their results in terms of morphemes rather than words or affixes. In this light, if Brown's 'functor' (88) is replaced by the more general 'morpheme', we get a reasonable prediction about the acquisition order of the various parts of a word:

(a) 'If [morpheme] x has some minimal frequency, high perceptual salience, is unconditioned by verbal context [sic], and expresses a basic semantic role rather than a modulation, then it will be fully controlled in Stage I (used freely and correctly).

(b) 'If [morpheme] x has high frequency and high perceptual salience, then whether conditioned or not, and whatever its semantic role, it will occur in Stage I but only in prefabricated routines.

(c) 'If [morpheme] x has low frequency and low perceptual salience, and is verbally conditioned [sic] and expressive of a semantic modulation, then it will be completely absent from Stage I.'

The next step is to apply these predictions to the morphemes of the Quiché verb shown in formula 1 (§2, above). The frequency of the morphemes in the parents' speech is not at issue here, since all the verb's morphemes are obligatory.⁷ Brown (83) lists three factors which might contribute to the perceptual salience of a morpheme: 'amount of phonetic substance, susceptibility to heavy stress and high pitch, and the possibility of occurring in utterance-final posi-

⁶ Depending on the amount of grammatical complexity one allows in the lexicon, a word's structure can bear a good deal of resemblance to syntactic structure (especially in the generative semantics of McCawley 1968 and others).

⁷ The Quiché mothers' speech to their children is neutral in this regard, since the full verb-stem and the termination system are preserved in it. Ex. 15, below, contains an instance of typical verb simplification found in caretaker speech to children. J's use of the form *k'a:tisa:j* drops the aspect and person markers from the full verb *chak'a:tisa:j*, but retains the causative and derived transitive suffixes.

tion'.⁸ In most Quiché verbs, the final vowel is the one that receives primary stress (Norman 1976:56). In utterances where the verb is final, the verb's stressed syllable is also utterance-final. (Although Quiché is a VOS language, the subject and object are not overtly expressed when sufficient information is encoded in the person markers on the verb.)

Getting back to formula 1, the aspect, movement, and person markers should all be absent from the early speech of Quiché children: they have low perceptual salience (lacking stress and being prefixed to the verb root), they are conditioned by the linguistic and non-linguistic context, and they express a semantic modulation (although this may not be true of the person markers). The verb root is unconditioned by the linguistic context, and expresses a basic semantic role. It has high perceptual salience only on monosyllabic verbs in clause-medial position, where it receives the main verb stress. Neither Brown nor Slobin predicts what should happen in a situation where high semantic saliency weighs against low perceptual saliency. However, since both assume that semantic complexity plays the central role in language development, they might predict that the verb root would be an early acquisition for Quiché children—especially since the root does not change shape in different linguistic contexts, and expresses a basic semantic role. The intransitivizing suffix has low perceptual saliency, is conditioned by the verbal root, and modulates only the verb's meaning. Therefore, part (c) of Brown's prediction applies, and the intransitivizing suffix should be absent from the children's speech. The transitive suffix and termination have high perceptual saliency (they take the primary stress, and often appear in utterance-final position); but they are conditioned by the linguistic context, and modulate only the meaning of the verb. Accordingly, part (b) of Brown's prediction is applicable to them, and they should occur in the children's early speech, albeit in prefabricated routines. In such routines, they should be present in full form (not contracted or deleted), and they should appear in a phonologically unique form (homonymous forms should be replaced by a single, all-purpose element).

The net result is that there are two possible parts of the verb with which Quiché children might begin: the semantically salient but perceptually weak

⁸ Some experimental evidence shows that children attend to stress and serial position in imitation tasks. Viktor 1917 (cited in MacWhinney 1982) had children imitate three-syllable words in Hungarian. He found that they preserved the first syllable for its stress, and the third for its recency. However, if they preserved only one syllable, it tended to be the first.

