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A Reexamination of the Old English Prosody *

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1. Introduction

Old English prosody (i.e. phenomena relating to the prosodic hierarchy, such as stress, versification, and the like) is one of the topics on which various researchers have been tackling each other on account of its fine relationship to some segmental phenomena (Keyser and O'Neil (1985, hereafter K & O), Kaminashi (1989), Okazaki (1989), Tanaka (1990a), Yokotani (1990), and Dresher and Lahiri (1991, henceforth D & L)). More specifically, the prosody of Old English is fairly interesting for the researchers because how such segmental rules should be properly formulated relies wholly on what kind of foot the language is defined to have; hence, a plausible theory of Old English prosody must not only represent the clear and fine relationship between the Old English stress system and the segmental rules but also the assigned feet and the formulated rules must account correctly for stress and segmental phenomena, respectively.

Let us now examine Old English stress and its related phenomenon called high vowel deletion below. First, the distribution of stress may be generalized as in (1), and its relevant data are given in (2):

(1) a. Primary stress falls on the initial syllable of a word ((2a-c)).

b. Secondary stress falls on the non-final syllable preceded by one heavy syllable ((2a)) or two light syllables ((2b)).

(2) a. After one heavy syllable:

sĭngènde 'sing' (pres.part.) (after CVC)

hlā́afòrdes 'lord' (gen.sg.) (after CVV)

b. After two light syllables:

ǽDelĭnges 'prince' (gen.sg.) [1]

c. After one light syllable:

ǽDeling 'prince' (nom.sg.)

The syllable *-De-* in (2c) does not have secondary stress because it is preceded by a single light syllable, and neither does the syllable *-ling-* because it is final. Second, the language has a deletion rule that may be stated roughly as in (3), and its examples are shown in (4):

(3) An open high vowel is deleted if it is preceded by one heavy syllable or two light syllables.

(4) a. After one heavy syllable:

wórdu 'word' (nom.sg.) (after CVC)
ϕ

bráadinu 'breadth' (nom.sg.) (after CVV)
ϕ

wórdum 'word' (dat.ins.pl.) (after CVC)

b. After two light syllables:

wérudu 'troop' (nom.sg.)
ϕ

c. After one light syllable

límu 'limb' (nom.sg.)

The high vowel of *wordum* in (4a) is not deleted because it is closed by a consonant, and neither is that of *limu* in (4c) because, in this case, it is preceded by a single light syllable.

Suppose, as a first approximation, that the rule might have nothing to do with the distribution of stress, and as a consequence, with the type of foot of Old English; then, the deletion rule might be formulated simply as in (5):

(5) High Vowel Deletion (HVD)

$$\underset{[+\text{ high}]}{V} \rightarrow \phi \; / \left\{ \begin{matrix} CVC \\ CVV \\ CVCV \end{matrix} \right\} C \; \_\_$$

(cf. Dresher (1978))

Looking closely at the formulation in terms of segments, one may

naturally ask some questions in the following lines:

(6) a. Why is it that the rule's environment should be specified just for CVC, CVV, or CVCV but not for CV?

b. Why is it that deletion should take place *after* those syllable structures but not before them or elsewhere?

But any segmentally-formulated version of HVD will probably provide us no answers to these questions since the choice of the deletion environment counts simply as an accidental one; in other words, such a version implies that it is a genuine accident for Old English to have the deletion rule. An approach with HVD based on segmental structures in this way, however, should not only be said to be uninteresting but contradicts the currently-developed notion of 'coherence' (cf. D & L):

(7) Phonological Coherence
The fact that the phonology of a language involves certain rules and processes is not accidental; rather it is to be attributed to the mechanisms drawn from a set of universal principles.

From a point of view of this notion, it is an inevitable consequence that Old English has such a deletion rule or that a high vowel is deleted in such an environment, and the consequence can possibly be ascribed to the mechanisms drawn from a set of universal principles. K & O were the first to challengingly relate the deletion environment to the Old English foot, a mechanism drawn from a set of universal principles and parameters.

In the following sections, we will examine the evolution of the notion 'coherence,' especially, how conceptual and empirical problems have been resolved and what kinds of problems have been left unresolved. We will first critically review three previous analyses (K & O, Kaminashi (1989), D & L) in section 1, and then present our theory of Old English prosody in section 2.

