1. Introduction

Optimality Theory (OT) developed by Prince and Smolensky (1993) assumes that cross-linguistic phonological variations solely derive from different rankings of universal constraints. A question naturally arises as to the adequate formulations of constraints for types of phonological entities which appear to be parametrized, and constraints which appear to apply in different domains. There are at least two possible ways of formulating them. One is to simply assume that UG contains a single constraint with a parameter for types or domains, and the other is to assume that UG contains distinct constraints for different types and different domains, and that all of them are present in every language. In this paper, based on stress assignment and its interaction with epenthetic vowels in Mohawk, a northern Iroquoian language studied by Michelson (1988, 1989) and Piggott (1992), and Selayarese, an Oceanic language studied by Mithun and Basri (1986), Goldsmith (1990), and Piggott (1992), I will argue for the latter. In particular, I will claim that UG contains distinct FT-FORM constraints for different foot types, and distinct FILL constraints and distinct NONFINALITY constraints for different domains.

This paper is organized as follows. Section 2 will introduce the basic facts in Mohawk. Section 3 will provide accounts for the relevant facts under OT, employing distinct FT-FORM constraints for different foot types, and distinct FILL constraints for different domains. Section 4 will refine the proposed accounts based on the facts in Selayarese. Section 5 will introduce two species of NONFINALITY for two different domains. Section 6 will discuss important implications of the accounts proposed in this paper for other aspects of the theory. Section 7 will conclude the paper.

2. The Mohawk facts

In this section, I will introduce all the relevant facts in Mohawk based on Michelson (1988, 1989).

2.1. Stress assignment and vowel-lengthening

In unmarked cases, stress falls on the penultimate syllable.

When the stressed penultimate syllable is open, its vowel is lengthened.

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*I am grateful to Moira Yip for her insightful comments and constant encouragement. I am also grateful to the audience of Arizona Phonology Conference, especially Diana Archangeli, Jennifer Cole, Mike Hammond, Jaye Padgett, Donca Steriade, Keiichiro Suzuki, and Cheryl Zoll.

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As the examples in (1) show, a stressed closed penultimate syllable does not get its vowel lengthened.

2.2. Epenthesis

There are four major epenthetic processes in Mohawk. First, epenthetic /e/ is inserted into consonant plus /n/, /r/, or /w/ clusters. Epenthetic /e/ will be represented as e.

Second, epenthetic /e/ is inserted between the first and the second segments triconsonantal clusters except ChC and CsC.

Third, epenthetic /a/ is inserted into consonant clusters resulting from the concatenation of an incorporated noun root and a following verb root or a verb root and a derivational suffix. Epenthetic /a/ will be represented as a.

Fourth, epenthetic /e/ is inserted between a consonant and a word-final glottal stop.

2.3. Augmentation of a subminimal unstressable word

To get stress on the penultimate syllable, a word has to have at least two syllables. Mohawk augments a monosyllabic word by epenthizing the vowel /i/ word-initially. Epenthetic /i/ will be represented as i.
c. k-ya-s [ikyas] 'I put it.'
d. k-tat-s [iktats] 'I offer it.'

Naturally, stress is on epenthetic /i/, and it gets lengthened when it happens to be the nucleus of an open syllable as in (7b).

2.4. Epenthetic vowels and stress assignment.

When an epenthetic vowel occurs in an open penult, it fails to be stressed. Stress assignment totally ignores it, and puts stress on the antepenultimate syllable.

(8) a. te-k-rík-s [tékeriks] 'I put them together.'
b. w-ak-ra-s [wákeras] 'It smells.'
c. wák-at-tr-u [wákátteru] 'I'm dangerous.'
d. ka-naw-k-u [kaná:twaku] 'in the swamp'
e. te-hs-a?ar-rik [tehsa?á:rarik] 'Put the curtains together.'

In contrast, an epenthetic vowel in a closed penult gets stress.

(9) a. wák-nyak-s [wakényaks] 'I get married.'
b. s-rhos [sérhos] 'You coat it with something.'
c. ak-tshe-ʔ [akétsheʔ] 'my container'
d. k-r-kw-as [kerákwas] 'I take it out of something.'
e. te-ka-hruw-nyu [tekahruwányu] 'many objects put in your mouth'

2.5. Epenthetic vowels and augmentation of a subminimal unstressable word

A bisyllabic word in which an epenthetic vowel occurs in an open penult is treated as a monosyllabic word, and affected by augmentation.

(10) a. k-hnrnk-s [ñkhnernks] 'I tie something.'
b. s-riht [iseriht] 'Cook.'

On the other hand, a bisyllabic word with an epenthetic vowel in a closed penult is regarded as bisyllabic, and not affected by augmentation.

(11) a. s-rhos [sérhos] 'You coat it with something.'
b. k-r-haʔ [kérhaʔ] 'I fill it in.'

3. Accounts under Optimality Theory (OT)

In this section, I will propose accounts under Optimality Theory (OT), after introducing its basic concepts.

3.1. Basic concepts

OT is different from the phonological analyses which have been put forth by many phonologists in that it gets rid of any derivational mechanisms. While an output is derived through the application of a set of rules in many of the previous phonological studies, in OT, it is chosen from a set of candidate parses associated with an input.

McCarthy and Prince (1993b) assume that two major components of OT, GEN and constraints, are subject to a set of principles. First, the function GEN takes an input, and assigns it an infinite set of candidate analyses. OT assumes that GEN is constrained by the following principles.
(12) a. Freedom of analysis
   Any amount of structure may be posited.

b. Containment
   No element may be literally removed from the input form. The input form is thus contained in every candidate form.

c. Consistency of exponence
   No changes in the exponence of a phonologically-specified morphemes are permitted.

(McCarthy and Prince (1993b; 8))

The set of candidate forms then is submitted to a hierarchy of constraints for evaluation. OT assumes that UG contains a set of universal constraints, and that the grammar of a particular language is embodied as a ranking of those constraints. Thus, in OT, different rankings of the constraints give rise to cross-linguistic variations. Constraints in OT are not absolute, but violable, and the candidate which minimally violates the constraints in the hierarchy is designated as the output. To be explicit, I list the basic principles of OT below.

(13) a. Violability
   Constraints are violable, but violation is minimal.

b. Ranking
   Constraints are ranked on a language-specific basis; the notion of minimal violation is defined in terms of ranking.

c. Inclusiveness
   The constraint hierarchy evaluates a set of candidate analyses that are admitted by very general considerations of structural well-formedness.

d. Parallelism
   Best-satisfaction of the constraint hierarchy is computed over the whole hierarchy and the whole set. There is no serial derivation.

(McCarthy and Prince (1993b; 4))

Let us see how candidate analyses are evaluated, using a simple schematic example given in (14), where we have four constraints with the ranking C1 > C2 > C3 > C4, and GEN has produced four candidate parses out of some input.

(14) | Candidates | C1 | C2 | C3 | C4 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An asterisk in row i and in column j indicates that candidate i violates constraint j. "*!" denotes a crucial failure. For instance, candidate P1 violates C2 and C3. Evaluation proceeds recursively. P2 and P4 are immediately eliminated as the violations of the highest-ranked constraint C1. P1 and P3 tie on C1 and C2, so the decision between them is based on the rest of the hierarchy. P1 violates C3, but P3 does not. P3 violates the constraints in the hierarchy minimally, and therefore is designated as the output.
3.2. Deriving the Mohawk facts

Now we have enough background on OT to analyze the Mohawk facts from its perspective. In this section, I will show that the Mohawk facts naturally follow from the relevant constraints put in a certain hierarchical order.¹

3.2.1. NONFINALITY » EDGEMOST

As we have seen in 2.1., stress basically falls on the penultimate syllable in Mohawk. The relevant examples are given below again.

(15) a. k-atirut-ha?
    b. k-ohar-ha?
    c. yo-tewey-awak-ht-ha?
    d. k-hrahrho-s
    e. war-i-hne
    f. ohrú?ke
    g. at-khw-a-hr-ahne

We can derive this stress pattern by ordering NONFINALITY and EDGEMOST as follows.

(16) NONFINALITY » EDGEMOST(pkIR)

(17) NONFINALITY
The prosodic head of the word does not fall on the word-final syllable.
(Prince and Smolensky (1993; 45))

(18) EDGEMOST(pk; LIR; Word)
The prosodic head must be on the leftmost/rightmost syllable.
(Prince and Smolensky (1993; 39))

Let us see how the hierarchy in (16) works, using (15a,f).

(19) NONFINALITY » EDGEMOST

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>.ka.ti.rut.há?</td>
<td>*!</td>
<td>o#</td>
</tr>
<tr>
<td>.ka.ti.rut.ha?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.ka.ti.rut.ha?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.ká.ti.rut.ha?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>.oh.ru?ke.</td>
<td>*!</td>
<td>σ#</td>
</tr>
<tr>
<td>.oh.ru?ke.</td>
<td></td>
<td>σ#</td>
</tr>
<tr>
<td>.óh.ru?ke.</td>
<td></td>
<td>σ#</td>
</tr>
</tbody>
</table>

In (19a), except for [.ka.ti.rut.há?], which violates NONFINALITY, all candidates tie on NONFINALITY, so EDGEMOST makes the decision, and .ka.ti.rut.ha? should be taken as the output.