Klein 1978 investigated the factors determining which consonants children produce in English polysyllabic words, and which they distort or omit. She worked with five children, aged 20–24 months. The relative markedness of a segment was not a significant factor in the children's production; they did not attempt unmarked consonants more often than marked ones. While the children varied in the extent to which they reduced or preserved syllables in polysyllabic words, it was always stress, or stress interacting with serial position, which determined whether a consonant was maintained or was the dominant consonant in processes of consonant simplification.

Blasdel & Jensen 1970 used strings of four nonsense syllables to test which string children aged 28–39 months were most likely to imitate. They found that primary stress (but not secondary stress) and utterance-final position favored the children's imitation of a syllable. Dupreez 1974 found a similar result in his study of imitations of adult utterances by three 18-month olds. These children almost always imitated a stressed, utterance-final word; and they tended to imitate a pre-final stressed word, sometimes followed by the final non-stressed word.

verb root, and the perceptually salient but semantically complex verb suffixes. The one-syllable-per-word production limit forces Quiché children to choose between semantic complexity and perceptual saliency. It seems worthwhile to find out which part of the verb children choose. Accordingly, I examined children's use of verbs in which the verb root was not stressed, i.e., when the verb root was not the final syllable of the verb. This occurred when the verb was in clause-final position and had a termination, or when the verb stem was polysyllabic (as when it contained a transitivizing suffix). I counted the number of instances in which the verb root was not the final syllable of the verb for the four subjects from whom I had obtained early acquisition data. Besides Al Tiya:n and Al Cha:y, they included two boys, A Carlos (3;0) and A Li:n (2;0). I used only the samples containing over 70% of one-syllable verb forms: the first eight samples from Al Tiya:n, the first six from Al Cha:y, the first three from A Carlos, and two from A Li:n. The results are shown in Table 3. The binomial test (Siegel 1956) shows that the children consistently chose perceptual saliency over semantic complexity ($p = .005$, two-tailed).

SUBJECT	TOTAL NUMBER OF ONE-SYLLABLE VERBS ^a	ONE-SYLLABLE VERBS WHOSE ROOT MORPHEME \neq FINAL SYLLABLE		
		SEMANTIC HYPOTHESIS ^{a,b}	PERCEPTUAL HYPOTHESIS ^{a,c}	OTHERS ^{a,d}
Al Tiya:n	108	8	40	60
Al Cha:y	410	23	119	268
A Carlos	65	3	16	46
A Li:n	56	3	22	31

TABLE 3. Test of semantic and perceptual hypotheses on verbs.

^a Tokens.

^b Use of the verb root rather than the final syllable.

^c Use of the final syllable rather than the verb root.

^d One-syllable verbs whose root morpheme is also the final syllable.

It is still possible, as Brown predicts, that the children were using the verb endings in prefabricated routines. However, there is no evidence of this in their speech. If we were dealing with prefabricated routines, one would expect the children to use the clause-final endings occasionally in clause-medial position. In fact, this did not happen; the children occasionally used the clause-medial form in clause-final position, but not the other way around (see Table 4).

ERROR TYPES	AL CHA:Y		AL TIYA:N	
	NUMBER	PERCENT	NUMBER	PERCENT
Trans./intrans.	1 ^a	2	2 ^a	5
C-medial/C-final	27 (33)	46 (57)	20 (23)	53 (60)
Status categories	8 (18)	14 (31)	4 (11)	1 (29)
Root trans./derived trans.	2	3	1 ^a	3
Other	7 (19)	12 (33)	5 (13)	13 (34)

TABLE 4. Sources of errors with status markers for Al Cha:y and Al Tiya:n. Where two numbers are given, the first includes only errors that are unambiguously of the type specified; the number in parentheses includes ambiguous errors.

^a The source of this error is uncertain.

There is also no indication that the children had any trouble distinguishing transitive from intransitive endings. Finally, the vowel in the transitivizing suffix is lexically determined—it follows no regular pattern. The children, however, seldom got the vowel wrong in their utterances. All this indicates that the children had indeed learned to use the status markers freely and appropriately at an early stage in their linguistic development.