1. The Evolution of the Notion 'Metrical Coherence'

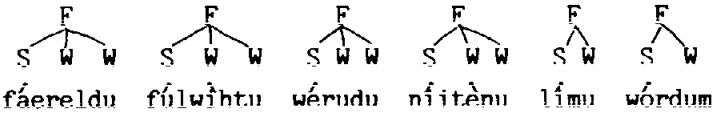
1.1. Keyser and O'Neil (1985)

K & O attempt to give an answer to the questions in (6) by advocating a biplanar analysis of stress and vowel deletion. They propose two foot construction rules, one for stress assignment ((8a)) and the other for HVD ((8b)):

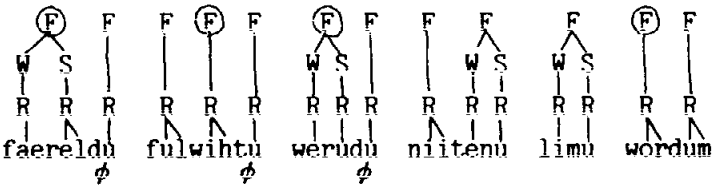
(8) a. Gather rimes into a left-headed, unbounded foot.
b. Gather rimes from left to right into binary, quantity-sensitive, right-headed feet.

The metrical plane on which (8a) applies is different from the one on which (8b) applies; that is, for each word, two distinct metrical planes should be assumed as in (9): [2, 3]

(9) a.



b.



As shown in (9a), primary stress is assigned correctly on the initial syllable of each word; and note in (9b) that the high vowel to be deleted is located after a foot (i.e. the encircled one) and that even after a foot it is not deleted if the rime in question branches (as in *wordum*). K & O thus formulate the deletion rule as below:

(10) K & O's HVD

$$\begin{array}{c} V \\ | \\ [+\ \text{high}] \end{array} \rightarrow \phi \ / \ F \left[\begin{array}{c} R \\ | \\ \underline{\quad} \end{array} \right]$$

This version of HVD not only predicts deletion phenomena observed in (9b) correctly, but also has those advantages that are not obtained for the segmentally-formulated HVD in (5):

(11) a. Any of CVC, CVV, and CVCV constitute a foot but a single CV does not; that is why the deletion environment is specified for the three. The choice of the three is not accidental (cf. (6a)).

b. The success of the formulation lies in the access to the level at which syllable structures are organized: the foot level.

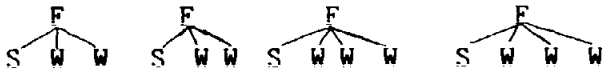
K & O's approach, however, has several theoretical and empirical problems that remain to be solved:

(12) a. Can the access to the specific syllable structure (i.e. rime branchingness) also be ascribed to the foot level?

b. Why should deletion occur *after* a foot but not before it (cf. (6b))? Is it simply an accident?

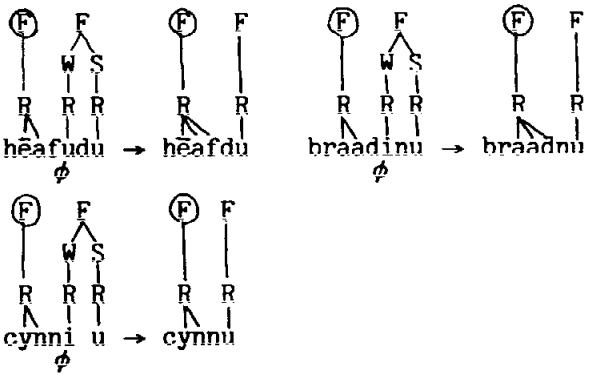
c. Is a uniplanar approach possible?

d. All the distributions of secondary stress are not accounted for:



fúlwìhtu nîitènu áeDelînges háalignèsse ...etc.

e. Certain high vowels are incorrectly deleted in spite of the match of the environment:



As for (12c), K & O adduce no independent evidence in favor of the feet constructed by (8b), and distinct metrical planes are harder to learn than a single metrical plane; as seen in (12d), the unbounded feet incorrectly predict that each syllable con-

cerned might have no secondary stress since it occupies a W position; and moreover, in each example of (12e), after an application of HVD, a high vowel might be deleted once again because it is situated after a foot (i.e. the encircled one), which contradicts the fact that it remains intact (cf. Yokotani (1990)).

In section 1.2., we will examine how these problem are resolved and, at the same time, how the fruits obtained are preserved by Kaminashi's approach.

1.2. Kaminashi (1989)

In Kaminashi's analysis, problems (12b-d) are resolved by the judicious assumptions that stress-bearing elements are moras but not syllables and that Old English has not just binary feet but also binary superfeet. She puts forward the following rules and parameter values for Old English stress system (F_i means a usual foot while F_j means a superfoot):

(13) a. Mark the final consonant extrametrical.
b. Assign grids to vowels and segments in the rime.
c. F_i parameter settings: binary, left-headed, left-to-right.
d. F_j parameter settings: binary, left-headed, right-to-left.
e. W parameter settings: unbounded, left-headed.

