Prosodic and Morphological Constraints: An Optimality Account of Alabama Negation[*]

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1. Standard Negation in Alabama

In this paper, I will discuss affixation patterns found in a certain morphological process of Alabama. Alabama is a member of the Muskogean language family and has a morphological process called standard negation that creates a negative form from a given verbal root. Standard negation in Alabama is characterized by the following three factors: (i) affixation of *ki* or *ik*, (ii) a final vowel *o*, and (iii) a high pitch accent on the penultimate syllable.[1] The second and the third properties are quite regular. On the other hand, the first property shows interesting variation depending on certain factors. Here I will take up and discuss the nature of this property in detail.

Let us first look at the examples of standard negation, given in (1)-(3) (all examples taken from Montler and Hardy 1991).

(1)	Prefixation	#CV# —> #*ik*CV#	
	/la/	*íklo*	'come'
	/sa/	*íkso*	'be located'
(2)	Suffixation		
	(a)	CVV# —> CVV*ki*#	
	/alkomoo/	alkomóo*ko*	'hug'
	(b)	CVC# —> CVC*ki*#	
	/sobay/	sobáy*ko*	'know'
	/bit/	bít*ko*	'hit'
	(c)	(C)VCV# —> (C)VC*ki*#	
	/hocifa/	hocíf*ko*	'name' ([c] = [ts])
	/kano/	kán*ko*	'good'
(3)	Infixation		
	(a)	CVCCV# —> CV*ki*CCV#	
	/talwa/	ta*kí*lwo	'sing'
	/nocihla/	noci*kí*hlo	'sleepy'
	(b)	VVCV# —> V*kii*CV#	
	/hoopa/	ho*kíi*po	'sick'
	/pakaama/	paka*kíi*mo	'tame'

The negative forms are given in the second column.[2] All the forms in the second column end with *o* and have a high pitch accent in the penultimate syllable, as a result of the regular processes

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[1]In addition to standard negation, Alabama has another type of negation called "periphrastic negation," which attaches the suffix *-ikko* to the root. According to Montler and Hardy (1991), most verbs that require periphrastic negation have roots with the shape (C)VCV#. Some roots of this shape do undergo standard negation, however, as we will see below.

[2]Those in the first column are underlying (or input) forms, not the actual affirmative forms. Although the cases in (2c) and (3) have surface affirmative forms identical to the underlying forms, that is not true of the cases in (1) and (2a,b). Thus, the actual affirmative forms for those in (1) all have [i] prefixed to the root ([ila], [isa]), and the affirmative forms for those in (2a,b) have [li] suffixed to the root ([alkomooli], [sobayli], [bitli]). Montler and

mentioned above. Putting these factors aside, we see that the negative forms show different affixation patterns depending on the shape of the roots. If the root consists of a single light syllable, as in (1), the negative morpheme is realized as *ik* and it is prefixed to the root. If the root ends with a heavy syllable, as in (2a) and (2b), the negative morpheme is realized as *ki* and it is suffixed to the root (following Montler and Hardy (1991), I assume that the vowel *i* of the negative morpheme is replaced by *o* because of the "final *o*" property of standard negation). The cases in (2c) show that if the root ends with two light syllables, *ki*-suffixation occurs and, at the same time, the root final vowel disappears. Finally, if the root ends with a heavy syllable followed by a light syllable, as in (3), the negative form shows infixation of *ki*.[3]. Notice that in the examples in (3b), where the root contains a long vowel in the penultimate syllable, the root length is transferred so that the infix *ki* is lengthened in the negative form.

Here I will show that these affixation patterns of standard negation can be derived from the interaction of prosodic and morphological constraints. In doing so, I will argue that the specific shape and position of the negative morpheme is determined by constraint interaction rather than by the lexicon. I will also claim that a constraint equivalent to the "Stress-To-Weight" Principle is necessary, contrary to Prince's (1990) claim, and further that long vowels must be represented as consisting of two root nodes, along the lines of Selkirk's (1990) proposal.

2. Toward a Prosodic Account: Montler and Hardy's (1991) Analysis

Montler and Hardy (1991) propose a prosodic account for the three patterns of standard negation. Let us begin by reviewing their approach. They propose that the negative morpheme is an unordered set consisting of *k* and *i* that is realized as [*ki*] or [*ik*]:

(4) Negative morpheme = {*k*, *i*} (i.e. /*ki*/ or /*ik*/)

Further, they propose the conditions in (5) and (6).

