North East Linguistics Society

Volume 11 *Proceedings of the Eleventh Annual Meeting of the North Eastern Linguistic Society* Article 12

1981

X̄ Morphology

John T. Jensen
University of Ottawa

X̄ MORPHOLOGY*

JOHN T. JENSEN

UNIVERSITY OF OTTAWA

Sapir (1921, chapter 6) distinguishes morphological structures according to four 'techniques,' which can be arranged in the hierarchy of (1). While some of these terms are used in different senses by various authors,[1] I shall assume the interpretation indicated in (1), which is probably not the only possible interpretation of Sapir's intentions.

(1) a. Isolating (one morpheme per word), e.g. I have the book
b. Juxtaposing or agglutinating (affixes loosely bound to roots within words, usually with open junctures), e.g. good#ness
c. Fusion (affixes more tightly bound to roots within words with phonological changes in one or both, usually with close juncture), e.g. dep+th; illus+ion
d. Symbolism (internal change; individual morphemes not isolable), e.g. sang, sung.

Most languages use two or more of these techniques and, as our examples show, English uses all four. Nevertheless, Sapir believed that languages could be grouped according to their dominant techniques. In Sapir's classification, English and Latin are both grouped as primarily fusional languages. English and Latin differ, however, along another dimension which Sapir develops, one which

counts the average number of morphemes per word. On this basis, English is classed as analytic (relatively few 'concepts' combined into words), while Latin comes in as synthetic (somewhat more 'concepts' combined into words).

Fusion and symbolism are difficult to characterize in terms of an item-and-arrangement model of morphology, such as is typically used in the analysis of agglutinating languages. Matthews (1972) has argued that for languages in which such techniques are dominant, such as Latin, a different model of morphology should be invoked. He develops a word-and-paradigm model, according to which roots are abstract (i.e. nonphonological) items which are manipulated by word formation rules, sensitive to features indicating morphosyntactic categories, to produce phonological word forms. The difficulty with Matthews' approach is that both models of morphology would have to be used in the analysis of those languages which use a number of these techniques, such as English. A single model should suffice for the analysis of such languages, and, by implication, for all languages. This model need not be a strict version of either IA or WP (or item-and-process (IP), an intermediate approach nearer to WP).

Aronoff (1976) develops an item-and-process approach to morphology in which word formation is based on words. He assumes that derivational affixes are attached under the node X, so that we have structures like (2).

(2) $[[[[\text{form}]_N \text{ al}]_A \text{ iz}]_V \text{ er}]_N$ (Nida 1949, 87)

Aronoff also assumes that inflectional affixes are attached to X^1 or to higher nodes.[2] In a more highly elaborated statement of $\bar{X}$ syntax, Jackendoff (1977) gives such examples as (3).

(3) $[\text{ the}[[\text{King of England}]_{N^1}]_{N^2} \text{ 's}]_{N^3}$

However, in Chomsky and Halle's (1968, henceforth SPE) treatment of English inflectional morphology, some inflectional suffixes are attached to X. SPE gives such examples as those in (4).

(4) a. $[[\text{sing}]_V \text{ ing}]_V$ 'singing' (SPE, 369)

b. $[[\text{wīp}]_V \text{ d}]_V$ 'wiped'

c. $[[\text{kēp}]_V \text{ d}]_V$ 'kept'

$\bar{X}$ MORPHOLOGY

Aronoff dismisses a number of possible counterexamples to the strictly word-based approach to English morphology. One is the existence of several words derived from one stem, although the stem itself never appears as a word. One of his examples of this is the paradigm in (5).

(5) a. incision incisive incisor *incise (Aronoff)

b. illusion illusory *illude

A similar example involves the suffixes ate and ee.

(6) a. nominate nominee

b. evacuate evacuee

In both these cases, Aronoff motivates one suffixed form as basic, and derives the other forms from it. In the case of (5), it is the -ion forms which are basic, and in (6) it is the -ate forms. These suffixes are deleted from the derived forms by a rule of truncation, as in (7).

