

The Free Element Condition and Cyclic versus Noncyclic Stress

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prominent than the others, reflecting the organization of the line 1 asterisks into an unbounded right-headed constituent (1b).

Displacement of stress under rules of vowel elision and epenthesis has independently confirmed the postulated constituency in a number of crucial cases (for instance, Tiberian Hebrew, Bedouin Arabic, and Winnebago; see Halle and Vergnaud (1987)), suggesting that the overall framework is on the right track. More recently, the ways in which metrical constituency shields syllables from reapplication of the stress rules has proved a valuable probe. Steriade (1988) inaugurated this line of inquiry in a study of Greek and Latin enclitic stress. In this article we continue this line of research. We identify three separate ways in which reapplication of the stress rules respects previously established structure. We show that each reflects the same very simple and natural constraint: only free, unparsed elements can be metrified (a condition originally suggested in Prince (1985)). Before laying out the evidence for this condition, we must clarify our assumptions about when previously established structure is visible to the stress rules.

1. Cyclic and Noncyclic Stress

A striking fact noted in Chomsky and Halle (1968; henceforth *SPE*) as well as in many other studies of English is that the suffixes of the language fall into two classes with regard to their effects on stress. On the one hand, there are suffixes such as *-ic*, *-ity*, *-ion*, and *-al*, which totally determine the placement of the main stress of the word. As illustrated in (2), *-ic*, *-ity*, and *-ion* place stress on the presuffixal syllable, whereas *-al* places stress on the antepresuffixal syllable if the presuffixal syllable is “weak”—that is, has a nonbranching rime—and on the presuffixal syllable otherwise.

- (2) pedánt-ic, económ-ic
 idént-ity, specific-ity
 exéempt-ion, demolít-ion
 parént-al, orígin-al

On the other hand, there are suffixes such as *-ing*, *-ness*, and *-less*, which are stress-neutral in that they preserve the stress of the stem intact.

- (3) expréssion-less, párent-less
 expréssionless-ness, grammátical-ness
 entertáin-ing, néighbor-ing, ínterest-ing

It is generally assumed that the distinction between these two classes of suffixes is not predictable from any other properties of the suffixes themselves. In the theoretical framework of Lexical Phonology (Kiparsky (1982)), this distinction is captured by interleaving the rules of affixation (and morphology in general) among the two main blocks of rules of the word phonology. In this theoretical framework, the distinction between the two classes of suffixes is reflected by ordering the rules affixing the stress-sensitive suffixes before the block of phonological rules that includes the stress rule, and by ordering the

rules affixing the stress-neutral suffixes after this block of rules. As a consequence of this ordering, the former class of suffixes determines stress placement whereas the latter class of suffixes is incapable of doing so.

This proposal, which takes up an idea originally advanced by Siegel (1974), was shown to be empirically invalid by Aronoff (1976). Aronoff noted that implicit in the proposal is the consequence that stress-neutral suffixes must not appear to the left of stress-sensitive suffixes. He pointed out that words such as those in (4) constitute counterexamples to this prediction: *-able*, *-ment*, and *-ize* do not displace the stress of the stem, yet they may be followed by suffixes that do shift the stress.

- | | | | |
|-----------------|----------------|-----------------|---------------------|
| (4) pátent-able | represént-able | patent-abíl-ity | represent-abíl-ity |
| devélop-ment | góvern-ment | develop-mént-al | govern-mént-al |
| órgan-ize | prótestant-ize | organiz-át-ion | protestantiz-át-ion |

Most discussions concerning Lexical Phonology have for some reason failed to face up to these counterexamples to a fundamental consequence of the theory. (See, however, Fabb (1988).) Attention has instead been focused on bracketing paradoxes represented by nouns like *un-grammatical-ity*, where the stress-sensitive suffix *-ity* is morphologically less deeply embedded than the prefix *un-*, which arguably must be grouped with the stress-neutral rather than with the stress-sensitive suffixes. An ingenious method of overcoming the difficulty posed for the theory by this class of words was suggested by Pesetsky (1985), and it appears to have been concluded by some that this also resolves the difficulties posed by the examples in (4). This is not the case, however. Pesetsky's "end run" applies only in the case of bracketing paradoxes involving a prefix and a suffix; it leaves unresolved the difficulties posed by the examples in (4), all of which represent "bracketing paradoxes" that exclusively involve suffixes.

In view of this, it is necessary to modify the theory of Lexical Phonology. Such a modification was proposed in Halle and Vergnaud (1987) and will be adopted here. It eliminates the "interleaving" of the morphological rules of affixation among the rules of the phonology proper and treats morphology as a separate module, distinct from the phonology, but retains most other aspects of Lexical Phonology. Specifically, the modified theory retains the organization of the rules of phonology into several different blocks or strata. The rules of the word phonology constitute two blocks, one cyclic and the other noncyclic, and a given rule may figure in both blocks. The major deviation from orthodox Lexical Phonology concerns the treatment of the distinction between stress-sensitive and stress-neutral suffixes. In the light of Aronoff's counterexamples in (4), this distinction cannot be expressed through the ordering of different affixation processes. It is therefore expressed by supplying the affixes with a diacritic [\pm cyclic], indicating whether or not they activate the phonological rules of the cyclic block. In the theoretical framework adopted here, each cyclic affix triggers a pass through the rules of the cyclic block. No noncyclic affix triggers any of the cyclic rules. After every cyclic affix has initiated a pass through the cyclic rules, the entire word is subjected once to the rules of the noncyclic block.

To illustrate this approach, the word *patentability* is derived as follows. On the first cycle, stress is assigned to the root to yield [pátent]. Being [–cyclic], the *-able* suffix does not activate the stress rule. However, the next suffix *-ity* is [+cyclic] and the stress rule therefore applies to yield *patent-abil-ity*.

Another key feature of our framework is that cyclic (that is, stress-sensitive) affixes trigger a convention of Universal Grammar that deletes the stresses assigned on earlier passes through the rules of the cyclic block (for motivation, see Halle and Vergnaud (1987, 77 ff.) as well as below). As a consequence, only noncyclic suffixes preserve stresses assigned by rules of the cyclic block. If cyclic suffixes erase previously assigned stresses, then the well-known account given in *SPE* for such contrasting stress contours as those in (5) can no longer be maintained.

- (5) còndensátion vs. còntemplátion
 instrumèntálicity vs. sèrendípity

In *SPE* it was argued that a subsidiary stress appears on the syllable before main stress because on the previous pass through the cycle main stress is assigned to that syllable. Thus, the main stress of *condense* and *instrumental* survives as a subsidiary stress in *condensátion* and *instrumèntálicity*. No subsidiary stress appears on the corresponding syllables in *còntemplátion* and *sèrendípity*: in the former because this syllable is unstressed in *còntemplàte*, and in the latter because *sèrendípity* is an underived word and hence undergoes only a single pass through the cyclic rules. It is obvious that in order for this explanation to succeed, stresses assigned on earlier passes through the cyclic rules must be preserved. The *SPE* account is therefore incompatible with the theory of stress advanced here.

It was noted in Halle and Vergnaud (1987) that the *SPE* analysis fails to explain the distribution of subsidiary stresses in words like those in (6) (from Kenyon and Knott (1944)).

- (6) a. àffirmátion, cònfir MÁtion, cònservátion, cònsultátion, cònversátion, infor-
 mátion, làmentátion, prèservátion, trànsportátion, ùsurpátion
 b. Hàlicàrnássus, incàntátion, incàrnátion, òstèntátion

Since *cònservátion* contains the stem *consérve*, the *SPE* analysis incorrectly predicts a subsidiary stress on the syllable before main stress, exactly as it predicts a subsidiary stress on the corresponding syllable in *còndensátion*. The same remark holds for the other examples in (6a). In addition, the *SPE* analysis fails to assign the correct subsidiary stress contours to the forms in (6b). Like *sèrendípity*, these words are not built from independently occurring stems; nevertheless, their pretonic syllable bears a subsidiary stress.

We propose to reanalyze these facts as follows. Since on our account English words emerge from the cyclic rules with a single stressed syllable, we shall assume that the subsidiary stresses are assigned by a noncyclic rule that metrifies the string of unstressed syllables preceding the cyclically assigned stress. The fact that near-minimal pairs con-

trast in the presence versus absence of subsidiary stress on the pretonic syllable suggests that the distinction is an idiosyncrasy of individual lexical items. Consequently, we postulate that the rule assigning stress (line 1 asterisks) to heavy syllables operates in both the cyclic and the noncyclic blocks but that its operation in the latter stratum is lexically restricted (applying in *còndensátion*, *dèpòrtátion*, *incàntátion*, *Hàlicàrnássus* but not in *còmpensátion*, *trànsportátion*, *informátion*, *sèrendípity*).

To summarize, the diagram in (7) represents our view of the stress rules of English. We justify the difference in the direction of metrification later (see section 7).

(7) Cyclic	Stress Erasure Convention Stress heavy syllables Metrification (right to left) Conflation
Noncyclic	Stress heavy syllables (lexically restricted) Metrification (left to right)

Given this conception of stress, previous metrical structure will be visible to and hence must be respected by the metrification process operating in the noncyclic block. We now turn to some examples.

2. Latin

It is well known that Latin words show antepenultimate stress when the penult is light, and penultimate stress otherwise. In the framework adopted here, which admits just binary constituents, ternary amphibrachs, and unbounded constituents, the only way to derive antepenultimate stress is by marking the last syllable extrametrical and constructing (from right to left) left-headed, binary feet over the rest of the word. To obtain stress on a heavy penult, we postulate a special rule that assigns a line 1 asterisk to heavy syllables. Since constituent construction rules respect previously assigned metrical structure, the presence of a stress on a heavy penult results in the last foot being unary rather than binary. To formally capture the fact that the word stress falls on the last foot, we postulate a rule constructing an unbounded right-headed constituent on line 1. We state these rules in (8) and illustrate their application to the active and passive 3rd person forms of the verb *reprimere* ‘to repress, hold back’ in (9).

- (8) a. All and only syllable heads are stress-bearing units projected on line 0.
- b. The word-final syllable is extrametrical.
- c. Accent (assign line 1 asterisks to) syllables with a heavy rime.
- d. On line 0 construct binary left-headed constituents from right to left and assign line 1 asterisks to the heads.
- e. On line 1 construct unbounded right-headed constituents and assign a line 2 asterisk to the heads.

li:miná#que, not **li:mína#que*). Steriade shows that this puzzling contrast is explained if two assumptions are made: first, that host + clitic structures undergo two rounds of stress assignment (to the host and then to the host + clitic); and second, that the stress assigned to the host + clitic combination respects the metrical constituent structure assigned to the host.

In terms of the metrical framework adopted here, the Latin stress rule figures in both the cyclic and the noncyclic blocks. Enclitics are noncyclic suffixes, whereas ordinary suffixes are cyclic. Hence, the stress rule in the noncyclic block applies to a representation containing metrical organization established on the last pass through the cyclic block.

There are three distinct ways in which the metrical organization must be respected. The first can be illustrated by the forms *li:miná#que* and *ubi#libet*. After the application of all the cyclic rules, the host words have the structure shown in (12a). In the next cycle, where the enclitic is first visible, none of the cyclic rules applies since the enclitic is [–cyclic] and hence cannot activate a cyclic rule. The string host + enclitic is therefore directly subject to the noncyclic stress rule, which, as noted, is essentially identical with the cyclic stress rule. An immediate consequence of the presence of the enclitic is that extrametricality of the host's final syllable, indicated by the angled brackets, is lost since it is no longer peripheral. The structures in (12b) thus ensue. (Extrametricality of the clitic is required to account for the antepenultimate stress in *ubi#libet*.)