The crucial points for her proposed system of Old English stress are that stress-bearing elements are moras, not syllables as in (13b) and that Old English has superfeet as in (13d). [4] Both of the points are also justified in Tanaka (1990). The effects of (13) are illustrated clearly in (14): [5, 6]

(14)

W	(x)	(x)	(x)
F_i	(x x)	(x x)	(x)
F_j	(x)(x x)	(x)(x x)	(x x)
R	(x)(xx)(x)	(xx)(xx)(x)	(x x)(x)
	fáerel du	fúl wìh tu	wéru du
	ϕ	ϕ	ϕ

```
W   (x       )    (x   )   (x     )
F2  (x       )    (x   )   (x     )
F1  (x   x   )    (x   )   (x   x)
R   (xx)(x x)     (x x)    (xx)(x)
    nîi tènu      lîmu     wór du<m>
```

Here, grids on the W (i.e. word) level represent primary stress whereas grids on the F_2 level represent secondary stress; hence, the metrical structures in (14) appear to capture Old English stress correctly. Kaminashi, furthermore, addresses her full attention to the F_1 grids on the high vowels which are to be deleted, although even a high vowel with an F_1 grid is not deleted if it is closed like *wordum*; and she therefore formulates HVD in terms of an F_1 grid as below:

(15) Kaminashi's HVD

a. x-delinking

```
F1  x   →   φ
R   x
    V [+ high]
    |
    R
```

b. x-deletion

```
R x   →   φ
```

c. ɢ-delinking

```
V
≠
R
```

She construes HVD as three processes: first, an F_1 grid on a high vowel whose rime is non-branching is delinked by (15a); second, the stray grid on the R level is deleted; and finally, the vowel with no grid loses its status as a syllable and disappears. These steps are illustrated in (16):

(16)

```
W   (x       )      (x       )      (x       )
F2  (x   x   )      (x   x   )      (x   x   )
F1  (x)(x    x)     (x)(x    )      (x)(x    )
R   (x)(xx)(x)  (15a) (x)(xx) x  (15b) (x)(xx)
    faerel du    →    faerel du    →   faerel du

    (x    )
    (x   x)
    (x)(x )
(15c)(x)(xx)
  →  faereld
```

There are several advantages in the analysis by Kaminashi, main ones of which can be summarized as below:

(17) a. The requirement 'after a foot' is now unnecessary: any high vowel with an F_1 grid is deleted.

b. The redundancy of biplanar metrical structures is now lost: the feet constructed account for both

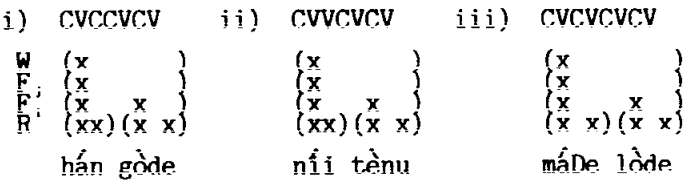
stress and HVD.

The reason why the lack of the requirement is favorable is that the deletability of the vowel concerned is determined not by the foot positioned accidentally before it but by the foot dominating it; then it follows that the approach without such a requirement reflects coherence in a more legitimate way than the one having it. Furthermore, the vowel to be deleted does not have an F_1 grid, so that it is a weak vowel; that is why it is qualified to be deleted.

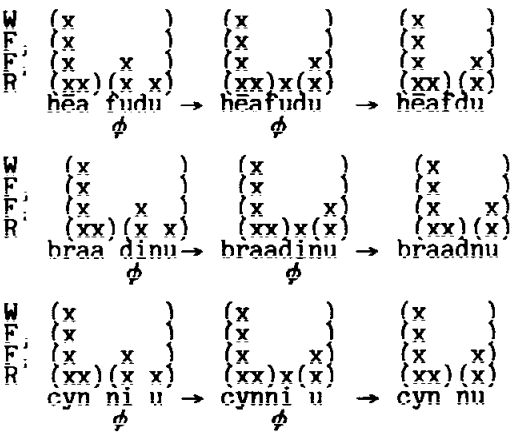
Her approach, however, suffers from some problems that are left unresolved:

(18) a. Can the access to the specific syllable structure (i.e. rime branchingness) also be ascribed to the foot or F_1 level?

b. Secondary stress (F_1 grids) of certain words is not assigned systematically:



c. Certain high vowels are incorrectly deleted in spite of the match of the environment:



As illustrated in (18b), the syllable in question would have no secondary stress in each configuration of (i-iii) since it is

provided with no F_1 grid; and in (18c), after an application of HVD, the final high vowels might incorrectly be deleted once more because they have F_1 grids, as was just the case with K & O's approach.

In what follows, we will show that D & L neatly resolve some of the problems by devising a new foot inventory —— the *Germanic foot*.

