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On the Underspecification of Functional Categories in Early Grammars

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It has long been observed that children tend to omit closed-class grammatical function items in early speech (Bloom, 1970; Brown, 1973). These observations have taken on new importance with recent developments in linguistic theory, where determiners, complementizers, subject-verb agreement and auxiliaries are all classified as functional (as opposed to lexical) categories, heading their own projections (Abney, 1987; Chomsky, 1989; Fukui & Speas, 1985). Indeed, functional categories are seen to encapsulate many of the critical aspects of syntactic structure itself. That early stages of language acquisition apparently lack these grammatical function items has led some researchers to propose that children's early grammars are syntactically impoverished, initially being composed of only a VP (e.g., Guilfoyle & Noonan, 1988; Lebeaux, 1988; Radford, 1990). Others have suggested that children may fluctuate between two competing structural representations, one with functional projections, the other without (e.g., Lebeaux, 1988). However, still others argue that children's early productions represent an incomplete picture of children's actual grammatical competence (e.g., Lee, Lust, & Whitman, 1990; Whitman, Lee, & Lust, 1991; Demuth, 1992a). Although each of these different points of view stems from an understanding that Universal Grammar plays a critical role in the acquisition process, each offers a fundamentally different perspective on the nature of that process.

This chapter focuses on the acquisition of functional categories, arguing that early child grammars are much richer and more fully developed than early child productions might suggest. I propose that much of the null and variable occurrence of functional categories in early speech can be explained more

accurately by appealing to phonological rather than syntactic aspects of children's developing grammars. Specifically, I demonstrate that the omission of functional categories such as determiners, subject pronouns, and auxiliaries in English and Sesotho (a southern Bantu language) is actually predicted by the Metrical Model of Production outlined here. Furthermore, the model accounts for other omissions that purely grammatical accounts are unable to address.

The chapter is organized as follows: In the next section I examine data from both English and Sesotho, illustrating the gradual and variable acquisition of functional categories. I then discuss the problems that the acquisition of functional categories presents for maturational and simultaneous grammars approaches to early grammars. In the following section, I provide a sketch of the Metrical Model of Production, showing how it accounts for much of the English and Sesotho data and extending it to account for other language data as well. I conclude by illustrating how an understanding of children's early production constraints is essential in determining the nature of Universal Grammar and the role it plays in the acquisition of syntactic structure.

THE VARIABILITY OF FUNCTIONAL CATEGORIES IN EARLY CHILD LANGUAGE

English Data

Brown (1973) chronicled the acquisition of grammatical morphemes by Adam, Eve, and Sarah, summarizing when these children reached the 90% criterion level of morpheme use in obligatory contexts. Adam and Sarah reached this stage at 3;6 years and 4;0 years, respectively. Eve arrived much earlier, demonstrating 90% competence by 2;3 years.

There are several observations to be made about these findings. First, there is a 21-month gap in the attainment of the 90% criterion by Eve and Sarah (almost 2 years). A coherent theory of language acquisition that addresses the issue of functional categories must account for this type of individual variation. Second, Brown's 90% criterion specified 90% appropriate use of grammatical function items in each of three successive recording sessions. In other words, each of the children was using grammatical function morphemes to a variable degree before achieving the 90% criterion. This variability in the use of functional categories is reported in many studies of early child English (Bloom, 1970; Brown, 1973; de Villiers & de Villiers, 1973). The following typical examples from the auxiliary/tense domain were reported in Radford (this volume, chapter 7).

- (1) a. We ___ been there. We've been there. (Robert—2;2 yrs.) (13b)
 b. That dress ___ not fit me. That dress doesn't fit me. (Betty—2;9 yrs.) (12g)
 c. I ___ do it, I can. (Lisa—2;10 yrs.) (23c)
 d. That ___ making noise, isn't it? (Gary—3;0 yrs.) (31b)

The picture that emerges is not that of an all-or-nothing use of functional categories but, rather, one where the production of grammatical function items occurs in some contexts but not in others, slowly becoming more systematically realized over time.¹

Sesotho Data

The variable use of functional categories is found in other languages as well. Bantu nouns are typically composed of a nominal stem, plus a noun class prefix (structurally equivalent to AGR; cf. Demuth & Gruber, 1993) that provides gender/class and number information, as in (2).