- | | | | |
|---------|----------------|---------------------|--------|
| (12) a. | li:mi na | u bi | |
| | (* *) <*> | (<*)> | line 0 |
| | * | * | line 1 |
| b. | li:mina#que | ubi#libet | |
| | (* *) * <*> | (<*)> * (<*)> | line 0 |
| | * | * | line 1 |
| c. | li:mi na#que | u bi#li bet | |
| | (* *) (*) <*> | (<*)> (*) (*) <*> | line 0 |
| | (* *) | (* *) | line 1 |
| | * | * | line 2 |

Antepenultimate stress cannot be assigned to *li:mina#que* since the [mi] syllable has already been bracketed. It thus has a status different from that of the second syllable of *ubi*. Being extrametrical, the latter is unparsed in the host word (12a), and upon cliticization it becomes a free element (in the sense of Prince (1985)). If the rules constructing metrical constituents leave previously assigned metrical structure intact and operate on unparsed material only, then the contrast follows. The two free asterisks in *ubi#libet* are parsed into a binary left-headed constituent, whereas *li:miná#que* has just a single free asterisk to contribute. The heads of these constituents are marked by line 1 asterisks, which in turn are organized by rule (8e) into an unbounded right-headed constituent whose head is marked on line 2 as the word accent. The result is the structures

in (12c). Subsequent conflation of lines 1 and 2 eliminates the stresses on the initial syllable.

The contrasting stress in *li:miná#que* and *ubí#libet* thus depends entirely on the postulated constituency in the hosts (li:mi)(na) and (u)(bi). The second syllable in *lí:mina* is invisible to metrification in the noncyclic block because it has been parsed as a dependent of the stressed syllable [li:]. Let us refer to this phenomenon as an “opacity” effect. It is important to note that the opacity effect depends on the assumption that there are just two kinds of head-terminal metrical constituents (binary and unbounded) and that the only way to derive third-last stress within the theoretical framework developed here is to set the parameters for trochaic (left-headed) feet and extrametricality.

There is a second sense in which Latin enclitic stress respects the metrical structure of the base. Consider the pair in (13).

- (13) Mú:sa ‘the muse’ Mu:sá#que ‘and the muse’

We have seen from *ubí#libet* that enclitic stress may extend to the antepenult. The stress shift in *Mu:sá#que* is thus puzzling. Why shift the accent if the antepenult may seat an enclitic stress? Our framework allows the following explanation. Given that stress reflects metrical constituency, and given that final syllables are extrametrical in Latin, *Mu:sa#que* has the structure in (14) at the point where the rules of the noncyclic block are applied.

- (14) Mu:sa#que
 (*) * *
 *

Since metrical rules respect previously assigned metrical structure, the (degenerate) foot in (14) is closed to the effects of stress rules applying at this point. The stress rules will therefore construct a (degenerate) foot on the second syllable, triggering a shift of the surface stress to this syllable. Let us refer to the failure of a degenerate foot to expand as a “closure” effect. It represents the second manner in which enclitic (noncyclic) stress respects the metrical structure established on the host in the cyclic block.

It is important to recall that the normal, nonclitic suffixes of Latin do not exhibit the opacity and closure effects: suffixation of *-ur* in *réprimit*, *reprimit-ur* causes the stress to jump just one syllable to the right, and no stress shift takes place in *légit*, *légit-ur*. (English stress-sensitive suffixes behave the same way: compare the absence of opacity in *óorigin*, *óorigin-al* (not **óorigin-al*) and the lack of closure in *sáne*, *sán-ity* (not **san-ítty*)). This difference follows from our hypothesis that nonclitic suffixes are [+cyclic] and that the rules of the cyclic block are subject to the Stress Erasure Convention, supplying each cyclic stress application with an unmetrified line of asterisks.

In addition to opacity and closure, there is a third respect in which the metrical structure of the host cannot be invaded. Suppose that (as a result of exhaustive parsing plus conflation) a grid such as (15) is submitted to the noncyclic rule block.

- | | | | | |
|---------|--------------|---------------------|----------|----------------------|
| (16) a. | u-píle | 'I spoke' 112 | ʔu-réba | 'you sailed' 112 |
| | u-yalále | 'I went' 114 | i-panána | 'he ran' 118 |
| | ʔi-poasagéna | 'we are tired' 113 | | |
| b. | wabúbu | 'night' 595 | ʔazíle | 'vagina' 83 |
| | moarépi | 'rice' 333 | waríge | 'rope' 558 |
| | ʔaníŋa | 'food' 559 | boʔísi | 'box' 559 |
| | tabíra | 'dish' 583 | ʔaŋári | 'canarium nut' 583 |
| | aláŋa | 'reef' 586 | atabála | 'up' 586 |
| | boazíŋa | 'hole' 594 | amári | 'sun' 596 |
| | mótu | 'island' 335 | lúnta | 'moss' 28 |
| c. | malabónŋ | 'flying fox' 52 | zaranóm | (personal name) 336 |
| | manám | 'Manam island' 335 | u-zém | 'I chewed (them)' 30 |
| | go-ʔáŋ | 'you eat (them)' 30 | | |

Certain suffixes, termed AP (antepenult) suffixes by Lichtenberk, regularly allow stress to be placed two syllables before them. In the possessive inflection of the noun, these are the 1pl. excl. *-ma*, the 3pl. *-di*, and the 3sg. *-i*. Other suffixes impose the normal penultimate or final stress.

- | | | |
|------|----------|--------------------|
| (17) | tamá-gu | 'my father' 37 |
| | tamá-ŋ | 'your sg. father' |
| | táma-∅ | 'his father' |
| | tamá-da | 'our inc. father' |
| | táma-ma | 'our excl. father' |
| | tama-míŋ | 'your pl. father' |
| | táma-di | 'their father' |

Similarly in the verb inflection, certain object suffixes allow antepenultimate stress whereas other suffixes fall into the penultimate pattern. In the former group are the 1sg. *-a* and the 3sg. *-i*; in the latter are the 2sg. *-iʔo*, the 1pl. excl. *-ʔama*, and the 1pl. incl. *-ʔita*.

- | | | |
|------|--------------------|-------------------------------|
| (18) | dí-te-a | 'they saw me' 124 |
| | ʔamá-doʔ- <i>i</i> | 'you take it' 124 |
| | ú-zem- <i>i</i> | 'I chewed it' 30 |
| | i-rápuŋ- <i>i</i> | 'he waited for her' 336 |
| | u-taga-íʔo | 'I followed you' 124 |
| | ʔu-lele-ʔáma | 'you looked for us excl.' 125 |
| | i-ra-ʔíta | 'he talked to us incl.' 125 |

The 3pl. suffix has several allomorphs, depending on the verb; these are *-i*, *-∅*, and *-di*. *-di* allows antepenultimate stress; *-i* does not.

- | | | |
|------|--------------------|----------------------|
| (19) | u-bázi-di | 'I carried them' 125 |
| | u-rará-ŋ- <i>i</i> | 'I warmed them' 130 |

There are quite a number and variety of AP suffixes in Manam. In (20) we list additional examples.

(20) <i>siŋába-lo</i>	‘in the bush’ 55 (- <i>lo</i> locative)
<i>bági-o</i>	‘on the platform’ 55 (- <i>o</i> locative)
<i>di-panána-to</i>	‘they few ran’ 55 (- <i>to</i> paucal)
<i>ta-éno-ru</i>	‘we two slept’ 113 (- <i>ru</i> dual)
<i>ʔa-malipi = lípi-la</i>	‘you only work’ 200 (- <i>la</i> limiter)
<i>ŋa-múle-re</i>	‘he must return’ 418 (- <i>re</i> assertive)

Manam syllables may be closed by a nasal consonant. As we have seen, closed syllables attract a stress in final position. When penultimate, they do not allow a final AP suffix to produce antepenultimate stress.

(21) <i>i-ʔínt-a</i>	‘he pinched me’ 124	(cf. <i>dí-te-a</i> ‘they saw me’ 124)
<i>u-ʔínt-i</i>	‘I pinched him’ 124	(cf. <i>ʔamá-doʔ-i</i> ‘you take it!’ 124)
<i>u-rapún-di</i>	‘I waited for them’ 126	(cf. <i>u-bázi-di</i> ‘I carried them’ 125)

The rules in (22) generate the Manam stress patterns.

- (22) a. All and only syllable heads are stress-bearing (projected on line 0).
 b. Accent (assign line 1 asterisks to) closed syllables.
 c. Final syllables are extrametrical (restricted to lexically marked suffixes).
 d. On line 0 construct binary left-headed constituents from right to left and assign line 1 asterisks to the heads.
 e. On line 1 construct unbounded right-headed constituents and assign a line 2 asterisk to the heads.

Rule (22b) ensures that a closed syllable is always stressed. (22d) groups the line 0 accentable positions into binary left-headed (stress-initial) feet and supplies the head with a stress. Application of this rule is restricted by the Faithfulness Condition, which requires that a stressed element occupy the head position in a metrical constituent. Hence, a final heavy syllable that has been accented by (22b) must constitute a metrical foot all by itself. In longer words the foot construction rule generates multiple stresses; the rightmost one always constitutes the word’s primary stress, and the others generally surface as secondary stresses. Enhancement of the final accent is the responsibility of (22e), which organizes line 1 asterisks into an unbounded right-headed constituent. Lichtenberk cites secondary stresses in just one small section of his grammar (for instance, *èta-ùta-tína-lo* ‘far away island’ 64). Otherwise, his transcriptions mark just primary stress. Since only primary stresses are relevant to enclitic stress, we simplify the discussion by looking only at the rightmost stress. Finally, to account for the AP suffixes, we shall assume that they trigger the lexically restricted rule (22c) that marks the final syllable extrametrical.

The derivations in (23) illustrate the intended analysis for a few selected items. In the first step closed syllables are supplied with a line 1 asterisk. Lexically restricted

extrametricality is then imposed on final syllables. Finally, line 0 asterisks are metrified according to the parameters of (22d).

(23) tama-miŋ tama-gu u-bazi-di u-rapun-di (22a)

* * * * * * * * * * * * * *

tama-miŋ inappl. inappl. u-rapun-di (22b)

* * * * * * *
* *

inappl. inappl. u-bazi-di u-rapun-di (22c)

* * * (*> * * * (*>
* *

tama-miŋ tama-gu u-bazi-di u-rapun-di (22d)

(* *) (* *) (* *) * *) (* *) (*> *) *) (*> (*>
* * * * * * * *

3.2. Clitic Suffixes and the Opacity Effect

Lichtenberk describes four suffixes that differ from all other Manam suffixes in three respects: position, morphology, and stress. These suffixes are the conjunction *-be* ‘and’, the disjunction *-ʔi* ‘or’, the demonstrative *-ŋe* ‘this’ (sometimes used as a resumptive pronoun), and the focus element *-ʔa*. First, these elements can never be followed by another suffix; they always occur at the end of the word. Second, they do not induce the appearance of what Lichtenberk calls “buffer elements.” Buffer elements are special suffixes (essentially, conjugation morphemes) whose presence is required by a given stem or suffix when another suffix follows. For example, the stem *ŋái* ‘he’ selects the buffer *-a* when followed by a suffix such as the limiter *-la* ‘only’: *ŋái-a-la* ‘only he’ (70). No buffer occurs when the stem appears in isolation (*ŋái* ‘he’) or when it is followed by the focus suffix *-ʔa* in *ŋái-ʔa* ‘he’ foc. (70). We follow Lichtenberk (p. 68) in interpreting these two properties as indicating that *-be*, *-ʔi*, *-ŋe*, and *-ʔa* are formally clitics. They are syntactically separate words (particles) that cliticize to the preceding word by incorporation and reassociation operations in the sense of Marantz (1988).