3.3. DISCOURSE FUNCTION. It is possible that the verb endings might serve some sort of discourse function for the children (cf. Greenfield 1979). When children initiate conversational episodes, they might be more inclined to use the verb stem; but if merely continuing a conversation, it would be easier to get away with just the final syllable of the verb. To test this hypothesis, I took the verbs from the previous test, i.e. the single-syllable verbs whose roots were distinct from their final syllable; and I returned to my transcriptions to see which verbs had been introduced by the children, and which they had repeated after someone else had used them. I labeled a child's use of a verb spontaneous only when it did not occur previously in the conversation (I checked back a full page in the transcript). I considered the child's use to be imitative if anyone else had used the verb in any form (passive, perfective, causative etc.) or had used a semantically similar verb (e.g. 'rip' and 'tear'). I put the results for all four children into the two-by-two contingency tables shown in Table 5. If the

	SPONTANEOUS		REPEATED	
	STEM	FINAL	STEM	FINAL
Al Tiya:n	6	10	2	30
Al Cha:y	10	48	13	71
A Carlos	1	5	2	11
A Li:n	3	18	0	4

TABLE 5. Test of verb endings' function in child discourse.

verb endings served a discourse function, one would expect the verb roots to be used spontaneously, while the endings should appear only as repetitions. In fact, only the results from Al Tiya:n showed such an outcome to a significant degree ($\chi^2 = 5.42$, $p < .01$). While the differentiation of new and old information may partly explain how the children used the verb endings, it is not the whole explanation.

The discourse hypothesis raises the interesting question of how successful the children were in communicating with adults. While they were fairly successful most of the time, there are a number of instances where an adult failed to pick up the child's intentions; e.g.,

- (12) Al Cha:y (2;9), E (an assistant), and myself find a mango. I ask whether it is sweet and whether she likes mango.

Al Cha:y: *xaj lij* (= *kaqe:saj le: ri:j*) 'Let's take off the skin'.

E: *jah?* 'Huh?'

Al Cha:y: *xaj lij uj* (= *kaqe:saj le: ri:j uj*) 'Let's take off the skin ourselves'.

E: *iya? ni modo.* 'Tsk. No way.'

Here Al Cha:y draws the obvious conclusion from my line of questioning, and says it's time to get down to business. Even though she is introducing the idea of actually taking off the mango's skin, she nonetheless uses only the final syllable of the derived-transitive verb *e:sa:j* 'take, take off'. Though her suggestion follows logically from the preceding discourse, E fails to pick it up the first time; thus Al Cha:y is forced to repeat it, with an independent personal pronoun added for emphasis. The use of a bare verb root could be just as confusing. In her fourth sample (2;2), Al Tiya:n spontaneously produced the utterance *kate?* in the context of chasing a quail around the house. Given her phonology at the time, this could be interpreted as the particle combination *k'a te?* 'right away' or as the verb *k'a:tanik* 'to burn'. After a slight hesitation, my assistant responded with the verb *kata:ʔik* 'it is heard', which Al Tiya:n then imitated as *ta ʔik*. When we later transcribed this passage, we decided that Al Tiya:n's first utterance was really uninterpretable given the context. In my work with the children, it took me several months before I could make the automatic adjustment between what the children were saying and the adult Quiché I had learned. Even my assistants (all males in their mid to late twenties) relied upon the mothers from time to time to tell them what the children were saying.

The children's individual personalities and the exigencies of the communicational situation seemed to have as much effect on the degree of spontaneity in their speech as the difference between new and old information. Al Tiya:n and A Carlos were quiet, timid children who were not as talkative as I might have hoped for. Much of their tapes consists of responses to questions from adults, or repetitions of utterances they were told to imitate. In sharp contrast, Al Cha:y and especially A Li:n were much more facile speakers, and tended to dominate conversation. This difference is reflected in Table 5 by the fact that Al Tiya:n and A Carlos show higher ratios of repetitious to spontaneous utterances than Al Cha:y or A Li:n. A voluble child is more likely to use the verb endings spontaneously than a quiet child.