(2) Noun Class Prefix + Nominal Stem

se-	tulo	
8-	chair	'chair'
li-	tulo	
9-	chair	'chairs'

Demuth (1992a) noted that the early null or variable production of noun class prefixes in Sesotho and other southern Bantu languages is very similar to the reported early absence of determiners in English and other languages. A typical example of early variability in the production of noun class prefixes is given in (3), with the adult target in parentheses on the right (Demuth, 1988).

(3) <i>Child - H 2;1 yrs.</i>	<i>Adult Target form + gloss</i>
a. phokə	(ma-phoqə)
b. a-pokə	6-green corn stalks
c. ma-pənkə	'green corn stalks'

¹Interestingly, Radford (this volume, chapter 7) suggested that children who demonstrate variable use of tense morphemes have not yet acquired a TP, even though they (a) make productive and in fact overgeneralized use of past tense *-d* and present tense *-s* morphemes; (b) tense-mark auxiliaries (*have/be, do, modals*); and (c) show appropriate subject-aux inversion in questions and have postauxiliary *not/n't* negation with tensed auxiliaries. Radford therefore assumed that a more consistent realization of functional morphology (90%?) is required to license the building of syntactic structure.

The examples in (3) represent this child's different tokens of the word *ma-phóqo* 'green corn stalks', all produced within the same recording session. The majority of this child's and other children's nouns at this time are prefixless, like that in (3a). Only a few occur with shadow vowels, as in (3b), and those with full prefixes, as in (3c), are extremely rare. In other words, many of the nouns in the speech of Sesotho-speaking 2-year-olds are missing the noun class prefix. Furthermore, this phenomenon has been robustly documented in other southern Bantu languages (Siswati: Kunene, 1979; Sesotho: Connelly, 1984; Demuth, 1988; Setswana: Tsonope, 1987; Zulu: Suzman, 1980, 1982, 1991; cf. Demuth, 1992b, for a review).

Sesotho noun class prefixes are produced more consistently around 2;6 years and are generally well formed by the age of 3 (Demuth, 1988, 1992b). Interestingly, however, the agreement prefix on demonstratives and possessives shows up much earlier, as is seen in the well-formed agreement prefixes underlined in (4) (cf. Connelly, 1984; Demuth, 1988).²

(4) <i>Child - H 2;1 yrs.</i>	<i>Adult Target form + gloss</i>
kolo <u>sá</u> -ne	(se-kólo <u>sá</u> -ne) 7-school 7DEM-that 'that school'
ponko <u>lá</u> -ne	(le-phoqo <u>lá</u> -ne) 5-green corn stalk 5DEM-that 'that green corn stalk'

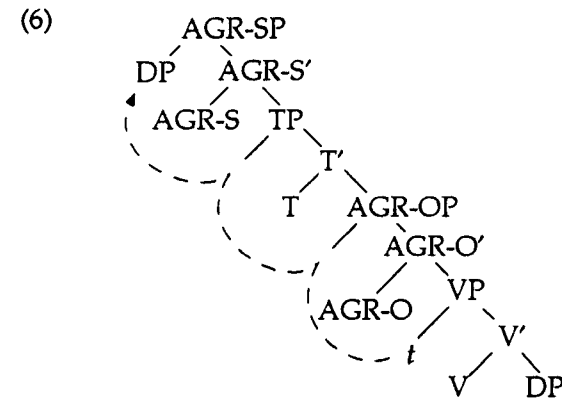
Examples like those in (4) show that children know the appropriate noun classes to which nominal stems belong, even when the noun itself surfaces with a null functional element. What remains to be explained is why the noun class prefix is frequently dropped, whereas the prefix on demonstratives is generally present.

Variability in the production of functional heads is also found in Sesotho IPs. Sesotho is an SVO language where both lexical subjects and lexical objects can be dropped. A subject clitic is always obligatory, whereas an object clitic is obligatory only when the lexical object has been dropped or extraposed (i.e., is not adjacent to the verb) (Demuth, 1992b). The Sesotho IP is therefore composed of the following morphemes:

²Glosses are as follows: DEM = demonstrative, FUT = future tense, M = mood, OM = object marker, PERF = perfective aspect, PN = independent pronoun, POSS = possessive marker, PRES = present tense, SM = subject marker, 1 = gender/number class #1 = third person, 1s = first person singular, ' = high tone, + = mid tone, low tone = unmarked. A modified version of Lesotho orthography has been used.