The Manam clitics have idiosyncratic stress properties. Sometimes they displace the main stress on their host and other times they do not. As Lichtenberk observes (p. 67), this stress shift systematically correlates with whether or not the final element of the base is an AP suffix. When the host word terminates in a suffix that is not a member of the AP class (and hence the stress is penultimate), the stress remains unshifted when the clitic follows. But when the base terminates in an AP suffix and thus allows antepenultimate stress, the word stress shifts to the AP suffix when the clitic is present. The 3sg. (AP) suffix *-i* and the 3pl. (non-AP) suffix *-i* form a striking minimal pair illustrating this generalization. Note the stress shift in the former case under enclisis of *-ʔi* ‘or’ (24a) and the stable accent in the latter (24b).

- (24) a. ʔú-doʔ-i 'you took it' 67 ʔu-doʔ-i-ʔi 'you took it or' 67
 b. ʔu-dóʔ-i 'you took them' 67 ʔu-dóʔ-i-ʔi 'you took them or' 67

In (25) we list additional examples culled from Lichtenberk's grammar showing that this correlation is remarkably systematic. We depart from Lichtenberk's transcription by separating the clitics with the # symbol.

(25) *No AP suffix*

i-ruʔu = rúʔu#be	'he is washing and' 98
i-alále#be	'he goes and' 412
da-mái#ʔi	'they come or' 411
n-láʔo#ʔi	'I go or' 411
ŋa-púra#ʔi	'it arrives or' 412
ruaŋá-da#ʔi	'our friend or' 412 (cf. <i>tamá-da</i> 'our father')
laba = lába#ʔa	'older one' foc. 477
wabúbu#ʔa	'night' foc. 477
áne#ʔa	'with' (instrumental) foc. 478
máʔa#be	'here and' 488
ru-óti#be	'all two, both' 484

AP suffix

i-pile-lá#be	'he kept talking and' 98 (- <i>la</i> limiter)
di-tao = taon-í#be	'the men were hunting it and' 99 (- <i>i</i> 3sg.)
ʔu-em = emaʔ-í#be	'you are doing it and' 101 (- <i>i</i> 3sg.)
ʔu-zaza-í#ʔi	'you buy it or' 411 (- <i>i</i> 3sg.)
ta-polo-í#ʔi	'we felled it (tree) or' 411 (- <i>i</i> 3sg.)
ta-raʔe-tó#ʔi	'should we few go up or' 411 (- <i>to</i> paucal)
ʔulu-lá#ʔa	'only Kulu' foc. 477 (- <i>la</i> limiter)
baga-ló#ʔa	'from the mainland' foc. 488 (- <i>lo</i> locative)
i-ebulo-n-á#ʔa	'he had scolded me' foc. 478 (- <i>a</i> 1sg.)
wabubu-ló#be	'at night' foc. 483 (- <i>lo</i> locative)
di-doʔ-i-a-rú#be	'they dual took it and' 489 (- <i>ru</i> dual)

We account for the special accentual properties of the clitics by assuming that, as in Latin, in Manam the stress rules apply in both the cyclic and the noncyclic rule blocks and that, like the Latin *que* 'and', *propter* 'because', and so on, the Manam enclitics are noncyclic suffixes that do not activate rules of the cyclic block. As a consequence, the enclitic stress is assigned to a word that has already been metrified by application of the cyclic stress rules. Since the stress rules are restricted to apply only to unmetrified asterisks, Lichtenberk's generalization ensues automatically. Only AP suffixes will be free elements, available for metrification once their extrametricality has been lost upon cliticization. The form ʔú-doʔ-i 'you take it' thus receives the analysis in (26a) whereas ʔu-dóʔ-i 'you take them' receives the analysis in (26b). Encliticization yields the rep-

representations in (26c,d). Only (26c) contains a free line 0 asterisk available for metrification. The penultimate syllable in (26d) is invisible to the metrification process because it has been parsed as a dependent of the stressed syllable (the opacity effect). Reapplication of the stress rules in the noncyclic block produces the representations in (26e,f).

- | | | | |
|---------|--|----|--|
| (26) a. | $\text{?u-do}^?-i$
(* *)⟨*⟩
* | b. | $\text{?u-do}^?-i$
(*)(* *)
* |
| c. | $\text{?u-do}^?-i\#?i$
(* *) * ⟨*⟩
* | d. | $\text{?u-do}^?-i\#?i$
(*)(* *)⟨*⟩
* |
| e. | $\text{?u-do}^?-i\#?i$
(* *) (*)⟨*⟩
* | f. | $\text{?u-do}^?-i\#?i$
(*)(* *)⟨*⟩
* |

(In the derivations in (26) we have omitted line 1 of the grid and have shown only lines 0 and 2 since secondary stress plays no role in these examples.) Note also that we must assume that the clitics themselves are extrametrical. Otherwise, the clitic would be stressed in (26f) and a word-final stress should emerge. We shall present additional evidence for the extrametricality of the clitics below.

Since the enclitic stress in Manam strictly correlates with the presence or absence of an AP (extrametrical) suffix, and since the latter is essentially lexical in nature, we can be quite certain that the differing location of enclitic stress is a function of the free element of the host word resulting from the loss of extrametricality under enclisis.

3.3. A Destressing Rule and the Crossover Constraint

There are two systematic deviations from the analysis we have proposed for Manam stress that must now be dealt with. Although stems normally have penultimate stress, antepenultimate stress is found when the penult is light but the antepenult is heavy. Lichtenberk cites the stems in (27) to illustrate this point. He states that these stems show antepenultimate stress when followed by a clitic (*embé?i#be*), rather than the expected penultimate stress (**embe?i#be*).

- | | | | |
|------|---------------|---|----------------------|
| (27) | <i>émbe?i</i> | ‘sacred flute’ 28 | (<i>embé?i#be</i>) |
| | <i>úŋguma</i> | ‘person from a village other than one’s own’ 28 | |

As noted earlier, closed syllables attract the stress in final position (*malabón* ‘flying fox’) and prevent antepenultimate stress assignment when they form the penult (*ta-yayún-di* ‘we woke them’; compare *í-te-di* ‘he saw them’). We posited a rule accenting (assigning a line 1 asterisk to) heavy syllables; *émbe?i* thus is assigned the representation in (28a) and *embé?i#be* the representation in (28b).

other places in Manam metrical phonology. One involves the monosyllabic element *ne-* 'of'. *ne-* is a possessive morpheme that takes as complements the series of pronouns that mark the possessor. Consider the paradigm in (38).

- (38) a. nátu síoti né-di 'the children's shirts' 294
 (lit. 'children shirts of + them')
- síoti né-gu 'my shirt' 283
- b. né-∅-na-la 'only his' 309
 (lit. 'of' + 3sg. + buffer + limiter)
- c. ne-∅-na-lá#be 'and only his' 309
- d. ?áti ne-dí#be 'and their canoe' 72
 (lit. 'canoe of-them#and')
- áine ne-dí#be 'and their women' 484
 (lit. 'woman of-them#and')

(38a,b) show that *ne-* may seat a stress when penultimate or when antepenultimate and followed by an extrametrical suffix such as *-la*. Our analysis assigns the representations in (39a,b) to these examples. As (38c) shows, (38b) has stress on the extrametrical suffix *-la* when followed by a clitic. Finally, (38d) demonstrates that when *ne-* is followed by the extrametrical 3pl. suffix *-di*, which in turn is followed by a clitic *#be*, stress shows up on the erstwhile extrametrical suffix—not on *ne-*. These two examples receive the representations in (39c,d) under our analysis.

- (39) a. ne di negu b. nena la
 (*)⟨*⟩ (* *) (* *)⟨*⟩
 * * *
- c. nena la#be d. ne di#be
 (* *) * ⟨*⟩ (* *) * ⟨*⟩
 * *

The stress shift in *né-di* (38a) and *ne-dí#be* (38d) thus parallels the *Mú:sa, Mu:sá#que* alternation of Latin.³

The curious stress alternation in (40) also helps us to demonstrate closure. 3sg. possessive forms (which Lichtenberk transcribes with a zero suffix *-∅*) uniformly impose

³ Note that the noncyclic destressing rule (29) must be prevented from applying in *ne-dí#be*, which receives the representation (i) under our analysis.

- (i) nedí#be (ii) embe?i
 (*)⟨*⟩ ⟨*⟩ * (* *)
 (* *) (* *)
 * *

Accordingly, we reformulate the rule to require that the deleting stress head a binary foot.

- (ii) (* *) → * * / *] line 0
 * * ____]_w line 1

This formulation allows the rule to apply in *émbe?i* and *áine* but not in *ne-dí#be*.

antepenultimate stress on noun stems that otherwise would be expected to take penultimate stress.

- | | | | |
|------|-------------|------------------|---|
| (40) | ʔázile-∅ | 'her vagina' 83 | (cf. ʔazíle 'vagina' 83) |
| | pájana-∅ | 'his head' 94 | (cf. paḡána 'head' 265,
paḡaná-gu 'my head' 302) |
| | moagáruḡa-∅ | 'his nose' 68 | (cf. moagaruḡá-∅#be
'his nose and' 68) |
| | sápara-∅ | 'its branch' 276 | |

This ∅ is an allomorph of 3sg. *-i*, a morpheme that is demonstrably extrametrical in verbs as well as adjectives: compare ʔamá-do ʔ-i 'you take it', zín = zim-i 'black' (30). According to Lichtenberk (p. 29), in nouns the zero allomorph occurs when the preceding stem terminates in a vowel: táma-∅ 'his father'. Given that extrametricality is assigned by the lexically restricted (22b), the rule marks the final syllable of the domain extrametrical when the domain terminates in one of the lexically designated group of suffixes. When there is no suffixal syllable (as in the case of the zero allomorph of the 3sg. morpheme), the final syllable of the domain is the last syllable of the stem. Thus, the final syllable is extrametrical in páḡana-∅ 'his head', but not in paḡána 'head' or in paḡaná-gu 'my head'.

- | | | | | |
|------|----------|--------|-----------|----------------|
| (41) | paḡana-∅ | paḡana | paḡana-gu | moagaruḡa-∅#be |
| | * * <∅> | * * * | * * * * | ** (* *) * <∅> |
| | | | | * |

Furthermore, it is now clear why such possessed stems systematically stress their final syllable when they precede a clitic (*moagaruḡá-∅#be* 'his nose and'). They end in an extrametrical position—but only when they realize the 3sg. possessive.

Given that the 3sg. possessive triggers extrametricality, we can now explain the puzzling contrast in (42). (42a) shows disyllabic nouns followed by a clitic. No stress shift occurs. But the disyllabic nouns in (42b) do exhibit stress shift under enclisis.

- | | | | |
|---------|---------|-------------------------------|--|
| (42) a. | súru#ʔi | deparóbu | 'soup or rice' 366 |
| | tóla#ʔi | píta | 'Tola or Pita' 366 |
| | ḡáu#be | | 'I too' 271 (cf. ḡáu 'I' 273) |
| b. | líli-∅ | 'his face' 72 | líli-∅#be 'his face and' 72 |
| | ía-∅ | 'her husband's
brother' 72 | ía-∅#be 'her husband's
brother and' 72 |
| | téʔe | 'one' 339 | teʔé-∅#ḡe 'one' #resumptive
pronoun 339 |

The difference of course is that the latter are 3sg. possessives, which induce extrametricality.