¹See Michelson (1988, 1989) and Piggott (1992) for possible derivational accounts of the Mohawk facts. I will not review these derivational accounts, because the main focus of this paper is to look for the adequate formulations of constraints under OT, and reviewing the derivational accounts is not directly relevant.
which is the minimum violation of EDGEMOST. Similarly, of all the candidates tying on Nonfinality in (19b), [oh.rú.ʔ.ke.] is optimal, minimally violating EDGEMOST.

Now it is clear that the hierarchy in (16) plays a substantial role in the Mohawk stress assignment.

3.2.2. FT-FORM-T(trochaic) | FT-FORM-I(ambic)

3.2.2.1. Mohawk as an iambic language

As in the following examples, a stressed syllable is affected by vowel-lengthening if it is open.

(20) a. k-haratat-s [khará:tats] 'I am lifting it up a little.'
b. wak-haratat-u [wakharátatu] 'I am holding it up.'
c. wak-ashet-u [wakashé:tu] 'I have counted it.'
d. sa-nuhwar-orok [sanuhwarórók] 'Put on your hat.'
e. A-k-atirut-ʌ? [akatirútʌ?] 'I'll pull.'
f. wak-atewey-awak-u [wakateweyawáku] 'I'm fanning myself.'

As Prince (1991) points out, enhancing the quantity of a stressed syllable is clearly a property of iambic languages. Trochaic languages generally do not enhance the quantity of a stressed syllable. The Norton Sound Dialect of Central Alaskan Yupik and Cairene Arabic, whose stress assignments are given the following formal accounts by Hayes (1991), exemplify the above asymmetry between iambic languages and trochaic languages.

(21) A. Norton Sound Dialect of Central Alaskan Yupik
   a. Construct iambs from left to right
   b. Word-final syllables are extra-metrical.
   c. The head of the iamb (LL) gets lengthened to make a canonical iamb (LH).
   d. The scale of prominence: CVV(C), #CVC > CVC, CV

B. Cairene Arabic
   a. Construct moraic trochees from left to right.
   b. Final consonants are extra-metrical.
   c. Degenerate feet are disallowed.
   d. End Rule Right
   e. CVV, CVC, CVVC = μμ, CV = μ

(22) A. Examples of Norton Sound Dialect of Central Alaskan Yupik in Jacobson (1985)
   a. (.qa.ya.)(.pix.ka).ni. => (.qa.yá:)(.pix.ká:).ni. 'his own future authentic kayak'
   b. (.aŋ:)(.yaχ.pá:).ka. => (.aŋ:)(.yaχ.pá:).ka. 'my big boat'
   c. (.qa.ya.).ni. => (.qa.yá:).ni. 'his own kayak'

B. Examples of Cairene Arabic in McCarthy (1979)
   a. *
      *
      (ka.ta)(bi.tu) 'She wrote it.'
   b. *
      *
      .ga.(tó:) 'cake'
Enhancing the quantity of the stressed syllable is a clear indication that Mohawk is an iambic language. However, we cannot easily conclude that Mohawk is an iambic language, because, as will be discussed in the next subsection, Mohawk also exhibits a property of trochaic languages.

3.2.2.2. Mohawk as a trochaic language

Recall that stress basically falls on the penultimate syllable in Mohawk.

Under the view that Mohawk is an iambic language, the above stress pattern is quite strange. It is evident from the discussion of Norton Sound Dialect of Central Alaskan Yupik that iambic languages usually have an alternating stress pattern by putting stress on the head of every iamb. Hayes (1991) attributes this to the absence of higher metrical structures involving End -Rule in iambic languages. Mohawk does not exhibit an alternating stress pattern. Rather, it puts stress only on one syllable, the penult. This conflicts with the characterization of Mohawk as an iambic language. According to Hayes (1991), it is a characteristic of a trochaic language to put stress only on one syllable.

Now, we have to say that Mohawk has the properties of both iambic languages and trochaic languages: (i) enhancing the quantity of the stressed syllable, which is a property of iambic languages, (ii) stressing only one syllable, which is characteristic to trochaic languages. In the subsequent subsections, I will seek a possible way to accommodate a language that looks both trochaic and iambic, like Mohawk.

3.2.2.3. FT-FORM-T | FT-FORM-I

Cayuga, another Lake Iroquoian language, is characterised as an iambic language by Hayes (1991). Hayes gives the following account of the stress assignment in Cayuga.

The following Cayuga examples in Foster (1982) are consistent with (24).

The alternating stress pattern in (25) suggests that Cayuga is an iambic language. Further, Hayes, summarizing the studies on stress patterns in Lake Iroquoian languages such as Chafe (1977), Foster (1982), and Michelson (1988), mentions that Cayuga and some other Lake Iroquoian languages, though inheriting penultimate stress from the trochaic system of Proto-Lake Iroquoian, have evolved iambic stress systems out of it.
Suppose that the development of stress assignment systems in Lake Iroquoian languages involves the competition between a trochaic system and an iambic system. In Cayuga, the iambic system has overridden the trochaic system. Mohawk, which is related to Cayuga, has characteristics of both trochaic languages and iambic languages. This suggests that neither the trochaic system nor the iambic system is overriding the other in Mohawk, which means that both are visible in the core of its stress assignment. It is rather clear that we cannot explain the stress assignment in Mohawk under the assumption that UG contains a single constraint for the foot-form (FT-FORM) with a parameter for foot types, set irrevocably for the entire language, since this predicts that stress patterns in natural languages are either typically trochaic or typically iambic. Instead, we must conclude that UG contains FT-FORM-T(rochaic) and FT-FORM-I(ambic) as distinct constraints.

(26) \text{FT-FORM-T} \\
Feet are trochaic./ Use LL, or H (Heads are bold-faced and italicized.)

(27) \text{FT-FORM-I} \\
Feet are iambic./ Use LL, LH, or H (Heads are bold-faced and italicized.)

The independence of FT-FORM-T and FT-FORM-I leads to the three possible rankings listed below.

(28) a. Either of FT-FORM-T or FT-FORM-I dominates the other, and no higher-ranked constraint forces a violation of the dominating constraint. 

b. Either FT-FORM-T or FT-FORM-I dominates the other, but the effects of the dominated become visible in special cases.

c. FT-FORM-T and FT-FORM-I are unranked with respect to each other so that the effects of both are visible.

(28a) applies to typical trochaic or iambic languages. (28b) may apply to languages like Axininca Campa discussed by McCarthy and Prince (1993a). Consider (29), which demonstrate that the basic stress pattern in Axininca Campa is obtained by constructing iambic feet from left to right.2

(29) a. (.hi.nó.)ki. 'arriba (por el río)'

b. (.i.chì.)(ka.kí.)na. 'él me ha cortado'

A bisyllabic word gets a trochaic stress, as in (30).

(30) a. (.cí.ri.) 'brea de árbol'

b. (.má.to.) 'polilla'

Under the assumption that FT-FORM-T and FT-FORM-I are distinct constraints, the stress pattern in (30) follows from the following ranking of the relevant constraints, as the evaluation of the possible parses for (30a) based on it in (32) shows.

(31) \text{NONFINALITY » FT-FORM-I » FT-FORM-T}

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>FT-FORM-I</th>
<th>FT-FORM-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>(.cí.ri.)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(.cí.ří)</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Maintaining the iambic stress pattern would violate the higher-ranked NONFINALITY constraint. So, in order to respect NONFINALITY, a trochaic stress pattern comes out, violating lower-ranked FT-FORM-I.

---

2All the Axininca Campa examples here are from Payne, Payne, and Santos (1982).
(28c) is clearly a valid logical possibility, but it has never been seriously considered. Here, based on the observation that Mohawk has the properties of both trochaic languages and iambic languages in its core of stress assignment, I would like to claim that (28c) applies to Mohawk, and assume the following.

(33) \text{FT-FORM-T(trochaic) I FT-FORM-I(ambic)} \text{3}

In the next subsection, we will see that vowel-lengthening is an essential property of both a typical iambic language and a language in which FT-FORM-T and FT-FORM-I are unranked with respect each other.

3.2.2.4. Deriving vowel-lengthening

As in the following, a stressed vowel in an open syllable gets lengthened.

(34)

a. k-haratat-s [khará:tats] 'I am lifting it up a little.'
b. wak-haratat-u [wakharatá:tu] 'I am holding it up.'
c. wak-ashet-u [wakashé:tu] 'I have counted it.'
d. sa-nuhwar-orok [sanuhwar:orok] 'Put on your hat.'
e. \(\Delta\)-k-atirút-\(\Delta\)? [\(\Delta\)katirút\(\Delta\)?] 'I'll pull.'
f. wak-atewey-awak-u [wakatweyawá:ku] 'I'm fanning myself.'