- (5) SUBJ - TENSE - (OBJ) - VERB - MOOD
 bá- tlá e- rék- a+
 2SM- FUT - 9OM- ask- M
 'They will buy it.'

Following Chomsky (1989) and others, Demuth and Gruber (1993) propose that the base structure of Sesotho is that given in (6). The VP-internal subject then raises to SPEC-AGR-S P, and the verb raises via head-to-head movement through AGR-O and T to AGR-S:



I propose, following standard assumptions for *pro*-drop languages, that Sesotho is similar to Italian in that *pro* is licensed in an A-position [SPEC, IP] under SPEC-head agreement with AGR-S. And, as in Italian, *pro* is identified by a rich AGR.

The early Sesotho IP is typified by the collapsing of preverbal functional heads (AGR-S and T) into one or two shadow vowels. This appears to be typical of early stages of acquisition in other Bantu languages as well (Demuth, 1992a, 1992b; Kunene, 1979). Adult target forms appear in parentheses underneath the child's utterances.³

- (7) (H—2;1 yrs.)
 a. a átá kumba kumba
 (ke-rát-á kumba-kumba)
 1sSM-like-M 9tape-recorder
 'I like the tape-recorder.'

³All Sesotho data included in this chapter come from child H and constitute part of the Demuth Sesotho corpus (see Demuth, 1992b, for discussion). Recordings were of spontaneous, naturalistic speech, coded with the assistance of the child's mother and grandmother, and the support of author's contextual notes.

- b. a lahlile
(ke-di-láhl-íl-e+)
1sSM-10OM-throw away-PERF-M
'I threw them away.'
- c. ta hâ:na
(ke-a-hân-a+)
1sSM-PRES-refuse-M
'I refuse.'
- d. áy shépa
(ó-a-sháp-a+)
1SM-PRES-lash-M
'S/he is lashing.'

Here again we see variability in the production of functional categories: In (7a) the subject marker is reduced to a shadow vowel, whereas in (7b) both subject marker and object marker are reduced to one shadow vowel. (7c) appears to include a direct coalescence of SM and T, whereas in (7d) it is not clear whether the vowel+glide sequence that surfaces represents the subject marker or the tense marker or both. In other words, at first glance it is not entirely clear from the examples in (7) whether functional categories have been omitted, coalesced, or reduced to a shadow vowel; and what the structural implications might be.

Interestingly, however, there is early evidence that AGR-S and T are actually projected. First, the perfect tense/aspect suffix *-ile* is productive at 2;1 years (e.g., (7b)), suggesting that children are making a present/past distinction from an early age. Note, however, that only the verbal suffixes occur consistently: Preverbal tense/aspect morphemes are subject to reduction. Second, there is tonal evidence that child H is marking person at 2;1 years: First and second person SMs are correctly produced with low tone in 80% of present indicative constructions, whereas third person SMs are likewise consistently produced with high tone (Demuth, 1993). Thus, although SMs are morphologically underspecified, they are distinguished tonally from an early age.

As in the case of noun class prefixes, Sesotho AGR-S and T begin to be more consistently identifiable around 2;6 years and are generally well formed by the age of 3. This is shown in (8) and (9).

- (8) (H—2;6 yrs.)
é-á-tsamay-a koloi yá:ka
(é-á-tsamay-a kolóí yá:ka)
9SM-PRES-go-M 9car 9POSS-my
'It's going, my car.'

- (9) (H—3 yrs.)
n-ná ke-a-e-batl-a buka yá:-ka
(n-ná ke-a-e-bátl-a búka yá:-ka)
1s-PN 1sSM-PRES-9OM-want-M 9book 9POSS-my
'Me, I want it, my book.'

In sum, variability in the production of functional categories is of two sorts: The first involves the overlapping and inconsistent null, shadow vowel, and/or full realization of a given functional item in a given structural context. The second involves the null versus full realization of a given functional item in different structural contexts. These are outlined in (10).