(5) All words end in a CV syllable.

(6) Alabama Verb Frame: Derived verbs must end in a two-syllable, three mora foot.

They claim that it follows from (5) and (6) that derived verbs must end in a foot consisting of a heavy syllable followed by a light syllable ($\sigma_{\mu\mu}\ \sigma_{\mu}$). They then propose the rules of Negative Placement in (7).

(7) Negative Placement:
  a. If the stem already conforms to the Alabama Verb Frame, insert {*k*, *i*} into the rime of the penultimate syllable.
  b. Elsewhere, place {*k*, *i*} so as to conform to the Alabama Verb Frame.

Hardy (1991) claim that *i*-prerfixation results from a constraint on minimal words (bisyllabic) (also see Appendix), and that *li*-suffixation is due to the requirement, discussed in section 2, that all words end in a CV syllable.

[3]There is another pattern of infixation that does not fall under the generalization in (3). If the final light syllable has *k* in its onset, the negative affix appears as *ik* inserted right before this onset, creating a geminate:

(i)	liska	lis*íkko*	'beat'
	libatka	libat*íkko*	'cooked'
	afaaka	afa*íkko*	'laugh'

If we follow the generalization given in (3), we expect that these forms would contain *ki*, instead of *ik*. But, as Montler and Hardy (1991) point out, there are also a few roots that permit free alternations between *ki* and *ik*:

(ii)	palki	pal*íkko*, pak*íl*ko	'fast'

One possibility that might deserve consideration in this connection is that the forms in (i) might be influenced by the periphrastic form of negation, namely *-tikko* (see note 1), which is identical to the negative parts in (i) except the onset of the penultimate syllable. I omit the cases in (i) and (ii) from consideration in this paper.

The infixation cases in (3) have roots that conform to the Alabama Verb frame, that is, roots ending in a foot consisting of a heavy syllable followed by a light one. So (7a) accounts for the cases in (3a) straightforwardly. In order to account for the length of *ki* in the cases in (3b), they suggest that a long vowel is represented as a single vowel followed by an unspecified slot X and that this unspecified slot is associated with the vowel *i* of *ki* in the negative form. The prefixation and suffixation cases in (1) and (2) have roots that do not satisfy the Alabama Verb Frame and so they fall under (7b). The cases in (1) have roots consisting of a single light syllable and therefore prefixation of *ik* takes place to satisfy the Alabama Verb Frame. For the cases in (2a) and (2b), simple suffixation is enough to satisfy the Alabama Verb Frame. For the cases in (2c), they assume that the root final vowel is extrametrical. Thus under this assumption, (2c) receives the same account as (2b).

Although Montler and Hardy's proposal provides important insights into the nature of affixation in standard negation, there are several problems with it. First, the Alabama Verb Frame in (6) leads them to posit the unusual type of foot ($\sigma_{\mu\mu}$ σ_{μ}). Given the current understanding of foot typology, it is surely desirable if such an unusual type of foot can be dispensed with.[4]

Second, their approach has to stipulate the position of the negative affix to account for the infixation pattern. So, for example, there is no principled account of why *[kitalwo], which involves prefixation of *ki*, cannot be a negative form of /talwa/. In order to derive the correct form [takilwo], they simply stipulate that infixation takes place in the penultimate syllable. Thus there is no generalization about the position of the negative morpheme in their approach.

Similarly, it is not clear why *[talikwo], which involves infixation of *ik*, is impossible, despite the fact that it satisfies the Alabama Verb Frame. Again, they simply stipulates the order of *k* and *i*. Here an important generalization is missing about the order of *k* and *i*.

Finally, as noted before, they assume that the root final vowel in the cases in (2c) is extrametrical. But, as it stands, this is nothing more than a description of the fact. We need a principled account that accommodates these cases without such a stipulation.

3. An Optimality Account

3.1. The Position and Form of Feet

Here I will provide an alternative account within the framework of Optimality Theory that resolves these problems, while maintaining the basic insights of Montler and Hardy's original proposal.[5] First, essentially following Montler and Hardy, suppose that the negative morpheme consists of four separate units {*k*, *i*, *o*, H}, where H is a high pitch accent:

(8) The negative morpheme consists of four separate units {*k*, *i*, *o*, H}, where H is a high pitch accent.