The most natural interpretation of vowel-lengthening in OT is to consider that an empty mora is parsed after a vowel. For instance, (34a) should be parsed as .kha.rá:tats. Parsing an empty structure violates \text{FILL}.

(35) \text{FILL}

Syllable positions are filled with segmental material. (Prince and Smolensky (1993; 25))

The optimal parse for (34a), involving an empty mora, clearly violates \text{FILL}. The basic concept of OT, however, is that a constraint is violable especially to satisfy a higher-ranked constraint. Now, the issue is what kind of constraint is forcing a violation of \text{FILL}. Two candidates easily come to mind. They are \text{PK-PROM} and \text{WSP}.

(36) \text{Peak-Prominence (PK-PROM)}

Peak (x) Peak (y) if \(lxl > lyl\). (Prince and Smolensky (1993; 39))

(37) \text{Weight-to-stress Principle (WSP)}

Heavy syllables are prominent in foot structure and on the grid. (Prince and Smolensky (1993; 53))

However, neither of them guarantees that a vowel in a stressed open syllable always gets lengthened. PK-PROM simply requires stress to be on the heaviest of the available syllables. In a case like (34f), \text{wak-atewey-awak-u}, which consists only of light syllables, it allows stress to be on any one of them, because they are all equal in prominence. In this case, PK-PROM cannot force the stressed syllable to be heavy, but the stressed vowel gets lengthened, as in the actual form of (34f), \text{[wakatweyawá:ku]}. The same is true of WSP. WSP simply requires that a heavy syllable be the head of a foot if there is one. It has nothing to say about a foot consisting only of light syllables like (LL). Like PK-PROM, WSP is silent for a word entirely consisting of light syllables. The

\text{3}\text{FT-FORM constraints could be restated in terms of the positions of the heads of feet (cf. Kager (1993) and Hewitt (1994)). This kind of possibility, however, does not affect my arguments in this paper, so I will keep to the simplest formulations of FT-FORM constraints in (30) and (31).}
following evaluation of the possible candidates best satisfying NONFINALITY » EDGEMOST for (34f) makes the point clearer.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>WSP</th>
<th>PK-PROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. .wa.ka.te.we.ya.wá.ku.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. .wa.ka.te.we.ya.wáj.ku.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. .wa.ka.te.we.ya.wá.ku.</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

In (38a), stress falls on the penultimate syllable, and it does not undergo vowel-lengthening. In (38b), in contrast, the stressed penultimate syllable undergoes vowel-lengthening. (38b) is the parse to be designated as optimal. However, neither WSP nor PK-PROM can distinguish (38b) from (38a), because both satisfy them. Thus, we have to conclude that vowel-lengthening in Mohawk is due to something other than WSP and PK-PROM.

Recall that we have assumed the following for Mohawk.

(33) \text{FT-FORM-T(rhocaic) $|$ FT-FORM-I(ambic)}

Interestingly, vowel-lengthening naturally follows from (33). Prince (1991) claims that iambic languages and trochaic languages are subject to the hierarchies in (39a) and (39b), respectively, with respect to the optimality of feet.

(39) a. Iambs: LH > \{LL, H\} > L
b. Trochees: \{LL, H\} > HL > L

The bold-faced feet are the acceptable feet. (33) requires both FT-FORM-T and FT-FORM-I to be respected. In order to satisfy both of them, stress assignment in Mohawk must employ the feet acceptable to both FT-FORM-T and FT-FORM-I, and it is clear from (39) that H is the only foot which is acceptable to both FT-FORM-T and FT-FORM-I. All other feet including LL are not consistent with one of them, once prominence is assigned to them.4

It is clear that vowel-lengthening, which changes a stressed open syllable to a heavy syllable, is driven by (33). To satisfy FT-FORM-T and FT-FORM-I, a stressed open syllable undergoes vowel-lengthening to be heavy.5 Otherwise, one of them would not be satisfied. In OT terms, FT-FORM-T $|$ FT-FORM-I force an empty mora to be parsed after a stressed vowel in an open syllable, violating FILL. The following evaluation of the possible candidates for (34f) shows that Mohawk has the ranking FT-FORM-T $|$ FT-FORM-I $|$ FILL.

(40) FT-FORM-T $|$ FT-FORM-I $|$ FILL

<table>
<thead>
<tr>
<th>Candidates</th>
<th>FT-FORM-T</th>
<th>FT-FORM-I</th>
<th>FILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>.wa.ka.te.we.ya.(wáj.ku)</td>
<td>* !</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>.wa.ka.te.we.ya.(wá.ku)</td>
<td></td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>.wa.ka.te.we.(ya.wá.ku)</td>
<td></td>
<td>!</td>
<td></td>
</tr>
</tbody>
</table>

4Under the assumption that the stress bearing unit in trochaic languages is a mora rather than a syllable, there should be two possible ways of representing stress on H. One is to put stress on the first mora, and the other is to put stress on the second mora. The former, conforming to FT-FORM-T, should be preferred. One might wonder whether or not this stress pattern on H is consistent with FT-FORM-I. I assume, following Hayes (1991), that the stress bearing unit is a syllable not a mora in iambic languages. Then, it does not make any difference to iambic languages whether the first mora bears stress or the second mora bears stress. Thus, H whose first mora bears stress is acceptable to FT-FORM-T and FT-FORM-I.

5(34f), which consists entirely of CV syllables, clearly shows that CV is light and has to be affected by vowel-lengthening.
CVC is heavy as it is, so it can form a foot acceptable to both FT-FORM-T and FT-FORM-I without parsing an empty mora, as in (41).

(41) a. k-atirut-ha? [katirútha?] ‘I pull.’
b. k-ohar-ha? [kohárho] ‘I attach.’
c. yo-tewey-awak-ht-ha? [yoteweyawákhtha?] ‘fan’
d. k-hrahrho-s [khrahros] ‘I pull it ashore.’
e. warí-hne [waríhne] ‘at Mary’s’
f. ohru?ke [ohru?ke] ‘in the morning’
g. at-khw-a-hr-ahne [atekhwáráhne] ‘on the table’

Now, the following ranking has been confirmed.

(42) FT-FORM-T | FT-FORM-I » FILL

It is rather clear that EDGEMOST dominates FILL. Otherwise we must seek out a closed syllable further from the edge without parsing an empty mora. Let us make sure of this point, using [wakharatá:tu] in (34b).6

(43) EDGEMOST » FILL

<table>
<thead>
<tr>
<th>Candidates</th>
<th>EDGEMOST</th>
<th>FILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>.wak.ha.ra.(tág.)tu.</td>
<td>σ#</td>
<td>*</td>
</tr>
<tr>
<td>.(wák.)ha.ra.ta.tu</td>
<td>σσσσ#!</td>
<td></td>
</tr>
</tbody>
</table>

Notice that both candidates in (43) with stress on a heavy syllable satisfy FT-FORM-T | FT-FORM-I, so these two constraints can be eliminated from our consideration. From (16) and (43), (44) obtains.

(44) NONFINALITY » EDGEMOST » FILL

Now, we have the following rankings of the relevant constraints.

(45) a. NONFINALITY » EDGEMOST » FILL
b. FT-FORM-T | FT-FORM-I » FILL

With Mohawk, natural languages exhaust all three possibilities arising from the independence of FT-FORM-T and FT-FORM-I. In this respect, Mohawk constitutes strong evidence for the existence of distinct FT-FORM constraints for different foot types.

3.3. Epenthetic vowels and stress assignment: FILL-σ and FILL

3.3.1. FILL-σ

We have seen that UG contains FT-FORM-T and FT-FORM-I as distinct constraints in deriving vowel-lengthening from FT-FORM-T | FT-FORM-I » FILL. Now, let us turn to constraints with domains, and see whether UG contains distinct constraints for different domains or if it just contains a single constraint whose domain is uniquely fixed by setting a parameter. Taking up FILL

---

6 On the assumption that PARSE-σ, which requires syllables to be parsed into feet, is so low in the constraint hierarchy for Mohawk that its effects are invisible and that syllables in Mohawk can be left unparsed into feet relatively freely, I will leave irrelevant syllables unparsed in the following discussion.

71
as an instance, we will see that both FILL taking a morphological word as its domain and FILL taking a syllable as its domain are operative in Mohawk.

As we have seen in 2.4., when an epenthetic vowel occurs in an open penult, it fails to be stressed. Stress assignment totally ignores it, and puts stress on the antepenultimate syllable.

(46) a. te-k-rik-s [tékeriks] 'I put them together.'
b. w-akra-s [vákeraš] 'It smells.'
c. wak-attr-u [wákáteru] 'I'm dangerous.'
d. ka-naw-ku [kanáwaku] 'in the swamp'
e. te-hs-a?ar-rik [tehsa?ararik] 'Put the curtains together.'