(7) nomin+ate (Aronoff)

nomin+ate+ee (+ee attachment)

nomin+ee truncation

Aronoff denies that there is any syntactic bracketing to the form nomin in (7), although he calls it a stem.[3] Aronoff would allow only syntactically motivated bracketing. However, as Strauss (1980) points out, "given a word-formation theory that is independent of syntactic theory (Chomsky, 1970), the nontransformational behavior of stems is no argument against their nodal status. Rather it is sufficient to establish that the category 'Stem' behaves like other presumably nodal categories (N, V, A) with respect to the operation of word-formation rules (WFRs)." Strauss argues that word-formation rules sometimes have S (= stem) as a base, as in the derivation of the word demonstration, for which he provides the structure (8)

(8) $[[[\text{demonstr}]_S+\text{at}]_V +\text{ion}]_N$ (Strauss)

However, it is not clear what the syntactic features of S would be in this framework. Furthermore, stems should be subcategorized into syntactic classes, since some stems form nouns, others form verbs, and others form other syntactic classes. Finally, the

notion of stem should be integrated into the $\bar{X}$ framework.

I propose that (8) be replaced by (9), where the stem of demonstrate is dominated by the node 'verb stem,' represented in bar notation by one negative bar, as V^{-1}.

(9) $[[[\text{demonstr}]_{V^{-1}} + \text{at}\ ]_{V} + \text{ion}\ ]_{N}$

In traditional descriptions of inflecting languages, e.g. Allen and Greenough (1901), Goodwin (1879), the stem is the part of a word to which the inflectional affixes (also called desinences) are added. These descriptions also accord a prominent place to the root, one level lower than the stem. In Latin, for example, a root is an abstract entity which may serve as the base of several major lexical categories. In $\bar{X}$ terms, the root can be represented as X^{-2}, with two negative bars. Roots are often archicategories, meaning they can be turned into stems for different lexical classes by suitable operations. Allen and Greenough (1901, 14) cite the root voc, which can become a verb stem by the addition of the suffix -ā, an adjective stem by the addition of the suffix -āli-, and a noun stem by lengthening the vowel. These are given in (10).

(10)

root	$[\text{voc}]_{X^{-2}}$	'calling'
verb stem	$[[\text{voc}]_{V^{-2}}\ \bar{a}\ ]_{V^{-1}}$	'call' (present stem)
	e.g. vocāmus 'we call'	
noun stem	$[\bar{\text{voc}}]_{N^{-1}}$	'voice'
	e.g. vōx 'voice' nom. sg.	
adj. stem	$[[\bar{\text{voc}}]_{A^{-2}}\ \bar{\text{a}}\text{li}\ ]_{A^{-1}}$	'vocal'
	e.g. vōcālis 'vocal' masc. nom. sg.	

This proposal solves the problems inherent in Strauss' framework without sacrificing any of his claims. The stem and root nodes will have the same inherent lexical features as the lexical nodes themselves. Roots and stems which are used to form more than one category can be left unspecified for one or more

features; they will then be archicategories.

The integration of stems and roots into the X̄ framework is accomplished by generalizing Jackendoff's (1977) phrase structure rule schema to cover these sub-lexical nodes. This is given in (11).

(11) $X^n \rightarrow (C_1) \ldots (C_j)\ X^{n-1}\ (C_{j+1}) \ldots (C_k)$

where $-1 \leq n \leq 3$
and for $1 \leq n \leq 3$, for all C_i, either $C_i = Y^{n'}$ for some lexical category Y, or C_i is a specified grammatical formative.
for $-1 \leq n \leq 0$, for all C_i, C_i = af (affix), where af is either a specified grammatical formative, a class of such formatives, or an empty node to be filled by sub-lexical insertion.

In schema (11), the restriction stated on C_i for the case where $1 \leq n \leq 3$ is Jackendoff's Uniform Three-Level Hypothesis (U3LH) for syntax. The restriction of C_i for the case of $-1 \leq n \leq 0$ can be called the Uniform Two-Level Hypothesis (U2LH) for morphology. Later, we will discuss the relation of this proposal to lexical structures.

The schema in (11) provides a syntactic interpretation of Sapir's hierarchy in (1). An isolating structure is one in which each morpheme is directly dominated by a lexical node. In juxtaposition, a lexical node dominates another lexical node and an affix (as in (2) and (4)). In fusion, a lexical node dominates a stem and an affix, as in (9).[3] Finally, in symbolism, the lexical (or stem) node directly dominates a complex element which is not segmentable into morphemes at all. Furthermore, we can give a strictly structural definition of the concept word in this framework. A word is a chunk exhaustively dominated by a lexical node which in turn is dominated only by phrasal nodes (X^1 or higher).

