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# Greek Accent: A Case for Preserving Structure

This study has two goals. One is to analyze the metrical system of Ancient Greek and, to a limited extent, that of Latin. The other is to argue, starting from these analyses, that all foot construction respects preexisting constituents.

Ancient Greek is commonly believed to have been a pitch accent language. The major regularities in its accentual system are thought to involve reference to tonal contours and tone-bearing units (*moras*) rather than to stress-related notions such as syllables, syllabic weight, rhythm, or rhythmic constituents (*feet*). This study shows that Ancient Greek had a mixed accentual system: the location of the accented syllable is determined by a metrical procedure, which counts syllables, is sensitive to syllable weight rather than number of *moras*, and builds metrical constituents. Later rules interpret metrical prominence tonally.

The analysis of Greek accent developed here is a metrical analysis, couched in the framework developed through the contributions of Liberman and Prince (1977), Hayes (1981), Prince (1983), Hammond (1984), Halle and Vergnaud (1987b), and others. Several results of general interest will emerge, one of which is the need to distinguish in Greek between two types of unaccented syllables, depending on whether the syllable in question does or does not belong to a foot. The need for constituent structure in the representation of stress has been questioned by Prince (1983) and Selkirk (1984). The Greek distinction between unaccented foot-internal syllables and unaccented extrametrical syllables belongs to a growing body of evidence that justifies the existence of metrical constituents (also see Al-Mozainy, Bley-Vroman, and McCarthy (1985) and Halle and Vergnaud (1987b)).

The Greek evidence sheds some light on a different aspect of the theory of accent: the extent to which structure-building rules such as Stress Assignment and Syllable Structure Assignment can change existing constituents. It has been assumed so far (Kiparsky (1982), Shaw (1985)) that in derived environments foot-construction rules may always change metrical structure. On the other hand, the study of syllabification rules appears to indicate that they can operate exclusively in structure-building fashion: even in derived environments syllabification rules are prevented from changing previously assigned structure and apply exclusively to stray segments (see Steriade (1982) and

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below). We will encounter in Greek and Latin accentual rules of the same sort: they can incorporate only stray syllables and, even in derived environments, they are prevented from altering the boundaries of previously assigned metrical constituents. The general implications of this fact for the interaction of stress and cyclicity will be discussed at some length.

## 1. Recessive Accent in Greek

### 1.1. Descriptive Background

Ancient Greek had long (or bimoraic) and short syllabic nuclei. Long nuclei consisted of long vowels or diphthongs. A relatively unusual feature of Greek accent is that either one of the two moras in a long nucleus is a potential accent bearer. More precisely, either mora could surface associated with the High tone marking accent. It is generally assumed that no more than one mora could be associated with the High tone. Thus, an accented syllable could display either an HL or an LH melodic contour: the first is traditionally referred to as circumflex accent, marked  $\bar{\text{~}}$ , the second as acute, marked  $\acute{\text{~}}$ . By extension, the single H tone of an accented short nucleus is also referred to as acute.<sup>1</sup>

Most Greek words contain one and only one H tone, located on one of the last three syllables. The location of this H tone is subject to further limitations but remains invariant in phrasal context. Words of this class are referred to as *orthotonic*. A small number of Greek words do exhibit accentual alternations depending on the accent of the orthotonic word to their left; these are called *enclitic* words. Under conditions to be discussed, a second H tone may surface on orthotonic words followed by enclitics. The Greek grammatical terminology distinguishes oxytone words (final acute accent: *hodós* or *hodoó* 'road-nominative singular and dual'), perispomena (final circumflex: *hodou* 'road-genitive singular'), paroxytones (penult acute: *paidískos* 'little child', *daímoon* 'god'), properispomena (penult circumflex: *óikos* 'house'), and proparoxytones (antepenult acute: *eépeiros* 'continent', *ánthroopos* 'man', *ángelos* 'messenger').

Although it has generally been assumed that the accent may occur freely on any one of the final three syllables, a more careful look at the accentual typology of Greek words reveals that there are only three accentual classes: words containing inherently accented suffixes (such as *paid-ísko-s* 'little child', *leluk-oó-s* 'having untied'), words containing no derivational suffix but accented on the predesinential syllable (*patér-a* 'father-accusative', *iskhuú-s* 'force-nominative'), and words in which the accent recedes as far to the left as allowed. I call the latter class *recessive*. Interestingly, all three classes are subject to the same limitations on the occurrence of accent:

<sup>1</sup> Greek words are transliterated here according to the following conventions. Long vowels are represented as double vowels. Acute and circumflex accents are represented as acute marks on the first and last mora, respectively:  $\acute{\text{óikwv}}$  is transliterated as *oikoon* and  $\acute{\text{óikw}}$  as *óikos*. Some standard transliteration conventions adopted here are as follows: *hV* is an aspirated vowel; *Ch* is an aspirated stop; *ou*, *ei* are not only diphthongs but also long tense vowels. Syllable boundaries are in general not indicated; the reader should bear in mind that sequences of two identical vowels and sequences of two [-high][+high] vowels are tautosyllabic in the material presented here. All other vowel sequences are understood to be heterosyllabic.

- (1) a. No accent is found to the left of the antepenultimate syllable.
- b. No accent is found to the left of the penultimate syllable if the final nucleus is long.<sup>2</sup>
- c. No accent is found to the left of the penultimate syllable if the final syllable is closed by a consonant cluster.
- d. If the accented syllable is followed by more than one mora within the same word, then the H tone is associated to its second mora; if the accented syllable is followed by exactly one mora, then the H tone is associated to its first mora; and if the accented syllable is word-final, then accent falls on either the first or the second mora, depending on morphological factors.

With the exception of (1c), these are generalizations found in every description of Greek accent. The generalization in (1c) is seldom recognized, however, and never incorporated into the analysis of the entire system.<sup>3</sup> Yet (1b) and (1c), taken together, indicate that syllable weight and not mora count determines the location of the accented syllable in Greek. I justify (1c) below.

### 1.2. Accent and Final Clusters

The surface word-final consonant clusters are restricted in Greek to the sequence *son-  
orant-stop-s*:<sup>4</sup>

- (2) a. *phléps* ‘vein’, *píidaks* ‘spring’, *thríks* ‘hair’
- b. *phórminks* ‘lyre’, *sálpinks* ‘trumpet’

A check through Kretschmer and Locker (1944) reveals that none of the many Greek forms ending in consonant clusters has an accent farther to the left than the penultimate syllable. Moreover, it is possible to show that this fact is directly relevant to the statement of accent limitations and not a sum of unrelated accidents.

At least two classes of Greek compound nouns are accentually marked by being systematically recessive, regardless of the accentuation of their components in isolation. That is, they require their accent to recede as far to the left as (1) allows. These compound classes are identified by Vendryes (1945) as the *bahuvrihi* compounds (“composés possessifs”: “pour ceux-là, l’accent recule autant que le permet la règle de limitation” (p. 196)) and the *synthetic* compounds (“composés de dépendance progressifs”: “accentués en faisant reculer l’accent autant que possible” (p. 195)).

<sup>2</sup> Most word-final *-oi*, *-ai* diphthongs behave in this respect like *-oy*, *-ay* sequences in allowing an antepenultimate accent: *trá.péz.dai* ‘tables’, *án.throo.poi* ‘men’. See Kiparsky (1973) for more details and some discussion.

<sup>3</sup> Bally (1945), Kuryłowicz (1958, 122; 1968, 86), and Risch (1981, 187) mention some of the facts that support this generalization. See footnote 6.

<sup>4</sup> A phonological explanation for the restriction of final clusters to the class in (2) is proposed in Steriade (1982). The sequences in (2) are always morphologically analyzable as obstruent-final stems followed by the *-s* suffix of the nominative singular.

(3) *Recessively accented compounds*

## a. Bahuvrihis

polú-naos 'with many temples', polú-botrus 'with many bunches of grapes',  
poikiló-phoonos 'with varied tones', poikiló-stolos 'with variegated prow'

## b. Synthetic compounds

lipó-sarkos 'lean', philó-ksenos 'hospitable'

In both classes of compounds, accent does not recede beyond the penult if the final syllable ends in a consonant cluster:

## (4) a. Bahuvrihis

polu-píidakas 'with many springs', poikilo-phórminks 'with various lyre notes',  
poikiló-thriks 'with various plumes', polu-ánthraks 'with much coal'

## b. Synthetic compounds

philo-kólakas 'fond of flatterers', philo-spéelunks 'fond of grottoes', phil-  
órtuks 'fond of quails', lipó-thriks 'shedding one's hair, hairless'

The conclusion to be drawn from these data is that a final consonant cluster has the same limiting effect as a final bimoraic nucleus in that it does not allow the accent to recede beyond the penult.

This conclusion can be confirmed by a different sort of consideration. As mentioned earlier, there are only three accentual classes of words in Greek: suffix-accented, pre-desinentially accented, and recessive. Examples of this classification drawn from the first two declensions are (a) suffix-accented *phus-ikó-s* 'natural', *psuukh-ikó-s* 'mental', *paid-isko-s* 'little child', (b) pre-desinentially accented *hodó-s* 'road', *phugeé-n* 'flight-accusative',<sup>5</sup> and (c) recessive *ánthroop-o-s* 'man', *trápezd-a* 'table', *khoór-aa* 'country'. Bearing in mind that *-o-* in *ánthroop-o-s* and *-a* in *trápezd-a* are not endings but declension markers, note that there are no accentual types such as *\*ánthroop-o-s*, *\*trapézd-a*.<sup>6</sup> Such accentual types would be neither recessive nor suffix-accented nor pre-desinentially accented. Third declension nouns and adjectives, to which all the forms ending in *-Cs* clusters belong, are similarly divided: (a) suffix-accented *basil-eú-s* 'king', *patr-id-s* 'fatherland' (surface *patris*), *aleeth-eés* 'true', (b) pre-desinentially accented *patér-a* 'father-accusative', *kheimóon-a* 'winter', and (c) recessive *péleku-s* 'axe', *ak-rópoli-s* 'citadel'. Here again we find no nouns such as *\*peléku-s*, with a nonrecessive accent falling on a medial root syllable. From the absence of the accentual types *\*ánthroop-o-s*, *\*trapézd-a*, *\*peléku-s* we may tentatively infer (5):

## (5) All inherently accented roots of Greek must have presuffixal accent.

<sup>5</sup> Accent may fall on a desinential mora in certain morphologically determined cases, such as *hodoó* 'road-nominative dual'. The acute accent of items like *hodoó* is discussed in section 1.3.

<sup>6</sup> A. Nussbaum reminds me of two exceptional items, the adjectival stems *megálo-* 'big' and *olígo-* 'small'. From the paradigm of the former, only the nominative plural forms are problematic for the proposed generalization (*megáloi*, *megála*, *megálai*). The remaining forms either are drawn from a different stem (*mega-*) or else are ambiguous (*megálee*, and so on). The paroxytone accent on *olígo-* is clearly influenced by that of its antonym, *megálo-*. As far as I know, these are the only exceptions to the generalization.

Consider now the fact already noted that nouns ending in *-Cs* cannot have antepenultimate accent: a few such nouns accent the predesinential syllable (*Almoóp-s*, *hupo-sphák-s*, *pterúk-s*, all cited in Chandler (1881, 176)), whereas the vast majority accent the penult (*Kappádok-s* ‘Cappadocian’, *kaláurop-s* ‘shepherd’s staff’, *katéelip-s* ‘upper story of a house’). What is significant here is that the explanation offered in (5) for the absence of a type *\*peléku-s* or *\*trapézd-a*—or any other explanation imaginable—cannot be maintained unless words like *Kappádok-s* belong to the recessive class, that is, to the class of words containing no inherently accented morphemes. Accepting then that these words are recessive, we must adopt (1c) as the explanation for their systematic penultimate accent: recessive accent must fall on the penult if the final ends in a cluster. The corollary of (1b) and (1c) is that syllabic weight, not just number of moras, determines the location of the accented syllable in Greek.<sup>7</sup>

A more surprising discovery is that not only surface clusters but also underlying ones attract accent on the penult. Several types of clusters are simplified word-finally in Greek: all final stops are lost in this position and all geminates are simplified. Thus, *-nt* finals surface as *-n*, but words ending in such sequences are accented exactly like those ending in *-ks*, *-ps*: their recessive accent never retracts beyond the penult. Examples of this type are neuter participles like *paidéu-on* ‘educating’ (from /paideu-ont/; compare the genitive *paideú-ont-os*) and neuter adjectives like *khari-en* ‘graceful’ (from /khari-ent/; compare *khari-ent-os*). If we assume (1c) and order the final cluster simplifications after recessive accent is assigned, we can explain the absence of alternations like *\*paideuon ~ paideúontos*, as well as the otherwise inexplicable penultimate accent of these derivational classes. Nominative singulars ending in *-d-s* clusters such as *hiké-t-id-s* ‘female supplicant’ (surface *hikétis*) also have invariant penultimate accent, despite the fact that the *-d-s* cluster is eliminated on the surface, through Regressive Gemination (*ds* → *ss*) and Geminate Simplification.

It is perhaps worth stressing that no other explanation for the penultimate accent of these derivational classes is possible: the penultimate syllables of *khari-en*, *paidéu-on*, *hiké-t-is* are not inherently accented. This is shown by the recessive accent of paradigmatically related forms *khári-s* ‘grace’ and *e-páideu-sa* ‘I educated’.<sup>8</sup>

<sup>7</sup> Bally (1945) and, independently, Kuryłowicz (1958) have attempted to attribute the penultimate accent of forms ending in *-ks*, *-ps* to analogy. They observe that high vowels shorten regularly before final *-ks*, *-ps*: *kéeruk-s* ‘herald-nominative’, but genitive *keéruuk-os*. Suppose that shortening follows the assignment of accent. Then in a trisyllabic word whose underlying form is *\*CVCVCVVk-s* accent will be assigned to the penult simply because the final contains a long nucleus (see (1b)). According to Bally and Kuryłowicz, such a form will then analogically cause the accent to advance to the penult in words like *lipó-thriks*, *polu-piídaks*, *pom-phóluks*, *Kappádoks*, whose final vowels are underlyingly short.

There are several problems with this hypothesis, not the least of which is the fact that the source of this analogical development cannot be identified; I could not find a single trisyllabic form with the required underlying long vowel that could serve as the “model” for the accent advancement in words like *Kappádoks*. The analogical explanation is not only untenable on its own terms; it is also irrelevant as a substitute for the exceptionless generalization in (1c).