In contrast, an epenthetic vowel in a closed penult gets stress.

(47) a. wak-nyak-s [wakényaks] 'I get married.'
b. s-rhos [sérhos] 'You coat it with something.'
c. ak-tshe-? [akétšhe?] 'my container'
d. k-r-kw-as [kerákwas] 'I take it out of something.'
e. te-ka-hruw-nyu [tekahruwánystu] 'many objects put in your mouth'

Both epenthetic /e/ and epenthetic /a/ behave in the same way with respect to stress assignment. Thus, we can treat them as the same phonological entity as epenthetic vowels, totally ignoring their difference in sound quality.7

As was mentioned in the previous subsections, vowel-lengthening in a stressed open syllable is due to undominated FT-FORM-T | FT-FORM-I, which force stress to be on a heavy syllable. For an open syllable with an epenthetic vowel to be heavy, it has to have two adjacent epenthetic structures parsed. For instance, to get stress on the penult, (46d) has to be parsed as .ka.na.(waŋ.č)ku. However, it is not optimal. The optimal parse is .ka.(ná.č)wa.ku., in which stress is on the antepenultimate syllable, but the relevant constraint hierarchy we have obtained EDGEMOST » FILL cannot mark it as optimal.

(48) shows that the constraint hierarchy assumed in this paper EDGEMOST » FILL should incorrectly designate .ka.na.(waŋ.č)ku. as optimal. The constraint hierarchy in (48), however, has been motivated by a sufficient amount of evidence. If we reorder EDGEMOST and FILL in (48), the facts which have motivated it should go against the reordered hierarchy. We must keep the order of the constraints as it is in (48). Then, how can we overcome this difficulty?

The problem in (48) is rather obvious. It designates as optimal a parse containing two (adjacent) null epenthetic structures in one syllable. As Selkirk (1981) and Prince and Smolensky (1993) suggest, many natural languages disfavor a phonological representation containing more than one epenthetic site in one syllable. In this respect, .ka.na.(waŋ.č)ku. is a generally disfavored phonological representation. Such a representation should be most likely to be excluded by FILL. However, FILL cannot make a proper distinction between a phonological representation with two adjacent epenthetic sites in one syllable like the first candidate in (48) and the one with a single epenthetic site in two different syllables such as the second candidate in (48), as it simply compares the number of epenthetic structures in candidates, taking a morphological word as its domain.

---

7A stressed antepenult does not undergo vowel-lengthening when it is followed by an epenthetic syllable with /e/, as in (46a, b), whereas it undergoes vowel-lengthening when it is followed by an epenthetic syllable with /a/, as in (46d, e). This issue will be discussed in the appendix.
To properly make such a distinction, I assume that there are two modes of measuring violations of FILL. One is, as is assumed by Prince and Smolensky (1993), to simply compare the number of epenthetic structures in candidate phonological representations, taking a morphological word as the domain. The other is to compare the number of epenthetic structures in a single syllable. Restricting our attention to adjacent epenthetic structures in a single syllable, let us adopt the following procedure.

(49) a. Examine each syllable in a representation to see if there is one containing adjacent epenthetic structures.
   b. If there is one, mark it with *.
   c. The number of *s is the degree of violation.

Let us call FILL with the above mode of the measurement of its violation FILL-σ. To put stress on the antepenultimate syllable, we need to have EDGEMOST dominated by FILL-σ, as in (50). Otherwise, stress would be forced to be on the penultimate syllable, even if it should incur a violation of FILL-σ.

(50) FILL-σ » EDGEMOST

Let us see how (50) works, taking (46c, d) as examples.

(51) FILL-σ » EDGEMOST

<table>
<thead>
<tr>
<th>Candidates</th>
<th>FILL-σ</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>.wa.kat.(teˈʌ).ru.</td>
<td>*!</td>
<td>σ#</td>
</tr>
<tr>
<td>.wa.(kát.)te.ru.</td>
<td></td>
<td>σσ#</td>
</tr>
</tbody>
</table>

b.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>FILL-σ</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>.ka.na.(wɑᵊ).ku.</td>
<td>*!</td>
<td>σ#</td>
</tr>
<tr>
<td>.ka.(náɬ).wa.ku.</td>
<td></td>
<td>σσ#</td>
</tr>
</tbody>
</table>

Now, we have the following rankings of the relevant constraints for Mohawk.

(52) a. NONFINALITY » EDGEMOST » FILL
    b. FT-FORM-T ! FT-FORM-I » FILL
    c. FILL-σ » EDGEMOST

The fact that an epenthetic vowel in a closed penult gets stress follows from NONFINALITY » EDGEMOST in (52a), as (53), the evaluation of the possible candidates for (47a), shows.

(53) NONFINALITY » EDGEMOST

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>.wa.ken.(yáks.)</td>
<td>*!</td>
<td>σ#</td>
</tr>
<tr>
<td>.wa.(ken)yáks.</td>
<td></td>
<td>σσ#</td>
</tr>
<tr>
<td>.(wɑᵊ).ken.yáks.</td>
<td></td>
<td>σσ#!</td>
</tr>
</tbody>
</table>

3.3.2. Augmentation of a subminimal unstressable word: NONFINALITY » FILL-σ

A word has to be at least bisyllabic to have stress on the penultimate syllable. A monosyllabic word is augmented by epenthesizing /i/ at the beginning of it.
This fact naturally follows from the constraint hierarchy we have obtained in (52), especially (52a).

Let us take (54a) as an example, and see how it works.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>EDGEMOST</th>
<th>FILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>.(kkās.)</td>
<td>*!</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td>.(āk.)kās.</td>
<td></td>
<td>#</td>
<td>*</td>
</tr>
</tbody>
</table>

NONFINALITY prohibits stress from falling on the final syllable, so (54a) has to be augmented by having epenthetic /i/ at the beginning of it. As epenthetic /i/ is in a closed syllable, it can get stress as it is.

(54b) suggests that NONFINALITY dominates FILL-σ. The following evaluation of the possible candidates for (54b) makes the point clear.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>FILL-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>.(wēs.)</td>
<td></td>
<td>σ*</td>
</tr>
<tr>
<td>.(iμ.)wēs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In (54b), with no coda consonants following it, epenthetic /i/ is in an open syllable, and it has to have an empty mora following it to get stress. The optimal parse .(iμ.)wēs. violates FILL-σ to satisfy higher ranked NONFINALITY. Now, (52a) and (52c) can combine into the following.

(57) a. NONFINALITY » FILL-σ » EDGEMOST » FILL
b. FT- FORM-T | FT- FORM-I » FILL

A bisyllabic word in which an epenthetic vowel occurs in an open penult is treated as a monosyllabic word, and affected by augmentation.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>FILL-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>.(khneraks)</td>
<td></td>
<td>σ*</td>
</tr>
<tr>
<td>.(iseriht)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the other hand, a bisyllabic word with an epenthetic vowel in a closed penult is regarded as bisyllabic, and not affected by augmentation.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>FILL-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>.(sērhos)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.(kērha?)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The above-mentioned distinct behaviors of an epenthetic vowel also follow from the rankings of the relevant constraints in (57), especially (57a). Let us take (58a) and (59a) as examples, and see the evaluation of their possible parses based on it.
b. 

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>FILL-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>*(i:u:)*sEhr hos.</td>
<td>⊥</td>
<td>σ*!</td>
</tr>
<tr>
<td>*(sEhr:)*hos.</td>
<td>⊥</td>
<td></td>
</tr>
</tbody>
</table>

In (58a) and (59a), NONFINALITY can be satisfied just by putting stress on a non-word-final syllable. If an epenthetic vowel in the penult can get stress, augmentation should not be necessary, but if it cannot, the word has to be augmented to have stress. To get stress, the epenthetic vowel in (58a) has to have an empty mora following it. However, the resulting representation should violate FILL-σ. Thus, the epenthetic vowel cannot get stress and that the word has to be augmented, as in the optimal parse in (60a). The epenthetic vowel in (59a), which is in a closed syllable, can get stress without having an empty mora following it. Thus, augmentation is not necessary, as (60b) shows.

One important issue left untouched concerning the augmentation of a subminimal word is why /i/ is inserted at the beginning of it rather than at the end of it. This issue will be taken up in 5.2.