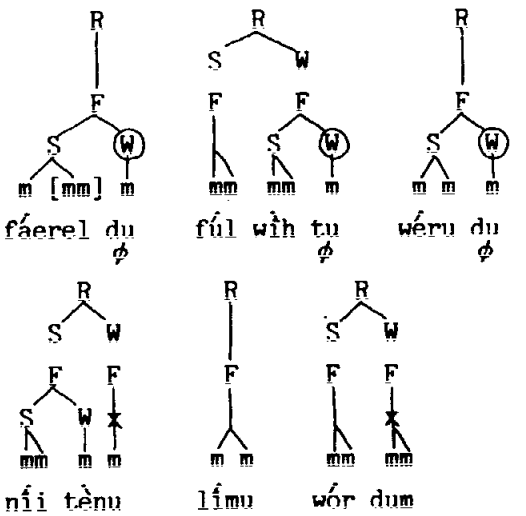
1.3. Dresher and Lahiri (1991)

D & L's advocated stress system for Old English is given in (19):

(19) a. From left to right, build binary, quantity-sensitive left-headed trees whose left branch contains at least two moras.
b. Build a left-headed unbounded tree.
c. Defoot a final weak nonbranching foot.
d. Adjoin resulting stray syllables to the preceding foot.

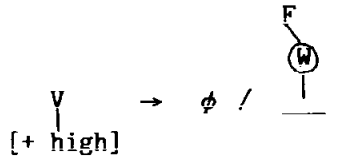
The feet constructed by (19a) hold not only for Old English but for early Germanic, so that D & L call them the Germanic foot. The instances to which (19a-d) apply are as below: [7, 8]

(20)



Note here that the high vowel to be deleted is dominated by the W position of an F. D & L therefore formulate HVD simply as in (21):

(21) D & L's HVD



This formulation is ingenious in that it succeeds in deleting only a weak vowel and that rime branchingness does not need to be encoded into the rule itself because a branching rime is never dominated by a weak position.

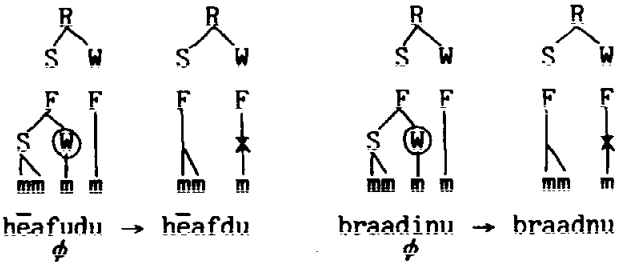
Advantages of D & L's approach can be summarized in the following way:

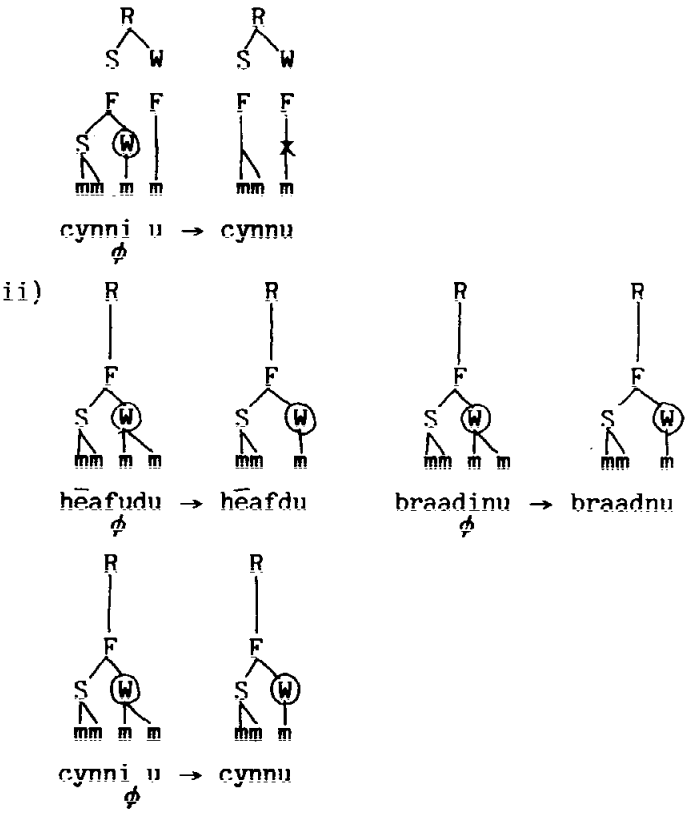
(22) a. The requirement 'after a foot' is again unnecessary: any high vowel with the weak branch of an F is deleted. Deleting a weak vowel is natural and not an accident.