- (43) a. li li Ø b. li li Ø#be
 (*)(*) (*)* <*

The stress shift in *líli-Ø*, *líli-Ø#be* thus parallels the Latin *Mú:sa*, *Mu:sá#que*.

To summarize briefly the results of this section, we have shown that Manam enclitic stress parallels Latin in its respect for previously established metrical structure. We have presented strong evidence that the unstressed member of a binary foot is inaccessible to enclitic stress (opacity) and that a degenerate foot does not expand to incorporate a free syllable (closure). (A corollary of the latter conclusion is that there is no automatic adjunction of stray syllables in the sense of Hayes (1981).) We have presented weaker but still suggestive evidence that line 0 metrification may not cross over a previously established constituent. Each of these effects follows from the simple formal requirement that metrification respect previously assigned metrical constituent structure and hence can only parse free asterisks.

4. Macedonian

In both Latin and Manam the enclitic stress lodges on the final (formerly extrametrical) syllable of the base. One might thus interpret the two examples as a “boundary-marking” phenomenon, in which case they would show nothing in particular about the metrical structure of the base. In this section we examine an opacity effect from Macedonian that cannot be construed in this fashion.

It is well known that stress regularly falls on the antepenult in Macedonian. Like Latin, Macedonian must therefore have a rule marking word-final syllables extrametrical: *vodéničar* ‘miller’, *vodeníčari* pl., *vodeničárite* pl. def. Franks (1987; 1989), considering data from Lunt (1952) and Koneski (1976), discusses certain constructions in Macedonian in which two separate words join together to form “enlarged stress domains.” The enlarged stress domains are formed by certain modifier plus noun constructions, numerous preposition plus noun groups, and a negative or interrogative element plus following verb. Examples appear in (44).

- | | |
|---------------|-------------------------------------|
| (44) dó vrata | ‘to the door’ |
| nád masa | ‘over the table’ |
| prekú zima | ‘through the winter’ |
| okolú selo | ‘near the village’ |
| suvó grozje | ‘dry grapes’ (= ‘raisins’) |
| prvá večer | ‘first evening’ (= ‘wedding night’) |
| kiseló mleko | ‘sour milk’ (= ‘yoghurt’) |
| stár čovek | ‘old man’ |
| tój vojník | ‘that soldier’ |
| onié luđe | ‘those people’ |
| né znaeš | ‘(you) do not know’ |
| štó čekaš | ‘what are (you) waiting for?’ |
| koj gó vide | ‘who saw him/it?’ |

It is unclear how these constructions arise. The first word might procliticize to the second or the second word may be enclitic to the first. A third possibility is that the enlarged stress domains reflect an exocentric compounding with no subordination of one word to the other. Theoretically, the second alternative seems more likely since raising a noun or verb to a governing particle preserves c-command and subsumes the construction under the Empty Category Principle of Chomsky (1981).

A curious deviation from the regular antepenultimate stress in the enlarged stress domain corroborates this interpretation. This deviation, termed the “monosyllabic head effect” in Franks (1989), can be described as follows: when the second word composing the enlarged stress domain is monosyllabic, stress is found on the penult instead of the antepenult.

(45)	okolú rid	‘around a hill’
	okolú stog	‘around a haystack’
	pomegú niv	‘among them’
	beliót dzid	‘the white wall’
	ne mu gó dal	‘(he) did not give it to him’
	što bi mú zel	‘what should he take from him’

Contrasts such as *prekú zima* ‘through the winter’ (44) versus *okolú rid* ‘around a hill’ (45) parallel Latin *ubí#libet* versus *li:miná#que* and can be explained in the same way. Let us assume that in the relevant constructions the second word encliticizes to the first, and that in the course of doing so it loses its status as an independent prosodic word (analogous to the *-man* of English *sales-man*). The result is a fresh string of line 0 asterisks that must be metrified in conjunction with the final (formerly extrametrical) syllable of the base. *Prekú zima* has three free asterisks whereas *okolú rid* has just two—on the assumption that [ko] has been metrified as a dependent of the first syllable and is thus inaccessible (opacity).

(46)	pre ku	preku#zima	preku#zima	preku#zima
	(*)(<*)	(*) * * *	(*)(* *)(<*)	(*)(* *)(<*)
	*	*	(*)	*
			*	
	oko lu	okolu#rid	oko lu#rid	okolu#rid
	(* *)(<*)	(* *) * *	(* *)(* *)(<*)	* *(*)(<*)
	*	*	(*)	*
			*	

In the final step of (46) we show the conflation of lines 1 and 2 suppressing all but the rightmost stress. Although the stresses on the bases *preku* and *okolu* are inaudible in the enlarged stress domains, they and the metrical structure they presuppose are crucial in explaining the different stress locations in *prekú zima* and *okolú rid*. These data thus

bolster Halle and Vergnaud's (1987) analysis of Macedonian, which crucially relies on conflation.⁴

Franks reports that when the first word of the enlarged stress domain is disyllabic and the second is monosyllabic, the stress vacillates between the penult and the antepenult.

- | | | |
|------|--------------------------|---------------------|
| (47) | préku rid, prekú rid | 'over the hill' |
| | spróti dzid, sprotí dzid | 'opposite the wall' |
| | mégu niv, meǰú niv | 'among them' |
| | kólku dni, kolkú dni | 'how many days?' |
| | óvoj pat, ovóǰ pat | 'this route' |
| | sékoj den, sekóǰ den | 'every day' |

The penultimately stressed *prekú rid* exhibits closure of the degenerate foot. It receives the derivation sketched in (48).

- $$\begin{array}{ccccc}
 (48) & \text{preku}\#\text{rid} & \rightarrow & \text{preku}\#\text{rid} & \rightarrow & \text{preku}\#\text{rid} \\
 & (*) * \langle * \rangle & & (*)(*) \langle * \rangle & & * (*) \langle * \rangle \\
 & * & & (* *) & & * \\
 & & & & & * \\
 & & & & & *
 \end{array}$$

We may account for the antepenultimate stress of *préku rid* with the help of (49), which deletes the second of two clashing stresses.

- $$\begin{array}{ccc}
 (49) & (*) \rightarrow * / * & \text{line 0} \\
 & * \quad * \text{ — } & \text{line 1}
 \end{array}$$

(49) retracts the line 2 asterisk (conservation of metrical structure), and conflation eliminates line 1 (50).

- $$\begin{array}{ccccc}
 (50) & \text{preku}\#\text{rid} & \rightarrow & \text{preku}\#\text{rid} & \rightarrow & \text{preku}\#\text{rid} \\
 & (*)(*) \langle * \rangle & & (*) * \langle * \rangle & & (*) * \langle * \rangle \\
 & (* *) & & (*) & & * \\
 & * & & * & & *
 \end{array}$$

For cases such as *stár čovek* 'old man' in which the first word is monosyllabic and the second disyllabic, Franks does not report the alternative *star čóvek* that our analysis predicts. It is unclear whether such a pronunciation is impossible or possible but simply not recorded. See Kenstowicz (1990) for further discussion of Macedonian enclitic stress.

Hans Hock (personal communication) has suggested an alternative interpretation of enclitic accent as simply a preaccenting phenomenon. As he correctly observes, under this interpretation the enclitic accent shows nothing about the metrical structure of the

⁴ Our explanation of Franks's "monosyllabic head effect" obviously requires that the stress rules figure in both the cyclic and the noncyclic rule blocks. Lacking such evidence, Halle and Vergnaud (1987) placed the stress rules in the noncyclic block alone.

base. For purposes of discussion, we express this alternative as a rule accenting the preclitic syllable.

$$(51) \quad V \rightarrow \acute{V} / \text{---} \# \text{clitic}$$

This alternative is open to several objections. First, rule (51) has no particular motivation in that we have no more reason to expect a stress to be assigned to the syllable preceding the clitic boundary than to the syllable that follows the boundary. Under our interpretation, preclitic stress follows from a network of assumptions that are supported independently of the phenomenon of enclisis.

Second, since enclitic stress is a function of the extrametricality of the base, to the extent that the assignment of such extrametricality is idiosyncratic, we expect corresponding idiosyncrasies in the distribution of enclitic stress. Steriade (1988) shows that final heavy syllables are not extrametrical in Ancient Greek. Hence, whereas the final syllable of *óikos* 'house' is extrametrical, the final syllable of *phóiniks* 'phoenix' is not. Consequently, the former may support an enclitic stress (*óikós tis*) but the latter may not (*phóiniks tis*). A preaccenting interpretation of enclitic stress would have to repeat this light-heavy distinction in the rule (51) realizing the enclitic stress—an obvious loss of generalization.

Finally, the Macedonian enlarged stress domain is unusual in that the second word encliticizes to the base regardless of its length. When the second word contains more than two syllables, the enclitic stress lodges on the same syllable it occupies in the isolation form of the word: compare *sedóm duši* 'seven people' with *sedom gódini* 'seven years' (cited in Hendriks (1976, 99)). Whereas the former could arise from rule (51), the latter cannot. On our interpretation, the accents in *sedóm duši* and *sedom gódini* have the same source: application of the antepenultimate stress rule in the noncyclic block (52).

$$\begin{array}{l}
 (52) \quad \text{sedom}\#\text{duši} \quad \rightarrow \quad \text{se dom}\#\text{du ši} \quad \rightarrow \quad \text{sedom}\#\text{du ši} \\
 \begin{array}{ccc}
 (*) * & * * & \\
 * & & \\
 & & *
 \end{array} & \begin{array}{ccc}
 (*) & (*) & (*) (*) \\
 (*) & * & \\
 & & *
 \end{array} & \begin{array}{ccc}
 * & (*) & (*) (*) \\
 & & *
 \end{array}
 \end{array}$$

$$\begin{array}{l}
 \text{sedom}\#\text{godini} \quad \rightarrow \quad \text{se dom}\#\text{godi ni} \quad \rightarrow \quad \text{sedom}\#\text{godi ni} \\
 \begin{array}{ccc}
 (*) * & * * * & \\
 * & & \\
 & & *
 \end{array} & \begin{array}{ccc}
 (*) & (*) & (*) (*) (*) \\
 (*) & * & * \\
 & & *
 \end{array} & \begin{array}{ccc}
 * & * & (*) (*) (*) \\
 & & *
 \end{array}
 \end{array}$$

We conclude that the Macedonian enlarged stress domains cannot be reduced to a simple junctural phenomenon. Consequently, they may serve as evidence for the metrical structure of the base and the free asterisk condition.

5. Diyari and Turkish

Crucial to our interpretation of the enclitic stress in Latin, Manam, and Macedonian has been the assumption that respect for previously established structure is a property of

the noncyclic rules. Because the Stress Erasure Convention operates in the cyclic block, metrical structure is not carried over from one cycle to the next and hence we do not expect cyclic rules to take previously established structure into account. Poser's (1989) analysis of Diyari contradicts this assumption—at least at first sight. It is thus important that we provide an alternative account of the stress contours of this language that is not inferior to Poser's.

In Diyari stress falls on odd-numbered syllables, except when the syllable is morpheme-final.