<sup>8</sup> Historically, a larger class of forms ended in a consonant cluster. For instance, the third person plural active verbs like *é-luu-on* ‘they untied’ originally ended in *-nt*: *\*e-luu-ont*. In this case the cluster is not synchronically recoverable: there are no forms in which the final *-nt* of the third person plural ending surfaces. Consequently, in this case the synchronic underlying form is not segmentally distinct from the surface *éluu-*

### 1.3. Formalizing Recessive Accent

I turn now to the main concern of this study: the metrical structures of Greek. I will focus first on the rules that assign accent to syllables: these must explain the generalizations in (1a–c). In section 3 I will take up the analysis of accent mobility within a bimoraic syllable and explain the generalization in (1d).

We have so far established that a final  $VVC_0$  or  $V(C)CC$  rime attracts accent on the penult. If we omit a word-final consonant from the computation of syllabic weight—as suggested for English nouns by Hayes (1981) and for Romance by Harris (1983)—our conclusion can be formulated simply as follows:

- (6) Accent the penultimate syllable if the final is heavy. Accent the antepenultimate syllable otherwise.

The statement in (6) can be formalized in a number of ways. The simplest is the following:

(7) *Recessive Accent*

Foot Formation

- a. A final consonant is extrametrical.
- b. A final light syllable is extrametrical.<sup>9</sup>
- c. Construct left-dominant binary feet right to left.

Main Stress Rule

- d. Construct a word-level right-dominant foot.
- e. Eliminate secondary stresses.

The effects of extrametricality clauses (7a) and (7b) are cumulative: a word like *ánthroopos*, syllabified *an.throo.pos*, becomes *an.throo.po(s)* by (7a)—marking extrametricality by parentheses—and *án.throo.(po(s))* by (7b).

I adopt here the representation of metrical structure introduced by Halle and Vergnaud (1987b).<sup>10</sup> Each syllable corresponds to a grid position on the lowest grid line, line 0. Accented syllables have positions on a superior grid line, line 1. Metrical constituents can be defined on any grid line: the head of a metrical constituent on any line  $n$  has a position on the immediately superior grid line  $n + 1$ . Thus, feet are constituents defined

*on*; this explains why the accent recedes to the antepenult. The comparison of the effect on recessive accent of the historic loss of final *t* in *\*eluu-ont* and *\*khari-ent* illustrates the fundamental difference between sound change as a historical event and rule application in a synchronic grammar.

<sup>9</sup> It is possible to reduce clauses (7a) and (7b) to a single statement by adopting an extension of Archangeli's (1985) convention that would percolate extrametricality from a rime segment to the entire rime. I have not done so here, for one reason: the analysis of English verbs like *devélop* (Hayes (1981)) and the Spanish contrast between, say, *canibal* and *nómada* (Harris (1983)) requires that segment extrametricality and syllable extrametricality be kept as distinct options. The convention mentioned would predict, for instance, that segment extrametricality in Spanish will result in the same stress patterns for vowel- and consonant-final words: *\*cánibal*, *nómada*. The issue is, in any event, independent of the line of argument pursued here.

<sup>10</sup> The arguments, however, and the essential conclusion of the study can be recast in the framework introduced by Hammond (1984).

on line 0 grid marks, and their heads are represented as grid positions on line 1. Word-level feet are constituents defined on line 1 grid marks, and their heads have grid positions on line 2. Constituent boundaries are represented by square brackets. The derivation of *ánthroopos*, *anthrópoon*, and *lipóthriks* is shown in (8):

(8)	an.throo.pos	an.throo.poon	li.po.thriks
	(s)	(n)	(s)
(7a)	(pos)	n/a	n/a
(7b)	x	x x	x x
(7c)	[x x] an.throo	[x] [x x] an.throo.poo	[x] [x x] li. po.thrik
(7d)	x	x	x
	[x]	[x x]	[x x]
	[x x] an.throo	[x] [x x] an.throo.poo	[x] [x x] li. po.thrik
(7e)	n/a	x	x <sup>11</sup>
		x [x x] an.throo.poo	x [x x] li.po.thrik

## 2. Deaccentuation

As mentioned earlier, words containing inherently accented morphemes appear to be subject to the same accentual limitations as recessive words. What explains this fact?

Consider an inherently accented suffix such as *-íd-* in the stem *patr-íd-* ‘fatherland’. To an *-íd-* stem an inflectional suffix may be added: *-íd-os*, *-íd-a*, *-íd-oon*, and so on. Such a suffix will never exceed one syllable in Attic; consequently, the accent on *-íd-* will never find itself outside the bounds set by (1).

Formally, the account of cases like *patr-íd-a* (accusative singular), *patr-íd-os* (genitive singular) must differ from that of *patr-íd-oon* (genitive plural). I assume, anticipating the discussion in section 6.2.1, that the lexical accent on *-íd-* is represented as an underlying line 1 grid position:

(9)	x
	x x
	patr-id-

<sup>11</sup> Kiparsky (1973) mentions Scheller’s (1951) finding that in Ionic, where prevocalic *i* becomes *y*, accented *i* in forms like *e.leu.the.ri.ee* ‘freedom-nominative’ shifts its accent onto the final, yielding end-accented *-yeé*. This fact is easily explicable in terms of the foot structure assigned by Recessive Accent: after desyllabification of *i*, [é][leù.the][ri.ee] becomes [é][leù.the][ryeé], with the final syllable inheriting the head position in the main-stressed foot. This is then potential support for the decision to have Recessive Accent build left-headed feet. However, to complete the argument and eliminate a number of other interpretations requires the existence of forms whose structure is CV.Cí.V: for these, the proposed analysis predicts a leftward shift of accent (CV.CyV), since the final is extrametrical. Such forms cannot be found in Greek.

When a single light syllable is added to this stem—as in *patr-íd-a* or *patr-íd-os*—clauses (7a) and (7b) apply to yield the structures *pa.trí.(dos)*, *pa.trí.(da)*. Clause (7c) constructs two monosyllabic feet ([pá][trí]); (7c) cannot place accented *í* in weak position, the blocking principle being either the Strict Cycle Condition (Kiparsky (1982)) or more specifically metrical considerations discussed in Halle and Vergnaud (1987b) and below. The result is that the accent on *-íd-* surfaces unaltered. When a heavy syllable is affixed to *-íd-*, as in *patr-íd-oon*, (7b) cannot apply and (7c) takes effect: the final syllable is incorporated into the foot dominating *-íd-*. Surface accent is thus assigned to the same syllable as in *patr-íd-os*, but by different means.

Consider now what happens when an inherently accented syllable is followed by a combination of derivational and inflectional suffixes sufficient to place it outside the bounds set by (1): such is the case with forms like *iskhuu-ro-tát-oon* ‘the most powerful-genitive plural’. Here the adjectival stem contains an accented suffix *-ró-*: *iskhuu-ró-s* ‘powerful’. The superlative suffix *-tat-* is not accented, as shown by *iskhuu-ró-tat-o-s* ‘the most powerful’. But when the genitive suffix *-oon* is added to the stem /iskhuu-ró-tat-oon/, accent appears to shift from the *-ró-* suffix onto the superlative suffix: the surface form is *iskhuurotátoon*. The generalization is that when an inherently accented syllable occurs outside the accentable domain defined by (1), stress shifts onto the leftmost syllable of the accentable domain. This shift in accent follows from the analysis proposed above, as can be seen from the following comparative derivation of *iskhuu-ró-s* and *iskhuu-ró-tat-o-s*, *iskhuu-ro-tát-oon*.

(10)	/iskhuu-ró-s/	/iskhuu-ró-tat-o-s/	/iskhuu-ró-tat-oon/
(7a)	(s)	(s)	(n)
(7b)	n/a	(tos)	n/a
(7c)	x      x [x   x] [x] is.khuu.ro	x      x [x   x] [x x] is.khuu.ro.ta	x      x   x [x   x] [x] [x x] is.khuu.ro. ta.toon
(7d)	x [x      x] [x   x] [x] is.khuu.ros	x [x      x] [x   x] [x x] is.khuu. ro.ta	x [x      x   x] [x   x] [x] [x x] is.khuu.ro. ta.toon
(7e)	x x [x   x] [x] is.khuu.ros	x x [x   x] [x x] is.khuu.ro.ta	x x [x   x] [x] [x x] is.khuu.ro. ta.toon

In the case of *iskhuurós* the accent on *-ró-* constitutes the rightmost foot of the word and therefore receives main stress by (7d). In the case of *iskhuu-ró-tat-o-s* the last syllable *-tos* is extrametrical; the penult *-ta-* is incorporated into the existing foot on *-ró-*. Here again, *-ró-* happens to be the rightmost stressed syllable and therefore receives

main stress. In the case of *iskhuu-ro-tát-oon* the final *-toon* is heavy and therefore nonextrametrical; the final foot must then be *-tátoon*. The syllable *-ró-* continues to be a foot in this form but is no longer the final, main-stressed foot. By (7e)—a clause that will do substantial work for us below—subsidiary stresses are eliminated after main stress is assigned; this explains why no trace of the underlying accent on *-ró-* surfaces in forms like *iskhuurotátoon*.

Suppose now that a sequence of several inherently accented syllables occurs on the final three syllables: (7d) predicts that main stress will always surface on the rightmost accented suffix. The evidence appears in (11):

- (11) a. *-íd-*  
 asp-íd-ísko-s → aspidískos ‘little shield’  
 (*compare* aspíd-s, -íd-os ‘shield’)  
 asp-íd-éio-n → aspidéion ‘part of a shield’  
 penther-íd-eú-s → pentherídeús ‘brother-in-law’  
 (penther-íd-s, -íd-os ‘sister-in-law’)  
 kheliidón-íd-eú-s → kheliidonideús ‘young swallow’  
 (kheliidon-íd-s, -íd-os, ‘she-swallow’)  
 kheliidón-íd-tees → kheliidonisteés ‘singer of the swallow-song’
- b. *-ú-, -uú-*  
 ligú-ró-s → ligurós ‘sharp’  
 (ligú-s ‘shrill’)  
 bradú-teé-s → braduteés ‘slowness’  
 (bradú-s ‘slow’)  
 iskhuú-ró-s → iskhuurós ‘powerful’  
 (iskh(u)ú-s ‘force’)
- c. *-eé-*  
 sun-okheé-íd-s → sunokhee.ís ‘holder together’  
 (sun-okheé ‘a holding together’)  
 sun-okheé-i-kó-s → sunokheeikós ‘of a holder together’  
 sigeé-ró-s → sigeerós ‘silent’  
 (sigeé ‘silence’)
- d. *-oón-*  
 leimoón-íd-s → leimoonís ‘of a meadow’  
 (leimoón ‘meadow’)  
 auloón-ísko-s → auloonískos ‘little strait’  
 (auloón ‘strait’)
- e. *-teér-*  
 likmeeteér-íd-s → likmeeteerís ‘female winnower’  
 (likmeeteér ‘winnower’)  
 boteér-ikó-s → boteerikós ‘of a herdsman’  
 (boteér ‘herdsman’)

- f. *-eú-*  
 khalkeú-t-ikó-s → khalkeutikós ‘of an ironsmith’  
 (khalkeú-s ‘ironsmith’)

All relevant forms known to me support the generalization that only the rightmost accent may surface in a sequence of inherently accented suffixes. I have already noted that this follows from clause (7d) of the Recessive Accent rule: the rightmost foot, whether underlying or derived by (7a–c), will always be assigned main stress.

Kiparsky’s (1973) analysis of Greek accent assumes that it is the leftmost accent in a sequence that always surfaces. Although this principle is clearly correct for Indo-European accent (reconstructible from Sanskrit and Balto-Slavic), the bulk of the Greek evidence goes against it. The Greek data that support Kiparsky’s position involve alternations between stem and predesinential accent in items like *pód-a* ‘foot-accusative’, *pod-ós* ‘foot-genitive’. Such alternations appear to indicate that the genitive marked *-os* is inherently accented. The *left accent wins* principle is then invoked to explain the fact that *-os* appears unaccented in other paradigms: for example, *keéruuk-os*, *daímon-os*. According to Kiparsky, these nouns are accented on their stem: the *left accent wins* principle will turn intermediate *dáimon-ós* into the correct surface form, *daímonos*. However, the only class of nouns in which stem-ending accent shifts like *pód-a*, *pod-ós* take place in Greek are the monosyllabic stems.<sup>12</sup> Moreover, *all* monosyllabic stems are subject to such accentual shifts; there are no monosyllabic noun stems that preserve stem accent throughout their paradigm. It is advantageous, then, to interpret the *pód-a/pod-ós* alternations as indicating not an inherent accent on *-os* but rather an accent movement rule that shifts an initial accent rightward onto the next syllable, if the latter belongs to certain case endings such as *-os*. This interpretation is compatible with the *rightmost accent wins* generalization defended here and has the added attraction of clearing the underlying lexicon of Greek of superfluous accents on the stems of recessive nouns like *daímoon* and *keéruks*.

For completeness, one other type of interaction between affixation and accent must be mentioned: a number of Greek morphemes, both inflectional and derivational, cause deaccentuation of the string they attach to. Thus, the unaccented feminine suffix *-ya* causes any stem it attaches to to become recessive:

- (12) /basil-eú-ya/ → basíleia ‘queen’  
 (compare basil-eú-s ‘king’)  
 /aleeth-és-ya/ → aleétheia ‘true-feminine’  
 (aleeth-és ‘true’)  
 /a-seb-és-ya/ → asébeia ‘impiety’  
 (a-seb-és ‘impious’)

<sup>12</sup> Only two polysyllabic nouns are exceptions to this statement: *thugáteer*, *thugatr-ós* ‘daughter’ and *gunéé*, *gunaik-ós* ‘woman’. The accent-shifting rule applying to monosyllables affects regularly the genitive and dative singular and the dative plural but less regularly the genitive plural forms: contrast *paíd-oon* ‘child-genitive plural’ with *pod-óon* ‘foot-genitive plural’.

Among inflectional affixes, the segmentally null vocative morpheme has deaccenting effects: compare predesinentially accented *pateér*, *patér-a* ‘father’ with the corresponding vocative *páter*. So do all verbal suffixes: compare *basileú-s* ‘king’ with the denominal verb *e-basíleu-e* ‘he ruled as king’.

Given that some morphemes cause deaccentuation in Greek, one may ask whether the facts in (11) should not be attributed to deaccentuation rather than to the effects of the Main Stress Rule in (7d,e). The answer is clearly negative. Not all unaccented affixes cause deaccentuation in Greek; in fact, most of them do not. In contrast, *all* accented morphemes have the effect illustrated in (11): the rightmost accent alone surfaces in a sequence of several. Only the Main Stress Rule can explain this.