3.4. PERCEPTION PRECEDES PRODUCTION. I have already shown how the Quiché children were largely limited in their initial samples to producing only a single syllable of their verbs. Operating under this constraint, they chose the syllable that received primary stress. They could not apply this strategy to the SAME syllable each time, since the stress on the verb shifts with the linguistic context. In clause-final position, the termination is stressed; but in clause-medial position, the verb stem receives the primary stress. The children were therefore forced to learn at least two syllables for some verbs, even though they could produce only one of the syllables in each utterance. For example, in talking about her plastic duck in her first sample (2;9), Al Cha:y used the final syllable *wik* of the verb *kach'a:wik* 'It's talking.' A week later, the duck was no longer talking, and Al Cha:y said *chaw taj* for *kach'a:w taj* 'It's not talking.' This expression contains the same verb as before, but in utterance-medial position.

Menyuk 1974 notes that, at the time when English-speaking children are producing one-syllable utterances, they appear to understand two-syllable

utterances. Shipley et al. 1969 reach much the same conclusion from children's response to commands. The termination system in Quiché is unique in providing a morphological device for showing perception in advance of production.

THE POSITIONAL *k'o:(lik)*

4. The Quiché elements called 'positionals' generally indicate whether an object is sitting, standing, lying etc; they include *ta:k'a:l(ik)* 'standing', *t'u:yu:l(ik)* 'sitting', and *q'o:yo:l(ik)* 'lying down'. Positionals are not marked for aspect, and hence belong to a different form class from the verbs. The positional *k'o:(lik)* is used to talk about the existence, location, or possession of an object; it is made up of the root *k'o*, the positional suffix */-V₁l/*, plus the termination */-ik/*. It is irregular in that, in clause-medial position, it drops the *l/* of the positional suffix along with the termination, appearing simply as *k'o:*. The obligatory nature of *k'o:(lik)*, with its high frequency in adults' and children's speech, permits us to follow the development of a termination system in great detail.

The children used various forms of *k'o:(lik)* in their first samples; e.g.,

- (13) In an attempt to get Al Cha:y (2;9) talking, her mother tells her to describe the plastic duck that I had brought.

M: *k'o: pala:j katcha?* 'It has a face, you say.'

Al Cha:y: *laj* (= *pala:j*) 'Face.'

ku paj (= *k'o: pala:j*) 'It has a face.'

M: *k'o: pala:j le: jun pa:tax katcha?* 'That duck has a face, you say it.'

Al Cha:y: *pa:j, tax* (= *k'o: pala:j le: pa:tax.*)

- (14) While playing together with her brother and sister, Al Tiya:n (2;1) notices something resembling a cow.

Al Tiya:n: *kolyih* (= *k'o:lik*) 'Here it is.'

kax (= *jun wa:kax*) 'A cow'.

...

Brother: *k'o: le: ake:j* 'You have your horse.'

Al Tiya:n: *lik e:?* (= *k'o:lik e:?*) 'I have it.'

In 13, Al Cha:y first uses the stem of the positional, and then omits it; but in 14, Al Tiya:n first uses the complete clause-final form, and then only the termination. The termination carries the primary sentence stress in utterance-final position; thus it should be easier to hear than the positional stem, which always appears in clause-medial position. Once again, the children face a choice between a semantically salient stem or the perceptually salient suffix in clause-final position. Table 6 shows the children's use of the positional forms in their

	CLAUSE-MEDIAL			CLAUSE-FINAL		
	∅	<i>k'o:</i>	<i>lik</i>	<i>k'o:</i>	<i>lik</i>	<i>k'o:lik</i>
Al Tiya:n	26	12	2	0	20	7
Al Cha:y	65	16	6	0	16	6
A Carlos	13	30	0	0	8	30
A Li:n	9	5	0	0	6	3

TABLE 6. Forms of *k'o:(lik)* in children's early samples.

early samples (the first six samples for Al Cha:y and Al Tiya:n, the first three for A Carlos, and two for A Li:n). Considering just the clause-final contexts for the moment, it can be seen that the children chose the perceptually salient suffix over the stem ($p = .001$ by a two-tailed binomial test).⁹