I also assume with Lombardi and McCarthy (1991) that the foot type of Alabama is iambic:

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[4]Dresher and Lahiri (1991) argue that a foot of this type, which they call the "Germanic Foot," is necessary to account for stress and high vowel deletion in Old English (as well as some other phonological phenomena) within the metrical framework of Hayes (1980) as modified by Hammond (1984, 1986), McCarthy and Prince (1986), and Hayes (1987). However, Halle, O'Neil and Vergnaud (1993) argue against their claim, showing that the same data can in fact be explained within the competing framework proposed by Halle and Vergnaud (1987) without introducing the Germanic Foot. Idsardi (1994) proposes a reanalysis of the phenomena that rests on the simplified bracketed theory of Idsardi (1992, 1993) and Halle and Idsardi (1993, to appear) without appealing to the Germanic Foot.

[5]See Prince and Smolensky (1991) and McCarthy and Prince (1993a, b) for an OT analysis of *um*-affixation in Tagalog, where the affix *um* is realized as a prefix or an infix depending on the shape of the root it is attached to. See also Yip (1994) for an OT account of habitual-repetitive reduplication in Javanese, where the reduplicant appears as a prefix or a suffix.

(9) FT-FORM = I: The foot type is iambic.

Further, regarding the positions of *k* and *i*, I adopt the constraint in (10), which requires *k* and *i* to be adjacent.

(10) ALIGN-*k*-TO-*i*: Align($[k]_{negaf}$, Edge, $[i]_{negaf}$, Edge)

In what follows, I assume that the constraints in (9) and (10) are undominated:

(11) FT-FORM = I and ALIGN-*k*-TO-*i* are undominated.

Accordingly, I will consider only those candidates that satisfy these constraints. I also adopt NONFINALITY and ALIGN-FT, given in (12) and (13), respectively.

(12) NONFINALITY: A foot may not be at the end of a PrWd. (Prince and Smolensky 1993)

(13) ALIGN-FT: Align(Ft, R, PrWd, R) (McCarthy and Prince 1993b)

NONFINALITY is violated whenever a given PrWd is parsed so that some foot is located at the end of the PrWd. Thus, under the OT conception, the analyses which do not have a foot at the end of the PrWd are always preferred over those which do.

ALIGN-FT, originally proposed by Prince and Smolensky (1993) under the name of EDGEMOST and reformulated by McCarthy and Prince (1993b) as an alignment constraint, dictates that every foot stands in the final position in a PrWd. Violation of ALIGN-FT is gradient. Each foot is judged by the distance of its right edge from the right edge of the PrWd. Following McCarthy and Prince (1993b), I assume here that the degree of violation is determined by counting the number of syllables separating the right edge of the foot under consideration from the right edge of the PrWd. ALIGN-FT has the effects of putting feet as close to the end as possible and also of reducing the number of feet to a minimum, that is, to one (we also assume that candidates where feet are not parsed at all have no chance to survive). The net result is that in each optimal candidate, there is one and only one foot located as close to the end of a PrWd as possible.

Now suppose that these constraints are ranked as in (14).

(14) NONFINALITY » ALIGN-FT

This ranking guarantees that the optimal output always ends with a single iambic foot followed by a single light syllable. This is shown in tableau (15).

(15)

		sobay+ki	NONFINALITY	ALIGN-FT
a.	☞	(sobay)ki		*
b.	☞	so(bay)ki		*
c.		so(bayki)	*!	
d.		sobay(ki)	*!	
e.		(so)(bay)ki		**!*

The candidates in (c) and (d) violate NONFINALITY and are therefore immediately excluded. The candidate in (e) incurs more violations of ALIGN-FT than the candidates in (a) and (b), because of the presence of an additional foot, and is excluded for this reason. (Incidentally, there is no empirical evidence to choose between (a) and (b). In what follows, I will simply assume that (a) reflects the optimal pattern.)

Recall that all the negative forms have a heavy syllable in the penultimate position. We can derive this effect by invoking the constraint in (16), which is equivalent to the "Stress-To-Weight" Principle of Prince (1990).

(16) HEAVY-HEAD: The head of a foot must be heavy.

Given HEAVY-HEAD, every foot that has a light syllable in its head position incurs a violation. Then (17) holds in general.

(17) The ranking in (14) and HEAVY-HEAD jointly ensure that every optimal candidate has the general form $...([\sigma_{\mu}]\ \sigma_{\mu\mu})\sigma_{\mu}\#$, where $[\sigma_{\mu}]$ is optional.