Returning to the focus of this section, I conclude that (7) formalizes correctly limitations on the occurrence of surface and underlying accents in Greek. As noted, (7) predicts not only the generalizations in (1) but also the surface outcome of underlying accent sequences.

### 3. Excursus on Moras

We have concluded that the weight of the final rime determines whether recessive accent will be assigned to the penultimate or the antepenultimate syllable. However, there exists an undeniable accentual alternation between the two vowels of a long nucleus, and this shift is conditioned by the number of vowels (or moras) rather than the number or weight of syllables. The generalizations that characterize this alternation have been mentioned in (1d). If the accented syllable is followed by more than one mora, as in *eépeiros* ‘continent’, *anthróopoo* ‘man-nominative dual’, *timoómetha* ‘we are valued’, the accent is acute; that is, it falls on the second mora. If the accented syllable is followed by exactly one mora, as in *óikos* or *phóiniks*, the accent is circumflex; that is, it falls on the first mora. In the remaining cases, when the accented syllable is final, the distribution between acute and circumflex accents is determined by morphological factors: *pateér* ‘father-nominative’, *phugeé* ‘flight’ versus *patr-óon* ‘father-genitive plural’, *phugées* ‘flight-genitive singular’.

The distribution between acute and circumflex accents is not the central concern of this article. My remarks on this score will be limited to sketching a possible account of the acute/circumflex shift.

A minimum of two rules will be necessary to derive the moraic alternations. One rule will regulate the distribution of accents in nonfinal syllables, accounting for alternations such as *óikos* ‘house’, *oíkoon* ‘house-genitive plural’. This rule applies with full regularity in the entire vocabulary and is unaffected by morphological factors. A distinct rule is necessary to determine the morphologically governed alternations within the final syllable between acute accent in the nominative/accusative (*pateér* ‘father-nominative’, *phugeé* ‘flight-nominative’, *phugeé-n* ‘flight-accusative’, *the-oús* ‘god-accusative plural’) and circumflex accent in the genitive-dative (*patr-óon* ‘father-genitive plural’, *the-óu* ‘god-genitive singular’, *the-óin* ‘god-dative/genitive dual’, *the-óis* ‘god-dative plural’).

I argue in Steriade (1979) that the latter rule must derive an acute accent from an underlyingly circumflex one, rather than the other way around. The reason for this is that acute final accents occur practically only in the nominative/accusative of nonneuter nouns; for the vast majority of words belonging to all other morphological categories, an accented word-final nucleus is circumflex.

(13) *Nominative/Accusative Shift*

Syllable line	x	x	
Mora line	[x	x] → [x	x] ## in the nominative/accusative of nonneuters

In stating rule (13), I have assumed (a) that the rule defines prominence relations rather than tonal associations, (b) that subsyllabic elements may be gridded (as suggested in Prince (1983)), and (c) that nuclei are underlyingly left-dominant in Greek and perhaps universally. The choice of an accentual analysis of Nominative/Accusative Shift over a tonal one is motivated only by the observation that tone plays no role in the lexical phonology of Greek. Assumption (c) is supported by the observation that a word-final nucleus is normally circumflex. The formalism of (13) is adapted from that introduced by Halle and Vergnaud (1987b): a bimoraic nucleus is a constituent on the mora line. Its head is the mora represented on the superior grid line, the syllable line (Halle and Vergnaud's line 0).

If we assume underlying left-dominant nuclei, then the remaining moraic alternation of Greek is also a shift from circumflex to acute. I suggest the following rule for the *óikos/oikoon* alternation:

(14) *Mora Rule*

- a. A word-final monomoraic syllable is extrametrical.
- b. Syllable line      x                      x  
Mora line            [x   x] → [x   x] / \_\_\_\_ x

The derivations of *óikos* 'house-nominative', *oikoon* 'house-genitive plural', and *naúarkhos* 'admiral' will illustrate the rule:

(15)		ó.i.kos	oí.koon	naú. ar.khos	
a.	Syllable line	x (x)	x x	x x	(x)
	Mora line	[xx] (x)	[xx] [xx]	[xx] [x]	(x)
b.	Syllable line	x (x)	x x	x x	(x)
	Mora line	[xx] (x)	[xx] [xx]	[xx] [x]	(x)

Step (a) in these derivations represents the effect of extrametricality, and step (b) is the mora shift itself. The rule will fail to apply to words like *phóiniks*, with a heavy but monomoraic final syllable, in the same way as it fails to apply to *óikos*.

Note that both Nominative/Accusative Shift and the Mora Rule apply independently of whether the syllable they affect is accented or not. Accent and mora rules do not in fact interact directly; they only determine jointly which vowel will be assigned the High

tone in a given word. The purely tonal phonology of Greek reduces almost to the statement that the head mora of an accented nucleus receives a High tone, whereas all other vowels receive a Low tone. One other tonal rule will be discussed in section 4.4.

I close this part of the study by comparing the traditional doctrine on how accent is computed in Greek with the conclusions reached here. The tradition is usefully summarized by Lejeune (1972, 296): ‘‘Les règles essentielles [of Greek accent/D.S.] sont celles qui lient la place du ton à la quantité brève ou longue de la voyelle finale (. . .) La structure ouverte ou fermée de la syllabe finale n’intervient pas: du point de vue du ton *éenops* ou *kóuphos* se comportent tout comme *tóuto*.’’

The root of the error in this statement is the failure to distinguish among rules assigning accent to a syllable, rules determining nucleus headship, and rules assigning the High tone-marking accent to a particular mora within the accented syllable. The accent rules distinguish heavy from light syllables, as shown, and partition the string of syllables into metrical constituents, as will be demonstrated later. The rules determining nuclear structure count moras and rely on no accentual information: it is only this class of rule that fails to distinguish, as Lejeune notes correctly, the light monomoraic syllable *-to* in *tóu.to* ‘this-neuter’ from the heavy monomoraic *-nops* in *ée.nops* ‘glittering’.

#### 4. Enclitic Accent

This section analyzes the accent patterns of Greek enclitic domains. We will observe that the rules of foot construction operating at this level preserve the metrical constituents created by the rule of Recessive Accent (7).

##### 4.1. The Data

Certain Greek words exhibit accentual alternations induced by the nearest accent to their left. These words—called *enclitics*—are monosyllabic or disyllabic, never longer. When they stand to the right of a nonenclitic (or *orthotonic*) word, enclitics induce accentual changes in the phrase, including the loss of their own accent. These changes are of two types: the enclitic induces an acute accent on the final syllable of the orthotonic word to its immediate left, as in *ánthroopós tis* ‘some man’; and the enclitic loses its own accent, as in *ánthroopós tis* or *daímoon tis* ‘some god’. A final possibility is that both the enclitic and the orthotonic word surface with separate accents: *anthróopoon tinóon* ‘some men-genitive plural’.

I illustrate in (16) the main types of orthotonic-enclitic combinations and their accentual effects.

- (16) a. Proparoxytone word + enclitic  
       *eépeirós tis* ‘some continent’  
       *eépeirós tinos* ‘someone’s continent’  
       *ángelós tis* ‘some messenger’  
       *ángelós tinos* ‘someone’s messenger’

- b. Properispome word ending in light syllable + enclitic  
*óikós tis* ‘some house’  
*óikós tinos* ‘someone’s house’
- c. Properispome word ending in heavy syllable + enclitic  
*phóniks tis* ‘some phoenix’  
*phóniks tinos* ‘someone’s phoenix’
- d. Paroxytone word + enclitic  
*phílos tis* ‘some friend’  
*phílos tinos* ‘someone’s friend’  
*daímoon tis* ‘some god’  
*daímoon tinos* ‘someone’s god’
- e. Final accented word + enclitic  
*phóos ti* ‘some light’  
*phóos tinos* ‘someone’s light’  
*hodós tis* ‘some road’  
*hodós tinos* ‘someone’s road’

The quantity of the enclitic syllables plays no role in determining the accent of enclitic phrases: *eékousé mou* ‘listened to me’ is accented exactly like *eépeirós tis*, and *ángelós tinos* is entirely parallel to *ángelós tinoon*.<sup>13</sup>

The following generalizations emerge:

- (17) a. The accent an orthotonic word bears in isolation is never affected by the addition of enclitics: orthotonic accents do not shift or delete when they precede enclitics.
- b. At least one mora must intervene between the orthotonic accent and the second accent induced by the addition of the clitic word. This factor differentiates cases like *óikós tis*, *óikós tinos*, *ángelós tis*, *ángelós tinos* from *phílos tis*, *phílos tinos*.
- c. A disyllabic enclitic is never accented on its initial syllable; no matter what the context, accentuations like *\*tinos*, *\*tinoon* do not occur.<sup>14</sup> Likewise, a monosyllabic enclitic never surfaces accented when it occurs at the end of the enclitic phrase: *\*daímoon tis* is impossible. On phrases consisting of more than one enclitic, see below.
- d. A second accent may occur only on those syllables of the orthotonic word that are counted extrametrical by (7). This factor differentiates *óikós tinos*

<sup>13</sup> When a bimoraic enclitic syllable receives an accent, as in *phílos tinóon*, it is circumflex. In the case of words like *tinóon*, the circumflex is predicted by the analysis of nuclear structure given above. Words for which one would predict a final acute are not attested in the same sort of configuration.

<sup>14</sup> Numerous pairs of homophones must be distinguished here: for example, enclitic *tis*, *tinós*, etc., an indefinite pronoun, from orthotonic *tis*, *tinos*, etc., the interrogative pronoun; similarly, the copular verb *estí*, an enclitic word, from the orthotonic verb *ésti*, denoting existence. All such lexical pairs are related historically, but no productive synchronic link between their members can be established.

from the minimally different *phóiniks tinós* and *óikós tis* from *phóiniks tis*. This explains more generally why no second accent appears on a final orthotonic syllable counted as heavy by (7): *daímoon* and *phóiniks* behave identically in enclitic phrases because both end in heavy syllables.

- e. The accent pattern  $\acute{\sigma}$  ( $\sigma$ )  $\acute{\sigma}$  is not encountered at the end of an enclitic phrase; the only accents that surface on the last syllable of an enclitic phrase are separated by more than one syllable from the next accent to their left: *daímoon tinós*. This observation explains the impossibility of a final accent in phrases like *daímoon tis* (not \**daímoon tís*), *ángelós tinos* (not \**ángelós tinós*), *phóos tinoon* (not \**phóos tinóon*), or *kakóos pote* (not \**kakóos poté*).

#### 4.2. Earlier Analyses

All previous analyses have attempted to relate the occurrence of the second accent in enclitic phrases to the fact that Greek accent is restricted to the last three syllables of a word: "Il est évident qu'il s'agit là [in the occurrence of the second accent of enclitic phrases/D.S.] d'une conséquence immédiate du fait que l'accent se borne aux trois dernières syllabes" (Risch (1981, 187)); "Where . . . the accent of the full word if applied to the combination as a whole would breach the rule of recession [the limitations in (1)/D.S.] a secondary accent was added to the full word, so far as possible, to bring the postaccentual sequence within the limitations of the rule: thus *ánthroopós tis*, etc.'" (Allen (1973, 240)). Formally this suggests reapplication of Recessive Accent on the string lying between the accented syllable of the orthotonic word and the end of the enclitic sequence. The absence of trisyllabic enclitics is explained by the same logic: a trisyllabic enclitic (say, *phérontai*) at the end of an enclitic phrase will always offer three syllables on which Recessive Accent can operate, thus yielding proparoxytone *phérontai*. The outcome would be indistinguishable from an orthotonic proparoxytone.

Warburton (1970), Sommerstein (1974), and, to some extent, Allen are the only linguists to have attempted an explicit account of enclitic accentuation based on this idea. From studying their analyses one derives however the conclusion that the word-internal accent limitations of Greek contribute practically nothing to an understanding of enclitic accent. Since Allen is the only one of the three to have discussed explicitly the relation between Recessive Accent and each subcase of enclitic accentuation, I will refer primarily to his ideas on the matter. Consider the accent on *óikós tis*: here the second accent is added because, on Allen's view, more than one mora follows the contonation. (The term *contonation* refers to a tautosyllabic sequence V(V) that follows the mora bearing High tone.) According to Allen, the unique restriction on the location of Greek accent is that no more than one syllable may follow the contonation within the accentual domain.<sup>15</sup> A second accent is added on the final of *óikos* in *óikós tis* rather

<sup>15</sup> Although an explicit critique of Allen's theory of Greek word-internal accent cannot be undertaken here, the reader will note two significant facts. First, this theory is based on the incorrect generalization that

than on *tis* because, as Allen puts it, it must be added “so far [to the left/D.S.] as possible.” Consider now *óikós tinoon*: after the second accent has been added to *óikos*, there is still more than one mora between the rightmost contonation and the end of the enclitic phrase. It is unclear exactly what one should expect this form to be, but the surface tone sequence is clearly incompatible with the analysis. Again in *kakóos pote* too many moras follow the contonation, leading to the expectation that an accent on the enclitic word would solve the problem: *\*kakóos poté* or *\*kakóos póte*. Why neither of these is the surface form remains a mystery. Why *phílos tinos* is correct instead of *\*phílos tinos*, with the second accent as far to the left as possible (recall *óikós tis*), is another mystery. There is nothing in this type of analysis that a few rules couldn’t fix; but one is left wondering whether the leading idea of the analysis—that Recessive Accent applies in the enclitic phrase—really contributes anything toward an account of the data. I should add that a mora-counting analysis like Allen’s, although it succeeds in explaining the second accent on *óikós tinos* along the same lines as that of *ángelós tinos*, will leave the accentuation of *phóiniks tinos* unexplained: the number of moras intervening between the contonation and the end of the phrase is the same in all three cases.

#### 4.3. Enclitics and the FEC

The Greeks apparently felt that the second accent in proparoxytone or properispome words like *ángelós*, *óikós* was latent in such forms in isolation and that the only function of the enclitic was to “awaken” this second accent (see the testimony of Charax cited by Vendryes (1945, 84)). We may also infer that orthotonic words ending in heavy syllables did not have this latent accent, since forms like *\*daímoón*, *\*phóiniks* never surface. My account aims in part at explicating this intuition: that proparoxytones like *ángelos*, unlike *daímoon* or *phóiniks*, have, at some point in the derivation, a second accent on their final syllable, regardless of whether or not they are followed by an enclitic word.