In the case of the positional, there is some reason to believe that the children might have been using the termination as a prefabricated routine. The overgeneralization of the termination to clause-medial position in the samples from Al Tiya:n and Al Cha:y certainly suggests this possibility. However, the children demonstrated a remarkable understanding of the contexts in which the positional was appropriate, even though they were using the positional in less than 90% of its obligatory contexts (Al Tiya:n used it in 58% of its obligatory contexts, while Al Cha:y used it in only 35%). The children definitely knew that the stem and termination were different manifestations of the same meaning; they did not use the stem or termination to signify a meaning outside the semantic range of *k'o:(lik)*, nor did they use any other word in its place. The overgeneralizations themselves are evidence that the children had made some connection between the clause-medial and clause-final forms of the positional. The overgeneralization was also quite minor; Al Tiya:n and Al Cha:y continued to use the clause-medial form of *k'o:(lik)* in the majority of the clause-medial contexts in which they used the positional. If the children did not use the terminations in prefabricated routines, the overgeneralizations remain to be explained.

The frequency with which the positional *k'o:(lik)* appeared in the children's utterances allowed me to follow its development beyond the initial stage shown in Table 6. Table 7 shows two later stages in the children's acquisition of the

	CLAUSE-MEDIAL				CLAUSE-FINAL		
	∅	<i>k'o:</i>	<i>lik</i>	<i>k'o:lik</i>	<i>k'o:</i>	<i>lik</i>	<i>k'o:lik</i>
Al Tiya:n							
Samples 7-9	14	21	1	4	3	12	9
Samples 10-12	2	52	0	1	1	4	8
Al Cha:y							
Samples 10-13	24	62	0	20	0	3	21
Samples 14-15	5	41	0	3	0	2	7

TABLE 7. The later development of the positional *k'o:(lik)*.

positional. Al Tiya:n, in samples 7-9, and Al Cha:y, in samples 10-13, omit the positional less often in clause-medial position, and begin using the full form in clause-final position. They continue to overgeneralize the clause-final form to clause-medial position; but they use the full form, which they are beginning to control better. The final stage in Table 7 shows a time when the children have nearly completed the transition to the adult usage of *k'o:(lik)*: the use of

⁹ The mothers' use of the positional also fails to explain the early appearance of the termination in the children's speech. In clause-final position, the mothers always used both the stem and termination. Moreover, in the first sample of the children's speech, Al Tiya:n's mother used the clause-medial form of *k'o:(lik)* twelve times, and the clause-final form 3 times; Al Cha:y's mother used the clause-medial form 29 times, and the clause-final form only once.

the stem in clause-medial position, and the full termination form in clause-final position.

A comparison of the children's use of terminations on verbs and *k'o:(lik)* highlights the role of perceptual saliency in the acquisition of Quiché. The major difference between the children's use of the two word-forms is the relative absence of the positional stem in clause-medial position, compared to the presence of the verb stem. Al Tiya:n omitted *k'o:(lik)* in 65% of its clause-medial contexts, compared with 40% for the verbs; Al Cha:y omitted *k'o:(lik)* in 75% of its clause-medial contexts, compared with 4% for the verbs. To a slight extent, this difference may be an artifact of the obligatory nature of *k'o:(lik)* as compared with the verbs, since it was easier to tell when the positional was missing from the children's utterances than when a verb was missing. However, the verb stems are also more salient perceptually than the positional stem in the middle of utterances. Many of the verbs consist of two or more syllables; the syllables at the beginning of the verb provide some contrast to the final stressed syllable, even in clause-medial position. There are many formulaic routines in Quiché in which the positional occurs just before the end of the sentence (e.g. *ma k'o: taj* 'There isn't any', *k'o: k'ut* 'Of course there is', *jawi k'o: wih* 'Where is it?' etc.) In this position, the stem of *k'o:(lik)* is in maximum contrast with the main stressed syllable at the end of the sentence, and therefore more likely to go unnoticed. These factors make it more difficult for the children to hear *k'o:(lik)*, so it should enter their speech later than the verbs.