This result allows us to derive the effect of the Alabama Verb Frame in (6) without invoking the unusual type of foot that Montler and Hardy posit, a desirable consequence of this approach.

3.2. Final-*o*

Before discussing the analysis of affixation patterns, I briefly mention here that the effect of final-*o* in the negative forms can be accounted for by appealing to the constraints in (18)-(21) (certain empirical considerations of Alabama force us to believe that NO HIATUS rather than ONSET must be adopted; see Appendix for discussion) and by proposing that FINAL-*o* in (18), NO HIATUS in (19), and FILL^{seg} in (20) are undominated, while PARSE^{seg} in (21) is lower-ranked.

(18) FINAL-*o*:: Align([*o*]$_{negaf}$, R, PrWd, R)
(19) NO HIATUS: Every non-initial syllable has an onset. (McCarthy and Prince 1993b)
(20) FILL^{seg}: Syllable positions must be filled with underlying segments. (PS 1993)
(21) PARSE^{seg}: Underlying segments must be parsed into syllable structure. (PS 1993)
(22) FINAL-*o*, NO-HIATUS, and FILL^{seg} are undominated; PARSE^{seg} is lower-ranked.

Under this analysis, PARSE^{seg} can be sacrificed in order to observe FINAL-*o*, NO HIATUS, and FILL^{seg}. As a result, every optimal candidate violates PARSE^{seg} (/la+{k, i, o}/ --> [ikl<a>*o*], /alkomoo+{k, i, o}/ --> [alkomook<i>*o*], etc). I assume this analysis in the following discussion.

Now we are ready to see how the three patterns of affixation fall out. Recall that in (17) we observed that given the ranking in (14) and HEAVY HEAD, every optimal candidate has the general prosodic form $...([\sigma_{\mu}]\ \sigma_{\mu\mu})\sigma_{\mu}\#$, where $[\sigma_{\mu}]$ is optional. In the following sections, I will examine only those candidates that have this general form.

3.3. Suffixation

Let us start with the third case of suffixation, given in (2c), repeated below.

(2) c. /hocifa/ hocíf*ko* 'name'

Let us first compare the candidates in (23).

(23) [(hocif<a>)k<i>o] vs. *[ho(cifa)k<i>o]

The difference between the two candidates is that the optimal candidate satisfies HEAVY-HEAD (the foot has a heavy syllable in its head), whereas the nonoptimal one violates it, but the optimal candidate causes more violations of PARSE^{seg}. This fact suggests that HEAVY-HEAD is ranked above PARSE^{seg} and hence that HEAVY-HEAD is respected at the cost of PARSE^{seg}. As shown in tableau (25), this ranking correctly chooses the optimal candidate.

(24) HEAVY HEAD >> PARSE^{seg}

(25)

	hocifa+ki+o	HEAVY HEAD	PARSE^{seg}
a.	☞ (hocif<a>)k<i>o		**
b.	ho(cifa)k<i>o	*!	*

Next let us consider the candidates in (26).

(26) [(hocif<a>)k<i>o] vs. *[ho(cifa)k<i>o]

Here epenthesis occurs in the nonoptimal candidate. As a result, both candidates satisfy HEAVY HEAD. In this case, the crucial constraints are FILL^{seg} and PARSE^{seg}, and they must be ranked as in (27). Tableau (28) illustrates the effect of the ranking.

(27) FILL^{seg} >> PARSE^{seg}

(28)

	hocifa+ki+o	FILL^{seg}	PARSE^{seg}
a.	☞ (hocif<a>)k<i>o		**
b.	ho(cifa)k<i>o	*!	*

Now the question arises why suffixation is necessary here; in other words, what makes the distinction among the candidates given in (29)?

(29) [(hocif<a>)k<i>o] vs. *[(hocik<i>)f<a>o], *[(hokic<i>)f<a>o], *[(kihoc<i>)f<a>o]

In (29) the nonoptimal candidates involve infixation or prefixation. This fact indicates that the negative morpheme {*k*, *i*} is morphologically a suffix to the root. To implement this idea, I propose a morphological constraint SUFFIX-*k*, *i* given in (30).

(30) SUFFIX-*k*, *i*: Align($[k, i]_{negaf}$, L, Rt, R)

This constraint basically states that {*k*, *i*} is morphologically a suffix to the root. Violation of the constraint is gradient and I assume that the degree of violation is determined by the number of segments between the left edge of {*k*, *i*} and the right edge of the root. Given SUFFIX-*k*, *i*, all the nonoptimal candidates in (29) are excluded since they violate this constraint, whereas the optimal candidate satisfies it.