Assume then that there exists a rule R that places a second accent on the final of words like *ángelos* and *óikos*. The first question we address is, Why does R fail to apply to the final of *daímoon* and *phóiniks*? The suggested answer is that the final syllable of such words is part of a foot already constructed by rule (7); recall that (7) parses *angelos* as [án.ge.](los)—where square brackets indicate the boundaries of metrical constituents—but *daímoon* and *phoiniks* as [daí.moo](n), [phói.nik](s), respectively. We can now invoke Prince’s (1985) *Free Element Condition* (FEC):

#### (18) *Free Element Condition*

Rules of primary metrical analysis apply only to Free Elements—those that do not stand in the metrical relationship being established; that is, they are “feature-filling” only.

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underlies the entire tradition on Greek accent: that only the quantity of the final nucleus matters in the assignment of accent, not the weight of the syllable. Second, on Allen’s account, Greek accent is a system without formal parallels. An attempt at formalizing Allen’s ideas reveals that the central element of the system is not a rule, tonal or accentual, but a filter ruling out tonal configurations in which the contonation is followed by more than one syllable. No language known to me employs similar formal devices.

The restriction to “rules of primary metrical analysis” is presumably meant to exempt from the FEC rules whose only function is to alter existing metrical constituents: for instance, the widespread resyllabification of VC.V sequences as V.CV or foot restructurings such as Hayes’s (1981) Poststress Destressing.<sup>16</sup>

The FEC will ensure that rule R affects only a syllable that does not already belong to a foot, thus drawing the correct distinction between *ángelos*, on the one hand, and *daímoon* or *phóiniks*, on the other.

Before looking at alternatives, let us consider a technical question: since the final in *ángelos* is a Free Element by virtue of being extrametrical, why is it available for further rules of foot construction? What de-extrametricalizes it? This question arises only if we view extrametricality provisions as independent rules that permanently alter phonological representations, rather than as parameters on the domain scanned by individual rules. On the second interpretation, a syllable invisible to one rule may be visible to the next. The second interpretation is the one intended here. It is also the interpretation supported independently by other phenomena: in English, for instance, a final syllable is extrametrical for Foot Formation but not for the rule that retracts main stress from a word-final syllable (Halle and Vergnaud’s (1987b) Rhythm Rule). For example, the final syllable in *àllegátion* is invisible for purposes of Foot Formation but visible enough to block the Rhythm Rule.

I conclude that the final syllable extrametrical for Recessive Accent in *ángelos* is both free and visible for rule R.

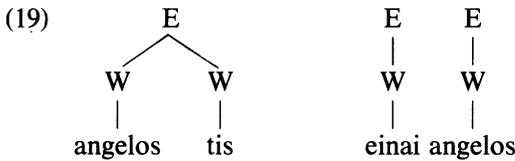
An obvious alternative to the FEC account must be considered: if rule R is cyclic, the Strict Cycle Condition might prevent it from changing previously assigned structure in a nonderived environment (see the discussion in Kiparsky (1982) and Shaw (1985)). There is no evidence that R is cyclic: within words, it applies, like Recessive Accent, as a word-level postcyclic rule would. The issue can be disposed of, however, by noting that rule R and Recessive Accent apply on the same domain. Then if rule R were cyclic, Recessive Accent should be cyclic as well and should be assumed to apply earlier on the same cycle. In circumstances of this sort, the Strict Cycle Condition, as interpreted in Kiparsky (1982), will not prevent rule R from changing structures assigned by Recessive Accent. According to Kiparsky’s interpretation, the Strict Cycle Condition is nothing but the disjunctive “elsewhere” relation between a lexically listed form and a rule output. In a large number of cases the correct result is achieved by identifying in the class of *lexically listed* forms both underlying forms and cyclic outputs, but not the outputs of individual rules in the middle of a cycle. For this reason, the output of Recessive Accent is not a lexically listed form with respect to the application of rule R; it then follows that the Strict Cycle Condition will not prevent rule R from altering structure assigned by Recessive Accent.<sup>17</sup> Moreover, we shall see that rule R fails to alter the

<sup>16</sup> I will have nothing further to say about how to distinguish in principle such restructuring rules from the “rules of primary metrical analysis.” It is clear, however, that the ultimate adoption of the FEC will depend on the existence of constraints on metrical restructuring.

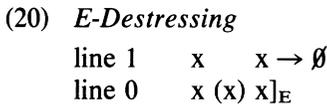
<sup>17</sup> See section 6.2.3 for further discussion of this issue.

boundaries of existing feet even in environments clearly derived by the addition of an enclitic.

The next task of such an analysis is to eliminate the second accent of *ángelós* in contexts where an enclitic does not follow. The resolution of this problem requires us to distinguish two types of subphrasal prosodic domains in Greek: *W-words* (corresponding to single words, enclitic or orthotonic) and *E-words* (corresponding to the domain of enclisis: an orthotonic word optionally followed by one or more enclitics). The phrase *ángelós tis* consists of three prosodic domains: two *W-words*, *ángelós* and *tis*, embedded into one *E-word*. The phrase *éinai ángelos* 'to be a messenger'—where *éinai* is orthotonic—contains four prosodic domains: two *E-words*, each consisting of a single *W-word*:



Recall now the observation in (17d): an *E-word* never ends in the sequence  $\acute{\sigma} (\sigma) \acute{\sigma}$ . I translate it into the following grid operation:



The following partial derivations emerge now for the *E-words* *ángelos*, *ángelós tis*, and *daímoon tis*:

(21)	ángelos	ángelos tis	daímoon tis
(7)	[áŋge]	[áŋge]	[daímoo]
Rule R	[áŋge] [lós]	[áŋge] [lós]	n/a
E-Destressing	[áŋge] los	n/a	n/a
Surface	ángelos	ángelós tis	daímoon tis

The question now arises whether the derivation proposed for *ángelós*, in which the last foot is removed in the context of a preceding foot, will not raise difficulties for the derivation of final-accented orthotonic words like *iskhuurós*: according to the analysis proposed in section 2, *iskhuurós* will be parsed by (7) as *[iskhuu][rós]*, with the final foot assigned main stress. The grid corresponding to this parse of *iskhuurós* will in fact meet the structural description of *E-Destressing* when no enclitic follows; we must therefore prevent *E-Destressing* from turning intermediate *iskhuurós* into *\*iskhuuros*. This is done straightforwardly by ordering the elimination of subsidiary stresses (clause (e) of (7)) before *E-Destressing*. In the output of (7e) *[[is.khuu][rós]]* will be reduced to *[is.khuu[rós]]*, a structure no longer subject to *E-Destressing*.

I turn now to the accent that surfaces on the second syllable of enclitics in *E-words*

like *daímoon tinós*. I noted in (17b) that the initial syllable of disyllabics like *tinós* is never accented in E-words. An explanation for this is rule R: we can assume that R creates binary right-headed feet:

- (22) *Rule R* (domain: W-words; E-words)  
Form binary right-headed feet.<sup>18</sup>

The derivations of *ángelós tinós* and *daímoon tinós* will proceed as follows:

- |      |               |                      |  |                   |
|------|---------------|----------------------|--|-------------------|
| (23) |               | angelos tinós        |  | daimoon tinós     |
|      | (7)           | [áŋge]               |  | [daímoo]          |
|      | Rule R        | [áŋge] [lós] [tinós] |  | [daímoon] [tinós] |
|      | E-Destressing | [áŋge] [lós] tinós   |  | n/a               |
|      | Surface       | ángelós tinós        |  | daímoon tinós     |

We observe now that rule R cannot change structure even in environments derived by cliticization. Compare a structure-changing and a structure-building application of rule R to the sequence *phóos ti* 'some light', where the orthotonic word is accented on its final syllable:

- |      |                          |            |                          |              |
|------|--------------------------|------------|--------------------------|--------------|
| (24) |                          | phoos ti   |                          | phoos ti     |
|      | (7)                      | [phoos]    | (7)                      | [phoos]      |
|      | Rule R                   | [phoos tí] | Rule R                   | [phoos] [ti] |
|      | (structure-<br>changing) |            | (structure-<br>building) |              |
|      | E-Destressing            | n/a        | E-Destressing            | [phoos] ti   |
|      | Surface                  | *phoos tí  | Surface                  | phóos ti     |

The same argument can be made by using phrases like *hodóon ge* 'even of the roads', where the final accent of the orthotonic word is underlying rather than assigned by Recessive Accent: a structure-changing application of rule R will incorrectly predict, for such cases as well, a loss of orthotonic accent (*\*hodoon gé*).

At this point an apparent difficulty surfaces: since a final light syllable is in general extrametrical, we must explain why rule R cannot apply to yield sequences like *\*ángelos tís*—that is, [án.ge][los.tís]—instead of *ángelós tís*. The derivation leading up to the incorrect *\*ángelos tís* is shown in (25):

- |      |                  |                  |
|------|------------------|------------------|
| (25) |                  | angelos          |
|      | W-domain: (7)    | [áŋge]           |
|      | E-domain: Rule R | [áŋge] [los tís] |
|      | E-Destressing    | n/a              |
|      | Surface          | *ángelos tís     |

If we assume, however, that rule R applies twice, first on the W-domain and then

<sup>18</sup> For reasons discussed later, it is impossible to determine the direction of this rule; in clear cases it applies on domains consisting of at most two syllables.

on the E-domain, this pattern too becomes tractable:

(26)		angelos tis
	W-domain: (7)	[áŋge]
	Rule R	[áŋge] [lós]
	E-domain: Rule R	[áŋge] [lós] [tís]
	E-Destressing	[áŋge] [lós] tis
	Surface	ángelós tis

Observe again that the reapplication of rule R on the E-domain is structure-building, not structure-changing: only this explains why we obtain the intermediate stage *ángelós tis*, with three feet rather than two. Without the constraining effect of the FEC, we would have once again derived the incorrect *\*ángelos tis*, with a structure-changing application of rule R. In this case it is clear that the second application of rule R takes place in an environment derived by the addition of the clitic material: rule R's inability to change structure even here is clearly due to the FEC rather than to the Strict Cycle Condition.

One more pattern must be analyzed: that of *phílos tis*, *phílos tinós*. Since the final of the orthotonic word is light and thus qualifies as extrametrical, we predict *\*phílos tis*, *\*phílos tinos*, like *óikós tis*, *óikós tinos*. The relevant generalization is that although accents may surface on adjacent syllables (as in *óikós tis*), they may not surface on adjacent moras. It was suggested earlier that in Greek the lowest grid units are moras rather than syllables. This type of representation permits us to represent the grid structure disallowed in *\*phílos tis* as follows:

(27)	Foot line (= line 1)	x	x
	Syllable line (= line 0)	x	x
	Mora line (= line -1)	x	x

The grid in (27) represents the output of Recessive Accent and rule R in *phílos*. It may also serve as structural description for a rule that eliminates such mora clashes:

(28)	<i>Mora Clash</i>	
	Line 1	x x → ∅
	Line 0	x x
	Line -1	x x

As the pattern of *phílos tinós* indicates, Mora Clash precedes and bleeds E-Destressing:

(29)		philos tinos
	W-domain: (7)	[phí]
	Rule R	[phí] [lós]
	E-domain: Rule R	[phí] [lós] [tinós]
	Mora Clash	[phí] los [tinós]
	E-Destressing	n/a
	Surface	phílos tinós

A minimally different derivation is possible if we assume that Mora Clash is applicable on the W-domain; in either case the order Mora Clash > E-Destressing must be imposed. If Mora Clash is applicable only on the E-domain, as assumed in (29), then sequences like *phílos tis* will be derived by two simultaneous applications of this rule on intermediate *phílós tís*. If Mora Clash is assumed to apply first on the W-domain, then the derivation will contain the following steps: *phílós* (after Recessive Accent and rule R), *phílos* (after Mora Clash), *phílos tís* (after rule R on the E-domain), and finally *phílos tis* (after E-Destressing).

This completes the analysis of all central cases of enclitic accentuation. The rules established, in order of their application, are as follows:

*W-domain*

1. Recessive Accent: Foot Formation (7a–c)
2. Recessive Accent: Main Stress Rule (7d–e)
3. Rule R (22)

*E-domain*

4. Rule R (22)
5. Mora Clash (28)
6. E-Destressing (20)

By way of summary, I examine now how the analysis accounts for the descriptive generalizations in (17).

I begin with observation (17a): the fact that enclisis never alters an orthotonic accent. The central aspect of the analysis that reflects this observation is the assumption that Greek accentual rules are subject to the FEC: that they cannot change structure, even where structure-changing applications would be compatible with the Strict Cycle Condition, as in the case of sequences like *phóiniks tis*, *phóos ti* (see (24)).

Observation (17b), concerning the impossibility of adjacent accented moras, corresponds directly to the rule of Mora Clash (28).

Observation (17c) states two facts: one is the impossibility of *\*tínos*, accounted for by the assumption that enclitic feet are right-dominant. The other is the impossibility of *tís*, as in *\*daimoon tís*; E-Destressing explains this.

Observation (17d)—the fact that the orthotonic word may receive a second accent only on a syllable unaffected by (7)—is explained as just another consequence of the inability of accentual rules to change structure.

Finally, observation (17e), the absence of  $\acute{\sigma}$  ( $\sigma$ )  $\acute{\sigma}$  sequences at the end of E-words, is the direct effect of E-Destressing.

Recall the terms in which the Greek grammarians discuss the “awakening” effect of enclitics on the final accent of orthotonics like *ángelós*, *óikós*. By simply letting rule R apply word-internally, we explain this obscure aspect of the grammatical tradition: the intuition that the second accent in words like *ángelós* is latent in every occurrence of that word, regardless of whether an enclitic follows or not. The enclitic awakens this latent accent by shielding it from the effects of E-Destressing. Of course, there is no

talk in the grammatical tradition about a latent accent in words like *phóiniks* or *daímoon*, which end in a heavy syllable; we have explained this too, since the final syllable in such words is not extrametrical and therefore is not available to receive an accent. Interestingly, however, if we look at words that are structurally identical to *phílos* (that is, words ending in a light syllable preceded by a monomoraic penult), we find some variation:

- (30) *phúllá te* ‘leaves and’  
*Lámpé te* ‘Lampos-vocative and’  
*állós tis* ‘some other’  
*óphrá toi* ‘in order that’  
*éstí tis* ‘there is someone’

These examples, most of them Homeric, indicate that the rule of Mora Clash was not active during all stages of the history of Greek. They support the analysis proposed here, in that they represent independent evidence for the intermediate stage of *phílos tis*, *phílos tinós*. Once we take into account the facts in (30), we can conclude that every final light syllable, in all types of sequences, receives an extra accent. No final heavy syllable can. This contrast is explained by our analysis in conjunction with the FEC.

#### 4.4. Final Lowering and E-Words

The account given here of accentual enclisis rests on the assumption that single orthotonic words not followed by enclitics are E-words (see (19)). I will first reexamine the necessity of this assumption and then provide some additional support for it.