Another difference in the children's use of terminations on verbs and *k'o:(lik)* lies in the direction of overgeneralization; the children used the termination of the positional in clause-medial position, while using the verb stem in clause-final position. This difference could result from the greater perceptual saliency of the verb stems: the children would be more likely to note the verb stems, and overgeneralize them to the clause-final position. This difference could also be explained by the difference in the children's acquisition of the two word-forms. Their acquisition of the verb stems was more advanced than that of *k'o:(lik)*; and as Table 7 shows, Al Tiya:n did use the positional stem in clause-final position in her later samples. Whatever the reasons may be, these differences are slight, in comparison with the basic similarity in the way the children acquired terminations on the two word-forms. For both verbs and *k'o:(lik)*, the children systematically distinguished between the clause-medial and clause-final forms in their earliest samples: they used the stems in clause-medial contexts, while using only the terminations in clause-final contexts. This behavior can be tied to the way that stress shifts in the two environments; in clause-medial positions, the word stems are stressed, whereas in clause-final positions the terminations receive primary stress. For both the verbs and *k'o:(lik)*, the stress shift results in considerable morphological complexity in the children's first words. The data suggest that children will first use the words that they hear most clearly, no matter what their meaning. Three factors stand out as determinants of perceptual saliency: (a) stress, (b) syllabicity, and (c) utterance-final position. Stage I as Brown defined it, where grammatical morphemes appear only in prefabricated routines, does not hold

true in all languages. Rather, the particular rhythmic structure of the language will determine the form of children's first words, and whether or not grammatical morphemes will be present.

DISCUSSION

5.1. THE PLACE OF STRESS IN CHILDREN'S SPEECH. Many investigators have noted children's tendency to drop unstressed syllables, especially in pretonic position (Miller & Ervin 1964: 13 and Waterson 1971 for English; Vogel 1975 for Rumanian; Berman 1981 for Hebrew; Feurer 1980 for Mohawk; MacWhinney 1982 for Hungarian; and Bowerman 1973 for Finnish). This tendency is typically explained as a perceptual limitation (Waterson, Klein) or as a limitation of auditory memory (Aitchison & Chiat 1982). Even Barton, who argues very persuasively that perception cannot be a major determinant of language acquisition, agrees (1976: 111–12): 'it is with unstressed syllable deletion that we get nearest to the likelihood that difficulties of perception can exert a strong influence on forms.' While stress is the primary factor controlling the children's use of terminations on Quiché verbs and *k'ol:(lik)*, these examples rule out a perceptual explanation. Since stress can shift with the linguistic context, the children had ample opportunity to perceive both stressed syllables, and they produced both syllables in different contexts. Nevertheless, they insisted on deleting the unstressed syllables. A production model of child language, such as the one proposed by Kiparsky & Menn 1977 and by Menn 1978 for phonology, provides a solution to this paradox. In that model, children first store recognition forms of adult target words. Then, to say the words they have retained, they must discard part of the recognition forms. They do this according to a set of reduction rules which enable them to modify recognition words automatically, rather than on a word-by-word basis. The reduced form is then passed along to the articulatory routines, eventually resulting in the word's production. Information that is lost when the recognition forms are reduced for production may be regained through the articulatory routines. For the most part, though, the combination of reduction rules and articulatory routines has a limiting effect on what the child can produce. As Menn says (1978: 164),

'We account for the observed output constraints by the hypothesis that (1) the child depends heavily on stored production subroutines; and (2) the child must work out each of these routines individually, so that he/she therefore has only a few routines available in the early stages of learning to talk.'