- (10) *Variability in the Production of Functional Categories*
a. In context *x*, Functional Category *f* occasionally appears.
b. Functional Category *f* appears in context *x* but not in context *y*.

A theory of acquisition must be able to account for both of these types of variability in the marking of functional categories. Furthermore, it must address whether the gradual increase in the appearance and well-formedness of functional categories is linked to parallel developments in grammatical structure or is due to some other nonsyntactic or nonlinguistic phenomenon. In the following section I review two grammatical proposals for the early variability in the production of functional categories and show that they are incapable of explaining the types of variation found in (10).

GRAMMATICAL PROPOSALS

Functional Categories and Maturation

Radford (1990) proposed that early child grammars lack functional categories because Case has not yet matured. Considering evidence from several children, he suggested that functional categories begin to appear at the same time that Case matures, around the age of 2 (give or take 3 months for individual variation). Given this maturational program, Radford was forced to argue that apparent uses of functional categories before 2;0 years are actually "impostors," or nonproductive forms. The variable presence of early functional categories within a given context therefore poses a problem for the maturational account.

The maturational explanation also runs into problems when we address the variable appearance of tense marking on English verbs and auxiliaries in different contexts (shown in (1)). Similar problems arise in explaining the early omission of Sesotho noun class prefixes versus the presence of nominal

agreement. We saw in (3) and (4) that Sesotho-speaking children have variable production of noun class prefixes, even though in many cases they use appropriate agreement morphology on nominal modifiers. Furthermore, 2-year-old Sesotho-speaking children use tense suffixes but omit tense prefixes. A maturational account would have nothing to say about this type of variation.

In sum, both the gradual nature of the acquisition of functional categories and the variable appearance of functional categories in different contexts present problems for a maturational approach. First, the 21-month (not 3-month) disparity between Eve and Sarah in the acquisition of inflectional morphology needs to be explained. Second, the gradual nature of the acquisition of function categories over time, rather than the abrupt onset argued for by Radford (1990), must be addressed. Finally, the variable production of functional categories in different contexts, such as that of English auxiliary/tense morphemes and Sesotho AGR and T morphemes, requires an explanation.

The Simultaneous Grammars Approach

Another grammatical account for the variable presence of functional categories in early child language is that children may be operating under two grammars simultaneously (e.g., Lebeaux, 1988). Under the simultaneous grammars approach, it is suggested that children produce some utterances with IP structure; but when under duress, they resort to a more primitive structure lacking functional morphology. This view, although of potential interest for explaining variability in overt movement (e.g., WH-movement), faces difficulties when confronted with the types of data presented here. What would be the cognitive consequences, for instance, of having two different grammars operating in a two-clause utterance such as *That ___ making noise, isn't it?*

Similarly, why would Sesotho-speaking children use two grammars—a fully articulated IP with the perfect suffix *-ile*, but a reduced VP structure with other tense forms? We know little about how bilingual acquisition takes place, but it is often suggested that children start out with one grammar and two lexicons. The simultaneous grammars approach implies that children learning one language would maintain two grammars and code-switch between them. However, such an approach would not be able to predict when children would use the fully articulated IP/CP grammar and when they would use the more primitive VP grammar.

In the following sections, I show that a Metrical Model of Production makes the appropriate predictions regarding the variable occurrence of functional categories in early acquisition.

A METRICAL MODEL OF PRODUCTION

In the following sections, I provide the outlines of a Metrical Model of Production and show how it accounts for the English and Sesotho data on the variable use of functional categories. First I consider proposals regarding the importance of stress and feet. Then I extend this approach to the notion of Minimal Word and show how it would account for cross-linguistic variation. Finally I show that the Metrical Model of Production is a probabilistic one that makes just the right predictions regarding the variable appearance of the functional categories discussed in the foregoing data.