Recall the derivation of *ángelós tis* in (26). The correct pattern is obtained by postulating two successive applications of rule R: one internal to the W-domain (yielding *ángelós*) and one on the E-domain (yielding *ángelós tis*). Recall that if rule R applies only on the E-domain, the pattern derived is *\*ángelos tis*, with one right-dominant foot [*los tis*].

Having established this, we must ask what happens when *ángelos* is not followed by an enclitic. The answer available within this analysis is that rule R derives *ángelós* and that E-Destressing removes the final accent, yielding *ángelos*. It is this chain of reasoning that leads to the conclusion that *ángelós* must be identifiable as an E-word: it is the domain of E-Destressing.<sup>19</sup>

A different sort of consideration argues for the E-word status of orthotonic words not followed by enclitics.

<sup>19</sup> One may wonder whether a rule with the basic structural characteristics of E-Destressing could be assumed to apply both to W-domains and to E-domains; if this were so, then the prosodic status of a domain consisting of a single orthotonic word, like *ángelós*, would be less clear-cut. But E-Destressing must not be allowed to apply to W-words. If it did, the derivation of *ángelós tis* would go astray: rule R on the W-domain creates [*án.ge*][*lós*], then E-Destressing on the W-domain would derive [*án.ge*]*los*, after which rule R on the E-domain would create the incorrect pattern [*án.ge*][*los.tís*].

A final High tone like that of *iskhuurós* 'powerful' or *phuugeé* 'flight' is lowered to Low when it precedes another orthotonic word: *iskhuuròs aneér* 'powerful man' rather than \**iskhuurós aneér*. In phrase-final position or before an enclitic word the High tone is preserved: *iskhuurós tis* 'someone powerful' and phrase-final *iskhuurós*. The loss of the High tone can be formalized either as a tonal rule or as a deaccentuation rule; I opt for the former because it reflects more closely the distinction made by Greek orthography between a grave mora (accented but tonally Low), an acute mora (accented and High), and a tonally unmarked mora (unaccented and Low). In either case the significant question is how to characterize the context of the rule. E-words allow the following simple answer:

(31) *Final Lowering*

$H \rightarrow L / \text{ — } [E\text{-word}]$

Rule (31) will not apply to perispomena (such as *nóoy mónooy* 'only in thought') because the final mora of a perispomenon will be tonally specified as Low: *nóoy*.

In applying (31) to phrases like *iskhuurós aneér*, one must assume that *aneér* begins an E-word domain regardless of whether it has enclitic satellites or not. This is precisely the assumption on which the application of E-Destressing in *ángelós* → *ángelos* relies.

Let us consider an alternative formalization of Final Lowering that obviates the mention of E-words. Suppose that the right context in this rule is not a prosodic domain like the E-word but simply a metrical constituent; the suggestion would be that Final Lowering fails in *iskhuurós tis* because the accent on *-rós* is not immediately followed by a footed syllable. Pursuing this, note that all syllables of an orthotonic word are incorporated into a metrical constituent by the time Final Lowering must apply: in *iskhuurós aneér* the syllable following *-rós* belongs to the word-level metrical constituent [*aneér*]. In contrast, in phrase-final *iskhuurós* or in *iskhuurós tis* no metrically incorporated syllable follows *-rós*. This would account for the failure of Final Lowering in such cases.

(32) *Final Lowering 2*

$H \rightarrow L / \text{ — } [\varphi]$

However, rule (32) fails with respect to E-words containing more than one enclitic. Many details concerning the accentuation of such sequences are uncertain (see Vendryes (1945) and Allen (1973)), but there is complete consensus on two facts: no accent surfaces on the final syllable of a string of enclitics, and no Final Lowering takes place internal to such a string. Thus, a string like *ei per tis se moi pheesi* 'if someone tells me concerning you' is variously accented as *eí pēr tís sé mói pheesi* (by the grammarians) and as *eí per tís se mói pheesi* (by certain manuscripts of the *Iliad*). Despite the differences, two common features emerge: (a) E-Destressing applies to the rightmost enclitic, *pheesi*, according to both traditions, and (b) several acute accents occur within the string of

enclitics, contrary to the predictions of (32).<sup>20</sup> Rule (31), on the other hand, is compatible with both the grammatical and the manuscript tradition: there is only one E-word in the entire string; therefore, Final Lowering is not expected to apply.

This then establishes the independent need for E-word domains, as defined above.

## 5. Other Cases of Enclisis

### 5.1. Adverbials

Not usually included in a discussion of enclisis is the accentuation of nouns followed by the particles *-phi(n)*, *-the*, *-then*, and *-de*. They function grammatically as oblique case markers: *-the* is locative, *-de* is directional, *-then* is ablative, and *-phi* is instrumental, locative, and ablative. Chandler (1881, 238–239) extracts the following rules on their accent from the grammatical tradition:

a. All adverbials based on noun stems ending in a light ( $C_0V$ ) syllable are paroxytone: *Kupró-then* (compare *Kúpro-s*), *Megaró-then* (*Megáraa*), *Lesbó-then* (*Lésbos*), *Abuudó-then* (*Ábuudos*), *passaló-phi* (*pássalos* ‘peg on which to hang clothes’), *enthá-de* ‘hither’ (*éntha* ‘here’).<sup>21</sup>

b. All adverbials based on recessive noun stems ending in a long nucleus ( $C_0VV(C)$ ) are proparoxytone: *Theébee-then* (compare *Theébee*), *Olumpíaa-then* (*Olumpíaa*), *amphotéeroo-then* ‘from both sides’ (*amphotéeroo* ‘both-nominative/accusative dual’), *héoo-then* ‘from dawn’ (*héooos* ‘dawn’).

c. All adverbials based on recessive noun stems ending in a closed syllable are proparoxytone: *ópis-then* ‘behind’ (compare *ópi-* ‘back’), *óres-phi* ‘in, from the mountains’ (*óros* ‘mountain’), *ókhes-phi* ‘(with) carriages’ (*ókhos* ‘carriage’), *kraátes-phi* ‘at the head’ (*káraa*, *kraat-ós* ‘head’), *Erébes-phi* (*Érebos*).

d. All end-accented noun stems ending in a bimoraic syllable are perispome when followed by *-then*, *-phin*: *agorée-then* ‘from the assembly’ (compare *agoreé*), *arkhée-then* ‘from the beginning’ (*arkheé* ‘beginning’).

An extensive discussion of adverbial accent is provided by Ringe (1977), who suggests that the regular paroxytone accent of the *-ó-then* forms is due to a deaccentuation rule: “When *-then* is suffixed to an *-o-* stem, any root accent inherent on that stem is erased, provided that the vowel *-o-* immediately precedes the suffix.” Following Kiparsky (1973), Ringe apparently assumes that the stem vowel *-o-* is inherently accented; thus, any . . .  $\acute{V}$  . . . *-ó-then* sequence is turned by deaccentuation into . . .  $V$  . . . *-ó-then*. The remaining adverbial forms preserve the accentual pattern of the nominal stem

<sup>20</sup> The difference between the grammatical doctrine and the practice of manuscripts involves in this case the applicability of Mora Clash on an enclitic syllable. We may assume that the rule was obligatory only for mora clashes within orthotonic words. This does not, however, exhaust the difficulties encountered in attempting to reconstruct the accentuation of several enclitics.

<sup>21</sup> This rule admits of certain exceptions: very common adverbs in *-then* such as *oiko-then* ‘from home’ keep the accent on the antepenult, if they are based on recessive stems. In these cases *-then* is treated as an ordinary unaccented inflectional suffix. Ringe (1977) argues that *oiko-then* must represent the old pattern and that the paroxytone type is the result of innovation.

on which they are based. However, as Ringe points out, this analysis leaves unexplained the accentuation of *-oo-then* adverbs such as *ampho-téroo-then*, *hopo-téroo-thi*. Since the long vowel *-oo-* of these forms is a lengthened version of the stem vowel *-o-*, we would expect that the claimed accent on *-oo-* should surface after deaccentuation of the stem; the result should then be *\*ampho-teróo-then*. Aside from this difficulty, Ringe's analysis is based on the untenable assumption that the theme vowel *-o-* is underlyingly accented; this assumption and the fact that *-o-* appears unaccented in the vast majority of thematic nouns (*óik-o-s*, *ángel-o-s*, and so on) cannot be reconciled with our observation in section 2 that the rightmost accent always wins in a sequence of several. If *-o-* is underlyingly accented, rule (7d) will predict invariable surface accent on it: *\*oikós*, *\*angelós*.

The accent of *-téroo-then* adverbs that proved problematic for Ringe's analysis falls under Chandler's generalization (b): a recessive stem ending in a heavy syllable has antepenultimate accent when suffixed with *-then/-phin*. Rather than ignoring these forms, it seems more promising to pursue an analysis that distinguishes *-ó-then* from *-óo-then*, *-ée-then*, *-és-then* on the basis of the differences in the quantity of the penult.

The key to this problem is the similarity between the accent of adverbs and that of enclitic phrases. The similarity emerges if we postulate a stage at which the proparoxytone accent of nouns like *Ábuudos* and the paroxytone accent of corresponding adverbials like *Abuudó-then* coexist: combining the two accents yields *Ábuudó-then*, a pattern identical to *ángelós tis*. *Abuudó-* and *ángelós* then share the property of having a light final syllable that receives an accent before a particle, *-then* or *tis*. The only difference is that the initial accent on the stem of the *-then* adverbial is not realized. The patterns of *amphotéroo-then* and *Erébes-phi* indicate that a heavy stem-final syllable cannot receive an accent before the adverbial suffix; in this *amphotéroo-then* is like *daímoon tis* and *Erébes-phi* is like *phóiniks tis*.

It appears, then, that the derivation of the *-then* and *-phin* forms is similar to that of enclitic phrases containing a single monosyllabic enclitic. The following are partial derivations of *Abuudó-then* and *Theébee-then*:

(33)		Abuudo-then	Theebee-then
	W-domain:	(7) [Á.buu]	[Theé.bee]
		Rule R [Á.buu][dó]	n/a
	E-domain:	Rule R [Á.buu][dó][thén]	[Theé.bee][thén]
		Mora Clash [Á.buu][dó] then	n/a
		E-Destressing n/a	[Theé.bee] then

The derivations in (33) show that the enclitic accentuation rules come close to deriving Chandler's generalizations about adverbial accent. Specifically, the only difference between the output of (33) and the surface accent of *Abuudó-then* is the removal of the initial accent. It is as if the final output of the enclitic accentuation rules is subjected in the case of adverbials to the Main Stress Rule (7d–e).

This is, however, not the only difference between adverbial and enclitic accentuation. In adverbials a stem-final consonant is not extrametrical. For example, the *s* in *Erebes-then* cannot fail to be counted in the determination of syllabic weight. This explains the fact that stem-final *-bes* behaves like a heavy syllable in the derivation of *Erébes-then*:

(34)		Erebes-then
	W-domain:	(7a) n/a
		(7b) n/a
		(7c) [É][ré.bes]
		(7d) [È][ré.bes]
		(7e) E[ré.bes]
		Rule R n/a
	E-domain:	Rule R E[ré.bes] [thén]
		E-Destressing E[ré.bes] then
	Surface	Erébes-then

The derivation of adverbs based on long vowel stems—for instance, *amphotérou-then*, *Thébee-then*—is identical to that of *Erébes-then*. In cases where the adverbial stem is underlyingly accented on its final syllable, as in *agorée-then*, the derivation will proceed as follows:

(35)		agorée-then
	W-domain:	(7a) n/a
		(7b) n/a
		(7c) [á.go][rée]
		(7d) [à.go][rée]
		(7e) a.go.[rée]
		Rule R n/a
	E-domain:	Rule R a.go.[rée][thén]
		E-Destressing a.go.[rée] then

As in other cases observed before, the foot-construction clause of Recessive Accent, (7c), cannot place an underlyingly accented syllable in weak position: for this reason (7c) constructs a monosyllabic foot at the end of the stem in *agorée-then*. In all relevant respects the derivation of *agorée-then* is identical to that of the enclitic sequence *agorée tis*.

I have shown how the accent of *-then*, *-phin* adverbials can be derived by exploiting the rules of enclitic accentuation.

## 5.2. Latin Enclisis

Accentual enclitics exist in Latin as well, and a comparison with the Greek facts proves revealing.

Latin stress falls on the penult if that syllable is heavy and on the antepenult otherwise: *Roo.maá.nii* ‘Romans’, *a.mií.ca* ‘friend-feminine’, *po.tés.taas* ‘power’, *pro.cél.la* ‘tempest’, *ho.mí.ni.bus* ‘to the men’, *hó.mi.nees* ‘men’, *a.maá.mi.nii* ‘you-plural-are loved’. The final syllable is stressed only in monosyllables. Since, aside from this default case, the final is unstressable, the simplest account of the pattern will be based on the idea that any final syllable, regardless of quantity, is extrametrical:

(36) *Latin Stress Rule*<sup>22</sup>

- a. The final syllable is extrametrical.
- b. Stress heavy syllables.
- c. Construct binary, left-dominant feet right to left.
- d. Assign main stress to the last foot.
- e. Eliminate secondary feet.

It appears that Latin accent differs from Greek in only two respects: foot construction is quantity-sensitive, by virtue of (36b); and any final syllable, not just a light one, is extrametrical.

Latin has a few accentual enclitics, monosyllabic and disyllabic. When these morphemes are added to an orthotonic word, the stress of that word shifts rightward and lands invariably on its final syllable.<sup>23</sup>

## (37) a. Monosyllabic enclitic

<i>límina</i> ‘thresholds’	<i>liminá-que</i> ‘and the thresholds’
<i>Múusa</i> ‘the muse’	<i>Muusá-ne</i> ‘whether the muse’
<i>hómínees</i> ‘men’	<i>homineés-que</i> ‘and men’
<i>homínibus</i> ‘to men’	<i>hominibús-que</i> ‘and to men’

## b. Disyllabic enclitic with light penult

<i>áalter</i> ‘other’	<i>altér-uter</i> ‘one of two’
<i>áltera</i> ‘other-feminine’	<i>altér-utra</i> ‘one of two-feminine’
<i>úbi</i> ‘where’	<i>ubí-libet</i> ‘wherever’
<i>própe</i> ‘near’	<i>propé-diem</i> ‘very soon, any day now’

## c. Disyllabic enclitic with heavy penult

<i>sii</i> ‘if’	<i>sii-quant.do</i> ‘if ever’
<i>quo-/qua-</i> ‘which’	<i>quaá-prop.ter</i> ‘because of which’
<i>éo-/éa-</i> ‘this’	<i>e.aá-prop.ter</i> ‘for this reason’
<i>id</i> ‘it, this’	<i>íd-cir.coo</i> ‘for this reason’
<i>sub</i> ‘under, near’	<i>súb-in.de</i> ‘immediately afterward’

<sup>22</sup> This rule is a restatement of Hayes’s (1981) analysis of Latin stress.