Children may use stressed syllables as a means of simplifying their prosodic representations. After all, children must learn word and sentence prosody, as well as the segmental structure of words. Finding the proper place for word stress or sentence accent is a skill that often eludes the most fluent speaker of a foreign language. To learn first the sounds of words, and only later to discover that they are stressed on certain syllables, would require an immense reduplication of effort. Children can make their productions sound more adult by using stressed syllables—since unstressed syllables in isolation may be perceived as if they were stressed, and thus add to children's communicative

burden. The most important reason, however, may be that the use of stressed syllables provides children with the means of organizing serial behavior. Lashley 1951 points out that most behaviors are not organized sequentially. In a typical behavior, such as speech, the movements responsible for producing each segment are too rapid to be controlled sequentially; they must be organized in some hierarchical way. The acquisition of basic sentence rhythms gives children a framework on which they can build the phonological segments. The stressed sentence accents play the central role in keeping the beat, and in defining the over-all rhythmic pattern. The unaccented syllables may then be positioned relative to the accents, as in the metrical account of stress proposed by Liberman 1978 and by Liberman & Prince 1977. Under such an hypothesis, children would first define the major sentence-constituents in terms of intonation and stress, and then go on to supply the words. Before children can talk, they must learn to sing.

5.2. VARIABILITY IN CHILD LANGUAGE. A production model provides a natural explanation of the variability to be found in child language. The typical course of morpheme acquisition runs over a period of months or even years. Table 2 (above) shows how the Quiché children's syllable structure developed over a period of several months. Although the children were largely limited to producing only one syllable of the verb, this limit was not absolute. In one instance, Al Cha:y made a truly heroic effort to go beyond what seemed to be the current limit of syllabic complexity in her first sample:

(15) Talking about the light on my tape recorder.

J (older sister): *chak'a:tisa:j cho?qa chare:ch cha?* 'Make it shine, say it to him, say.'

k'a:tisa:j cho?qa chare: na:n 'Make shine, say it to him, mother.'

Al Cha:y: *chat..ix..xa:j* (= *ch-Ø-a-k'a:t-is-a:j* 'ASP-B3-A2-shine-CAUS-TR')

Al Cha:y paused slightly between syllables and pronounced all the syllables with equal stress, almost as if she were producing three separate words. Her intonation remained high until the final syllable, showing that this was a single utterance (cf. Branigan & Stokes 1981). All three syllables preserve a CVC structure (the second syllable begins with the consonant /ʔ/). Tables 6–7 document the slow development of the positional *k'o:(lik)*. Al Tiya:n first used *k'o:(lik)* correctly in 90% or more of its obligatory contexts at 2;10, while Al Chay reached this level at 3;3. Even though the children controlled all the pieces of *k'o:(lik)*, it took several months before they were able to put them together in the adult fashion. Such patterns are typical of the slow pace of language development (Brown 1973, Cazden 1968); they emphasize the variable nature of linguistic rules in children's speech. However, as Slobin points out, children do not generalize across morpheme or sentence boundaries. While there can be large variations in the percentage of presence of a particular morpheme in its obligatory contexts, the variation is limited to the obligatory contexts. Children do not supply new morphemes at random.

Bloom 1970 proposed a 'reduction transformation' as a device to handle the variability in the length of children's utterances. She felt that such a transformation offered the best account of such replacement sequences as *Lois read*, *Read book*, and *Lois book*—where the child seems to control all the pieces of a complete sentence, but cannot put the three words together in the same utterance. Brown (238–9) notes several objections to Bloom's reduction transformation, including the fact that it suggests an absolute ceiling to the complexity of children's utterances, though in fact they may produce SOME three-word utterances during the period when they use mostly two-word utterances. The reduction transformation also gives a counter-intuitive explanation of language development: as children produce longer sentences, they lose reduction transformations and their grammar becomes less complex. Brown's solution to the problem is to make the sentence constituents optional in the child's grammar: the child progresses by discovering which constituents are truly optional in the adult grammar, and which are obligatory. The main defect of such a solution, as Brown himself points out, is the implication that children could exercise all the options if they wished, and so produce eight- or nine-word utterances (which they do not). More recently, Bloom, Miller & Hood 1975 have argued that a variable component should be incorporated directly into children's grammar; but they do not explain which parts of the grammar should contain variable rules, or why the variability should change over time.