It has long been observed that English-speaking children tend to produce stressed syllables and are more likely to omit certain unstressed syllables. Capitalizing on recent developments in phonological theory, and metrical phonology in particular (e.g., Hayes, 1984), Gerken (1991) and Gerken and McIntosh (1993) found that young English-speaking children are more likely to produce either stressed word units (like monosyllabic verbs) or parts of words that incorporate a trochaic foot (with a strong-weak stress pattern). In contrast, children tend to omit the initial unstressed syllable of iambic feet (weak-strong stress), or unstressed syllables preceding a trochaic foot. These four conditions are schematized in (11) with corresponding English samples (*s* = strong, *w* = weak). The unstressed syllable most likely to be omitted is underlined in each case, and a binary-branching foot is delimited by the square brackets.

(11) stressed monosyllabic foot	[s]	ball
trochaic foot	[s w]	dolly
iambic foot	[<u>w</u> s]	<u>the</u> ball
trochaic foot + pretonic syllable	<u>w</u> [s w]	<u>the</u> dolly

Note the patterns that result: The weak syllables most likely to be omitted fall on determiners, or functional categories. If we subject longer words without functional categories to the same test, we should be able to predict which syllables would be omitted and which, preserved. Not surprisingly, child output forms like those on the right in (12) are widely attested.

(12) trochaic foot + pretonic syllable		
<u>w</u> [s w]	<u>ba</u> nana	nana
	<u>pi</u> ano	nano

Given (11) and (12), two generalizations can be made. First, English-speaking children's early words contain a stressed syllable. This phenomenon occurs cross-linguistically. Certainly this is true for Sesotho (discussed

in the following), and the same is reported for early Maya K'iche', a language with final stress (Pye, 1983).

Second, as shown in (12), English-speaking children prefer initiating words and utterances with a stressed syllable. The same pattern appears to hold for early stages of Sesotho acquisition, a language with penultimate stress. Such observations led Allen and Hawkins (1980) to propose that children universally begin the language acquisition process with a trochaic foot. Although this would appear to account for most of the early productions of English- and Sesotho-speaking children, it does not generalize to stress-final languages like French and Maya K'iche'. I propose that children's early productions tend to include feet rather than stressed syllables alone, and that the construction of those feet necessarily interacts with the metrical structure of the language being acquired. Thus, English and Sesotho tend to utilize trochaic feet, and this is reflected in children's early productions. In contrast, Maya K'iche' exhibits word-final stress. We would predict that children's first utterances would include final stressed syllables, and this is exactly what Pye (1983) reports.

I therefore propose that children's early word formation is influenced by a Minimal Word Constraint (13):

(13) *Minimal Word Constraint*: A prosodic word contains a foot.

The Minimal Word Constraint is deliberately left vague, so as to be maximally applicable across languages. I suggest that children have the correct setting for iambic (w-s) versus trochaic (s-w) structure relatively early, and that binary-branching feet constitute the maximal setting at early stages of acquisition. I also suggest that syllables falling outside of the foot will be treated as extrametrical and subject to reduction or deletion. Subsequent adjustments in the incorporation of extrametrical syllables into prosodic words will occur gradually over time, showing both intra- and interspeaker variation.⁴

Armed with the Minimal Word Constraint, where all words must contain a foot, and feet by definition include a stressed syllable, I again consider the question why young children tend to omit functional categories. First, functional categories in English are generally unstressed and are thereby candidates for deletion, unless they constitute the second syllable of a trochaic foot. But there are few instances in the structure of English where this scenario is found: Many English verbs, and English-speaking children's early verbs in particular, are monosyllabic stressed syllables (e.g., *gave, fix, give, hit, put, ride, go*) (Brown, 1973). Preverbal auxiliaries are generally

⁴See Dresher and Kaye (1990) for a computational approach to the acquisition of stress systems, and Demuth (in press) for a more detailed treatment of the acquisition of prosodic domains in general.

unstressed and are therefore candidates for deletion. Consider again the forms listed in (1) (= (14)).

- (14) a. We ___ been there. We've been there.
 b. That dress ___ not fit me. That dress doesn't fit me.
 c. I ___ do it, I can.
 d. That ___ making noise, isn't it?

Note that in (14a–d), the forms omitted are stressless or contractible forms. In each second clause or sentence, however, the previously omitted forms occur. Note also that these forms are all stressed: tag questions in (14c) and (14d), and the stressed form of the auxiliary *do* in (14b), where the negative is now stressless and contracts. Only the alternation in (14a) appears to be unaccounted for by the Minimal Word Constraint, though it is possible that this form was contrastively stressed—a situation not generally captured in most transcriptions of child speech.