<sup>23</sup> Our sources on the accentuation of Latin enclitic words are the statements of Latin grammarians and commentators gathered in Schoell (1876). The most interesting datum of the Latin enclitic paradigm, the accentuation of items like *liminá-que*, with a light accented penult, is provided by several statements cited by Schoell (pp. 124–139). The following, from Servius’s commentary on the *Aeneid*, is the clearest among them: “*Nam μόρια, i.e. minores particulae, ut que, ve, ne, ce quotiens iunguntur aliis partibus, ante se accentum faciunt, qualislibet sit syllaba quae praecedat, sive brevis sive longa.*” (For the *moria*—that is, the smaller particles such as *que, ve, ne, ce*—whenever they are joined to other forms, place the accent before them (on whatever syllable may precede them, whether short or long.)

A few of these enclitic phrases could be accented correctly by counting them as single word domains and applying the stress rule once to the entire E-word: forms like *altér-utra* or *propé-diem*, whose enclitic words are disyllables with light penults, fall in this class. Interestingly, however, such an account is impossible for the other two classes of enclitics. Monosyllabic enclitics like *-que* and *-ne* attract accent on the final of the orthotonic word regardless of the quantity of that syllable: recall *liminá-que*, whose penult accent falls inexplicably on a light syllable, one syllable to the right of where the word-internal stress rule would place it. Disyllabic enclitics with a heavy penult present the converse difficulty: the stress in *íd-cir.coo* surfaces one syllable to the left of its expected location.

Since Latin offers no surface evidence for any foot construction rule other than (36c), the null hypothesis is that the enclitic accent pattern results from several applications of that rule. There are several possibilities in implementing this idea, but the simplest would be to assume that all provisions of (36) reapply in E-words, with the exception of (36b), the rule that accents heavy syllables. As in Greek, the Latin enclitic words enter phrasal phonology without having been assigned an accent: clauses (36a,c-e) will now apply again on the E-domain:

(38)		limina-que	eaá propter
W-domain:	(36a–c)	[lí.mi] (na)	[é] (aa)
E-domain:	(36a)	[lí.mi] na (que)	[é] aa. prop (ter)
	(36c)	[lí.mi] [ná] (que)	[é] [aá.prop] (ter)
	(36d)	[lí.mi] [ná] (que)	[è] [aá.prop] (ter)
	(36e)	li.mi [ná] que	e [aá.prop] ter
Surface		limináque	eaápropter

We observe that a very simple derivation of Latin enclitic accent is possible if the rule stressing heavy syllables is suppressed on E-domains. As before, the analysis relies critically on the distinction between footed syllables, stressed or stressless, and metrically stray syllables. Only the latter can undergo foot formation in E-words.

The point of central interest to us is the fact that in Latin, unlike in Greek, (36c) stresses any syllable at the end of the orthotonic word, not just a light CV(C) syllable: the correct derivation of *homineés-que* turns on this assumption. The final syllable *-nees* of *hómínees* is extrametrical for the word-internal Latin Stress Rule, and this makes it available for the later application of (36c). In contrast, Greek words ending in heavy syllables (*daímoon*, *phóiniks*) never allow rule R to affect their finals (*daímoon tis*, not \**daímoón tis*). This difference follows from the difference in word-internal stress rules: for the Greek Recessive Accent only a light syllable is extrametrical, whereas for Latin any final syllable is.<sup>24</sup>

<sup>24</sup> The reader may have noted that the rules of Greek accentual enclisis could also derive the Latin pattern. The following derivations show this:

## 6. General Implications

### 6.1. Grids, Trees, and Moras

The Greek accent rules must refer both to metrical constituents and to the grid. The role of constituent structure in the assignment of enclitic accent has been made clear above and will be taken up again. It perhaps bears repeating that a grid-only representation of the sort advocated by Prince (1983) and Selkirk (1984) will not be able to draw the correct distinction between a stressless but footed syllable and a stressless and metrically stray syllable. This distinction has proved essential to the analysis of enclisis.

No argument for the grid has been explicitly made so far in this study. An argument emerges when we take a closer look at E-Destressing. This rule must apply to the following structures:

- (39) a. Line 1     x    x  
           Line 0   [x x] (x) (as in *ángelós* → *ángelos*)
- b. Line 1     x    x  
           Line 0   [x] [x x] (as in *ángelós tinós* → *ángelós tinos*)
- c. Line 1     x    x  
           Line 0   [x] [x] (as in *phóos tí* → *phóos ti*)

One rhythmic pattern underlies all three environments in (39):

- (40) Line 1     x    x  
        Line 0     x (x) x

There is, in contrast, no arboreal generalization unifying the three cases in (39). This was the reason for stating E-Destressing as in (20), and this is the argument provided by E-Destressing against a tree-only approach to stress, such as the one proposed by Liberman and Prince (1977) and Hayes (1981).<sup>25</sup>

We have also observed that a simple approach to the mora-based rules of Greek

(i)		limina-que	eaa-propter
W-domain:	(36a)	limi(na)	e(aa)
	(36b-d)	[lími]	[é]
	Rule R	[lími][ná]	[é][aá]
E-domain:	Rule R	[lími][ná][qué]	[é][aá][proptér]
	E-Destressing	[lími][ná] que	[é][aá] propter

To this derivation must be added a final step: the assignment of main stress on the E-domain and the removal of secondary stresses. This will turn [lími][ná] que into the surface *limináque*. The possibility of deriving the accentual paradigm of Latin enclitics with Greek rules should not come as a complete surprise: Greek and Latin share a number of phonological and morphological innovations (see Meillet (1922, 100, 153)). It is possible, then, that the rules of enclisis represent one of these shared developments, not identified so far because it involves identity of formal mechanism rather than surface pattern.

<sup>25</sup> The bracketed derived terminal element (DTE) notation introduced by Hammond (1984) will permit a statement of E-Destressing equivalent to that given in the text. In this respect, and some others, the descriptive possibilities of Hammond's (1984) theory and of Halle and Vergnaud's (1987b) are identical.

(rules (13), (14), and (28)) is made possible by the assumption that individual nuclear elements are gridded, perhaps only on a language-specific basis. This conclusion is, however, less secure: the available evidence does not allow us to exclude a number of alternative formulations of these rules.

## 6.2. *Accent and Constituents*

The main conclusion to be drawn from the analysis of accentual enclisis is that neither the boundaries of existing metrical constituents nor the corresponding grid structure can be altered by rules of foot construction. I recapitulate the evidence and then discuss its general implications.

In phrases like *phoiniks tis* the metrical constituent constructed by Recessive Accent (7)—[*phoi.nik*—] cannot be affected by the application of rule R: if it had been, the result would be \**phóiniks tis*, like *óikós tis*. The same observation can be made in Latin: in phrases like *liminá-que* the metrical constituent erected by a word-internal application of the Latin Stress Rule, [*lí.mi*], cannot be altered by a later application of the same rule. This explains why enclitic accentuations like \**limínaque* (derived through a structure-changing reapplication of the Latin Stress Rule) are not found. In Greek phrases like *ángelós tis* the metrical constituent [*los*] constructed by rule R on the W-domain cannot be affected by a later application of rule R on the E-domain; otherwise, \**ángelos tís* would be derived. In phrases like *basileús ge* ‘even the king’ rule R cannot affect the underlying accent of *-eú-*, on the E-domain; if it could, \**basileus gé* would result. Finally, a fact not mentioned so far but equally significant is that Recessive Accent, like rule R, cannot displace underlying accents. We have seen in section 2 that Recessive Accent applies on stems containing underlying accents (recall *iskhuuro-tátoon*, from /iskhuuró-tat-oon/) but does not incorporate an underlyingly accented syllable into a weak metrical position: Recessive Accent does not apply to a sequence like *basileú-si* ‘king-dative plural’ in structure-changing fashion to derive \**basileusi*. Rather, the assignment of metrical constituents by Recessive Accent or by rule R always “works around” existing accents and existing constituents: it affects only unaccented and metrically stray syllables.

The cases listed above illustrate two related but distinct properties of Foot Formation:

- (41) a. Foot Formation cannot apply to an unaccented but already footed syllable.  
 b. Foot Formation cannot place an accented syllable in weak position.

The nonapplication of rule R to the last syllable of *phóiniks* and of the Latin Stress Rule to the penultimate syllable of *limína* in *liminá-que* is due to (41a); all other facts recapitulated above are due to (41b).

The observation in (41a) is a simple consequence of the FEC. I leave it aside for the moment, anticipating the conclusion that the FEC governs all circumstances of Foot

Formation, including the case where the latter takes place in derived environments. The observation in (41b) does require some discussion, however.

*6.2.1. Accent as a Local Property.* Early arboreal theories of stress, like those of Liberman (1975), Liberman and Prince (1977), and Hayes (1981), differ from more recent ones like those of Hammond (1984) and Halle and Vergnaud (1987b) in one respect: the latter distinguish accent from constituent structure, whereas the former use constituents and labeling to derive accent. For Liberman (1975) and Liberman and Prince (1977) accent is a relation between two members of a constituent, not a property that can inhere in an isolated syllable: “A strong position is strong only by virtue of being associated with a corresponding weak position, not because of any inherent property of strongness; a weak position can be considered weak only because, in some metrical pattern, it plays the role of weak in relation to some strong” (Liberman (1975, 15)). But the observation in (41b) can be derived only if the distinction between accent and constituency is made: only if accent is a local property.

To see this, consider once again the case of underlying accents in words like *basileús*, *basiléu-si* and the fact that neither rule (7) nor rule R can place the accented *-eu-* in weak position. Let us imagine an account of these facts under the relational theory of accent provided by Liberman and Prince (1977). In that format the only representation of the underlying accent on *-eu-* is an underlying monosyllabic foot: *basi[leu]-s*. Now it is clearly possible for rule (7) to incorporate a syllable into this foot: in *basileú-oon* (genitive plural) the intermediate foot structure must be [*bá.si*][*leú.oon*], since otherwise the heavy and nonextrametrical *-oon* would itself form the last foot of the word and would take main stress, producing \**basileuoón*. It must be inferred, then, that the boundaries of the underlying monosyllabic foot on *-eu-* can be extended by the incorporation of a syllable. However, they cannot be extended in a case like *basiléu-si*, whose underlying structure is *basil[eu]-si*; if rule (7) had been able to extend foot structure in this case, it would have derived intermediate *ba.[sí.leu](sí)*, and this would yield \**basíleusi*. I conclude from this that the representation of underlying or derived accents in terms of foot boundaries alone does not provide the correct distinction between the cases of *basileúoon* and *basíleusi*.

This problem does not arise if the underlying accent is represented as a local property: an underlying line 2 grid mark, with or without foot boundaries, in Halle and Vergnaud’s theory or an underlying DTE in Hammond’s. The accent on *-eu-* marks it as *the head of any foot it might belong to*. Given this interpretation of accent and the fact that feet are left-dominant in Greek, rule (7) will derive correctly a disyllabic foot in *ba.si.[leú.oon]* and a monosyllabic one in *ba.si.[leú.](sí)*.

*6.2.2. Foot Construction and the FEC.* I return now to (41a) and the principle that underlies it.

The structure-changing potential of rules assigning metrical structure has been stud-

ied by Kiparsky (1982), with reference to English stress. Kiparsky draws the conclusions paraphrased in (42):

(42) *Stress and the Strict Cycle* (after Kiparsky (1982))

- a. Rules assigning metrical structure can apply in nonderived environments in structure-building fashion, in the sense that they can assign metrical structure to metrically stray elements, syllables, and segments.
- b. The same rules can apply in structure-changing fashion—that is, by altering existing constituents—only in derived environments.

The distinctions drawn in (42) are illustrated by the derivation of the English triplet *origin, original, originality*. Metrical structure is assigned, in structure-building fashion, on the first cycle, *origin*: the final syllable is extrametrical and a left-dominant binary foot is erected over the remaining two syllables, to derive [ó.ri](gin). On the second cycle the suffix *-al* is added; by the Peripherality Condition (Hayes (1981), Harris (1983)), the syllable *-gin-* loses its extrametricality and we obtain the sequence [ó.ri]gi.nal. The final syllable of the new sequence is again declared extrametrical and a binary left-dominant foot is formed over *ri.gi*, yielding [o][rí.gi](nal). The rule forming left-dominant feet has applied here in structure-changing fashion by removing a weak syllable from the existing foot on [ó.ri]. This application of Foot Formation is sanctioned by the Strict Cycle Condition because the string to which it applies is derived, that is, different from the output of the first cycle: the first cycle ended in [ó.ri](gin), whereas the input to Foot Formation on the second cycle is [óri] gin, with a nonextrametrical final syllable. Finally, on the third cycle the suffix *-ity* is added, and this yields, via syllabification and the Peripherality Condition, a new input for Foot Formation, [o][rígi]na.li.ty. In the new string *-ty* is extrametrical and a foot is constructed over *na.li*: we obtain [o][rí.gi][ná.li](ty). On each cycle the final foot takes main stress. The derivation is completed by applying Prestress Destressing (Hayes (1981)) to the initial monosyllabic foot; the result is o.[rí.gi][ná.li](ty). Kiparsky points out that the contexts where Foot Formation may and may not apply, in structure-changing or structure-building fashion, need not be directly stipulated as in (42); they are predicted by the Strict Cycle Condition, if the latter is interpreted as a variant of the Elsewhere Condition, a proposal supported on independent grounds. Only one assumption, but a fundamental one, is needed in deriving the generalizations in (42) from the Strict Cycle/Elsewhere Condition:

(43) Rules of metrical structure assignment *can* change structure.

The Greek evidence has led to conclusions that directly contradict (43) and (42b). I will now attempt a reanalysis of the data that motivated Kiparsky's theory of the interaction of stress and strict cyclicity. The conclusion this reanalysis builds up to is that Prince's FEC rather than (43) makes the correct predictions regarding this interaction.

6.2.3. *The Strict Cycle Condition versus the FEC.* I will first contrast in the abstract the predictions of the FEC with those made jointly by the Strict Cycle Condition and (43).

Take a pair of rule applications R1 and R2, where R2 may be a reapplication of R1 or the application of a distinct rule. Both R1 and R2 assign metrical structure at the same level—say, at the foot level. The order, extrinsic or not, is that R1 applies before R2.