3.3.3. The relevance of FILL and FILL-σ for Mohawk

Now, it is clear that FILL-σ, taking a syllable as its domain, plays an important role in deriving the asymmetry between an epenthetic vowel in an open syllable and in a closed syllable. FILL, taking a morphological word as its domain, also plays a role in Mohawk. We have seen in 3.2.2.4. and 3.3.2. that FILL plays a role in deriving the vowel-lengthening in a stressed open syllable, and the basic augmentation pattern of a subminimal unstressable word. Furthermore, FILL is necessary to prevent unnecessary epenthetic processes like lengthening an unstressed vowel, as the following evaluation of the possible candidates for (41a) shows.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>FILL-σ</th>
<th>FILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>.ka.ti.(rút.)há?</td>
<td>⊥</td>
<td>⊥</td>
</tr>
<tr>
<td>.ka.ti.(rút.)ha?</td>
<td>⊥</td>
<td>⊥</td>
</tr>
</tbody>
</table>

Both candidates satisfy FILL-σ, since they do not contain adjacent epenthetic structures in a single syllable. FILL excludes the first candidate, which contains an unnecessary epenthetic structure. Thus, both FILL and FILL-σ are operative in Mohawk. The assumption that UG contains a single FILL constraint with a parameter for its domain is clearly inconsistent with the fact that FILL taking a morphological word as its domain, and FILL-σ taking a syllable as its domain are operative in Mohawk simultaneously. Now, we draw the same conclusion as we did for FT-FORM; UG contains distinct FILL constraints for different domains. The conclusions we have drawn will be further confirmed by stress assignment and its interaction with epenthetic vowels in Selayarese.

4. Stress assignment and Epenthetic vowels in Selayarese: some refinements

In this section, we will examine our accounts of the Mohawk facts in the light of the facts in Selayarese discussed by Mithun and Basri (1986), Goldsmith (1990), and Piggott (1992), which basically shares the same characteristics with Mohawk concerning stress assignment, but exhibits a different property in the visibility of epenthetic vowels to stress assignment. All the Selayarese data to be presented are from Mithun and Basri (1986).

4.1. FT-FORM-T / FT-FORM-I

As in the following, stress basically falls on the penultimate syllable in Selayarese.

(62)  a. sassa  [sássa]  'wash'
      b. ?appa  [?áppa]  'four'
c. kekke? [kékke?] 'to tear'
d. takkaluppa [takkalúppa] 'faint'
e. ta?dó?do? [ta?dó?do?] 'be sleepy'

Furthermore, as in Mohawk, a stressed vowel in an open syllable gets lengthened.

(63) a. sasa [sá:sa] 'cut'
b. ?apa [?á:pa] 'what?'
c. goló [goló] 'ball'
d. goloku [goló:ku] 'my ball'
e. sahala [sahá:la] 'sea cucumber'
f. sahalaba [sahalá:ba] 'our sea cucumber'

The above two facts indicate that Selayarese and Mohawk are basically the same with respect to stress assignment. This leads us to the following rankings of constraints, which are essentially the same as those for Mohawk.

(64) a. NONFINALITY » EDGEMOST » FILL
b. FT-FORM-T ! FT-FORM-I » FILL

The ranking NONFINALITY » EDGEMOST requires stress to be on a non-final syllable which is closest to the right edge of the word, namely the penultimate syllable. As FT-FORM-T and FT-FORM-I are unranked with respect to each other, and are undominated, every stressed foot must satisfy both of them. As H is the only foot which can satisfy both FT-FORM-T and FT-FORM-I, Selayarese must always put stress on H. From this, it follows that a stressed syllable, if it is open, undergoes vowel-lengthening to be H.

4.2. The visibility of an epenthetic vowel to stress assignment: EDGEMOST » FILL-σ

Looking at an epenthetic vowel and stress assignment in Selayarese, we can notice an important and interesting difference between Selayarese and Mohawk. The coda in Selayarese is very restricted. Only a nasal homorganic, not identical, with the onset of the following syllable, a voiceless obstruent identical with the onset of the following syllable, or a glottal stop is allowed in coda. When a consonant unacceptable as a coda appears in the coda position, Selayarese inserts the epenthetic vowel /a/ to change the unacceptable coda into its onset.

(65) a. sahal-ku /sahalaku/ 'my profit'
b. sahal-mu /sahalamu/ 'your profit'
c. sahal-ba /sahalaba/ 'our profit'

An epenthetic syllable with /a/ exhibits two striking characteristics, (i) it is visible to stress assignment, and (ii) it gets heavy through the gemination of the onset of the following syllable or the insertion of the glottal stop /ʔ/.

(65) a'. [sahalá:ku]
b'. [sahalá:mu]
c'. [sahalá:ba]

In Mohawk, FILL-σ, which prohibits having more than one epenthetic structure in one syllable dominatesEDGEMOST, which requires stress to be on the syllable closest to the right edge of the word, so an epenthetic open penult fails to get lengthened, and stress falls on the antepenultimate syllable. (65a'-c'), containing two adjacent null epenthetic structures in one syllable, one being for the nucleus, and the other being for the coda, indicate that in Selayarese, FILL-σ can be violated to put stress on the non-final syllable closest to the right edge of a word. It is EDGEMOST that requires
stress to be as close to the right edge of a word as possible. Based on this, we can say that Selayarese is reversing the order of EDGEMOST and FILL-σ in Mohawk, as in EDGEMOST » FILL-σ.

Now, we have the following constraint rankings for Selayarese.

(66)  a.  NONFINALITY » EDGEMOST » FILL-σ | FILL
       b.  FT-FORM-T | FT-FORM-I » FILL

Let us make sure that (66a) works properly, taking (65b) as an example.

(67)  NONFINALITY » EDGEMOST » FILL-σ

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY</th>
<th>EDGEMOST</th>
<th>FILL-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>.sa.ha.(lá?)mu.</td>
<td>σ#</td>
<td>σ*</td>
<td></td>
</tr>
<tr>
<td>.sa.(háµ.)la.mu.</td>
<td>σσ#</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.sa.ha.(múµ.)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As expected, the first candidate stressing the penult, the rightmost non-final syllable, best satisfies NONFINALITY » EDGEMOST, and is designated as optimal. A violation of FILL-σ does not matter here.

4.3. The asymmetry between underlying vowels and epenthetic vowels in how they get heavy: breaking down FILL into FILL-N(uceulus) and FILL-M(argin), and breaking down FILL-σ into FILL-σ-N and FILL-σ-M

We have seen that there are two ways for a stressed open syllable to be heavy in Selayarese. One is to lengthen its vowel, and the other is to acquire a coda through the gemination of the onset of the following syllable or the insertion of ?/. The former, not the latter, is available to a non-epenthetic syllable, whereas the latter, not the former, is available to an epenthetic syllable. The violability of FILL-σ in Selayarese, simply telling that more than one null epenthetic structure is allowed in one syllable, does not lead us to the above distinction between an epenthetic open syllable and a non-epenthetic open syllable with respect to how they get heavy.

The above asymmetry between underlying vowels and epenthetic vowels strongly suggests that we need to make a distinction between the nuclear position and the coda position. A non-epenthetic vowel can be lengthened. Under the nuclear/coda distinction, this tells us that parsing a null epenthetic structure in the nuclear position is preferred over parsing a null epenthetic structure in the coda position as long as it does not incur a violation of FILL-σ. We can derive this fact by splitting FILL into FILL-N(uceulus) and FILL-M(argin), and ranking them as follows.

(68)  FILL-M » FILL-N

FILL-N and FILL-M prohibit a null epenthetic structure in the nuclear position and the coda position, respectively. The following evaluation of the possible candidates for (63d) shows that it works well.

(69)  FILL-M » FILL-N

<table>
<thead>
<tr>
<th>Candidates</th>
<th>FILL-M</th>
<th>FILL-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>.go.(lóµ.)ku.</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>.go.(lók.)ku.</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

An epenthetic vowel cannot be lengthened, but should acquire a coda. Under the nuclear/coda distinction, we can take this to indicate that parsing a single epenthetic structure in the nuclear
position and the coda position of a single syllable is preferred over parsing two null epenthetic structures in the nuclear position of a single syllable. We can derive this by splitting FILL-σ into FILL-N(nucleus)-σ and FILL-M(argin)-σ as we split FILL into FILL-N and FILL-M. FILL-N-σ and FILL-M-σ prohibit adjacent null epenthetic structures in the nuclear position and the coda/onset position, respectively. The following ranking involving FILL-N-σ and FILL-M guarantees that a null epenthetic structure can be posited in the coda position in order to avoid positing two null epenthetic structures in the nuclear position.

\[(70) \text{FILL-N-σ » FILL-M}\]

The following evaluation of the possible parses for (65b') shows that (70) works well.

\[(71) \text{Candidates} \quad \text{FILL-N-σ} \quad \text{FILL-M}
\begin{array}{|c|c|c|}
\hline
\text{ea} & \text{sa.ha.(IA?.)mu.} & \ast \\
\text{sa.ha.(IA¿.)mu.} & \ast! \\
\hline
\end{array}\]

(68) and (70) combine into the following.

\[(72) \text{FILL-N-σ » FILL-M » FILL-N}\]

(72) and (66) combine as follows.

\[(73) \quad a. \quad \text{NONFINALITY » EDGEMOST » FILL-N-σ » FILL-M » FILL-N}
\quad b. \quad \text{FT-FORM-T I FT-FORM-I » FILL-N}\]

As we have seen, by splitting FILL and FILL-σ to FILL-N and FILL-M, and FILL-N-σ and FILL-M-σ, respectively, we can provide a principled account for the distinction between a non-epenthetic vowel and an epenthetic vowel in how they get heavy. This further confirms our conclusion that UG contains distinct FILL constraints for different domains.