Aronoff's word-based conception of word-formation rules does not generalize readily to the generation of complex inflected structures such as those of Latin. In his framework, one would have to derive inflected forms from other inflected forms, presumably via truncation. Within the X̄ framework proposed here, this is not necessary. Inflected forms can be generated by phrase structure rules conforming to the schema in (11), along with lexical insertion of roots and inflectional affixes. For the class of cases in which the stem is formed by symbolism rather

than by affixation, I will describe a class of stem-formation rules, which operate on roots as the base, turning them into stems.

To my knowledge, the first attempt to develop a theory of morphology integrating the traditional notions of stem and root into a generative grammar was Selkirk (1978). My treatment here differs from hers in a number of respects. First, she does not integrate stems and roots into the $\bar{X}$ framework. Her node labels X_{stem}, X_{root} are globally distinct from other node labels, much as nodes like S, NP, VP were in early generative syntax. Secondly, she allows lexical items to be dominated by the nodes stem and root. In my system, a condition for an item to be labelled stem or root is that it not be an independent word. In other words, stems and roots are always bound forms.

A recent treatment of similar problems, with specific reference to Latin inflectional morphology, is Lieber (1980). In her treatment, stems and roots are listed lexically, roots being a subclass of stems. She states the subcategorization frames for inflectional affixes in terms of arbitrary diacritics. My system differs from hers in these two respects. I do not consider roots as a subset of stems, but rather as a distinct structural level. Although arbitrary diacritics appear to be necessary for some operations, such as stating inflectional classes, the attachment of meaningful inflectional suffixes can be achieved in terms of independently needed syntactic features and sublexical node labels. In other respects, however, I have adopted some of her suggestions, although giving them a somewhat different interpretation in terms of my framework.

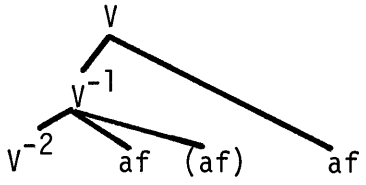
I assume the following phrase structure rules for Latin verb forms.

(12) a. $V \rightarrow V^{-1}$ af

b. $V^{-1} \rightarrow V^{-2}$ af (af)

In these rules, the node af is to be interpreted as an empty affix place-holder, to be filled by lexical insertion. These base rules produce the basic verb structure shown in (13).

(13)



$\bar{X}$ MORPHOLOGY

Latin verbs have six tenses in the indicative and four in the subjunctive. In addition, there are two tenses of the imperative, which is defective in having no first person and no third person in the present tense, plus various infinitives and participles. I will confine myself primarily to the indicative tenses here. I assume three semantic features which classify the tenses according to the table in (14).

(14)

	[-perfect]	[+perfect]
[-past, -future]	(present)	(perfect)
[+past, -future]	(imperfect)	(pluperfect)
[-past, +future]	(future)	(future perfect)

I will assume that inflectional morphemes carry features for the relevant semantic properties, but are unmarked for irrelevant properties. The semantic interpretation of a full verb form is achieved by percolating features from the roots and affixes to the lexical node, according to Lieber's feature percolation conventions, which I paraphrase in (15), changed to conform to my terminology.

(15) Feature percolation conventions (Lieber, slightly revised)

I. All features of a root morpheme, including category features, percolate to the first non-branching node dominating that morpheme (i.e. the X^{-2} node).

II. All features of an affix morpheme, including category features, percolate to the first branching node dominating that morpheme.

III. If a branching node fails to obtain features by convention II, features from the next lowest labelled node are automatically percolated up to the unlabelled branching node. ("Labelled" and "unlabelled" in this context mean respectively "specified" and "unspecified" for a given feature.)

To these three conventions it seems necessary to add a fourth to

the effect that a node which is unspecified for certain features after the operation of conventions I to III is specified for the unmarked value of those features. In Latin, present tense forms carry no overt morpheme. Thus, no tense features will percolate up to the lexical node. Such forms have to be marked [-past, -future], however. Convention IV specifies the unmarked value for tense features that are otherwise unspecified, as in (16).

(16) IV. The node V, if unspecified for any of the features [past], [future], [perfect] after the operation of conventions I - III, receives the unmarked (i.e. minus) value for those unspecified features.