(53)	káṇa-wàṛa-ṅundu	'man + PL + ABL'
	ṅándawálka	'to close'
	pínadu	'old man'
	máda-la-ntu	'hill + CHARAC + PROPRIETIVE'
	púḷuri-ṅi-màṭa	'mud + LOC + IDENT'
	yákalka-yirpa-màli-na	'ask + BEN + RECIP + PART'

Poser writes,

The facts presented above motivate a simple stress system in which binary quantity-insensitive left-dominant feet are constructed from left to right, with a left-dominant word tree, together with some proviso for preventing stress on an odd-numbered final syllable, such as defooting of degenerate feet . . . (p. 119)

As Poser remarks, this analysis accounts for all of the facts, provided that the rules can be applied so that "each morpheme in Diyari is stressed separately." As Poser shows in great detail, on the theoretical assumptions prevalent at the time of composing his article, this is not easy to implement without violating other considerations. Poser's solution is to "assume that metrical structure construction is cyclic and that feet once constructed may not be modified by subsequent application of the foot construction rule" (pp. 122 ff.) To illustrate, *yákalka-yirpa-màli-na* receives the derivation in (54).

(54)	yakalka	→	yakalka	→	yakalka + yirpa	→
	* * *		(* *) (*)		(* *) (*) (* *)	
			* *		* * *	
	yakalka + yirpa + mali	→	yakalka + yirpa + mali + na			
	(* *) (*) (* *) (**)		(* *) (*) (* *) (**)		(*) (*) (*)	
	* * * *		* * * *		* * *	

The stem parses as (1 2) (3) on the first cycle, as (1 2) (3) (4 5) on the second, as (1 2) (3) (4 5) (6 7) on the third, and as (1 2) (3) (4 5) (6 7) (8) on the last. The rule eliminating the degenerate feet then gives the appropriate distribution of stressed and unstressed syllables: '1 2 3 '4 5 '6 7 8.

From our perspective, this analysis is doubly problematic. First, it violates the

crossover condition. Second, our Stress Erasure Convention prevents the metrical structure of one cycle from passing to the next. Diyari stress must consequently be noncyclic. But then, the root plus all affixes should be metrified in one pass through the stress rules. We thus have no simple means to skip a morpheme-final syllable and restart the stress-unstressed alternation.

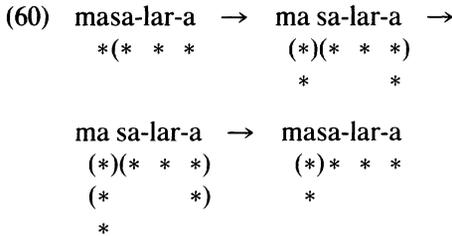
The solution we shall propose generalizes the use of metrical bracketing introduced in Halle (1990) so that it parallels the use of preassigned accent in Halle and Vergnaud (1987). In our framework there are three ways to obtain a line 1 asterisk: through head marking of constituents formed by the parsing procedure, by rules stressing a vowel in virtue of some property of the local environment (such as length), and by marking a morpheme's lexical representation. In addition to asterisks in the grid, the other theoretical construct in our analysis of stress patterns is metrical bracketing. In Halle and Vergnaud (1987) metrical brackets arise exclusively from rules organizing the asterisks of a given grid line into constituents. To account for systems where both timing slots of a heavy syllable are stress-bearing and a heavy syllable always starts a new metrical constituent (for instance, Cairene Arabic, Yupik Eskimo), Halle (1990) proposes allowing metrical rules to insert a bracket in the string on the basis of a locally determined property such as syllable weight. The subsequent rules parsing asterisks into constituents must respect these locally determined brackets.

If the parallel we are drawing between the use of line 1 asterisks (accents) and metrical brackets is correct, we expect to find cases in which metrical boundaries are an idiosyncratic property of individual lexical items. At least some cases of pre- and postaccenting morphemes receive a natural interpretation in these terms. A typical example is discussed by Poser (1984). In Turkish, stress is normally assigned to the last syllable of the word (55a). Exceptions are of two kinds. First, there are a number of words with inherent stress on some nonfinal syllable (55b). Unlike what happens in the cases in (55a), when suffixes are added to such stems, the stress does not shift.

- | | | |
|---------|----------------|------------------|
| (55) a. | adám | 'man' |
| | adam-lár | 'men' |
| | adam-lar-á | 'to the men' |
| b. | mása | 'table' |
| | mása-lar | 'tables' |
| | mása-lar-a | 'to the tables' |
| c. | adám-im | 'I am a man' |
| | gít-me-di-m | 'I did not go' |
| | yorgun-lár | 'tired' pl. |
| | yorgún-dur-lar | 'they are tired' |

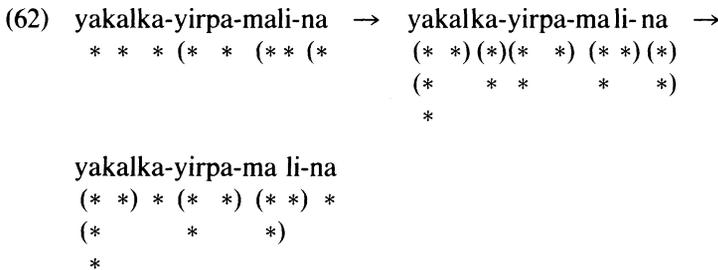
We assume provisionally that words such as *mása* with stress on a nonfinal syllable are represented with a line 1 lexical asterisk. The rules in (56) obtain the stress contours of these words, as illustrated by the derivations of *mása-lar-a* and *yorgun-lár* in (57).

preaccenting “prosodic suffix” (perhaps to ensure that the stem satisfies a minimal prosodic weight). On this analysis, the stress in *mása-lar-a* would be derived as in (60).



Given the possibility of idiosyncratic boundary assignment, the Diyari data can now be handled easily. The only assumption required is that in Diyari all suffixes—not just some, as in Turkish—are represented with a left constituent boundary. Poser’s rules, which we have restated somewhat more formally in (61), now derive the correct stress contours without difficulty. The derivation of *yákalka-yirpa-màli-na* proceeds as in (62).

- (61) a. On line 0 construct binary left-headed constituents from left to right and assign line 1 asterisks to the heads.
- b. On line 1 construct unbounded left-headed constituents and assign a line 2 asterisk to the heads.
- c. Delete the line 1 asterisk from monosyllabic (degenerate) line 0 constituents.



Of course, we assume that the stress rules of (61) apply in the noncyclic block. If this analysis is accepted, then the Diyari data no longer stand in the way of the thesis that respect for previous metrical structure is a property exhibited exclusively by noncyclic stress rules.

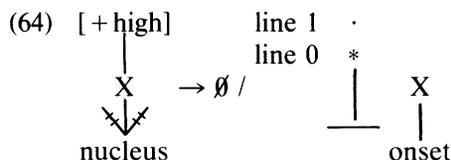
6. Levantine Arabic

In this section we focus on the Damascus and Beirut dialects of Levantine Arabic. They exhibit an opacity effect; in addition, the crossover constraint must be invoked in order to capture a striking contrast that parallels the one originally discovered by Brame (1973)

for Palestinian Arabic. Before turning to the Damascus and Beirut material, we briefly review Brame's well-known result.

Palestinian Arabic has a rule formally stated as (64) that syncopates short high vowels in unstressed nonfinal open syllables (63). In virtue of this rule, [CiCiC] verb stems lose their second vowel before a vowel-initial suffix such as the 3pl. [-u]; and the first syllable syncopates before a consonant-initial suffix such as [-ti], which draws the stress to the heavy penult.

(63)	dárab	'he hit'	fihim	'he understood'
	dárab-u	'they hit'	fihm-u	'they understood'
	ḍaráb-ti	'you sg. f. hit'	fhím-ti	'you sg. f. understood'



Object suffixes, which Brame (1974) argued to be enclitics, also activate the syncope and stress rules. A vowel-initial object suffix opens the preceding syllable of the stem by the pan-Arabic prohibition against onsetless syllables and syncopates its vowel when it is high. Although a consonant-initial object suffix draws stress to the preceding penult just like a subject suffix, it systematically fails to syncopate the first syllable in a [CiCiC] stem.

(65)	dárab	'he hit'	fihim	'he understood'
	dárab#ak	'he hit you sg. m.'	fihm#ak	'he understood you sg. m.'
	ḍaráb#ha	'he hit her'	fihím#ha	'he understood her'

Since the 1pl. suffix [-na] marks both the subject and the object inflection, it is possible to construct minimal pairs in which the same phonemic strings are pronounced differently depending on the underlying syntax: [fihim + na] 'we understood' is realized as *fhím-na*, but [fihim#na] 'he understood us' is realized as *fihím#na*.

Brame's explanation for this striking contrast assumed that in the derivation of verb#object structures the stress rule is applied twice: first to the word [fihim] and then to [fihim#na] to derive [fihím#na]. In contrast, the stress rule applies only once to the noncliticized [fihim-na]. So long as syncope (64) is ordered after the first stress assignment, the initial syllable of [fihím + na] 'we understood' syncopates, but the same syllable of [fihím#na] does not. A late stress deletion process suppresses nonfinal stresses.

Subsequent research by Kenstowicz and Abdul-Karim (1980) and by Bohas and Kouloughli (1981) uncovered additional evidence for this analysis in other Levantine dialects, where various vowel reduction rules are mysteriously suspended in the first syllable of verb#object structures. As in the Palestinian dialect, this rule blockage can be explained by the "abstract" stress assigned to the orthotonic base. Given the sys-

tematic, widespread, and well-documented nature of the phenomenon, the stress assigned under enclisis in Levantine Arabic furnishes us with a fruitful testing ground for the thesis that metrical stress respects previously established structure.

Our discussion here focuses on the Damascus and Beirut dialects. Our data for the Damascus dialect come from McCarthy (1980), whose analysis we adopt in essential respects. The Beirut material is taken from Abdul-Karim (1979). Consider first the abbreviated paradigms in (66), where a light penult allows stress to fall on the antepenult (for example, *ʕállam-u*). Elsewhere stress lands on the penult (for example, *ʕállám-na*, *ʕállam*).

(66) *Damascus*

fátaH	sómeʕ	ʕállam	3sg. m.
fatáH-na	smóʕ-na	ʕállám-na	1pl.
fátaH-u	sómʕ-u	ʕállam-u	3pl.
fátH-et	sómʕ-et	ʕállam-et	3sg. f.
'open'	'hear'	'teach'	

Beirut

ḏárab	fíhim	ʕállam	3sg. m.
ḏaráb-na	fhím-na	ʕállám-na	1pl.
ḏárab-u	fíhm-u	ʕállam-u	3pl.
ḏárab-it	fíhm-it	ʕállam-it	3sg. f.
'hit'	'understand'	'teach'	

Since rules of vowel elision have eliminated most sequences of three or more light syllables, it is difficult to show directly that these dialects respect an antepenultimate limit. However, indirect evidence supports this claim. For example, McCarthy (1980, 79) reports, "Forms like *muttáHíde* 'united (f.sg.)' borrowed from Literary Arabic show that stress does not retract to the preantepenult even when the penult and the antepenult are light." Also, our Beirut informants assign antepenultimate stress to Classical Arabic words such as *šajáratun* 'tree' in *šajáratun kabíiratun* 'a big tree'.⁶

Accordingly, the Damascus and Beirut dialects have essentially the same stress rules as Latin. We state these rules in (67).

(67) a. Syllable heads are stress-bearing units.

⁶ In contrast to Palestinian, where our consultant has initial stress: *šajáratun kabíiratun*. Like previous researchers of Arabic stress, we assume that the stress contours imposed on classical words reflect the metrical rules of the native colloquial dialects. We believe that Palestinian differs from the Beirut and Damascus dialects in having left-to-right metrification, so that *šajáratun* is parsed as in (i).

(i) (* *) (* *) (* *)
* * *

A rule eliminating final degenerate feet derives the initial stress. Since discussion of the Palestinian dialect would take us too far afield, we concentrate on the Damascus and Beirut dialects, which allow us to make our points more straightforwardly.