It is easy to recast the Mohawk facts, employing the four FILL constraints we have come up with. An epenthetic vowel in an open syllable is invisible to stress assignment, as it neither gets lengthened nor acquires a coda, which indicates that the effects of FILL-N-σ and FILL-M override the effects of EDGEMOST. This leads us to the following constraint rankings.

---

8As is clear from the text, FILL-M-σ does not play any visible roles in Selayarese. Here, it is just a logical necessity. It is not entirely clear whether or not FILL-M-σ is necessary. As Moira Yip (personal communication) pointed out to me, phonologically speaking, there is no reason for double epenthesis either in the onset position or in the coda position, and probably this can be excluded by FILL-M. Then, there should be no reason to assume a constraint to specifically bar this unmotivated process.

9Moira Yip (personal communication) pointed out to me that a case like (65a') is derivable by assuming a constraint which forces the segmental features present in the input to be used. Under this approach, acquisition of a coda through the gemination of the onset of the following syllable, which is totally dependent on the segmental features of /k/ present in the input, is favored over vowel-lengthening, which should lead to excessive use of an epenthetic segment. This approach, though consistent with (65a'), runs into a problem in dealing with (65b'). In (65b'), the gemination of the onset of the following syllable is not possible, since /m/ is not a possible coda in Selayarese. Thus, it is not possible to make use of the segmental features present in the input to make the stressed open syllable heavy, and we cannot avoid depending on epenthetic segments in making the stressed syllable heavy. Here, there are two choices, (i) vowel-lengthening, and (ii) insertion of the null consonantal segment /?/ into the coda position, and (65b') shows that (ii) is chosen over (i). The constraint which forces the use of the segmental features present in the input has nothing to say concerning the choice in (65b'), and it needs FILL-N-σ and FILL-M-σ to correctly explain (65b'). We may need the constraint in forcing the gemination of the onset of the following syllable when it is possible, but it is not directly relevant in choosing the acquisition of a coda over vowel-lengthening in the examples in (65).
5. Two species of NONFINALITY

In this section, we will see that Mohawk and Selayarese provide strong evidence for the existence of distinct species of NONFINALITY for different domains.

5.1. NONFINALITY-P and NONFINALITY-M

Although epenthetic vowels in Mohawk and Selayarese exhibit a significant difference in their visibility to stress assignment, they share an interesting property. It is that they fail to be regarded as proper word-final vowels in stress assignment. As we have seen in 2.2., Mohawk has an epenthetic process, which inserts /e/ between a consonant and the word-final glottal stop /ʔ/.

(75) a. A-k-arat-ʔ [Aká:rateʔ] 'I lay myself down.'
    b. ro-kut-ot-ʔ [rokú:toteʔ] 'He has a bump on his nose.'

Similarly, Selayarese inserts a copy of the preceding vowel after a word-final consonant which is unacceptable as a coda.

(76) a. tulis [tulisi] 'write'
    b. lamber [lambere] 'long'
    c. sahal [sahala] 'profit'

In all the above examples, stress falls on the antepenultimate syllable, not the penultimate syllable.

The stress pattern in (75) and (76) is curious. We are assuming that both Mohawk and Selayarese have NONFINALITY dominating EDGEMOST. The best satisfaction of the ranking NONFINALITY » EDGEMOST is to put stress on the penultimate syllable, the non-final syllable closest to the right edge of the word. (75) and (76) should exhibit the best satisfaction of NONFINALITY » EDGEMOST by stressing the penultimate syllable, but they actually put stress on the antepenultimate syllable.

The stress pattern in (75) and (76) tells us that a word-final epenthetic syllable is not a relevant syllable to NONFINALITY, and that it treats the penultimate syllable as if it were a word-final syllable. Let us look at NONFINALITY in (17), given below again as (77).

(77) NONFINALITY

The prosodic head of the word does not fall on the word-final syllable.

NONFINALITY checks the right edge of a 'word', to see whether or not stress is there. A question arises as to what is the notion of 'word' relevant to NONFINALITY. There are two different levels of 'word' that could be relevant to NONFINALITY. One is a prosodic word, and the other is a morphological word. Thus, NONFINALITY basically has two right edges to check, the right edge of a prosodic word and the right edge of a morphological word. Assuming that NONFINALITY works on both a prosodic word and a morphological word, let us split NONFINALITY into two,
NONFINALITY-P (prosodic) and NONFINALITY-M (morphological), and suppose that they are ranked with respect to each other.

Parsed underlying segments are the members of both a prosodic word and a morphological word. Epenthetic segments, however, are the members of a prosodic word, but are not the members of a morphological word, since they do not have any morphological affiliation, as McCarthy (1993) points out. Thus, underlying segments appear in the representations for a prosodic word and a morphological word, whereas epenthetic segments appear only in the representation for a prosodic word. This difference between underlying segments and epenthetic segments is crucial to our discussion.

The following ranking of NONFINALITY-P, NONFINALITY-M, and EDGEMOST leads to stressing the antepenultimate syllable in a word whose final syllable is epenthetic.

(78) NONFINALITY-P \| NONFINALITY-M \| EDGEMOST

[(rokti:tote²) in (75b) and [tú:lisí] in (76a) have the following organizations of vowels, potential stress bearing units, in their representations for a prosodic word and a morphological word.

(75) b'. P: [-o-u-o-e] M: [-o-u-o-]
(76) a'. P: [-u-i-i] M: [-u-i-]

Based on the representations in (75b'), let us see how (78) works.

(79) NONFINALITY-P \| NONFINALITY-M \| EDGEMOST

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY-P</th>
<th>NONFINALITY-M</th>
<th>EDGEMOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>-o-u-o-E</td>
<td>*!</td>
<td></td>
<td>σσ#</td>
</tr>
<tr>
<td>-o-u-ó-E</td>
<td></td>
<td></td>
<td>α#</td>
</tr>
</tbody>
</table>

Putting stress on the actual final vowel, as in o-u-o-e, violates NONFINALITY-P, while it does not violate NONFINALITY-M, as stress is not on the penultimate vowel, the final vowel in the morphological representations. Stressing the penultimate syllable, the final vowel in the morphological representations, as in o-u-ó-e, violates NONFINALITY-M, but not NONFINALITY-P. Both of these two are less optimal than stressing the antepenultimate syllable, which satisfies both NONFINALITY-P and NONFINALITY-M.

Now, we have reached the rankings of constraints in (80) and (81) for Selayarese and Mohawk, respectively.

(80) a. NONFINALITY-P \| NONFINALITY-M \| EDGEMOST \| FILL-N-σ \| FILL-M \| FILL-N
    b. Ft-FORM-T \| Ft-FORM-I \| FILL-N

(81) a. NONFINALITY-P \| NONFINALITY-M \| FILL-N-σ \| FILL-M \| EDGEMOST \| FILL-N
    b. Ft-FORM-T \| Ft-FORM-I \| FILL-N

The only difference between (80) and (81) is that EDGEMOST dominates FILL-N-σ in the former, whereas the converse is true in the latter. Thus, an epenthetic vowel in an open syllable is visible to stress assignment and undergoes vowel-lengthening in Selayarese, but not in Mohawk.

5.2. Deriving the augmentation pattern of a subminimal word in Mohawk

With NONFINALITY-P and NONFINALITY-M, we can now provide a principled account for the problem we left untouched in 3.3.2., namely why in augmenting a subminimal word, epenthetic /i/ is inserted at the beginning of it rather than at its end.
All the augmentation patterns involving epenthetic /i/ inserted at the end of a subminimal word are less optimal than the actual augmentation pattern inserting /i/ at the beginning of it. The following evaluation of the possible candidates for [lkas] in (54a) illustrates the point.

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY-P</th>
<th>NONFINALITY-M</th>
<th>FILL-N-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (ik.)kas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (kkas.)</td>
<td>*!</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. kas. (Ις)</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. (kkas.ι)</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

Putting stress on the vowel of the subminimal word without inserting /i/, as in (82b), violates both NONFINALITY-P and NONFINALITY-M, as the vowel of the subminimal word is the final vowel of both the prosodic representation and the morphological representation. Inserting /i/ at the end of the subminimal word and stressing the vowel of the subminimal word violates NONFINALITY-M, which amounts to stressing a vowel which is non-final in the prosodic representation but final in the morphological representation, as (82d) shows. Inserting /i/ at the end of the subminimal word and stressing it, as in (82c), violates NONFINALITY-P, as it leads to stressing the final vowel only in the prosodic representation. Thus, (82a), which satisfies both NONFINALITY-P and NONFINALITY-M by epenthesizing /i/ at the beginning of the word and stressing it, is designated as optimal. Basically the same reasoning as above applies to [I:we?ς] in (54b).