b. The deletion environment need not access to rime branchingness, but just to the foot level.

c. Problems of incorrect deletions are settled, if D & L assume that HVD is ordered before Defooting (19c) and Stray Syllable Adjunction (19d). If the ordering is just the opposite, HVD will apply twice incorrectly as in ii): [9]

i)



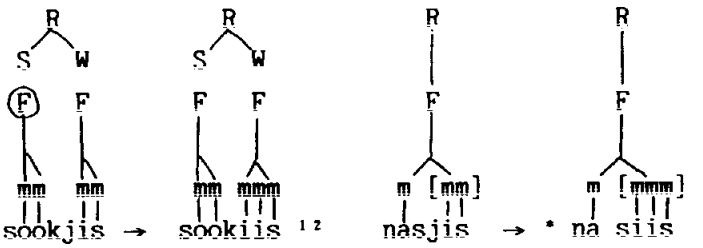


Another advantage is seen in D & L's framework: they succeed in formulating not only HVD but also Sievers's Law in terms of an F. [10] Sievers's Law is observed in Gothic, another Germanic language, and can be generalized in (23a):

(23) a. Sievers's Law (SL)
[i] occurs after a heavy syllable or a sequence of light syllables, whereas [j] occurs after a single light syllable.

b. /sookjis/ → [sookiis] 'seek'
/mikiljis/ → [mikiliis] 'glorify'
/nasjis/ → [nasjis] 'save'
/stoojis/ → [stoojis] 'judge' [11]

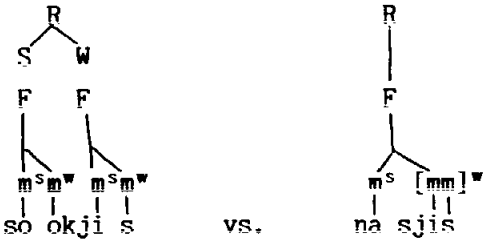
c.



d. D & L's Vocalization

Add a mora after a foot.

e.



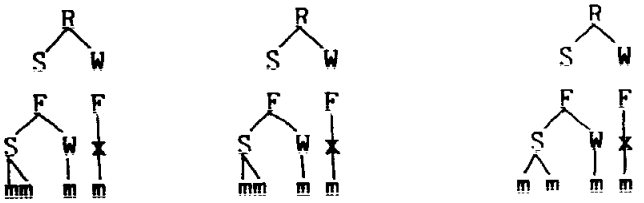
As shown in (23c), vocalization of /j/ to [i] occurs after an (encircled) F, so that D & L formulate the rule as in (23d). This formulation is supported by the fact that, as in (23e), mora insertion after a foot leads to add a mora to a strong mora while mora insertion elsewhere amounts to addition of a mora to a weak mora; the addition to a weak position is unfavorable since the position is considered to be 'frozen,' and that is why the rule applies after a foot.

It is unfortunate, however, that we should point out some problems from which this approach suffers, which are given below:

(24) a. There is a cost in adding the Germanic foot to the foot inventory in that the inventory excessively expands and that the foot does not have an independent motivation. Is it possible to characterize Old English stress by an ordinary foot?

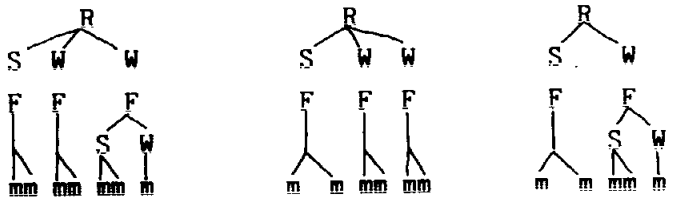
b. Secondary stress of certain words is not assigned systematically:

i) CVCCVCV ii) CVVCVCV iii) CVCVCVCV



hán gòde nîi tènu máDe lòde

c. Certain words are provided with secondary stress incorrectly:



* háalignèsse cf. áeDelìnges áeDelìnga

As to (24a), D & L regard Cayuvava as a candidate having the Germanic foot, but the stress locations of this language are also analyzable by an ordinary foot without any inconsistent stipulations (Haraguchi (1991)); as in (24b), Kaminashi's problem in (18 b) remains unresolved in D & L's framework; and the Germanic foot might assign secondary stress to *-lig-* in (24c), so that it should be deleted anyhow, but unfortunately, clash deletion does not work here since it would delete secondary stress of *aeDelinges* or *aeDelinga* incorrectly.

In what follows, we will present a more adequate analysis in which all of these empirical and conceptual problems seen thus far do not arise and yet HVD and SL are coherent to the mechanism drawn from a set of universal principles. The crucial assumption is that foot assignment should apply by taking morphological boundaries into account.