Notice that the fact that the root-final vowel disappears in the suffixation cases in (2c) now falls out as a result of constraint interaction. Thus there is no need to stipulate extrametricality in this account, another desirable consequence.

The suffixation cases in (2b), repeated below, also fall out straightforwardly, since suffixation of *k<i>* plus *o* is sufficient to achieve the general prosodic pattern $([\sigma_{\mu}]\ \sigma_{\mu\mu})\sigma_{\mu}\#$.

(2) b. /sobay/ sobáy*ko* 'know'

3.4. Infixation

Now let us move on to the infixation cases. First, let us consider the cases in (3a).

(3) a. talwa ta*kí*lwo 'sing'

It is now obvious that the nonoptimal candidate in (31) loses because of SUFFIX-*k*, *i*, just like those in (29).

(31) [(takil)w<a>o] vs. *[(kital)w<a>o]

The next question to ask is how the candidates in (32) are distinguished.

(32) [(takil)w<a>o] vs. *[(talik)w<a>o]

Here I propose another morphological constraint ALIGN-*k, i* given in (33).

(33) ALIGN-*k, i*: Align($[k]_{negaf}$, R, $[i]_{negaf}$, L)

Basically, this constraint guarantees that *ki* is preferred to *ik*. Now suppose that ALIGN-*k, i* is ranked higher than SUFFIX-*k, i*, as in (34).

(34) ALIGN-*k, i* >> SUFFIX-*k, i*

This ranking implies that SUFFIX-*k, i* can be sacrificed to observe ALIGN-*k, i*, and this is exactly what is going on in the cases in (32). Tableau (35) shows this point.

(35)

talwa+{k,i}+o	ALIGN-*k, i*	SUFFIX-*k, i*
a. ☞ (takil)w<a>o		***
b. (talik)w<a>o	*!	**

Thus the ranking in (34) makes the desired distinction between the two candidates in (32).
What about the cases in (36)?

(36) [(takil)w<a>o] vs. *[(tal)<wa>k<i>o]

Here the nonoptimal candidate causes three violations of PARSE^{seg}. Given this, we can accommodate the cases in (36) by ranking PARSE^{seg} above SUFFIX-*k, i*.

(37) PARSE^{seg} >> SUFFIX-*k, i*

According to this ranking, violation of PARSE^{seg} is fatal, as compared with violation of SUFFIX-*k, i*, and this idea correctly captures the difference between the two candidates, as shown in tableau (38).

(38)

talwa+{k,i}+o	PARSE^{seg}	SUFFIX-*k, i*
a. ☞ (takil)w<a>o	*	***
b. (tal)<wa>k<i>o	**!*	

Thus the basic facts regarding the infixation cases in (3a) fall out in this account. I will return to the other infixation cases in (3b) in section 3.6.

3.5. Prefixation

The cases involving prefixation, given in (1), also follow from the interaction of the proposed constraints.

(1) /la/ íklo 'come'

Let us compare the candidates in (39).

(39) [(ik)l<a>o] vs. *[(la)k<i>o]

Here the optimal candidate loses to the nonoptimal one on ALIGN-*k*, *i* (because it has *ik* rather than *ki*) and on SUFFIX-*k*, *i* (because it involves prefixation). On the other hand, the optimal candidate satisfies HEAVY HEAD, whereas the nonoptimal one does not. Given this, it is crucial that HEAVY HEAD dominates ALIGN-*k*, *i* , and SUFFIX-*k*, *i* as in (40).

(40) HEAVY HEAD >> ALIGN-*k*, *i* , SUFFIX-*k*, *i*

Recall that we have already established the ranking in (34).

(34) ALIGN-*k*, *i* >> SUFFIX-*k*, *i*

Putting (40) and (34) together, we have the ranking in (41).

(41) HEAVY HEAD >> ALIGN-*k*, *i* >> SUFFIX-*k*, *i*

Tableau (42) indicates that the optimal candidate is correctly chosen, given this ranking.

(42)

la+ik+o	HEAVY HEAD	ALIGN-*k*, *i*	SUFFIX-*k*, *i*
a. ☞ (ik)l<a>o		*	**
b. (la)k<i>o	*!		

Similarly, the candidates in (43) can be distinguished by the same ranking, as (44) shows.