As we have seen, the proposal to split NONFINALITY to NONFINALITY-P and NONFINALITY-M, especially NONFINALITY-M, gets independent support from the augmentation pattern of a subminimal word in Mohawk.

5.3. An unusual stress pattern following from the rankings of the relevant constraints in Mohawk

The following Mohawk examples with an unusual stress pattern confirm that the entire approach we have taken is on the right track.

(83) a. wa?-k-wn-rahkw-? [wa?kewά:narahkwε?] \(\text{I obey}'\)
   b. wa?-k-riht-? [wa:kerihte?] \(\text{I will cook it.}'\)

(83a) contains three epenthetic vowels, epenthetic /e/ between /wI/ and /I/, and between /k/ and /w/, and epenthetic /a/ between /n/ and /r/. (83b) contains two epenthetic vowels, epenthetic /e/ between /k/ and /r/, and between /h/ and /r/. Both examples have stress on the fourth syllable from the right. This unusual stress pattern naturally follows from the rankings of constraints in (81), given below again as (84).

(84) a. NONFINALITY-P \(\rightarrow\) NONFINALITY-M \(\rightarrow\) FILL-N-σ \(\rightarrow\) FILL-M \(\rightarrow\) EDGEMOST \(\rightarrow\) FILL-N
   b. FT-FORM-T \(\rightarrow\) FT-FORM-I \(\rightarrow\) FILL-N

Let us see how the stress pattern in (83a, b) follows from (84a), taking (83b) as an example.

\(10\text{Notice that the augmentation of a subminimal word in Mohawk is driven by the requirement that every word must contain a stress, which can be restated that every word must contain a foot. In this respect, it is different from the familiar type of augmentation of a subminimal word to satisfy the minimal word requirement that every word should contain two moras.}\)
(85)

<table>
<thead>
<tr>
<th>Candidates</th>
<th>NONFINALITY-P</th>
<th>NONFINALITY-M</th>
<th>FILL-N-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. .wa?.kE.rih.(tE?.)</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. .wa?.kE.(rih.)tE?.</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. .wa?.(kE?.)rh.tE?.</td>
<td></td>
<td></td>
<td>σ*!</td>
</tr>
<tr>
<td>d. .(wa?.)kE.rh.tE?.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(85a), stressing the final syllable, and (85b), stressing the penultimate syllable, violate NONFINALITY-P and NONFINALITY-M, respectively, so they are easily eliminated. (85c) satisfies NONFINALITY-P and NONFINALITY-M, but violates FILL-N-σ by forcing the epenthetic open syllable to undergo vowel-lengthening. Thus, (85d), which satisfies NONFINALITY-P, NONFINALITY-M, and FILL-N-σ, is designated as optimal. The stress pattern in (83a, b) follows from the interactions of NONFINALITY-P, NONFINALITY-M, and FILL-N-σ. This confirms that the entire approach we have taken to Mohawk and Selayarese is on the right track. Now, we can say that UG contains distinct NONFINALITY constraints for different domains.

6. Other theoretical Implications

6.1. Advantages of deriving vowel-lengthening from FT-FORM-T and FT-FORM-I

We have derived vowel-lengthening in Mohawk and Selayarese by assuming that FT-FORM-T and FT-FORM-I are unranked with respect to each other. This approach has several advantages. They can be clearer if we compare our approach with a possibility we have not yet considered, which is to assume Stress-to-Weight Principle discussed and rejected in Prince (1991).11

(86) Stress-to-Weight Principle (SWP)
If a syllable is stressed, then it is heavy.

With (86), we could derive vowel-lengthening by ranking it higher than FILL. However, there are at least two serious problems with this approach. First, the status of SWP as a principle is not clear at all. Assuming SWP as an independent principle implies that vowel-lengthening should be observed as a general process even in typical trochaic languages. This is clearly inconsistent with Hayes's (1991) observation that trochaic languages generally do not enhance the quantity of a stressed syllable. Prince himself clearly denies the validity of SWP as a principle. Second, introducing a new constraint like SWP to derive vowel-lengthening necessarily causes complications to the theory. Unless there is strong empirical evidence or a conceptual reason for it, we should avoid introducing a new constraint; it is clearly better to derive it from constraints which have been independently motivated.

Our approach is free from the problems pointed out above with SWP. First, vowel-lengthening such as the one in Mohawk and Selayarese is given a natural account as a valid logical possibility following from the independence of FT-FORM-T and FT-FORM-I. Furthermore, deriving vowel-lengthening from FT-FORM-T and FT-FORM-I causes no complications to the theory. Since we can derive vowel-lengthening from the two independently motivated constraints unranked with respect to each other, we do not have to introduce anything new to derive it.12 These advantages of our account of vowel-lengthening strongly suggest its validity.

11 The discussion in this subsection owes much to the comments by Jennifer Cole and Donca Steriade.
12 Since FT-FORM-T and FT-FORM-I are undominated constraints, it is natural and in fact inevitable that they are unranked with respect to each other. Notice that I have taken the conjunction interpretation of unranked constraints in this paper, which requires both to be satisfied. This is not the only logically possible interpretation of unranked constraints. Logically speaking, we can take the disjunction interpretation of unranked constraints as well. Yip
6.2. **FILL-σ/FILL-N-σ and local conjunction**

We have derived the invisibility of an epenthetic vowel in an open syllable in Mohawk to stress assignment from the dominant role of FILL-σ, which has been later revised into FILL-N-σ to accommodate the relevant facts in Selayarese. The basic idea behind the dominant role of FILL-σ/FILL-N-σ is that multiple violations of FILL in a very local domain such as a syllable are worse than multiple violations of FILL in a less local domain such as a morphological word. This idea nicely accords with the notion of local conjunction discussed by Smolensky (1995). There are languages which allow labials and codas but do not allow labials in the coda position. Based on observations of this kind, Smolensky claims that two constraint violations are worse when they occur in the same location, which means that constraint interactions are stronger locally than non-locally. He implements this idea with the notion of local conjunction, given below.

(87) The local conjunction of C₁ and C₂ in domain D
C₁ & C₂ is violated when there is some domain D in which both C₁ and C₂ are violated.

Smolensky further assumes that the local conjunction of two constraints are universally higher-ranked than their independent appearance, as follows.

(88) C₁ & C₂ \(\gg\) C₁, C₂

Given the notion of local conjunction, we can explain the language which does not allow labials in the coda position by assuming the following.

(89) *PL/Lab & NOCODA \(\gg\) *PL/Lab, NOCODA

FILL-σ/FILL-N-σ might fall under the notion of local conjunction if we can allow local self-conjunctions like the following.

(90) a. FILL-σ
FILL & FILL: Domain= σ

b. FILL-N-σ
FILL & FILL: Domain= nucleus

(90a) and (90b) prohibit multiple violations of FILL in a single syllable and in the single nuclear position, respectively, and these are exactly the effects FILL-σ and FILL-N-σ have. Thus, our approach to the invisibility of an epenthetic vowel in an open syllable to stress assignment in Mohawk converges with the current development of OT. Notice, however, that whether we take FILL-σ/FILL-N-σ or the local conjunctions in (90), the point this paper has made remains the same; we need distinct FILL constraints for distinct domains.

7. **Concluding remarks**

In this paper, in deriving the interesting properties of Mohawk and Selayarese in their stress assignments and their interactions with epenthetic vowels, we have seen the following.

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(1992) mentions the possibility of deriving optionality from reranking two adjacent constraints. This can be easily restated in terms of the disjunction interpretation; the two relevant constraints are actually unranked with respect to each other, and we take the disjunction interpretation of them. At any rate, this issue needs more research.

I am grateful to Mike Hammond for bringing this issue to my attention.
(91) a. UG contains FT-FORM-T and FT-FORM-I as distinct constraints.
b. UG contains distinct FILL constraints and distinct NONFINALITY constraints for different domains.

Strengthening and generalizing (91), we could say that there is no constraint with a parameter in UG; UG contains distinct constraints for different types of phonological entities and different domains. This is a favorable conclusion for OT, which claims that cross-linguistic variations solely derive from different rankings of constraints. If UG contains no constraints with a parameter, we can maintain the claim in its strongest form; the only source of cross-linguistic variations is different rankings of constraints. In order to allow for constraints with a parameter, we have to somewhat weaken the claim, since we have to admit two sources of cross-linguistic variations, the values of parameters, and different rankings of constraints. Assuming a single source for cross-linguistic variations is clearly simpler than assuming two sources.

The above approach to cross-linguistic variations based on different rankings of constraints, however, has to face one major problem: its lack of restrictiveness. For instance, the number of possible variations following from a constraint with a parameter which can be set in five ways is five. In contrast, the number of possible variations arising from the different rankings of five constraints is 5!, namely 120. In this respect, assuming a constraint with a parameter is far more restrictive. Nevertheless, we have seen that it is not empirically adequate. How to resolve the tension between empirical adequacy and restrictiveness may be a major issue for OT.