2. What is the Truth of the Issues?

We will first propose that Old English or other early Germanic languages have the following parameter values with respect to prosodic categories (cf. Tanaka (1990b)):

(25) a. Mora: all rime segments.

b. Foot: $(\underset{M}{*}\ \underset{M}{.})$ / Left-to-Right

c. Superfoot: $(\underset{F}{*}\ \underset{F}{.})$ / Right-to-Left

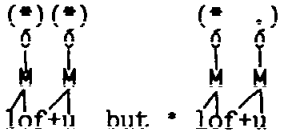
d. Phonological Word: $(\underset{SF_1}{*}\ \underset{SF_2}{.}\ \ldots\ \underset{SF_n}{.})$

(25a) specifies that any rime segment counts as a mora; (25b) that Old English foot pairs two moras from left to right with the left mora strong; (25c) that the language has superfeet which pair two feet from right to left; and (25d) that a phonological word is left-headed and unbounded, which gather all superfeet below. We assume neither defooting nor extrametricality because there seems to be no evidence in favor of either of these, but the superfeet assigned have some independent motivations as seen in footnote 4.

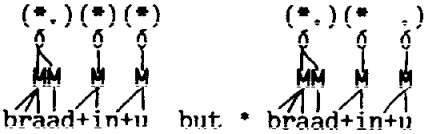
Second, the account of Old English stress needs the assumption:

(26) All morphemes constitute a domain of foot assignment; that is, a foot is not located across a morpheme boundary (a morpheme boundary is depicted as +):

a. (*)(*) (* .)



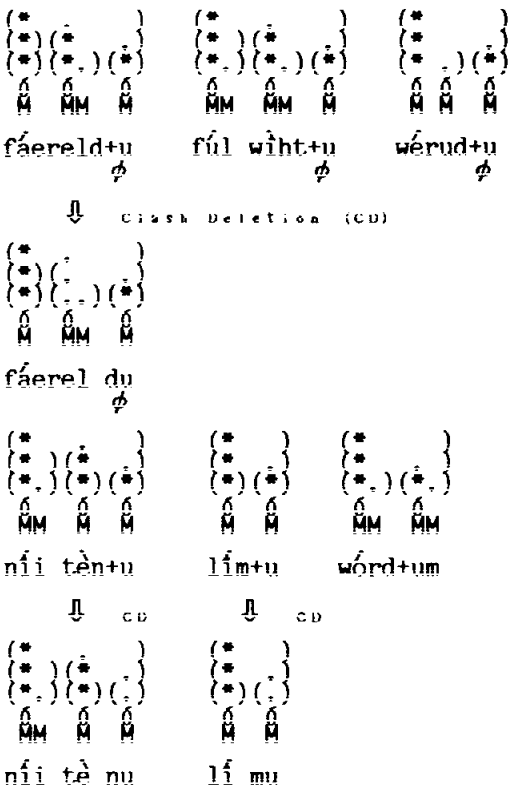
b. (*.)(*)(*) (*.)(* .)



The case where a morpheme constitute a domain of foot assignment is also found in English (Halle and Vergnaud (1987)) and Japanese (Tanaka (1990c)).

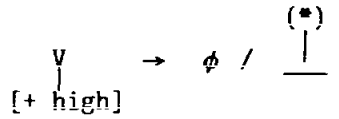
Given the above assumptions, then, Old English words are, for example, provided with the following prosodic structures: [13]

(27)



Here, the representation below an arrow indicates an output after clash deletion; and the head of a superfoot represents secondary stress whereas the head of a foot implies that the vowel dominated by it does not undergo reduction. It is to be noted that stress facts are characterized properly and that the high vowel to be deleted is dominated by a degenerate or unary foot. It then follows from the latter point that HVD can be formulated simply as in (28):

(28) HVD



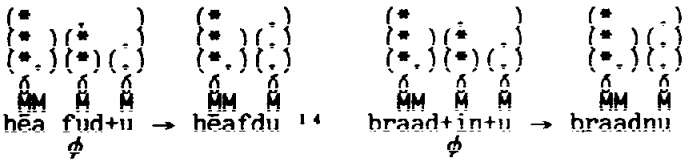
The reason why a high vowel dominated by *a unary foot with a head* is deleted is that a unary foot is degenerate or defective in nature and that a headless foot predicts a vowel to undergo reduction in advance but not deletion; hence, the factors of un-

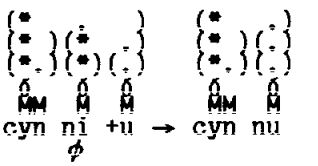
arity and headfulness are crucial here.

Let us now examine how the problems from which either of the previous analyses suffer can be solved in our framework:

(29) a. The deletion environment does not access to rime branchingness, and is also located at the weak position of a superfoot (i.e. a stressless position).