(i) Suppose first that both R1 and R2 are cyclic and apply on the same cycle. Then (43) and the Strict Cycle Condition as interpreted by Kiparsky (1982) predict that R2 may alter the structure assigned by R1. The reason is that, by hypothesis, the output of R1 is not a cyclic output; and only cyclic outputs or lexically listed items can block other rules by entering into a blocking “elsewhere” relation to their outputs.<sup>26</sup> The combination of (43) and the Strict Cycle Condition does not block derivations in which R1 assigns metrical structure to a string, after which R2 applies to change the assigned structure over that same string. In contrast, the FEC predicts that R2 cannot alter any of the structures built by R1.

(ii) Suppose now that R1 and R2 are both cyclic but that R2 applies on a later cycle than R1. Then (43) and the Strict Cycle Condition predict that R2 may change structure assigned on a prior cycle by R1 over a portion of the string that differs from the prior cyclic output of R1. This has been illustrated above with the derivation of *original*, where the string [ó.ri]gin derived by Peripherality from the cyclic output [ó.ri](gin) undergoes Foot Formation and becomes [o][rí.gin]. On the other hand, R2 cannot alter the constituents built by R1 on portions of the string that are not derived on the current cycle: for instance, no cyclic rule can alter on the cycle of [o][rí.gi]na.li.ty the foot [rí.gi] assigned on the prior cycle. Once again, the FEC predicts in this case as well that R2 cannot affect the structure assigned by R1, in any context, regardless of the derived status of the environment.

(iii) Suppose that R1 is cyclic or postcyclic and that R2 is postcyclic. In this case the Strict Cycle Condition does not constrain, by hypothesis, the mode of application of R2. By virtue of (43), R2 can now not only alter some portions of the structure assigned previously by R1 but also eliminate completely all constituents assigned by R1. The FEC will block such applications.

(iv) Consider now the applicability of R1, where R1 is cyclic, to a string containing underlyingly accented syllables. As pointed out by Halle and Mohanan (1985), the Strict Cycle Condition predicts that a language in which accent is distinctive (underlyingly present on some syllables) will not allow a cyclic foot-construction rule to apply on the first cycle or more generally in nonderived environments. This prediction is quite independent of the adoption of the FEC; it is derived from Kiparsky’s idea that strict cyclicity is the effect of a disjunctive “elsewhere” relation between a lexically listed

<sup>26</sup> See also above, section 4.2.

form and a rule output. Of course, the FEC will make the same prediction in such a case.

(v) On the other hand, if R1 were to apply to a string derived on the current cycle and distinct from the lexically listed form, the Strict Cycle Condition and (43) will permit it to deaccent the underlyingly accented syllable by placing it in weak position on a newly constructed foot. The FEC will not permit this.

(vi) Finally, if R1 is postcyclic, then the Strict Cycle Condition will allow it to apply so as to deaccent underlyingly accented syllables, in any context. The FEC will not.

Some of these predictions made by (43) can be changed if it is assumed that stress, once assigned to a syllable, is not only the relational property of foot-headedness but also the local property of possessing a line 1 grid position or, in Hammond's terms, an underlying DTE. If this assumption is made within a theory incorporating (43), then it is predicted that the foot membership of individual syllables can change in the circumstances outlined above but that stressed syllables cannot be destressed. Of course, the interest of the Greek and Latin enclitic facts lies in the suggestion that even this more narrowly constrained theory is inadequate: recall once again the contrast between the inapplicability of rule R on [*phói.niks*] and its applicability on [*ói*](*kos*). In what follows, my comments will be addressed to the more constrained version of (43), according to which only foot membership, not accent, can be altered by structure-changing applications of Foot Formation.

The reader may have spotted so far one clear case in which the predictions of such a theory are undoubtedly wrong. This case is (iii): postcyclic rules do not in fact alter the foot membership of existing constituents. Examples relevant to (iii) are discussed by Stowell (1979) and Hayes (1981). The case discussed by Stowell involves the interaction in Seneca between a noniterative unbounded foot-construction rule applying at the end of the word and the iterative binary foot-construction rule that operates left to right on the remainder of the word. The unbounded foot is quantity-sensitive: it will stop at a nonfinal closed syllable. Both the unbounded right foot and the iterative left-to-right ones are right-dominant. The relevant point here is that the binary iterative rule does not apply on syllables contained within the boundaries of the rightmost, unbounded foot. An example of the metrical structure assignment in Seneca is given in (44), replacing the *s w* notation employed by Stowell with the square brackets used here:

(44) [wat.síʔ] [ka:.yá] [káh] [a:.tÓ:s] 'rocking chair'

The unbounded right foot [*a:.tÓ:s*] contains the maximal sequence  $\check{\sigma}^*\bar{\sigma}\#\#$ , where  $\check{\sigma}^*$  is a string of open syllables,  $\bar{\sigma}$  is closed, and  $\#\#$  is the end of the word. Note that the left-to-right binary foot construction stops at *-a:-*, the first syllable of the already constructed right-hand foot. Had *-a:-* been available for incorporation into a preceding foot, the ultimate result would have been the incorrect \*[*wat.si*][*ka:.yà*][*kah.á*][*to:s*]. The same point can be illustrated with a case in which the  $\check{\sigma}^*\bar{\sigma}\#\#$  sequence of the right-hand foot

exhausts the word:

(45) [ha.ti.we.no.ta.tyéʔs] ‘the Thunderers’

There are no alternating stresses in this case; no syllable in the word is available for further foot construction after the right-hand unbounded foot has been erected.

The interaction between the two foot-construction rules of Seneca cannot be attributed to the requirements of the Strict Cycle Condition, since both rules apply in postcyclic fashion to the whole word at once.

Let us now consider case (i), where R1 and R2 are both cyclic. Assume that R1 and R2 are different iterations of the same cyclic rule of binary, left-dominant foot formation. As Prince (1985) points out, researchers on stress assume tacitly the effects of the FEC in analyzing such cases: a left-to-right application of such a rule will parse a string  $\sigma \sigma \sigma \sigma$  as  $[\acute{\sigma} \sigma] \sigma \sigma$ , then as  $[\acute{\sigma} \sigma] [\acute{\sigma} \sigma] \sigma$ , and finally as  $[\acute{\sigma} \sigma] [\acute{\sigma} \sigma] [\acute{\sigma}]$ . Without the FEC the derivation would have been  $[\acute{\sigma} \sigma] \sigma \sigma \sigma \rightarrow [\acute{\sigma}] [\acute{\sigma} \sigma] \sigma \sigma \rightarrow [\acute{\sigma}] [\acute{\sigma} \sigma] \sigma \rightarrow [\acute{\sigma}] [\acute{\sigma} \sigma] \sigma \rightarrow [\acute{\sigma}] [\acute{\sigma}] [\acute{\sigma}] [\acute{\sigma} \sigma]$ . Similar examples can be provided from the application of syllabification rules. One such case involves the cyclic creation of syllabic CV constituents in Latin and Romanian (see Steriade (1984)); for example, the Latin string /uia/ ‘road’ is parsed by the rightward iteration of the rule creating (C)V syllables as *wi.a*. The first iteration creates the maximal CV syllable *wi*. The second iteration leaves the existing syllable intact and erects an onsetless syllable over the remaining segment *a*. A structure-changing derivation would have resulted in \**wya* or \**uya*. This is again a fact not covered by the Strict Cycle Condition and left unexplained if (43) is assumed.

Now consider (ii). In this case the accentual evidence discussed so far in the literature appears to favor overwhelmingly the predictions of the structure-changing hypothesis. It is, however, relatively straightforward to show that the syllabification facts are incompatible with it. Here is a summary of the Greek evidence to this effect discussed in Steriade (1982). The discussion assumes that syllabification proceeds in three steps: first CV syllables are formed, then stray consonants are incorporated into the onset (C [CV . . .] → [CCV . . .]), then stray consonants are incorporated into the coda ([. . . V] C → [. . . VC]). As Prince (1985) points out, the restriction of these rules to stray consonants is in fact a reflex of the FEC and need not be stipulated individually. Now compare Greek stem-internal clusters like *kr* with *kr* clusters created by prefixation: *ma.kros* versus *ek.-re.oo* ‘flow out’. *Kr* is a possible onset in Greek, and *Vk* is a possible rime. Both stems and prefixes like *ek-* are cyclic domains. Assuming the FEC, we can explain the contrast between *ma.kros* and *ek.re.oo*: prefix and stem are syllabified separately, yielding [ek], [re.oo], and [ma.kros]. The first two morphemes are concatenated, and we obtain [ek.re.oo]. No change in syllable structure such as *ek.re.oo* → *e.kre.oo* can accompany prefixation because the FEC prohibits structure-changing applications of the onset rule. The FEC also prohibits structure-changing applications of the coda rule. To see this, compare the effect of vowel-final prefixes like *a-* ‘without’, *apo-* ‘off’

on the syllabification of stems beginning with consonant clusters. When the stem-initial cluster is a possible onset, no syllabic restructuring takes place under prefixation: *a.-kra.tees* ‘powerless’ does not become \**ak.ra.tees*, because the coda rule cannot change structure. But when the initial cluster of the stem cannot be parsed as an onset, then its first member does become coda to a preceding prefix: *a-m.bro.tos* ‘immortal’ (not \**a.mbro.tos*), *a.po-s.ta.sis* ‘defection’ (not \**a.po.-sta.sis*). The same assumptions as above derive these facts: stems are cyclic domains, and syllabification (in this case the coda rule) is cyclic but cannot change structure. The initial consonant in initial clusters like *mbr*, *st* is syllabically stray—a fact established independently—in contrast with the initial of possible onset clusters like *kr*. A syllabified consonant cannot become a coda; a stray one can. The Strict Cycle Condition does not explain the failure of structure-changing applications of the coda rule in derived environments such as that of *a.-kra.tees*.

What then of the structure-changing application of cyclic Foot Formation? One case has already been mentioned: that of English *ó*igin, *orig*inal, *orig*inálity. What this paradigm shows is minimally that the affixation of *-al* overrides existing foot structure. It is possible to interpret this fact broadly, as Kiparsky (1982) does, and infer from it (43). But the stress pattern of words like *orig*inal is also compatible with other interpretations. One is that given by Halle and Vergnaud (1987a), who claim that all level 1 English suffixes trigger the elimination of previously assigned metrical structure from the stem to which they attach.<sup>27</sup> Halle and Vergnaud show that in a number of languages cyclic affixation is accompanied by Deforestation in the stem, and they claim that this is universally the case. If we adopt their view, then the derivation of *orig*inal from *ó*igin will take a form fully compatible with the FEC:

- (46) Cycle 1: Foot Formation [ó.ri] (gin)  
 Cycle 2: Deforestation o.ri.gi.nal  
 Foot Formation [o] [rí.gi] (nal)

The problem then becomes *orig*inálity, whose secondary stress is related to the primary stress of *orig*inal; note the different distribution of secondary stresses in monomorphemic words like *Tàtamagoúchi*. Halle and Vergnaud argue that the relation between the primary stress in *orig*inal and the secondary stress in *orig*inálity is covertly transderivational: in their terms, the stress on *ri* in *orig*inal is not directly inherited but rather postcyclically copied in *orig*inálity. Nothing then stands in the way of adopting the FEC, and the problems for (43) mentioned earlier disappear.

There are a number of alternative approaches to data of this sort, which do not rely on stress copying. My discussion here cannot do full justice to the issues such alternatives raise; I will mention only two, leaving a more extensive discussion to later studies. One alternative can be found in Poser’s (1986) remark that individual rules may have a stip-

<sup>27</sup> A partly similar claim was earlier made, in response to different concerns, by Liberman and Prince (1977).

ulated structure-changing potential; Poser's suggestion could be translated in our terms by stipulating that the FEC is suspended for individual rules. Another possibility, perhaps more restrictive, is inspired by Liberman and Prince's (1977) approach to stress and cyclicity: if we distinguish between constituent structure and the grid, we can allow certain affixes to condition Deforestation proper (the removal of metrical constituent structure on the stem) without destressing cyclically stressed syllables. Stress will then be preserved as a grid mark on line 1, but the foot boundaries will not be preserved. Foot Formation will be restricted, as in Liberman and Prince (1977) or Halle and Vergnaud (1987b), from placing a stressed syllable in a weak metrical position. If level 1 suffixes have this property, then the triplet *óorigin*, *original*, *origináality* is derived by cyclic applications of Foot Formation, as in Liberman and Prince (1977).

We would then have three possibilities for describing the accentual effect of an affix on a stem. The first possibility is that the affix causes both Deforestation and Destressing, as in the case of Sanskrit or Lithuanian dominant suffixes (see Halle and Vergnaud (1987b)).

The second possibility is that the affix causes Deforestation but not Destressing. This is the analysis required for English level 1 affixes and for the effect of Chamorro affixation on stress (see Chung (1983) and the metrical analyses in Halle and Vergnaud (1987a) and Kiparsky (1986)). In Chamorro some surface secondary stresses are cyclic in origin, indicating that Destressing does not accompany affixation, but Foot Formation appears to change structure in pairs like *magágu* 'clothes' versus *màgagú-na* 'his clothes'. Following the arguments given in Kiparsky (1986) and Halle and Vergnaud (1987b), I assume that the first cycle foot structure is [ma][gágu]. If so, reapplication of Foot Formation on the second cycle in *màgagú-na* could not be reconciled with the FEC without the assumption that Chamorro suffixes trigger Deforestation.

An argument that an English level 1 suffix such as *-al* causes only Deforestation, but not Destressing, is based on the fact that the few speakers who maintain the SPE distinction between, say, *còndensáation* (from *condéense*) and *còmpeñsáation* (from *cómpeñsàate*) do maintain a subsidiary stress in the corresponding *-al* derivatives: they pronounce *còndensáational* and *còmpeñsáational*.<sup>28</sup> I have no data to indicate whether affixes like *-ion* cause both Deforestation and Destressing or just the former. We must assume at least Deforestation with *-ion* in order to explain the stress on *contribút-ion* (from *contribute*) and *demólít-ion* (from *demólish*), while maintaining Hayes's (1981) convincing point that a final V(C) rime is not extrametrical in verbs.

A final instance of Deforestation without Destressing is provided by the well-known interaction of cyclic stress and syncope in Levantine Arabic (see Brame (1974) and Kenstowicz and Abdul-Karim (1980) for a pandialectal discussion of this pattern). I will not recapitulate here the arguments for cyclicity of stress assignment in these dialects.