We are now ready to consider the processes forming stems in Latin. Traditionally, each verb has three stems. The present stem ought logically to be called the imperfect stem, for from it all the [-perfect] tenses are derived. From the perfect stem are derived all the [+perfect] tenses. The third stem is called the supine stem, or participial stem, and from it the perfect participal and the supine are derived.

The present stem is formed from the root by the addition of a thematic vowel. The five conjugations, traditionally the major division of verbs in Latin, are based on the different thematic vowels used with each class. For four of the conjugations the theme vowel is obvious from the imperfect system forms. For the fifth, there is some controversy. I accept Lieber's analysis, which gives the thematic vowel of this class as the glide /y/. In (17) I list the five traditional conjugations along with their theme vowels and some examples.

(17) I. āmo, amāre 'love' (theme vowel ā)

II. moneō, monēre 'remain' (theme vowel ē)

III. capiō, capere 'seize' (theme vowel i) (often numbered IIIb)

IV. audiō, audīre 'hear' (theme vowel ī)

V. dicō, dicere 'say' (theme vowel y) (often numbered IIIa)

We can view the process of forming the present stem as one where thematic vowels, as separate lexical entries having sub-categorization features, are inserted in the first affix position

following the root in the stem. The roots may be regarded as having arbitrary diacritics which determine the appropriate thematic vowel. Assume that the conjugation class numbers given in (17) are the correct diacritic features. The thematic vowels then have subcategorization features as in (18).

(18) Subcategorization frames for the theme vowels

ā / I $]_{V}$-2 _____ $]_{V}$-1

ē / II $]_{V}$-2 _____ $]_{V}$-1

i / III $]_{V}$-2 _____ $]_{V}$-1

ī / IV $]_{V}$-2 _____ $]_{V}$-1

y / V $]_{V}$-2 _____ $]_{V}$-1

To form words from these stems, we must add the appropriate desinences indicating person and number. The suffixes that appear in the present tense -- and in all tenses except the perfect -- are given in (19), along with their feature composition.

(19)

	[-plural]	[+plural]
[1 person]	-ō /-m	-mus
[2 person]	-s	-tis
[3 person]	-t	-nt /-unt

All the morphemes in (19) have the subcategorization frame (20).

(20) [-perf] $]_{V}$-1 _____ $]_{V}$

The distribution of the two first person singular morphemes is rather difficult to state; see Lieber (1980, 150-151) for discussion. The two third person plural allomorphs are distributed according to the height of the vowel (or glide) preceding it: -unt appears after [+high] theme vowels; -nt appears elsewhere.

JOHN T. JENSEN

A distinct set of person-number desinences is required immediately after a perfect morpheme: these are given in (21).

(21)

	[-plural]	[+plural]
[1 person]	-ī	-imus
[2 person]	-istī	-istis
[3 person]	-it	-ērunt

These have the subcategorization frame (22).

(22) Subcategorization frame for person/number suffixes ([+perfect])

$$[+\text{perfect}]\ ]_{V}\text{-}1\ \_\_\_\_\ ]_{V}$$

The perfect stem itself is formed in a variety of ways. One method involves suffixing one of five suffixes, listed in (23). Roots are classified in terms of features for these suffixes; the suffixes include these features in their subcategorization frames.

(23) Perfect suffixes

	I	II	III	IV	V
-āv	amāvī				
-ēv		dēlēvī			
-īv			cupīvī	audīvī	petīvī
-u	micuī	monuī	rapuī	amicuī	aluī
-s		auxī	conspexī	vinxī	dīxī
	amō 'love'	dēleō 'destroy'	cupiō 'want'	audiō 'hear'	petō 'seek' alō 'feed'
	micō 'sparkle'	moneō 'warn'	rapiō 'seize'	amiciō 'clothe'	dīcō 'say'
		augeō 'increase'	conspiciō 'see'	vinciō 'bind'	

X̄ MORPHOLOGY

As can be seen from the table in (23), the various suffixes cross-classify the various conjugation classes. Not all combinations occur, however. The first two suffixes, consisting of a long vowel plus v, appear only with verbs with the same theme vowel as the vowel of the suffix. The third occurs only with verbs having [+hi] theme vowels. The lack of first conjugation verbs with an -s suffix in the perfect seems an accidental gap.