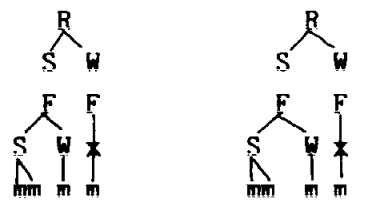
b. Problems of incorrect deletions are settled again:





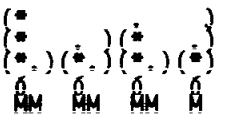
c. Problems of systematic exceptions to Kaminashi's and D & L's framework do not arise here:

i) CVCCVCV ii) CVVCVCV iii) CVCVCVCV



cf. hēafudu vs. * hán gòde

d. In *haalignesse*, the lack of secondary stress on its second syllable is predicted correctly:



As shown in (29b), the final high vowel of each output of HVD

(28) is, thanks to the effect of clash deletion, no more dominated by a foot having its head, so that the rule does not apply twice but vowel reduction is predicted to occur; and as with (29c), the reason D & L's (resp. Kaminashi's) approach fails to assign secondary stress to the penult of such kinds of words is that the syllable is always dominated by the weak position of a Germanic foot (resp. a superfoot) to make HVD apply to a stressless vowel: compare ***hangode*** with ***heafudu***, which has the same syllable structure with the former word and whose penultimate syllable is to be deleted by HVD. In our framework, any high vowel to be deleted is also usually dominated by the weak position of a superfoot (see (27)), but the only unusual cases are words like ***heafudu***, since the penult of this word is dominated by the ***strong*** position of a superfoot although it is to be deleted; the very fact, however, makes secondary stress fall correctly on the penult of each of the words in (29ci-iii).

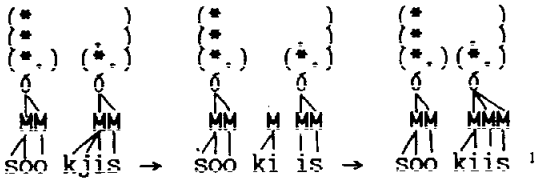
Our approach to Old English prosody also makes it possible to give a foot-based account of SL. The examples are the following:

(30) Sievers' Law

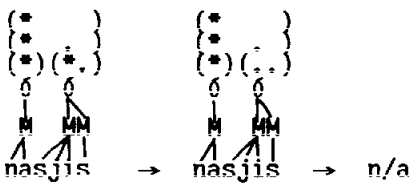
a. /sookjis/ → [sookiis]
/nasjis/ → [nasjis]

b. Vocalization

c.



[15]



Vocalization (30b) states that /j/, which is preceded by a consonant, obtains a mora of its own if it is followed by a syllable with the head of a foot; the former example of (30c), then, undergoes the rule, while the latter does not because /j/ is followed by a syllable dominated by a foot whose head is lost on account of clash deletion. Our account of why /j/ should obtain a mora just *before a syllable with a grid* is almost the same as D & L's (recall (23e)): a syllable with a grid counts, in a sense, as strong since it does not undergo reduction, whereas one dominated by a headless foot counts as weak since it does undergo vowel reduction, so that only a strong syllable like *-bjis-* is qualified to obtain another mora in itself whereas a weak syllable like *-sjis-* is not.

3. Concluding Remarks

We have so far seen the theoretical and empirical evolution of the Old English prosody. Specifically, we have critically reviewed three approaches to stress and its related phenomena, and have examined how one approach has left its problems unresolved and how the later one has tackled them well.

All of these approaches including ours have evolved, aiming toward one and the same target: to shed new lights upon 'phonological coherence' through the analysis of the Old English prosody. It is true that, as an empirical issue, it is important to account for some stress facts or segmental phenomena properly, but, at the same time, it is no less important that the account is based on phonological coherence. Our account of Old English prosody may still suffer from some empirical problems; even if so, it should be improved just in accordance with this concept.

As given in definition (7), the effects of rules and processes of a language are to be attributed to the mechanisms drawn

from a set of universal principles. In phonology, the mechanisms in question happen to be, in most cases, prosodic categories such as mora, syllable, foot, and the like; in such cases, rules and processes may be called *prosodically coherent* (in D & L's terms, *metrically coherent*). For instance, HVD, SL, vowel reduction, and resolution are all related to the Old English foot specified, as we have seen. [16] There are other processes related to feet, such as vowel reduction (Rappaport (1984)), vowel deletion (Archangeli (1984)), vowel lengthening (Haraguchi (1991)), hypocoristic formation (Poser (1984, 1990)), and stump word formation (Honma, Okazaki, Homma, Tanaka, and Kazumi (1990); phenomena which are coherent to moras are compensatory lengthening (Hayes (1989a), Tanaka (1989)) and vowel shortening (Tanaka (1989)); and those coherent to syllables are various forms of reduplication (McCarthy and Prince (1986, 1989, forthcoming)). These rules and processes are all lexical while effects of postlexical rules should also be ascribed to upper prosodic categories like phonological phrase, intonational phrase, and so on (Nespor and Vogel (1984)).