- b. Final syllables are extrametrical unless superheavy.
- c. Assign line 1 asterisks to heavy syllables.
- d. On line 0 construct binary left-headed constituents from right to left and assign line 1 asterisks to the heads.
- e. On line 1 construct unbounded right-headed constituents and assign a line 2 asterisk to the heads.
- f. Conflate lines 1 and 2.

The Damascus dialect has two additional segmental rules that are lacking in Beirut. First, [CaCaC] stems take a [CaCC] allomorph before the 3sg. feminine suffix. (See Kenstowicz and Abdul-Karim (1980) for further discussion of this rule in the Levantine dialects.) Second, the Damascus dialect has merged the Classical Arabic contrast between short [i] and [u] as schwa, which in turn is realized as [e] before a word-final consonant by a rule of the noncyclic block. Accordingly, the syncope rule (64) is defined over schwa in the Damascus dialect. In (68) we illustrate our rules with the derivations of *fátH-et*, *sámʕ-u*, and *ʕállám-na* in the Damascus dialect.

(68)	fataH-ət	səməʕ-u	ʕállam-na	
	* * *	* * *	* * *	
	fataH-ət	səməʕ-u	ʕállam-na	Extrametricality and accent heavy syllables
	* * ⟨*⟩	* * ⟨*⟩	* * ⟨*⟩	
			* *	
	fataH-ət	səməʕ-u	ʕállam-na	Metrification of lines 0 and 1
	(* *) ⟨*⟩	(* *) ⟨*⟩	(*)(*) ⟨*⟩	
	(*)	(*)	(* *)	
	*	*	*	
	fataH-ət	səməʕ-u	ʕállam-na	Conflation
	(* *) ⟨*⟩	(* *) ⟨*⟩	* (*) ⟨*⟩	
	*	*	*	
	fátH-et	inappl.	inappl.	Elision and ə → e
	inappl.	səmʕ-u	inappl.	Syncope of schwa

We now have the descriptive background to interpret the stress shifts arising from enclisis. In (69) we show various verbs amplified by the vowel-initial 3sg. masculine clitic and the consonant-initial 1pl. *-na* or 2pl. *-kon*.

(69) *Damascus*

ʕállam	ʕállam#o	ʕállám#na
ʕállam-et	ʕállam-ət#o	ʕállam-ət#na
fátaH	fátaH#o	fatáH#na
fátH-et	fátH-t#o	fatH-ət#na
sámeʕ	səmʕ#o	səmóʕ#kon

Beirut

ʕállam	ʕállam#u	ʕállám#na
ʕállam-it	ʕállam-ít#u	ʕállam-ít#na
ḍárab	ḍárab#u	ḍaráb#na
ḍárab-it	ḍarab-ít#u	ḍarab-ít#na
fíhim	fíhm#u	fihím#na
fíhm-it	fíhm-ít#u	fíhm-ít#na

We see an opacity effect in cases such as Damascus *ʕállam-et* versus *ʕállam-ét#o*, where the stress shifts over the antepenult to lodge on the final syllable of the base under enclisis. This is the expected result, given our analysis. The initial representation in (70) shows the output of the cyclic block and the second the input to the noncyclic rules. Metrification of the free asterisks eventuates in a stress on the penultimate syllable.

$$\begin{array}{cccc}
 (70) & \text{ʕállam-ət} & \rightarrow & \text{ʕállam-ət#o} & \rightarrow & \text{ʕállam-ət#o} & \rightarrow & \text{ʕállam-ət#o} \\
 & (* *) \langle * \rangle & & (* *) * * & & (* *) (*) \langle * \rangle & & * * (*) \langle * \rangle \\
 & * & & * & & (* *) & & * \\
 & & & & & * & & *
 \end{array}$$

For cases like *fátaH#o*, our rules yield the preconflation derivation in (71).

$$\begin{array}{cccc}
 (71) & \text{fa taH} & \rightarrow & \text{fataH#o} & \rightarrow & \text{fa taH#o} & \rightarrow & \text{fa taH#o} \\
 & (*) \langle * \rangle & & (*) * \langle * \rangle & & (*) (*) \langle * \rangle & & (*) (*) \langle * \rangle \\
 & * & & * & & * * & & (* *) \\
 & & & & & * & & *
 \end{array}$$

We may derive the correct initial stress with the help of rule (72), which destresses a light syllable under stress clash.

$$\begin{array}{l}
 (72) \quad * \quad * / * \quad \text{line 0} \\
 * \rightarrow \cdot * \text{ —} \quad \text{line 1} \\
 | \\
 \text{R}_{\text{nonbranching}}
 \end{array}$$

Application of this rule followed by conflation completes the derivation, as shown in (73). We observe that the rule must be restricted to light syllables in order to retain penultimate stress in *ʕállám#na*.

$$\begin{array}{ccc}
 (73) & \text{fataH#o} & \rightarrow & \text{fataH#o} \\
 & (*) * \langle * \rangle & & (*) * \langle * \rangle \\
 & (*) & & * \\
 & * & & *
 \end{array}$$

Rule (72) is ordered before syncope in the noncyclic block. In a case such as *fátH-t#o* 'she opened it' from [fátH-ət#o], elimination of the stress on the -ət suffix feeds the syncope rule.

The Beirut dialect has much the same pattern of enclitic stress and hence the same rules—in particular, the destressing rule (72) for cases such as *dārāb#u* instead of **dārāb#u*. The major difference is that the 3sg. feminine suffix *-it* always takes the stress in the Beirut dialect. This is easy to describe in our system: we simply mark this morpheme as an exception to the destressing rule (72). Earlier analyses had to posit a special rule to stress this suffix under enclisis.

Let us now turn to the *fhīm-na* versus *fihīm#na* contrast discovered by Brame. The latter form receives the derivation in (74) under our analysis. We start with the output of the cyclic rule block.

$$\begin{array}{ccccccc}
 (74) & fi\ hi\ m & \rightarrow & fi\ hi\ m\#na & \rightarrow & fi\ hi\ m\#na & \rightarrow & fi\ hi\ m\#na \\
 & (*)(*) & & (*) * \langle * \rangle & & (*) (*) \langle * \rangle & & (*) (*) \langle * \rangle \\
 & * & & * & & * & & * \\
 & & & & & & & * \\
 & & & & & & & * \\
 & & & & & & & * \\
 & & & & & & & *
 \end{array}$$

In the first step the appearance of the clitic removes the extrametricality of the verb's final syllable, exposing this syllable to the heavy syllable rule and then to metrification. Noncyclic syncope is inapplicable because the initial syllable preserves the stress assigned to it in the cyclic block. This stress is subsequently suppressed through conflation.

Consider now the derivation of *fhīm-na* in the cyclic block.

$$\begin{array}{ccccccc}
 (75) & fihim-na & \rightarrow & fihim-na & \rightarrow & fi\ hi\ m-na & \rightarrow & fi\ hi\ m-na \\
 & * * \langle * \rangle & & * * \langle * \rangle & & (*) (*) \langle * \rangle & & (*) (*) \langle * \rangle \\
 & & & * & & * * & & (*) \\
 & & & & & & & * \\
 & & & & & & & *
 \end{array}$$

In the first step a line 1 asterisk is assigned to the heavy penult. Exhaustive metrification of line 0 then yields a representation with two monosyllabic constituents. In the next step the final stress is enhanced by metrification of the line 1 asterisks. Two things must now happen to derive the correct result. First, conflation of lines 1 and 2 must apply and take the form of eliminating all of line 1 in order to suppress the stress on the initial syllable of the word. This is necessary so that the syncope rule may apply. The result is shown in (76).

$$\begin{array}{ccc}
 (76) & fihim-na & \\
 & *(*) \langle * \rangle & \\
 & * &
 \end{array}$$

Second, it is crucial that metrification in the noncyclic block not reparse the initial syllable. Otherwise, the contrast between *fhīm-na* and *fihīm#na* is neutralized and we lose Brame's original solution. However, since metrification takes place from right to left, the proposed crossover constraint prevents the assignment of a stress to the initial syllable in (76) and hence preserves the contrast with *fihīm#na*.

7. The Crossover Constraint

In this section we examine further evidence bearing on the crossover constraint.

7.1. English

Recall from section 1 our assumption that the stress rules of English are assigned to both the cyclic and the noncyclic rule blocks. Since the [–cyclic] suffixes fail to dislodge the accent of the base, metrification must be prevented from affecting the posttonic sequence in the noncyclic block. This is supported by the lack of any appreciable stress modulation in the posttonic syllables of words such as *expressionlessness* and *óriginlessness*. These cases clearly contrast with the alternating stress found in the pretonic string of *Àpalàchicóla*. We shall accept Halle and Vergnaud's (1987) assumption that conflation of lines 1 and 2 applies in the cyclic block in English. This implies that representations emerge from the cyclic rules with just a single metrical constituent at the right edge of the word. It follows that any pretonic secondary stresses must be assigned in the noncyclic block. And given the crossover constraint, we must assume that the subsidiary stresses arise from a left-to-right rather than a right-to-left parse.

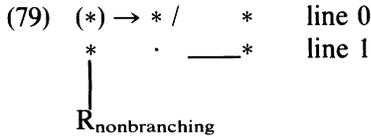
This change in the direction of metrification simplifies the analysis of English secondary stress in several respects. Consider first the behavior of pretonic strings composed of light syllables in such monomorphemic stems as those in (77).

- (77) América, Dakóta, Nebráska
 Àlabáma, Càlifórnia, Màssachúsetts
 àbracadábra, Kàlamazóo, Winnipesáukee
 Àpalàchicóla, hàmamèlidánthemum, (sùper)càlifràgílistic

The two analyses differ in the groupings imposed on strings containing an odd number of positions greater than one (for example, the trisyllabic pretonic string in *àbracadábra* (78)).

- | | |
|--------------------|-------------------------------|
| (78) Left to right | abracadabra → abracadabra |
| | * * * (* *) (* *) (* *) (* *) |
| | * * * * * |
| Right to left | abracadabra → abracadabra |
| | * * * (* *) (* *) (* *) (* *) |
| | * * * * * |

The left-to-right analysis offers several advantages. First, the destressings required on the initial syllable of *América* and the third syllable of *àbracadábra* fall under the same simple rule that eliminates a degenerate foot dominating a light syllable under stress clash.



Two separate rules are required under the right-to-left analysis.

Second, so long as the word's second syllable does not bear primary stress, the first syllable in a pretonic string of light syllables is generally stressed and the second unstressed in English. Such a stressed plus unstressed sequence at the front end of the pretonic string would be a "cue" for left-to-right metrification in the learning models discussed by Dresher and Kaye (1990).

Finally, left-to-right metrification in the noncyclic block simplifies considerably the analysis of a subtle contrast noted by Hammond (1989). In (80) we display three groups of trisyllabic pretonic strings, classified for syllable weight (H=heavy, L=light). The first group (80a) is composed of monomorphemes, the second and third (80b,c) of words that are morphologically complex.

(80)	'LLL	L'HL	'HLL	'H'HL / 'H'HL
a.	Winnepesaukee	Monongahela	Luxipalilla	Ticonderoga
b.	L'LL	L'HL	'H'LL / 'H'LL	'H'HL / 'H'HL
	originality	amalgamation	iconoclastic	authentication
c.	'LLL		'HLL	
	peregrination		alienation	

Hammond draws attention to two systematic contrasts. First, trisyllabic strings composed exclusively of light syllables place a subsidiary stress on the initial syllable in the monomorphemic cases (*Winnepesaukee* 'LLL), whereas morphologically complex words can stress their second syllable when that syllable bears a stress in the derivational source: *originality* (*original*) versus *peregrination* (*peregrinate*). Pretonic strings with the shape HLL contrast in the same way. Monomorphemes begin with a stressed plus unstressed sequence (for instance, *Luxipalilla* 'HLL), whereas morphologically complex words can stress their second syllable—provided their derivational source also stresses this syllable (compare *iconoclastic* and *iconoclast*). These forms also display the variation between first and second syllable prominence found in pretonic strings beginning with two heavy syllables—either monomorphemic (*Ticonderoga*) or complex (*authentication*).