Appendix: The asymmetry between epenthetic /e/ and epenthetic /a/ with respect to the onset requirement: *START-HIGH

As briefly mentioned in footnote 7, a stressed antepenult does not undergo vowel-lengthening when it is followed by an epenthetic syllable with /e/, whereas it undergoes vowel-lengthening when it is followed by an epenthetic syllable with /a/.

(92) a. te-k-rik-s [tékeriks] 'I put them together.'
b. w-akra-s [wákera:s] 'It smells.'

(93) a. ka-naw-ku [kaná:waku] 'in the swamp'
b. te-hs-aʔar-rrik [tehsaʔá:raʁik] 'Put the curtains together.'

Undominated FT-FORM-T I FT-FORM-I force a stressed syllable to be heavy. The fact that the stressed vowels in (92a, b) is not lengthened indicates that there is a way for their syllables to be heavy without parsing an empty mora, and it could be incorporating the onset of the following syllable as its coda. For instance, the optimal parse of (92a) should be .(ték.)e.riks. not .(té i.)ke.riks. In the optimal parse, the epenthetic syllable is onsetless. The stressed vowels followed by an epenthetic syllable with /a/ in (93a, b), in contrast, cannot acquire a coda, so it has to undergo vowel-lengthening. If this reasoning is on the right track, epenthetic /e/ can be onsetless, but epenthetic /a/ cannot. It is clear from the data we have seen that except for word-initial syllables, syllables in Mohawk are generally subject to the onset requirement. The asymmetry between epenthetic /e/ and epenthetic /a/, especially the exceptional status of epenthetic /e/, clearly needs an explanation, and we could derive it by pursuing the possibility of reducing the onset requirement to the optimal sonority shape of a syllable.

Some researchers suggest the possibility of deriving the onset requirement from a constraint on the sonority shape of syllables. For instance, observing that the preferred syllable type shows a sonority profile that rises maximally toward the peak and falls minimally toward the end, Clements (1990) proposes the syllabification principle in (94), assuming the sonority scale in (95).
a. Associate each [+syllabic] segment to a syllable node.
b. Given P (an unsyllabified segment) adjacent to Q (a syllabified segment), if P is lower in sonority rank than Q, adjoin it to the syllable containing Q.

(Clements (1990; 317))

obstruent < nasal < liquid < glide < vowel

The basic idea behind (94) is that a syllable is required to be formed so as to have the preferred sonority profile. Looking at the onset requirement in the present context, we can easily say that it is reducible to this general requirement on the sonority shape of syllables. An optimal syllable is required to start with rising sonority. To start with rising sonority, a syllable has to have an onset which has lower sonority than its peak. Taking this requirement for rising sonority as a ban on starting with high sonority, we can restate the onset requirement as follows.

(96) *START-HIGH
A syllable does not start with high sonority.

Vowels have high sonority, and thus are required to have an onset to satisfy (96). Epenthetic /el/ in Mohawk does not have to have an onset. This suggests that it does not have sonority high enough to violate (96). Rice (1992) claims that the sonority of phonological segments is derivable from their feature specifications. Assuming the feature geometry in (97), Rice assigns (98a), (98b), and (98c) to a liquid, a nasal, and an obstruent, respectively.

14The same analysis applies to (3e), and (58b), where /A/ and epenthetic /i/ followed by an epenthetic syllable with /el/ fail to be lengthened.

According to Rice (1992), the sonority of a segment is a direct reflection of the degree of its feature specification. Thus, the less feature specification present in a segment, the less sonorous it is. Suppose that epenthetic /el/ in Mohawk is a true null epenthetic vowel without any feature specification. Then its sonority is unspecified or very low. Due to its unspecified or very low sonority, a syllable with epenthetic /el/ does not start with high sonority even when it is onsetless. To be distinguished from epenthetic /el/, epenthetic /a/ has to have feature specification to some

14
extent, which means that epenthetic /a/ has high sonority. To start its syllable with low sonority, epenthetic /a/ needs an onset.

Important to note is the fact that Mohawk is not making use of epenthesis to affiliate an unsyllabified consonant as an onset. Epenthetic /e/ is inserted not to affiliate any unsyllabified consonants but to break up certain consonant clusters. Mohawk does not allow /kr/-clusters and /sr/-clusters even if they could be syllabified into well-formed syllables. To break up those clusters, /e/ is epenthesized. Thus, .tek. in (92a) and .wak. in (92b) are well-formed syllables. This is confirmed by the following examples.

(99) a. te-k-ya?k-s [tékya?ks] 'I break it into two.'
   b. wak-haratat-u [wakharatá;tu] 'I am holding it up.'

(99a, b), in which .tek. and .wak. are not followed by a vowel but by /y/ and /h/, respectively, show that .tek. and .wak. themselves are well-formed syllables. In (99a), the stressed vowel /e/ is not lengthened. This indicates that /k/ is in the coda position of its syllable, which further confirms that .tek. is a well-formed syllable. Now it is clear that epenthesis of /e/ is not for affiliating any unsyllabified consonant. The problem with (99a, b) is the /kr/ cluster, which is not allowed in Mohawk, and /e/ is inserted between them. Thus, allowing the epenthetic syllables to be onsetless does not conflict with the epenthetic processes themselves.

It is easy to see that we can designate .(ték.)e.riks. and .ka.(náw.)A.ku. as the optimal parses of (92a) and (93a), respectively, by giving *START-HIGH in (96) a rank higher than that of FILL-N in the constraint hierarchy, as in the following evaluations of the candidates for (92a) and (93a) (NONFINALITY constraints are omitted as irrelevant).

(100) *START-HIGH » FILL-N
a. Candidates
   (ték.)E.riks. *START-HIGH FILL-N
   *(tí:ki:k-s)

b. Candidates
   .(náw.)A.ku. *START-HIGH FILL-N
   *(ték.)kE.riks

Now, we have the following rankings of the constraints for Mohawk.

(101) a. NONFINALITY-P I NONFINALITY-M » FILL-N » FILL-M » EDGEMOST » FILL-N
b. FT-FORM-T I FT-FORM-I » FILL-N
   *START-HIGH » FILL-N

One might wonder why epenthetic /e/, not epenthetic /a/, is a null segment without any feature specifications. Recall that the epenthesis of /e/ is phonologically conditioned. It is inserted to break up illicit consonant clusters such as /kr/ and /sr/. The epenthesis of /a/, in contrast, is morphologically conditioned. It is inserted to properly connect certain roots. Epenthetic /a/, whose insertion is morphologically conditioned, is more like an underlying vowel in that it contributes to the morphological make-up of a word. Considering that underlying segments basically have feature specifications, it is natural that epenthetic /e/, which is more remote from underlying vowels than epenthetic /a/ is a null segment lacking any feature specifications.

The asymmetry between epenthetic /e/ and epenthetic /a/ in Mohawk has an important theoretical implication. OT outlined in Prince and Smolensky (1993) regards epenthetic segments as null segments without feature specifications. GEN simply inserts a null structure into a representation as a place holder for an epenthetic segment, whose sound quality is to be determined in phonetics. Nevertheless, the Mohawk facts show that this simple interpretation of epenthetic
segments cannot be maintained. It is not possible to distinguish /e/ and /a/ in terms of their environments, since their environments overlap. Epenthetic /e/ can precede /h/, /l/, /w/, /l/, and /ʔ/, and follow /k/, /ɬ/, and /l/. Epenthetic /a/ can precede /k/, /ɬ/, and /l/, and follow /k/, and /w/. Thus, simply representing epenthetic segments as null segments, we cannot distinguish epenthetic /e/ and epenthetic /a/ in Mohawk. We must provide some feature specification for one of them, epenthetic /a/ in Mohawk, to make them distinct in their sound quality. This requires GEN to generate an epenthetic segment with feature specification.\(^{15}\)

Although we must allow GEN to produce epenthetic segments with feature specifications in the face of the Mohawk facts, it is also true that many facts concerning epenthetic segments have been successfully explained by FILL based on the assumption that they are null segments. This suggests that we should keep the assumption that epenthetic segments are generated as null segments in unmarked cases, as constraints such as *STRUC requires, and that in marked cases, where some higher-ranked constraint must be respected, epenthetic segments are generated with feature specifications.

References


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\(^{15}\)See also McCarthy (1993), who reaches the same conclusion based on the Lardil facts discussed by Prince and Smolensky (1993; 102-122). On the consideration that epenthetic segments are not always null, McCarthy proposes to adopt the constraint MSEG instead of FILL. MSEG based on the assumption that epenthetic segments are without morphological affiliations requires every segment to have morphological affiliation. It has the same function as FILL, which is to prohibit epenthetic segments.