Problems we now face are what other processes are considered to be prosodically coherent and whether coherence can be observed in other areas of phonology or, for that matter, in other components of grammar. We must await further research to find a clue to these problems.

Footnotes

* This paper originates in the talk given on the monthly meeting of the Tsukuba Colloquium of English Linguistics held on June 30, 1991. I would like to thank Shosuke Haraguchi and Yukio Hirose for their valuable suggestions. I am also grateful to the followng people for their useful comments and proofreading: Takeru Honma, Yukiko Kazumi, Hiroko Utsubo, and Yasumichi Hatanaka. I accept sole responsibility for any inadequacies.

[1] A voiceless interdental fricative consonant is depicted as *Đ* here and below. In this case, however, it is pronounced as voiced because of its location between vowels.

[2] Other cases in which the distinct metrical plane is assumed from the stress plane are vowel reduction in Tiberian Hebrew (Rappaport (1989), Halle and Vergnaud (1987)), vowel deletion in Yawelmani (Archangeli (1984)), vowel lengthening in Nakizin Japanese (Haraguchi (1991)), stump word formation in English (Honma, Okazaki, Homma, Tanaka, and Kazumi (1990)), and the like.

[3] Here, F and R indicate a foot and a rime, respectively.

[4] According to Kaminashi (1989), superfeet in Old English have some independent motivations: they constitute a domain of i-umlaut (vowel fronting) and restoration (vowel backing).

[5] For expository purposes, Halle and Vergnaud's (1987) representation is adopted here instead of Kaminashi's original one since they are basically equivalent.

[6] A binary foot is not constructed on the first and the second syllable of *faereldu*, since, if so, the syllable *-rel-* might be split by the foot boundary. Such a case is eliminated by the Strict Layer Hypothesis (Hayes (1989b), Tanaka (1989, 1990a, 1991)) or her Constituent Integrity Principle. After the construction of all prosodic constituents, this particular word may undergoes clash deletion, losing its secondary stress, although Kaminashi does not refer to the rule.

[7] The final nonbranching foot with an x mark means that it is promised to be defooted; hence, the representations in (20) are the ones before the application of rules (19c) and (19d).

[8] A root is indicated as R here.

[9] D & L do not mention the ordering.

[10] Kaminashi also analyzes Sievers's Law, but her account is not foot-based but syllable-based since she regards the rule as a resyllabification process; so, her formulated rule is rather complicated, needs an odd syllabification (cf. Kaminashi's (56)), and is not clear why /j/ should turn into [i] just in the environment concerned. Instead, as seen below, D & L's and our accounts are foot-based and regard the rule as mora addition; so, they are fairly simple and make clear why /j/ should turn into [i] just in the environment: the syllable with /j/ in question is located in the strong position of a foot, and that is why /j/

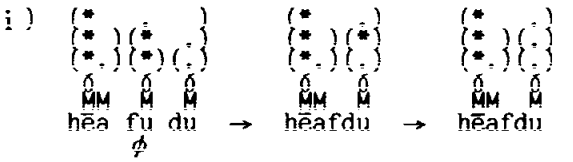
is qualified to obtain a mora and turns into [i].

[11] /j/ never changes into [i] if it is in the onset-initial position, or if it is not preceded by a tautosyllabic consonant.

[12] /j/ is interpreted as [i] when associated with a mora and as [j] when unassociated with it.

[13] As mentioned in footnote 6, the first syllable of *faerel-du* has a unary foot of its own because of the requirement of the Strict Layer Hypothesis.

[14] We assume with Kaminashi (1989) and Tanaka (1990b) that a short diphthong is assigned one mora while a long diphthong like *ēa* is assigned two moras. Incidentally, the derivation is, strictly speaking, intermediated by the following stage:



The head of the superfoot over *-du-* on the second stage is erased automatically, because all grids are continuous vertically.

[15] There is a long vowel like *ii* in the phonemic inventory of this language, so that *-hi-* and *-is-* collapse into a single syllable. The mora on *-hi-* is not dominated by any foot, a violation of the Strict Layer hypothesis, so that Refooting applies and the mora occupies the head position of a foot. For details of the relation between the Strict Layer Hypothesis and Refooting, see Tanaka (1990a, 1991).

[16] For a foot-based account of resolution, see D & L.

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