A production model suggests a physiological basis for the comprehension/production distinction in children's speech. The children's control of the terminations in Quiché demonstrates that they have knowledge of at least two syllables of a word, even when they usually produce only one. Similarly, Bloom's replacement sequences demonstrate that children can control various parts of an adult sentence, even if they are able to produce only part of the sentence. While a more adult knowledge of word and sentence forms may be the basis of children's linguistic comprehension, unpracticed articulatory routines limit their productions to one syllable of the word, or two words of the sentence. The variability in child language is precisely what should occur if physical routines are being built up slowly to accomplish the demands of language. Children do not follow strict two-syllable-per-word or two-word-per-sentence limits, because the limits are not a part of their linguistic comprehension. They do not generalize across morpheme or sentence boundaries because their comprehension exceeds their production, and so limits the types of errors that can occur. Children gradually develop more adult-like speech by practicing the articulatory routines which are necessary to realize the patterns that are already a part of their linguistic knowledge.

5.3. INTONATION AND CHILD LANGUAGE. Inflectional development in Quiché provides a specific instance of a much broader theory proposed by Bolinger 1978.¹⁰ Syllabicity, stress, and utterance-final position are intimately connected with intonation in language. Utterance-final position is part of the pausal phe-

¹⁰ The following discussion incorporates the observations that Bolinger makes on the place of intonation in child language.

nomena of a language, including the terminal intonation contours. The syllable is the primary unit of intonation (Wang 1967): a rising, falling, high, or low pitch usually affects an entire syllable, not just the individual segments. Stress is correlated with the high or low points of the intonational contour. Hyman 1978 states that, historically, word stress is actually derived from intonation. I would suggest that stress is derived from intonation ontogenetically, as well as historically.

The use of intonationally salient syllables would be a natural continuation of children's earlier uses of intonation, beginning at birth. According to Condon & Sander 1974, 'as early as the first day of life, the human neonate moves in precise and sustained segments of movement that are synchronous with the articulated structure of adult speech.' Neonates vocally distinguish pain from pleasure by crying at one, and not the other. Delack (1974: 16) states:

'such sound-meaning correspondences may begin as non-volitional responses to endogenous as well as exogenous stimuli. It would thus seem that this ability arises very early in an infant's existence and is to a large degree non-arbitrary.'

The cries are quickly differentiated into 'regular' and 'mad' types, and then into cries and non-cries (Wolff 1966). From the age of three months, infants respond positively to friendly tones, and negatively to angry tones of voice. By the babbling stage, 'seemingly adult intonation patterns are heard' (Kaplan & Kaplan 1971: 362-3, Menn 1976: 182). Nakazima 1966 found that the earliest difference in vocalizations between American and Japanese infants was in intonation.

Intonation is ideally suited to expressing meanings that are most important to children: attention-getting, requests, inquiries, complaints etc. These are then incorporated into the illocutionary counterparts of children's first words (Dore 1975). Parents and others rely primarily on the intonation of children's first utterances in order to interpret them, while using exaggerated prosodic features in their speech to children (Garnica 1974). We can hypothesize that an innate capacity for distinguishing and controlling intonation enables infants to differentiate speech from non-speech, and maternal speech from non-maternal. A built-in tie between intonation and affective state provides infants with their first clue to the connection between sound and meaning. Infants then analyse both intonation and meaning to discover their constituents. The relative prominence of pitch and pause, in conjunction with the clustering effect of processing speech in syllabic units, provides children with their first clues for slicing up the intonational patterns, first revealing syllables, then words and phonological segments.

In the babbling stage, children practice breaking up intonational contours into syllable-sized segments. The first 'words' arise when the babbled syllables begin to incorporate segments in the target words. Nor is this the end of intonation's role in language development—since, as Bolinger points out (514), 'once the repertory of words and syntactic patterns has been mastered, intonation is free to embrace larger stretches of speech, up to paragraphs, carrying on both an organizing and an illocutionary role.' The acquisition of inflectional morphology in Quiché illustrates a single point in an intonational account of

language development. Children's attention to intonation in other stages of language acquisition and in other languages remains to be documented.

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