The perfect stems of other verbs are formed by means of symbolic processes, in Sapir's terms. One such process lengthens the root vowel, another reduplicates a consonant. A third process forms a perfect stem which is segmentally identical to the root. Finally, there is a process of nasal infixation, which forms a number of present stems; a number of these words also have the infix in the perfect stem as well as the -s suffix. Again, these processes cross-classify with the conjugation classes, as shown in (24).

There is no way to predict which verbs will undergo which of these rules. However, some combinations do not occur. There seem to be no identity verbs of the first conjugation, and infixing is restricted to verbs of the fifth class. In addition, some verbs undergo more than one of these rules, although here the combinations are very restricted. In the list above, fundō undergoes infixing in the present and vowel length in the perfect; the verb pangō 'fasten' has infixing in the present and either vowel length (pēgī) or reduplication (pepigī) in the perfect. We therefore assume that verb roots are marked with diacritic features indicating which of these processes, if any, they undergo. The processes are stated as transformations in (25).

(24) Symbolic perfect stems

	I	II	III	IV	V
vowel length	iūvī	sēdī	cēpī	vēnī	fūdī, ēmī
reduplication	dedī	momordī	peperī	?repperī	cucurrī
identity		prandī	solvī	comperī	bibī
nasal infix					
present only					fundō, fūdī, fūsus
present and perfect					pingō, pīnxī, pictus
	iuvō 'help'	sedeō 'sit'	capiō 'take'	veniō 'come'	fundō 'pour'
	dō, dare 'give'	mordeō 'bite'	pariō 'bring forth'	reperiō 'find'	emō 'buy'
		prandeō 'lunch'	solvō 'loosten'	comperiō 'discover'	currō 'run'
					bibō 'drink'
					pingō 'paint'

$\bar{X}$ MORPHOLOGY

(25) Stem-formation rules

a. Vowel length

$$[\ C_o\ V\ C_o\ ]_{V-2}\quad af\quad (af)\ ]_{V-1}$$
$$1\ \ 2\ 3\qquad\quad 4\quad 5\qquad\quad 1\quad 2\qquad 3\ \ \emptyset\quad\ 5]$$
$$\langle +lo\rangle\qquad\qquad\qquad \rightarrow\qquad \left[\begin{matrix}+long\\ \langle -lo\rangle\\ -bk\end{matrix}\right]\qquad\qquad [+perf]$$

b. Reduplication

$$[\ C_o\ C\ V\ C_1^2\ ]_{V-2}\quad af\quad (af)\ ]_{V-1}$$
$$1\ \ 2\ 3\ 4\qquad\quad 5\quad\ 6\qquad \rightarrow 1\quad 2\quad \left[\begin{matrix}3\\ -hi\\ -lo\end{matrix}\right]\quad 2\quad 3\quad 4\quad \emptyset\quad 6$$
$$[-lo]\qquad\qquad [+perf]$$

c. Identity

$$[\ X\ ]_{V-2}\quad af\quad (af)\ ]_{V-1}$$
$$1\qquad\quad 2\quad\ 3\qquad \rightarrow\ 1\quad \emptyset\quad 3\ ]$$
$$[+perf]$$

d. Infix

$$[\ C_o\ V\ C_o\ ]_{V-2}\quad af\quad (af)\ ]_{V-1}$$
$$1\ \ 2\ 3\qquad\quad 4\quad 5\qquad \rightarrow 1\quad 2\quad n\quad 3\quad \emptyset\quad 5$$

The tense suffixes have simple subcategorization frames depending only on independently motivated semantic categories and structural sublexical nodes. The underlying forms of the suffixes in (26) are from Lieber; the subcategorization frames are mine. Unlike Lieber, I do not need arbitrary diacritics to state the distribution of these suffixes, as the comparison with her frames shows.