This approach can also be extended to account for the variable appearance of noun class prefixes in Sesotho. Sesotho does not have stress as such but employs penultimate lengthening, thereby creating a trochaic foot. We would therefore expect Sesotho-speaking children to produce disyllabic nominal stems but to do less well on material that precedes the foot—material that often includes the noun class prefix, or AGR. As seen in (4) (= (15)), the underlined noun class prefix is missing. I hypothesize that it is null because it falls on an unstressed syllable outside the trochaic foot, whereas the stressed agreement morphemes on the disyllabic demonstrative (in boldface) are present and well formed.

- | | | |
|---------------------------|----------------------------------|--|
| (15) <u>w</u> [s w] [s w] | [ponko] [l <u>á</u> -ne] | (<u>le</u> -phoqo l ^á -ne) |
| | | 'that green corn stalk' |
| | [kolo] [s <u>á</u> -ne] | (<u>se</u> -kólo s ^á -ne) |
| | | 'that school' |

Interestingly, and as Gerken (1991) noted, a similar solution may provide an account of children's variable production of English subject pronouns. English subject pronouns can be either stressed or unstressed: When they are topical, old information, they tend to be unstressed, bearing the phonological status of stressless clitics. However, English subject pronouns can also be stressed: In such cases contrastive focus is on the subject. Possible stress patterns and foot structures for English subject pronouns are provided in (16):

- | | | |
|--------------------------------------|----------------|------------|
| (16) a. 2 stressed monosyllabic feet | [s] [s] | I know |
| b. iambic foot | [<u>w</u> s] | I know |
| c. trochaic foot + pretonic syllable | <u>w</u> [s w] | I know him |

As is shown in (16), noncontrastive English subject pronouns, like English determiners, generally fall either on the first syllable of an iambic foot or on a pretonic syllable and are therefore subject to deletion. This might help explain why lexical subjects in English, which are always stressed, are present from the outset in children's early speech, whereas pronominal subjects are often null. Furthermore, the Minimal Word Constraint predicts that when subject pronouns are contrastive, or stressed, they will constitute a minimal word and will surface in children's speech.

The stressed pronoun/unstressed agreement marker distinction is morphologically transparent in languages like Sesotho. Interestingly, children's stressed pronouns (e.g., *n-ná* 'me') are well formed long before unstressed subject markers are consistently realized, the preverbal morphology often disappearing when the stressed pronoun is present. Brackets are used to designate each prosodic word and underlined portions indicate the final trochaic foot in (17) (from Demuth, 1993).

- (17) (H—2;6 yrs.)
 ná bidíkisa
 ([n-ná] [ke-a-bídíkis-a])
 1s-PN 1sSM-PRES-turn-M
 'I'm revolving (it).'

Most Sesotho verb stems used by 2-year-old children are disyllabic and constitute a trochaic foot. This means that IP functional heads (AGR-S, T, and AGR-O) should be subject to reduction, and this is exactly what happens. Consider again examples (7c-d) (= (18a-b)).

- (18) (H—2;1 yrs.)
 a. ta há:na
 ([ke-a-hán-a+])
 1sSM-PRES-refuse-M
 'I refuse.'
 b. áy shépa
 ([ó-a-sháp-a+])
 1SM-PRES-lash-M
 'S/he is lashing.'

Notice that the foot remains constant, whereas the preverbal extrametrical syllables are reduced or null. The large majority of utterances from Sesotho-speaking children at this stage of development show a similar pattern. Note that object markers in Sesotho are found in extrametrical syllables; English *him/her/it*, on the other hand, can be either stressed or unstressed, but even

in their unstressed form they fall within the foot and are therefore candidates for retention (cf. 16c).

I propose, then, that the Minimal Word Constraint is operative in children's early productions. Given the Minimal Word Constraint, the Metrical Model of Production makes certain predictions about which syllables will be retained and which will be omitted or reduced in early child speech.

(19) *Metrical Model of Production*

- a. Stressed syllables of a word are most likely to be retained.
- b. Unstressed syllables of a prosodic word are most likely to be omitted or reduced.
- c. Unstressed syllables that fall within a foot are more likely to be retained than extrametrical syllables.