Given that the Stress Erasure Convention operates in the cyclic block, the second-syllable stress found in *originality* and *iconoclastic* is not expected. Furthermore, the contrasting initial stress in *peregrination* and *alienation* shows that the difference is a function of the stress contour of the derivational bases *original* versus *peregrinate* and *iconoclast* versus *alienate*. To account for these etymological stresses, we follow Halle and Vergnaud (1987) and postulate a special rule that copies the stress from the cyclic source. As noted there, this rule is subject to considerable lexical conditioning. Given

the stress copy rule, *Winnepesaukee* and *originality* have the grids shown in (81a,b) before metrification in the noncyclic rule block.

- (81) a. Winnepesaukee → c. Winnepesaukee
 * * *(* *) (*) (* *) (* *)
 * * * *
- b. originality → d. originality
 * * *(*) (*) (*) (*) (*) (*)
 * * * * *

Exhaustive metrification from right to left yields the representations in (81c,d). As Hammond (1989) notes, the contrast has been merged and the subsequent destressing rule will be unable to distinguish the copied stress of *originality* from the one assigned by the right-to-left parse in *Winnepesaukee*. But only the latter destresses the second syllable. Hammond introduces an ad hoc diacritic to distinguish the two cases. No such diacritic is needed, however, if the pretonic string is metrified from left to right. Instead, the independently needed rule (79) destressing degenerate light syllables under clash will distinguish the two cases. To see this, consider the way in which *originality* and *Winnepesaukee* metrify under a left-to-right parse.

- (82) originality → originality
 * * *(*) (*) (*) (*) (*) (*)
 * * * * *
- Winnepesaukee → Winnepesaukee
 * * *(* *) (*) (*) (*) (*)
 * * * *

In the former case the copied stress on the second syllable prevents this position from being parsed as a dependent of the initial syllable. Instead it must occupy a head position, which then takes the following syllable as a dependent. In *Winnepesaukee* the first two syllables group into a left-headed constituent and the third falls into a degenerate foot. The subsequent application of the destressing rule (79) eliminates the clashing degenerate feet from the initial syllable of *originality* and from the third syllable of *Winnepesaukee*.

A similar problem arises with the contrast between *Luxipalilla* and *iconoclastic*. The heavy syllable rule supplies a line 1 asterisk to the initial syllable of both words, and the second syllable of *iconoclastic* copies a stress from the cycle (compare *iconoclast*). Right-to-left metrification merges the two grids, and once again the contrasting stress contours of the pretonic strings cannot be recovered (83a).

- (83) a. Luxipalilla → Luxipalilla
 * * *(* *) (*) (*) (*) (*)
 * * * * *
- iconoclastic → iconoclastic
 * * *(* *) (*) (*) (*) (*)
 * * * * *

b.	Luxipa lilla	→	Luxipa lilla
	* * *(* *)		(* *) (* *) (* *)
	* * *		* * *
	iconoclastic	→	i conoclastic
	* * * (* *)		(*) (* *) (* *)
	* * *		* * *

Left-to-right parsing (83b) keeps them distinct, and the subsequent elimination of degenerate feet yields the contrast between 'HLL and 'H'LL.

In the account of English stress given to this point, no more than three degrees of stress can be distinguished: main stress (asterisks on lines 0, 1, 2), nonmain stress (asterisks on lines 0, 1), and stresslessness (no asterisks above line 0). Phonetically, however, one additional degree of stress is distinguished in such words as *Apalachicola*, *Ticonderoga*, and *iconoclastic*. In *Apalachicola* the subsidiary stress on the first syllable is greater than that on the third; and in *iconoclastic* and *Ticonderoga* the nonmain stresses on the first two syllables are not of the same magnitude and vacillate as to which is stronger. We account for these facts by a rule parsing line 1 asterisks into binary constituents, the headedness of the constituents being allowed to vary between left (the unmarked case) and right (the marked case), as shown in (84).

(84) a.	i conoclastic	i conoclastic	
	(*) (* *) (* *)	(*) (* *) (* *)	line 0
	(* *) (*)	(* *) (*)	line 1
	* * *)	(* *)	line 2
	*	*	line 3
b.	Apa lachi cola		
	(* *) (* *) (* *)		line 0
	(* *) (*)		line 1
	(* *)		line 2
	*		line 3

As before, main stress is assigned by an unbounded right-headed constituent, which is now constructed on line 2.

Finally, there is a small number of words with a L'LL pretonic string instead of the 'LLL contour our analysis predicts.

(85) apòtheósis, Apòllináris, Epàminóndas

These words seem to be restricted to the Greek sector of the vocabulary and have another idiosyncrasy: they begin with a vowel. The simplest solution is to posit a special rule marking the initial, onsetless syllable extrametrical.⁷

⁷ Michael Hammond (personal communication) has drawn our attention to pretonic dactyls ('LLH) such as *Kilimanjaro* and *paraphernalia* where the third syllable is unstressed even though it is heavy. For these we suggest extending the well-known rule of Hayes (1981) operating in *Häckensack* that destresses a medial degenerate foot closed by a sonorant consonant.

7.2. *Italian and Polish*

The noncyclic left-to-right assignment of secondary stresses to fill in the gap resulting from conflation in the cyclic block generates a stress contour that is found in a number of other metrical systems. For example, in their study of secondary stress in Italian, Vogel and Scalise (1982) report that pretonic strings generally begin with a stress, unless it would clash with the primary word stress on the following syllable.

- (86) V \acute{V} . . . *metá* 'half', *lavóro* 'work', *catástrofe* 'catastrophe'
 \acute{V} V \acute{V} . . . *pàritá* 'parity', *sòlitúdi-ne* 'solitude'
 \acute{V} V V \acute{V} . . . *càpacitá* 'capacity', *tèmp(er)atúra* 'temperature'
 \acute{V} V \grave{V} V \acute{V} . . . *pròbabilitá* 'probability', *èlegàntemén-te* 'elegantly'

Deviations from this general pattern are possible, but evidently only when the stray stress derives from a cyclic source.

- (87) *èlettricitá or elèttricitá* 'electricity' (cf. *elèttrico* 'electric')
gènèricamén-te or genèricamén-te 'generically' (cf. *genérico* 'generic')

In both English and Italian the noncyclic stress rules metrify the pretonic sequence while leaving the posttonic sequence unmetrified: compare English *óri-gin-less-ness*, Italian *má-cina-me-lo* 'grind it for me'. As pointed out by Rubach and Booij (1985), Polish metrifies both the pretonic and the posttonic sequences. Like Manam, Polish has predominantly penultimate stress; antepenultimate stress occurs in restricted circumstances through a lexically conditioned assignment of final extrametricality (see Halle and Vergnaud (1987) for discussion). Line 0 constituents are thus left-headed. As shown by the data in (88), Polish has the telltale initial stress on its pretonic string that reflects a left-to-right parse in the noncyclic block (with the ubiquitous elimination of degenerate feet under clash).

- (88) *Warszáwa*
pròpagánda
sàksofonísta
rèwolùcjonísta
rèwolùcjonístámi

Rubach and Booij report that proclitic verbal particles manifest the left-to-right alternating pattern as well.

- (89) *to zróbil* 'did it'
bỳ to zróbil 'would do it'
òn by to zróbil 'he would do it'
òn by wàm to zróbil 'he would do it for you'

These particles may also encliticize to the verb.

- (90) a. *zróbil wam*

- b. zróbil wàm to
- c. zróbil by wàm to
- d. zróbil òn by wàm to

The trochaic rhythm of *òn by wàm to* (90d) establishes that the line 0 constituents are left-headed in the posttonic string as well. And the stressing of the trisyllabic *by wàm to* of (90c) fixes the direction of assignment as right to left. If it were left to right, we should expect a stress on the particle *by*. The derivations in (91) sketch the intended analysis.

- (91) zrobil on by wam to → zrobil on by wam to
 (**)* * * * * (**)(* *) (* *)
 (*) (*) * *
 * *
- zrobil by wam to → zrobil by wam to → zrobil by wam to
 (**)* * * * (**) (*) (* *) (**)* * (* *)
 (*) (*) * * (*) *
 * * *

The Polish data suggest that a string of free asterisks lying on the far side of a cyclically established constituent can only be metrified by a parse that originates from the opposite edge of the phonological word. Since Polish metrifies both pre- and posttonic strings, two rules are required. Each assigns binary left-headed constituents. They differ only for the parameter of directionality.

7.3. Spanish

Like English, Italian, and Polish, Spanish distributes its stress rule over more than one rule block. The location of primary stress is sensitive to syllable weight and is assigned from right to left, with conflation pushing the accent toward the right edge of the word. The distribution of secondary stresses is not weight-sensitive, on the other hand. This state of affairs suggests that primary stress is assigned in the cyclic block and secondary stress is assigned later. But unlike what happens in English, Italian, and Polish, where the initial syllable of the pretonic string is consistently stressed, in Spanish it is the word-initial syllable that alternates between stressed and unstressed as a function of the number of syllables in the string. (In faster speech tempi, phrase-initial V V̇ V may be replaced by the dactyl V̇ V V; our discussion is restricted to the slower tempo described by Roca (1986).)

- | | |
|------------------|---------------------------------|
| (92) constánte | ‘constant’ |
| Cònstantíno | ‘Constantine’ |
| Constàntinópla | ‘Constantinople’ |
| cònstantinopléño | ‘Constantinople guy’ |
| constàntinòpleár | ‘to hang out in Constantinople’ |

còstantinopòlitano	'Constantinopolitan'
constàtinòpolizaciòn	'constantinopolization'
còstantinopòlizaciònismo	'constantinopolizationism'

In (92) the fixed position appears at the other end of the pretonic string, where a secondary stress consistently lies two syllables to the left of the primary stress. This suggests that Spanish metrifies its pretonic string from right to left, in contrast to the left-to-right direction of English, Italian, and Polish, which, if we are correct, is forced by the crossover constraint.

Spanish would thus appear to violate the crossover constraint. It is, however, far from clear whether this conclusion can be drawn with any confidence. First of all, according to Harris (1990), the posttonic string is not metrified at all or is metrified by a different rule from the one that operates pretonically. A string of enclitics either has a phrase-final accent or remains unaccented: *cantándo#se#me#ló* or *cantándo#se#me#lo* 'it being sung for me'. If the left-to-right parsing that is responsible for pretonic stress had started at the right edge of the word, we would expect a stress on *se* as well. However, *cantándo#sé#me#ló* evidently does not occur, suggesting an unbounded right-headed constituent, in contrast to the binary parse of the enclitic string found in Polish. Thus, it appears that the parsing of the Spanish pretonic string into binary feet does not in fact originate at the right edge of the word and cross over the cyclically established constituent.

But then how is the pretonic string metrified? One possibility is to give up the idea that the fixed stressed + unstressed sequence at the right edge of the pretonic string is a cue for right-to-left directionality. We could then parse it as binary and from left to right but make the right- versus left-headedness of the constituents depend on whether the string contains an odd or an even number of positions (that is, on whether it ends in a degenerate foot or not). An analysis of this form is proposed for Yidin^y in Halle and Vergnaud (1987) and, if correct, could be invoked here as well.