<sup>28</sup> I have found, however, only four speakers of this dialect, all linguists: R. Larson, M. Rochemont, S. J. Keyser, M. Hammond. Another fifteen English speakers I asked—many of them nonlinguists—denied the basic contrast.

Two facts are relevant to our discussion: the application of Foot Formation on the third cycle in forms like *darás-at-u* 'she studies him' and the contrast between *fhím-na* 'we understood' and *fihím-na* 'he understood us'. Foot Formation is binary, quantity-sensitive, and left-dominant; it operates cyclically, right to left; and it counts a final CV(C) syllable as extrametrical. In *darás-at-u* this means that the input to the third cycle will contain [dá.ra](sa.)tu. To explain the antepenultimate surface stress, we must assume then that Deforestation applies: with Deforestation and Peripherality, Foot Formation on the third cycle will apply on the string *dá.ra.sa.tu* and will derive intermediate [dá][rá.sa](tu). The surface form can be obtained by a later rule of Prestress Destressing. The contrast between *fihím-na* and *fhím-na* will be interpreted as indicating (a) that Foot Formation is noniterative and (b) that cyclically assigned stresses are preserved. Like all other writers on the subject, I assume that *fhím-na* comes from /fihim-na/ and that stress begins applying on the cycle of subject prefixes. I derive first *fhím-na* 'we understood'. Foot Formation yields *fi[hím](na)*, and Syncope deletes the stressless high vowel: *fhímna*. In *fihímna* 'he understood us', the derivation has two cycles: on the first the structure derived by Foot Formation is [fi](hím). On the second cycle this structure is inherited, with Deforestation but not Destressing, as *fi.hím.na*. Foot Formation creates [fi][hím](na): here the initial high vowel is not stressless and cannot be syncopated. Eventually Prestress Destressing will derive the surface form: *fi.hím.na*.

The third possible interaction between stress and affixation is that the affix causes neither Deforestation nor Destressing (see below for examples). A fourth logical possibility exists but remains unattested: the suffix causes Destressing but not Deforestation. It is perhaps premature to speculate on whether this is an accidental gap.

The effects of the FEC are directly observable only with morphemes of the third category, which do not cause either Deforestation or Destressing. Examples of this sort are not restricted to the Greek and Latin clitic cases discussed above. Poser (1986) has shown that in Diyari a binary foot-formation rule is cyclic and that it does not change structure even when its environment is derived by affixation. The stress pattern of Diyari is this: main stress falls on the first syllable, with secondary stresses on odd-numbered syllables counting from the left end of each morpheme (roots and suffixes); however, secondary stress cannot fall on the last syllable of any morpheme:

- (47) a. wílapìna 'old woman'  
 b. káŋa-wàra 'man-plural'  
 c. wílapìna-wàra 'old woman-plural'  
 d. táyi-yàtimàyi 'eat-optative'  
 e. pínadu 'old man'  
 f. nánda-yi 'hit-present'  
 g. nánda-tàri-yi 'hit-reflexive-present'  
 h. púluru-ni 'mud-locative'  
 i. púluru-ni-màta 'mud-locative-ident.'  
 j. yákalka-yìrpa-màli-na 'ask-benefactive-reciprocal-participle'

Poser argues that Diyari Foot Formation is of the binary, left-dominant type, applying left to right and cyclically. Where a cycle contains an odd number of syllables, a degenerate foot is constructed on the last syllable: thus, [pí.na][du] for (47e). On the following cycle this foot remains unaffected and Foot Formation resumes with the next syllable: hence intermediate structures like [yá.kal][ka]-[yir.pa], for the first two cycles of (47j). On a cycle consisting of a single syllable this procedure will define a single monosyllabic foot, regardless of whether other monosyllabic feet precede: for example, [pú.lu][ru]-[ni] for (47h). Main stress falls on the first foot. Eventually monosyllabic secondary feet are defooted; this distinguishes the primary stressed foot of a monosyllabic word like *yá* from the last foot of [pí.na][du] in (47e), which must be removed.<sup>29</sup>

Poser's conclusions differ from mine on one detail: he assumes that a disyllabic left-dominant foot cannot be formed in the configuration [σ] σ, where the first syllable is footed and the second is not. In contrast, my understanding of the FEC is that foot-construction rules cannot alter foot membership but can extend foot boundaries by incorporating stray syllables. The stress data available to me can be made compatible with either view. The Diyari data are derivable from the FEC if we assume that defooting and a rule of Stray Syllable Adjunction (SSA) apply cyclically in this language, yielding derivations of the following sort:

(48) 1st cycle input	pu.lu.ru
Foot Formation	[pú.lu] [rú]
Main Stress Rule	[pú.lu] [rù]
Defooting	[pú.lu] ru
SSA	[pú.lu.ru]
2nd cycle input	[pú.lu.ru] ní
Foot Formation	[pú.lu.ru] [ní]
Main Stress Rule	[pú.lu.ru] [ní]
Defooting	[pú.lu.ru] ní
SSA	[pú.lu.ru.ní]

Taking now Poser's view on the matter (foot boundaries cannot be extended), let us reconsider some of the Greek facts presented above. The critical cases involve Foot Formation in forms like *basileú-oon*, where the penult is stressed and the final cannot be extrametrical. Foot Formation must apply to incorporate *-oon* into the same foot as *-leu-*, so as to block \**basileuoón*. This can be achieved if we interpret underlying accent as a line 1 grid mark, without accompanying foot boundaries. It is harder, however, to reconcile the facts of syllabification with Poser's position; clearly the boundaries of existing syllabic constituents can be extended by the incorporation of stray segments. In the interest of pursuing the parallel between formal conditions on syllabic constituent structure and those on accentual constituent structure, I opt here for interpreting the

<sup>29</sup> Halle (1987) proposes an alternative analysis of Diyari, according to which both stems and suffixes are independent domains for stress and undergo this rule before they are concatenated.

FEC as a constraint that bars only rule applications that change constituent membership, not applications that change constituent boundaries.

Aside from this difference, I agree with Poser on the basic interpretation of the Diyari data. Diyari is then a secure example of cyclic stress assignment in a language where affixation causes neither Destressing nor Deforestation.

The first study that provided an explicit argument for preserving structure in Foot Formation was McCarthy's (1980) analysis of Damascene Arabic stress and syncope. This work relies explicitly on the assumption that cyclic Foot Formation cannot alter constituents inherited from a prior cycle. The central fact is the contrast between underlying /ʕallam-et-o/, which surfaces as *ʕallamáto*, and underlying /ʕatah-et-o/, /ʕaaf-et-o/, which surface, with syncope, as *fáhtto*, *ʕaáftto*. McCarthy parses the second cycle in these forms as follows: [*fá.ta.het*], [*ʕaá.fet*] but [*ʕál.la.*]met, with a cycle-final stray syllable. The constraint that blocks incorporation of *-met* into the preceding foot appears to involve the total number of moras allowable within a Damascene foot: [*fá.ta.he(t)*] and [*ʕaá.fe(t)*] are trimoraic, whereas impossible \*[*ʕál.la.me(t)*] would be quadrimoraic.<sup>30</sup> A constraint against monomoraic feet bars \*[*ʕál.la*][*mé(t)*] and ensures that *-met* will be stray on the next cycle. Upon affixation of *-o* (the third person masculine singular object suffix), the foot structure changes as follows: intermediate [*ʕál.la*]me.t-o becomes [*ʕál.la*][*mé.to*], whereas intermediate [*fá.ta.he*].t-o, [*ʕaá.fe*].t-o remain intact. Foot Formation cannot alter existing constituents, nor can the final syllable *-to* form a monomoraic foot. McCarthy then goes on to show how the difference in constituent structure explains the incidence of syncope: in particular, it provides the structure needed for the correct operation of a rule that removes stressless *e* in open syllables.

The Damascene suffix *-o* causes, in our terms, neither Deforestation nor Destressing. Much more interesting, however, is the fact that lack of Deforestation is clearly restricted in Damascene to one morphological context: verbs followed by the suffixes *-et-* 'third singular feminine subject' and *-o*, discussed above. In all other circumstances described by McCarthy, no effects of constituent preservation can be observed, although the interaction of Stress and Syncope shows clearly that both rules are cyclic, as in neighboring Levantine Arabic. This pattern can be given a very natural account in terms of the distinction proposed here between affixes that cause Deforestation and affixes that do not: it appears that the bulk of Damascene suffixes are deforesting, like those of Levantine, whereas one of them, the direct object *-o*, is not. The reader is invited to compare this account with the considerably more complex proposals made by McCarthy in the study cited.

<sup>30</sup> In hindsight, McCarthy's early adoption of trimoraic feet appears heterodox. But each ingredient of the foot-construction rule required for Damascene has solid precedents elsewhere. We must distinguish two subconstituents in each foot: the final monomoraic CV(C) syllable and the preceding bimoraic sequence. Bimoraic feet (consisting of either two lights or one heavy) exist in Cairene, as shown by McCarthy (1979) and later Prince (1983). In order to derive the Damascene foot, we only need to add one mora to a Cairene foot; Prince (1980) shows that the same operation is required in Estonian, whose ternary feet consist of two syllables plus a monomoraic one.

Surprisingly, affixes that cause neither Deforestation nor Destressing exist in English as well. A cursory check reveals three obvious cases: *-eer*, as in *chàrioteér*; *-ize*, as in *nómináize*; and *-ation*, as in *pègrin-átion*. Consider first *chàrioteér*: if we assume a cyclic derivation based on (43), as in *oríginál*, then the predicted form is *\*chàrioteér*. Briefly: the input to the *-eer* cycle is [*chá.ri*](*ot*)-*eer*; syllabification and Peripherality derive [*chá.ri*].*o*.*teer*; Foot Formation applies in a structure-building iteration and derives [*chá.ri*].*o*.*[teér]*; it then reapplies in a structure-changing iteration and derives *\*[chá][rí]o*.*[teér]*. With the Main Stress Rule and Prestress Destressing, we obtain *\*chàrioteér*. With the FEC, and the assumption that *-eer* attaches to a metrically intact stem, the following derivation emerges: [*chá.ri*](*ot*)-*eer* becomes [*chá.ri*].*o*.*teer* (syllabification and Peripherality); Foot Formation can now derive only [*chà.ri*][*ò*][*teér*]; Prestress Destressing completes the derivation, yielding *chàrioteér*. The same remarks apply to *nómináize*: a derivation based on (43) could derive only *\*nómináize*. The only difference between the two cases is that main stress falls on the final foot in *-eer* forms, and on the next-to-last foot in *-ize* forms.<sup>31</sup> Finally, consider *-ation* forms such as *pègrin-átion*: the input to the final cycle is presumably [*pé.re.*]*grination*, with foot structure inherited from [*pé.re.*](*grin*). Foot Formation, without the FEC, will generate the wrong parse [*pè*][*rè.gri.*][*ná.tion*], leading eventually to *\*perègrinátion*.<sup>32</sup>

M. Hammond reminds me that this argument for the FEC relies in part on the assumption that Hayes's Poststress Destressing fails to apply to [*ò*][*ò*σ][*ó* . . .] strings. Poststress Destressing is the operation that, according to Hayes (1981), turns intermediate [*Tà*][*tà.ma*][*góu.chi*] into surface *Tàtamagóuchi*. Had Poststress Destressing been operative in intermediate [*chá*][*rì.o*][*teér*], [*pè*][*rè.gri*][*ná.tion*]*—*the outputs of structure-changing Foot Formation*—*we could reach the correct surface patterns without difficulty. There are two answers to this potential objection. One is that Poststress Destressing is unavailable to correct the intermediate parse *\*[nò][mí.na][lize]*: as Hayes shows, this rule affects only subsidiary stresses. The other is that Poststress Destressing should, for independent reasons, be prohibited from applying to [*ò*][*ò*σ][*ó* . . .] structures. The first reason for this revision is that cyclically derived structures of this form never undergo the rule: witness [*tò*][*tà.li*][*tá.ri.an*]. The second reason is that the original set of forms for which Poststress Destressing was intended, *Tàtamagóuchi*, can and should be reanalyzed so as to obviate its need. As shown by the test of expletive infixation (McCarthy (1982)), the intermediate foot structure in *Tatamagouchi* is [*Tà.ta*][*mà*][*góuchi*], not *\*[Tà][tà.ma][góu.chi]*. The correct parse is obtained by letting the assignment of secondary feet run left to right, rather than right to left, as assumed by Hayes (1981). From intermediate [*Tà.ta*][*mà*][*góu.chi*] we obtain the surface form by Prestress Destressing. This eliminates the need for Poststress Destressing in this class

<sup>31</sup> See Halle and Vergnaud (1987b) for an explanation of the forms in which the next-to-last foot takes main stress.

<sup>32</sup> G. N. Clements and a reviewer note that there is probably a connection between the failure of these suffixes to cause Deforestation and the fact that they themselves surface stressed.

of structures and establishes the fact that no independent rule of English will patch the incorrect results of the structure-changing parse \*[chà][ri.o][téér].

From the examination of Damascene and English data, Deforestation emerges as a property of individual affixes, rather than as a side effect of individual rules of foot construction. This differentiates my proposal from Poser's (1986), whose suggestion, it will be recalled, was to allow individual rules to change structure. Deforestation is closer in spirit to Halle and Vergnaud's (1987b) ideas about the interaction between affixation and stress: my deforesting affixes correspond to their cyclic affixes, when followed by Stress Copy. Affixes that, for my theory, are deforesting and destressing translate their category of cyclic affixes not followed by Stress Copy. Finally, affixes that do neither correspond to Halle and Vergnaud's noncyclic affixes. What separates the two theories is that mine avoids the device of Stress Copy and that Deforestation is not linked in any way to cyclicity. In this respect, the Damascene evidence appears to support my approach: McCarthy shows that all pronominal suffixes, including *-o*, are cyclic in Damascene, but that *-o* alone fails to cause Deforestation.<sup>33</sup>

We have seen that Deforestation provides an alternative account for a class of potential counterexamples to the FEC. We may ask, in closing, what makes it advisable to replace (43) by the combination of the FEC and Deforestation. The answer is that by doing so, we gain a better set of predictions on the interactions between strict cyclicity and metrical structure assignment; we predict correctly that all postcyclic rules will respect preexisting domains, and we permit a natural analysis of the cyclic structure-preserving stress of Diyari, Damascene, and English and of the cyclic structure-preserving syllabification of Greek and Latin.

The global conclusion is then that the Greek and Latin accentual evidence supporting the FEC illustrates the rule, not the exception.

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<sup>33</sup> See also Melvold (1986), who shows that the distinction between destressing and stress-preserving affixes in Russian is not related to a difference in cyclicity.

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