(43) [(ik)l<a>o] vs. *[(l<a>i)ko]

(44)

la+ik+o	HEAVY HEAD	ALIGN-*k*, *i*	SUFFIX-*k*, *i*
a. ☞ (ik)l<a>o		*	**
b. (l<a>i)ko	*!	*	

Thus, under this analysis, prefixation of *ik* takes place only when it provides the heavy penult to fit the general prosodic pattern $...([\sigma_\mu]\ \sigma_{\mu\mu})\sigma_\mu\#$.

3.6. Two-Root Theory of Long Vowels

Finally, let us turn to the infixation cases in (3b), where the root has a long vowel in the penultimate syllable.

(3) b. hoopa ho*kíi*po 'sick'

This case poses a serious problem for the standard treatment of length in terms of moras. Suppose that the root /hoopa/ is represented as in (45).

(45) /hoopa/

```
 μ μ     μ
  \/     |
 h o    p a    (Hayes 1989)
```

Under this assumption, the two candidates in (46) will have the output structures given below the candidates.

(46) [(hokii)p<a>o] vs. *[(hopaa)k<i>o]

```
 μ  μ μ   μ          μ  μ μ   μ
 |   \/   |          |   \/   |
 h o k i  p a       *h o p a  k i
```

Now the two candidates cannot be properly distinguished, since both involve reassociation of a mora, assuming that reassociation of a mora involves some kind of violation. What is worse, the optimal candidate loses to the nonoptimal one on SUFFIX-*k, i*. It seems that the problem cannot be avoided under the treatment of length in terms of moras.

Selkirk (1990) proposes a different conception of length, called a"two-root" theory, according to which a long vowel consists of two root nodes and some amount of shared feature specifications, including Place features, as shown in (47).

(47) RtV RtV
  \ /
  Place

Adopting the basic insight of Selkirk (1990) and also following a suggestion made by Montler and Hardy (1991) (see section 2), I propose that a long vowel consists of two segments, the first one being a fully specified vowel and the second one a vocalic node with other features unspecified. Thus, under this proposal, the input for /hoopa/ is something like (48).

(48) /ho𝕍pa/ (where 𝕍 is a vocalic root node)
  |
  Place

If Gen associates 𝕍 with Place of the preceding [o], the output is as in (49) and it is interpreted as [hoopa].

(49) /ho𝕍pa/
  V
  Place

This proposal resolves the problem with the nonoptimal candidate in (46). Notice that under the two-root conception, this candidate necessarily involves rearrangement of the segments of a morpheme, as shown in (50).

(50) *[(ho pa 𝕍)k<i>o]
  |___↑

This type of reordering of the segments surely violates something. Here I suggest that it violates Consistency of Exponence, given in (51).

(51) Consistency of Exponence (MP 1993a):
No changes in the exponence of a phonologically-specified morpheme are permitted.

According to Consistency of Exponence, the phonological specifications of a morpheme (segments, moras, or whatever) cannot be affected by Gen. Thus, by this principle, Gen may not change the underlying order of the segments, if the underlying order is part of the phonological specifications of a morpheme. Therefore the problem in (50) never arises.

Alternatively, we might invoke the constraint LINEARITY, proposed by McCarthy (1995), given in (52).

(52) LINEARITY: Input and output have identical linear-precedence properties.
(McCarthy 1995)

Then we can propose (53).

(53) LINEARITY is undominated in Alabama.

In either way, we can derive the consequence that the infixation cases in (3b) can be treated on a par with the infixation cases in (3a).

Similarly, given the two-root conception, the suffixation cases in (2a), skipped before, receives exactly the same treatment as the suffixation cases in (2b).

(2)	a.	/alkomo𝕍/	alkomóo*ko*	'hug'
	b.	/sobay/	sobáy*ko*	'know'

3.7. The Origin of [i]

So far, following Montler and Hardy's (1991) proposal, we have been taking the position that the negative affix in Alabama includes *i* as well as *k*. A reasonable alternative suggests itself, however. Suppose that the negative affix includes just *k* and that the surface *i* is "inserted" independently. In the terms of OT, this means that *i* is a result of a FILL^{seg} violation. Other things being equal, this hypothesis would probably be more desirable than our position, given the fact that the default vowel in Alabama is often *i* (Montler and Hardy 1990, 1991).