The Metrical Model of Production makes probabilistic rather than absolute predictions about which functional categories will be missing in early child speech. As such, it goes a long way toward accounting for the pervasive variation found in children's early production of functional categories. Furthermore, it provides a unified account for the fact that syllables other than functional categories are also missing in early child speech.

IMPLICATIONS REGARDING THE NATURE OF EARLY GRAMMARS

I have examined the variable use of functional categories in early English and Sesotho. I have demonstrated that the variable presence of functional categories in early child language poses serious problems for grammatical explanations such as maturational and simultaneous grammars accounts. Rather than attributing this variability to the maturation of Case or to a switching between two grammars, one with functional categories and the other without, I argue that prosodic factors such as stress and foot structure not only explain much of the variation found but also make correct predictions about which functional categories will occur and which are most likely to be null or reduced. I demonstrate that the omission of auxiliaries, determiners, agreement morphemes, tense markers, and even pronominal subjects is part of a much larger phenomenon that characterizes unstressed, extrametrical syllables in general. I provide a Metrical Model of Production that accounts for this phenomenon. Under this model, early child grammars are subject to the Minimal Word Constraint. The model is presented as a probabilistic one that predicts that certain (stressed) syllables will be retained in early productions, whereas other (unstressed) syllables will be subject to deletion, especially if they fall outside of the prosodic foot.

The Metrical Model of Production incorporates several conceptual advantages over previous proposals of this type. First, rather than making the strong prediction that children's first utterances will always contain trochaic feet (Allen & Hawkins, 1980), or stressed and final syllables (Echols & Newport, 1992), the Metrical Model of Production provides room for the language-specific construction of feet as realized by the Minimal Word Constraint. Second, it extends Gerken's (1991) and Gerken and McIntosh's (1993) proposals regarding the importance in English of stressed syllables and feet to other English constructions (e.g., auxiliaries) and applies the same approach to functional categories in other languages (e.g., Sesotho). Finally, it presents a probabilistic model of production that can predict which syllables/morphemes children will be most likely to retain, or reduce. This model allows for the observed inter- and intraspeaker variation (e.g., Peters & Menn, 1993; Peters, in press) by incorporating the notion of word formation constraints (rather than, say, a parameter) that are gradually relaxed over time (cf. Demuth, in press).

Although the Metrical Model of Production goes a long way toward handling the problematic data outlined here, it also raises several questions. Some might wonder whether certain functional categories are being omitted for reasons of perception rather than production. It is possible that at earlier stages of acquisition, perception would be a relevant factor. The type of data examined here, however, where children know the noun class of Sesotho nouns (as evidenced by the correct agreement form on modifiers), and the form of the English auxiliary (as evidenced by the use of the correct form in the tag questions), shows that phenomena other than perception are at work. Rather, I suggest that the phenomena described here are not an effect of production but rather of principles of Universal Grammar as applied to the organization of prosodic structure. We have tended to think of UG as constraining and directing children's acquisition of syntactic structure: Why should UG not also constrain the form and shape of children's phonological and prosodic structures? It is indeed possible that the Metrical Model of Production outlined here, and more particularly the notion of a Minimal Word Constraint, are more appropriately characterized as evidence of UG and the cognitive organization of prosodic structure, rather than simply as mechanistic production constraints. Such an approach was developed further in Demuth (1992c, in press).

In conclusion, the Metrical Model of Production is offered not as a competitor to syntactic theory but as a necessary complement to it. Much of the study of language acquisition is necessarily based on children's productions. Yet children do not simply produce syntactic trees; they produce utterances that are part of a linguistic system, one that incorporates both phonological and syntactic elements. The Metrical Model of Production makes a strong, testable statement about the role of stress and feet in the prosodic

organization of young children's utterances. If it is applied carefully, with a sophisticated phonological understanding of the prosodic properties of the language at hand, it will prove a useful tool in addressing the acquisition of syntax. If prosodic or other phonological phenomena, such as phonotactic constraints, can be ruled out as possible constraints on the production of functional categories, it is all the more likely that the phenomenon exhibited is a syntactic one.

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