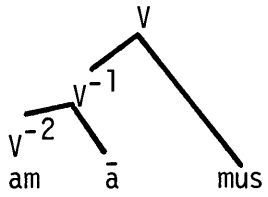
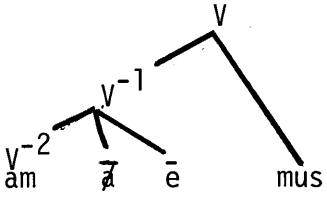
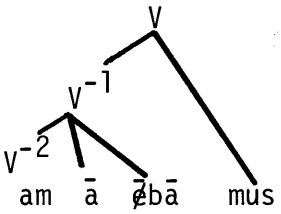
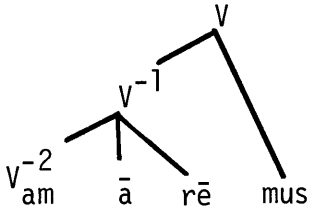
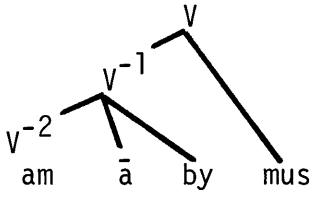
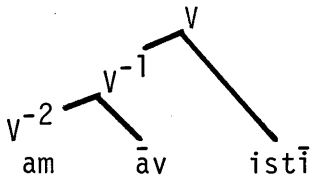
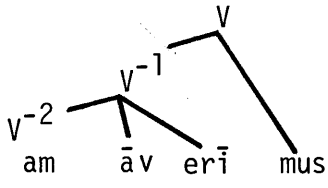
(26) Tense suffixes

underlying forms		Subcategorization X̄ morphology	Subcategorization (Lieber)
ēbā [+past]	'imperfect'	[-perf] [-cons] ___]$_{V}^{-1}$	]$_{+T}^{+D}$ ____]$_{+T}$
by [+future]	'future' (I,II)	$\begin{bmatrix}\text{-perf}\\ \text{-hi}\end{bmatrix}$ [-cons] ___]$_{V}^{-1}$	[-hi]]$_{+T}^{+D}$ ____]$_{+T}$
ē [+future]	'future' (III,IV,V)	$\begin{bmatrix}\text{-perf}\\ \text{+hi}\end{bmatrix}$ [-cons] ___]$_{V}^{-1}$	[+hi]]$_{+T}^{+D}$ ____]$_{+T}$
erā [+past]	'pluperfect'	[+perf] ____]$_{V}^{-1}$	]$_{+T}^{-D}$ ____]$_{+T}$
eri [+future]	'future perfect'	[+perf] ____]$_{V}^{-1}$	]$_{+T}^{-D}$ ____]$_{+T}$
ē [+subj]	'present subjunctive' (I)	[+lo] ____]$_{V}^{-1}$	[+lo]]$_{+T}^{+D}$ ____]$_{+T}$
ā [+subj]	'present subjunctive' (II,III,IV,V)	[-lo] ____]$_{V}^{-1}$	[-lo]]$_{+T}^{+D}$ ____]$_{+T}$
rē $\begin{bmatrix}\text{+past}\\ \text{+subj}\end{bmatrix}$	'imperfect subjunctive'	[-perf] ____]$_{V}^{-1}$	]$_{+D}^{+T}$ ____]$_{+T}$
erī [+subj]	'perfect subjunctive'	[+perf] ____]$_{V}^{-1}$	]$_{+T}^{-D}$ ____]$_{+T}$
issē [+past] [+subj]	'pluperfect subjunctive'	[+perf] ____]$_{V}^{-1}$	]$_{+T}^{-D}$ ____]$_{+T}$

$\bar{X}$ MORPHOLOGY

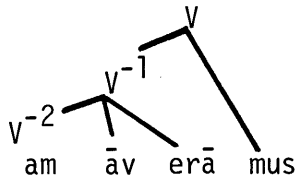
To illustrate the attachment of the tense suffixes, (27) gives the six indicative and four subjunctive tenses of amō 'love' in underlying form with their $\bar{X}$ structure. Phonological operations on these forms are limited to two deletions; the deleted segments are slashed.

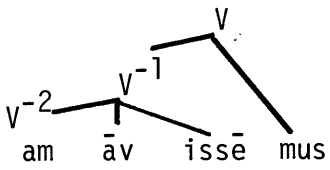
(27)

	indicative	subjunctive
[-perfect] tenses		
[-past] [-future] 'present'		
[+past] 'imperfect'		
[+future] 'future'		
[+perfect] tenses		
[-past] [-future] 'perfect'		

[+past]

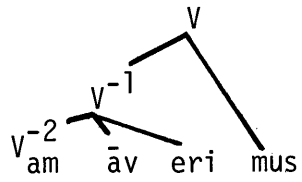
'pluperfect'





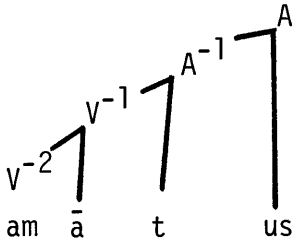
[+future]

'future perfect'



My final example from Latin shows the structure of participles. Participles are verbal adjectives: they take adjective inflections for case, gender, and number, and they agree with nouns. Since adjective inflections are attached to adjective stems to form adjectives, we assume that participles also make use of the node A^{-1} (adjective stem). As such, they provide an interesting example of Jackendoff's deverbalizing rules at the sublexical level. The structure of the perfect passive participle of amō 'love' is given in (28).