However, there is reason to believe that such a move cannot be correct. First, under the assumption that *i* comes from a FILL^{seg} violation, the analysis of the prefixation cases must be changed. Let us take the root /la/. In the alternative approach, the optimal candidate will be analyzed as [(k)l<a>o]. Since this involves one violation of FILL^{seg}, we cannot distinguish it from nonoptimal *[(l)k<a>o]. Suppose that we propose to treat the latter as a violation of some hypothetical constraint that requires underlying morpheme structures to be maintained. Let us call it MORPHEME INTEGRITY. Then we could choose [(k)l<a>o] over *[(l)k<a>o] by ranking MORPHEME INTEGRITY over SUFFIX-*k*, *i*.

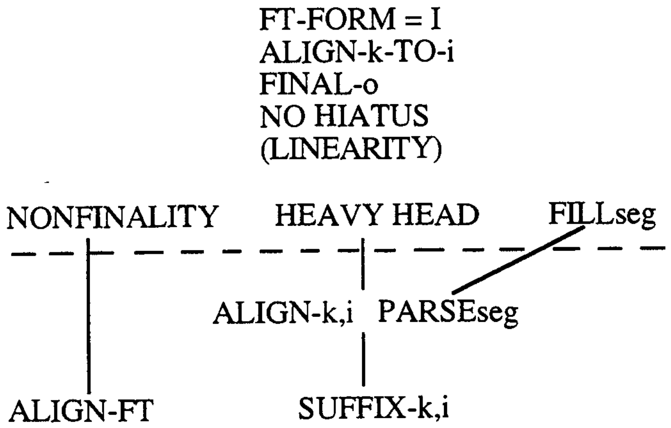
Let us now consider the root /talwa/, an infixation case. Recall that in the account given above, we can make the correct distinction between the optimal [(takil)w<a>o] and nonoptimal *[(talik)w<a>o] by invoking ALIGN-*k*, *i*, which only the latter violates. Under the assumption that only *k* is underlyingly present, on the other hand, we cannot invoke ALIGN-*k*, *i*. Under this assumption, the two candidates are analyzed as [(tak l)w<a>o] and [(tal k)w<a>o]. Note that both candidates violate MORPHEME INTEGRITY, and hence we cannot distinguish the two by appealing to this constraint, either. What is worse, given SUFFIX-*k*, *i*, which correctly captures the generalization that the negative affix is morphologically a suffix in the unmarked case, *[(tal k)w<a>o] would be incorrectly chosen as the optimal candidate. Thus we would lose our account of the infixation cases.

Therefore this alternative cannot be maintained unless the problem is shown to be solved on principled grounds.

4. Conclusion

To conclude the discussion, I have argued that the negative morpheme consists of four separate units {*k*, *i*, *o*, H}, and that the specific shape as well as the position of the negative morpheme is determined by the constraint system summarized in (54) (in (54) all the constraints above the dotted line are undominated).

(54)



I have also proposed that the constraint HEAVY HEAD, which is equivalent to the "Stress-To-Weight" principle, is necessary, contrary to Prince's (1990) claim. Further, I have argued for the two-root conception of long vowels proposed by Selkirk (1990).

This analysis resolves the problems with Montler and Hardy's (1991) analysis, noted in section 2. We have already seen that there is no need to appeal to the unusual type of foot that they invoke, and also that there is no need for extrametricality. As for the position and the shape of the negative morpheme, the ranking NONFINALITY » ALIGN-FT and the constraint HEAVY HEAD jointly determine the general prosodic pattern ...$([\sigma_\mu]\sigma_{\mu\mu})\sigma_\mu\#$ to which the morpheme is affixed. On the other hand, ALIGN-*k*, *i* and SUFFIX-*k*, *i* jointly determine the unmarked form of the negative morpheme, which is suffixation of *ki* to the root. This unmarked form is modified only when other constraints force it, and in that case, the unmarked form is modified in accordance with the system in (54). This explains why there is no prefixation of *ki* and no infixation or suffixation of *ik*.