Another possibility is suggested by the following data from Harris (1990), taken in turn from Roca (1986).

- (93) a. *quejàndo#se#mé* 'complaining to me'
 b. *quejàndo#sè#me pòr Constància* 'complaining to me for Constance'

(93a) shows a posttonic string *se#me* at the end of the phrase with a final accent. But when that string is embedded in the phrase, it evidently combines with the pretonic string of *pòr Constància* to form an "intertonic" string [*se#me#por#Con*] that is metrified from right to left. This datum indicates that Spanish fuses its pretonic and posttonic strings and metrifies them as one. The assignment of secondary stress in Spanish must thus take place at the phrasal level when material from adjacent words becomes available. This late assignment of secondary stress in Spanish is confirmed by Roca (1986), who shows that it must follow a rule of syllable merger that operates between words. Since all of the other cases discussed in this article have concerned word accent, it is possible

that the crossover constraint holds only for the word-level phonology. At the phrasal level, metrification may work differently. Perhaps the edges from which metrification proceeds are determined not by grammatical boundaries but in some other manner—conceivably by the metrical constituents erected at the word level. Clearly, further study of this topic is required.

We conclude that, initial impressions notwithstanding, secondary stress in Spanish is not a counterexample to the proposed crossover constraint, which may be retained in order to explain why secondary stresses are so frequently assigned by a parse that proceeds from an edge opposite to the one that determines primary stress.

7.4. *Auca*

The phenomenon of bidirectional stress assignment we have been discussing in this section was, to the best of our knowledge, first observed some thirty years ago by Kenneth Pike (1964) in the Ecuadorian language *Auca*. We conclude our discussion of this topic by examining Pike's data. In his contribution to the volume honoring Daniel Jones, Pike discusses two stress "trains" in *Auca*. One train traverses the stem from left to right, the second crosses the suffixal string from right to left. For the most part, the *Auca* stress contours conform to and illustrate well the principles we have discussed in this article—in particular, the crossover constraint.

In (94) we tabulate the stress contours Pike reports for *Auca*, schematized for the number of stress-bearing units that lie on either side of the stem plus suffixal juncture.

(94)	1 + 1	C'a#Ca	g'o#bo 'I go'
	1 + 2	C'a#C'aCa	g'o#b'opa 'I go', declarative
	1 + 3	C'a#CaC'aCa	g'o#tab'opa 'I went'
	1 + 4	C'a#C'aCaC'aCa	g'o#t'amōn'apa 'we two went'
	2 + 1	C'aC'a#Ca	w'od'ō#ŋā 'she hangs up'
	2 + 2	C'aCa#C'aCa	k'æga#k'āmba 'his tooth hurts'
	2 + 3	C'aC'a#CaC'aCa	'ēŋ'a#kānd'apa 'he was born'
	3 + 1	C'aCaC'a#Ca	k'iwēn'ō#ŋa 'where he lives'
	3 + 2	C'aCaC'a#C'aCa	y'iwæm'ō#ŋ'āmba 'he carves, writes'
	3 + 3	C'aCaC'a#CaC'aCa	'apæn'e#kānd'apa 'he speaks'
	4 + 1	C'aCaC'aC'a#Ca	k'ægīn'ew'a#kā 'his tongue hurts'
	4 + 2	C'aCaC'aCa#C'aCa	p'ædæp'ōnō#n'āmba 'he handed it over'
	5 + 2	C'aCaC'aCaC'a#C'aCa	t'ikaw'odōn'o#k'āmba 'he lights'

We follow Pike in discerning two processes of metrification in *Auca*. The stem is parsed from left to right into binary left-headed feet whereas the suffixes are metrified from right to left. This difference in direction of metrification follows from the crossover constraint if the parse is assigned to both the cyclic and noncyclic rule blocks. Distributing the metrification over the two rule blocks is independently supported by two prop-

erties of Auca stress: the behavior of vowel sequences and the treatment of the final syllable of the stem.

Pike states, “Within the stem, sequences of two like or of two diverse vowels act as sequences of two syllable nuclei in the mora count which affects the placement of stresses” (p. 430). For example, each vowel of the stem /ōō/ ‘hunt with a blow-gun’ must count as a stress-bearing unit, as is evident from comparing *'ō'ō#ñānd'apa* ‘he went blow-gunning’ with *w'oō'ō#ñānd'apa* ‘he blew his blow-gun’. The double stress of the former parallels a [C'aC'a#CaC'aCa] structure, whereas the latter is an analogue of [C'aCaC'a#CaC'aCa]. Pike continues, “Within the suffix train, however, sequences of diverse vowels act in the mora count as single-syllable nuclei” (p. 430). For example, in *'a#boi* ‘I see’ the [oi] sequence must count as a single stress-bearing unit so that the resultant [C'a#Ca] receives a single stress rather than the double stress that would be expected if this word realized a [C'a#C'aCa] structure. This contrast in the behavior of vowel sequences is reminiscent of the situation in Latin noted by Steriade where enclitic stress ignored syllable weight. We can succinctly describe it by saying that the vowel is the stress-bearing unit in the cyclic rule block, whereas the head of the syllable rime is the stress-bearing unit in the noncyclic block.

In examining the data in (94), we note that the final syllable of a polysyllabic stem seems to belong to the suffixal train. In general, this syllable is unstressed if it abuts a suffixal stress. (The only exception is when the number of stem syllables is odd and the number of suffixal syllables is even; these cases will be explained shortly.) This fact suggests that the final syllable of the stem is extrametrical. Just as in the cases of stress shift under enclisis discussed earlier in this article, this syllable will lose its extrametricality and then metrify with the suffixes in the noncyclic block. On the standard assumption that extrametricality can only be assigned at an edge, the final syllable of the stem must terminate a metrical domain. This point also follows straightforwardly if the suffixal string is metrified in the noncyclic rule block.

The rules in (95) summarize our analysis of the Auca stress contours.

(95) *Cyclic*

- a. Vowels are stress-bearing units.
- b. The final stress-bearing unit is extrametrical.
- c. On line 0 construct binary left-headed constituents from left to right and assign line 1 asterisks to the heads.

Noncyclic

- a. Syllable rime heads are stress-bearing units.
- b. On line 0 construct binary left-headed constituents from right to left and assign line 1 asterisks to the heads.

We illustrate these rules with the schematized derivations in (96), in which integers represent arbitrary stress-bearing units and # separates the stem from the suffixal string.

(96)	1 # 2 3	1 2# 3 4 5	1 2 3 # 4 5	Cyclic
	(1)	(1) (2)	(1 2) (3)	Left to right
	(1)# 2 3	(1) 2# 3 4 5	(1 2) 3 # 4 5	Noncyclic
	(1) (2 3)	(1) (2 3)(4 5)	(1 2) (3) (4 5)	Right to left
	C'a #C'aCa	C'aC'a#CaC'aCa	C'aCaC'a #C'aCa	Output

When the noncyclic metrification produces a degenerate (single-element) constituent that clashes with a stress on its left, the stress is removed by the rule in (97)—a process that closely resembles the one observed earlier in English and Polish.

(97)	(*)	→	*	/	*	_____	line 0
	*		.	*		_____	line 1

We illustrate with a few cases in (98).

(98)	1 # 2	1 # 2 3 4	1 2 # 3 4	Cyclic
	(1)# 2	(1)# 2 3 4	(1)(2)# 3 4	Left to right
	(1)# 2	(1)# 2 3 4	(1) 2 # 3 4	Noncyclic
	(1) (2)	(1) (2) (3 4)	(1)(2) (3 4)	Right to left
	(1) 2	(1) 2 (3 4)	(1) 2 (3 4)	Destressing
	C'a #Ca	C'a #CaC'aCa	C'aCa# C'aCa	Output

When the stem or the suffixal string is longer than those depicted in (94), the strictly alternating patterns of stress in Auca seem to give way to a different mode of organization. Pike cites only two examples. A 1#23456 structure is realized with a [C'a#C'aCaCaC'aCa] stress contour instead of the [C'a#CaC'aCaC'aCa] our rules predict: for example, *g'o#k'ædômôn'aimba* 'we two would have gone'. Pike cites one example of a six-syllable stem: *y'ærak'ægīnewa#kānd'apa* 'he licked'. Here the expected stress on the fifth syllable fails to materialize: [C'aCaC'aCaCa#CaC'aCa]. It is possible that the stresses our analysis predicts are actually assigned and are then suppressed in medial position. Alternatively, the mode of metrical organization might be different in these cases, perhaps reflecting a switch to stress-medial, ternary ([CaC'aCa]) constituents. Switching from binary to ternary economizes on the number of constituents by increasing their capacity. Since there are no further data to constrain the discussion, we cannot profitably pursue the point. In any case, it is clear that stress is assigned bidirectionally in Auca.⁸

8. Summary

In this article we have considered three superficially separate ways in which rules of metrification respect previously established structure. First, in a grid such as (99a) the

⁸ An additional example of the crossover constraint is provided by Indonesian, where prefixes are systematically unstressed (see Cohn (1987, sec. 3.1)). This is accounted for by assuming that in Indonesian—as in many other languages—prefixes are noncyclic. The Indonesian stress rules, which figure both in the cyclic and in the noncyclic stratum, metrify the string from right to left. The crossover constraint prevents metrification of prefixes since in order to reach the prefix, metrification would have to cross over material that was metrified in the cyclic stratum.

second position is inaccessible to an antepenultimate stress rule because it has been parsed as a dependent of the constituent headed by the first syllable—the opacity effect.

- (99) a. 1 2 3 4
 (* *) * *
 *
 1 2 3
 b. (*) * *
 1 2 3 4 5 6 7
 c. * * * (* *) * *

Second, in a grid such as (99b) the posttonic asterisk is not incorporated into the degenerate foot either by stray adjunction or by application of a stress rule constructing left-headed feet—the closure effect. Our explanation was based on three assumptions: (i) that pace Hayes (1981), there is no convention of stray adjunction, (ii) that construction of metrical constituents respects previously assigned structure and therefore cannot affect the structure of the degenerate foot, and (iii) that metrification is exhaustive, requiring that each of the free asterisks in (99b) be parsed.

Finally, in (99c) the free asterisks 1 2 3 lying to the left of the metrical constituent are not reachable by a parse that originates from the right edge of the word—the crossover effect. Rather, the pretonic string is metrified from left to right as (1 2) (3) rather than as (1) (2 3). We obtained this result by requiring that the parsing procedure not cross over a previously established constituent in its sweep from one edge of the word to the other to satisfy exhaustive metrification.

Our major result is that each of these effects—opacity, closure, and crossover—follows from one simple requirement: that the rule parsing a grid line into metrical constituents only operates on free, unbracketed asterisks. Stated differently, as soon as it encounters a full-fledged metrical constituent, the parsing procedure ceases. Most of our examples involved stress shifts arising under enclisis. Since nonenclitic suffixes did not display the opacity and closure effects, we hypothesized that respect for previously established metrical structure is a property of stratum II, noncyclic suffixes. This in turn makes sense under Halle and Vergnaud's (1987) hypothesis that the stratum I, cyclic suffixes activate the Stress Erasure Convention that prevents metrical structure from passing from one cycle of affixation to the next. To the extent that this correlation between respect for previous metrical structure and stratum II affixation continues to hold up as more languages are studied, we have evidence for the organization of the phonological rules as shown in (100).

- (100) Stratum I Cyclic application
 Stress Erasure Convention
 Metrification: right to left/left to right
 Stratum II Noncyclic application
 Metrification: left to right/right to left

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