(28)



Recall that deverbalizing rules (Jackendoff 1977) form a systematic class of exceptions to the uniform three level hypothesis, and have the general phrase structure schema of (29).

(29) $X^i \rightarrow af\ V^i$

That is, deverbalizing rules expand any category at the i level to a verb at the same level plus an affix. For Latin, I assume the specific rule for participles of (30); the affix is to the right, not the left, of the verb.

(30) $A^{-1} \rightarrow V^{-1}\ af$

$\bar{X}$ MORPHOLOGY

To conclude, I have shown that inflectional morphology in Latin (and I assume in other inflected languages) can be naturally incorporated into the framework of $\bar{X}$ syntax. Clearly, the same is not true of derivational morphology. Some derivational structures (e.g. 9) conform to the constraints on $\bar{X}$ morphology, others contain violations of such constraints (e.g. 2). This should not be particularly surprising in view of the lexicalist hypothesis of Chomsky (1970): virtually anything can be lexicalized and stored as such. The $\bar{X}$ convention provides a criterion for distinguishing base structures from other types of syntactic structure. The natural extension of the $\bar{X}$ convention developed here suggests that inflectional structures belong to the base component.

FOOTNOTES

*I wish to thank Doug Walker and Margaret Stong-Jensen for their comments on this paper.

[1]Some authors use the term fusion to refer to a morpheme that simultaneously indicates two or more grammatical categories, e.g. Matthews (1972). This does not appear to be Sapir's usage.

[2]Aronoff's statement "... inflectional morphemes would be dominated by the node X, and perhaps higher nodes ..." (1976, 2) should read "... by the node $\bar{X}$ ..." as in his thesis.

[3]Aronoff (1976, 11-14). He refers to the same type of element as a root on pages 102, 188. In my framework, the terms root and stem are carefully distinguished.

JOHN T. JENSEN

REFERENCES

Allen and Greenough (1901) Latin Grammar (Revised and enlarged by James Bradstreet Greenough and George L. Kittredge), Ginn and Company, Boston.

Aronoff, Mark (1976) Word Formation in Generative Grammar, MIT Press, Cambridge, MA.

Chomsky, Noam (1970) "Remarks on Nominalization," in R. Jacobs and P. Rosenbaum, eds. Readings in English Transformational Grammar, Ginn and Company, Waltham, MA (184-221). Also in Chomsky, N. (1972) Studies on Semantics in Generative Grammar, Mouton, The Hague (11-61).

Chomsky, N. and Morris Halle (1968) The Sound Pattern of English, Harper and Row, New York.

Goodwin, William W. (1890) An Elementary Greek Grammar, Ginn and Company, Boston.

Jackendoff, Ray (1977) $\bar{X}$ Syntax: A Study of Phrase Structure, MIT Press, Cambridge, MA.

Lieber, Rochelle (1980) On the Organization of the Lexicon, Ph.D. Dissertation, MIT, Cambridge, MA.

Matthews, P.H. (1972) Inflectional Morphology, Cambridge University Press, Cambridge, England.

Nida, E.A. (1949) Morphology (2nd Edition), University of Michigan Press, Ann Arbor, MI.

Sapir, Edward (1921) Language, Harcourt, Brace, and World, New York.

Selkirk, Lisa (1978) "On Prosodic Structure and its Relation to Syntactic Structure," presented at the Sloan Workshop on the Mental Representation of Phonology, Nov. 18-19, 1978, University of Massachusetts, Amherst.

Strauss, Stephen L. (1980) "How Abstract is English Morphology?" Glossa 14, 89-110.

John T. Jensen
Department of Linguistics
University of Ottawa
Ottawa, Ontario K1N 6N5 Canada