Appendix. ONSET vs. NO HIATUS: Vowel Epenthesis in Affirmative Forms

In Alabama, a root consisting of a single light syllable always has *i-* prefixed to it on the surface:

(1) /la/ [ila] 'come'
/sa/ [isa] 'be located'
/pa/ [ipa] 'eat'

Following Montler and Hardy (1991), let us assume that this *i-* is not part of the root but is inserted as a response to the constraint on the minimal word size (bisyllabic) in Alabama (see Montler and Hardy 1991 for detailed arguments). In the terms of OT, this effect can be accounted for by invoking the constraint FOOt BINALITY (FTBIN):

(2) FTBIN: Feet are binary at some level of analysis (μ, σ).
(McCarthy and Prince 1986, PS 1993)

Consider the root /la/. The output form *[la] violates FTBIN since it is neither bimoraic mor disyllabic. Suppose that FTBIN is ranked over FILL^{seg}. Then it is possible to "insert" an epenthetic vowel at the cost of FILL^{seg}. The following tableau illustrates the point:

(3)

la	FTBIN	FILL^{seg}
a. (la)	*!	
b. ☞ (la)		*

Note that the optimal candidate in (3b) violates NONFINALITY. This does not cause any problem to the extent that the alternative candidate also violates it.

Now consider the candidate *[( )la], where double epenthesis takes place. This candidate does satisfy NONFINALITY and therefore the ranking between NONFINALITY and FILL^{seg} becomes relevant:

(4)

la	FILL^{seg}	NONFINALITY
a. ☞ (la)	*	*
b. ( )la	**!	

Thus in order to achieve the right result, FILL^{seg} must be ranked higher than NONFINALITY. Putting the results in (3) and (4) together, we get the following ranking:

(5) FTBIN » FILL^{seg} » NONFINALITY

Now the question immediately arises why [(la)] is the correct form rather than *[(la.)], which fares equally well with respect to the ranking in (5). The key to the answer to this question is ONSET, which requires every syllable to have an onset. Although both candidates contain onsetless syllables, it is very common that languages allow onsetless syllables only word-initially but not in other positions. Alabama is no exception in this regard (Hardy and Montler 1988: 380). If initial syllables can somehow be exempt from ONSET, the two candidates in question will be distinguished: *[(la.)] violates ONSET, whereas [(la)] does not and hence the latter is preferred.

How exactly are initial syllables exempt from ONSET? McCarthy and Prince (1993b) discuss two possible approaches to this problem. One possibility they discuss is to parametrize ONSET in the following way:

(6) NO HIATUS: *[$_\sigma$ V except word-initially.

This has the effect of tolerating onsetless syllables only in word-initial positions. McCarthy and Prince argue, however, that "[p]arametrizing ONSET by adding "NO HIATUS" to the panoply of universal constraints is obviously unsatisfactory, [because it] does not explain why just exactly word-initial position is special, and it compromises the claim of OT that languages differ principally in how they rank a fixed set of universal constraints" (pp. 36-37). Rejecting the first approach on these grounds, they propose an alternative approach according to which the exceptional behavior of word-initial onsetless syllables comes from the interaction of ONSET and ALIGN-LEFT:

(7) ALIGN-LEFT: Align(Stem, L, PrWd, L)

ALIGN-LEFT says that the left edge of any stem must coincide with the left edge of a PrWd. This approach has one immediate desirable consequence. Suppose that ALIGN-LEFT >> ONSET. Suppose further that there are two alternative analyses C1 and C2, where C1 has an onsetless syllable in stem-initial position, thereby violating ONSET, whereas C2 undergoes consonant epenthesis in front of the stem-initial vowel, respecting ONSET. Then, given the hierarchy ALIGN-LEFT >> ONSET, C1 is favored over C2, since the left edges of the stem and the PrWd are aligned correctly, thus satisfying the higher ranked ALIGN-LEFT, in the former, whereas they are misaligned in the latter. This analysis can therefore capture the fact that in some languages consonant epenthesis only takes place before an onsetless syllable in a non-initial position (for details, see the discussion of Axininca Campa in section 5 of McCarthy and Prince 1993b).

Now if we consider the Alabama case, we see that the situation is rather different. In the optimal candidate [(la)], the initial vowel is not part of the stem but is epenthetic and hence the left edges of the stem and of the PrWd are misaligned, whereas in the losing candidate *[(la.)], they coincide. This state of affairs makes it impossible to invoke the interaction of ALIGN-LEFT and ONSET to resolve the problem at hand. Note that the first approach, abandoned in McCarthy and

Prince's treatment, does give us the right result, since *[(la.)] violates NO HIATUS, whereas [(la)] does not.

Thus, at least for Alabama, NO HIATUS is descriptively adequate. Whether it can be derived from (the interaction of) some other constraints or it can replace the alternative advocated by McCarthy and Prince, is a matter that must await future research.

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