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Against featural alignment[1]

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Morphemes are sometimes expressed by elements that are less than full segments, and, in a given language, the position of these elements in a word may vary. A recent analysis of these 'mobile morphemes' claims that their distribution is best explained in an optimality-theoretic framework that incorporates a set of featural alignment constraints (Akinlabi 1996). This paper argues that featural alignment plays no role in the realization of 'mobile morphemes'. Instead, it recognizes a set of licensing constraints that explicitly identifies where featural exponents of such morphemes may appear in a word. Crucially, these licensing constraints, unlike featural alignment, are not morpheme-specific and therefore enjoy cross-linguistic support. Analyses of Chaha labialization, Terena nasalization, High tone realization in the Edoid associative construction and Southern Sami vowel lowering in terms of licensing are shown to be superior to the alignment-theoretic ones on both descriptive and explanatory grounds.

1. INTRODUCTION

It is well documented that grammatical morphemes are sometimes represented by elements which are realized in different positions within a stem and may even span the entire stem. The phenomenon is labeled Mobile Morphology by Rose (1997). In orthodox generative phonology, these mobile entities are considered to be less than full segments; in many instances they are demonstrably just single features. The mobility has normally been attributed to the fact that the featural exponents are not segmentally affiliated in underlying representation. Recently, Akinlabi (1996) claims that the variable realization of these morphemes, which he labels 'featural affixes', is best explained within the framework of Optimality Theory (OT) where constraint domination and violability are fundamental tenets. A family of Featural Alignment constraints plays a central role in Akinlabi's analysis. These constraints are considered to be extensions of the theory of Generalized Alignment developed by McCarthy & Prince (1993).

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Two types of Featural Alignment constraints are recognized. One is appropriately identified as morphological alignment; it determines the location of the grammatical morpheme at a particular stem edge.

(1) *ALIGN AFFIX*: Align (Affix (x), Edge_i; Stem, Edge_j)
The Edge_i of Affix (x) is aligned with the Edge_j of a stem.

This type of constraint identifies an affix as fundamentally either a prefix (stem-initial) or a suffix (stem-final). The other type is considered to be phonological, because it requires the alignment of the edges of affixes and prosodic categories (for example, the prosodic word).

(2) *ALIGN AFFIX*: Align (Affix (x), Edge_i; PCat, Edge_j)
The Edge_i of Affix (x) is aligned with the $\text{Edge}_j$of PCat.

The latter is supposed to be responsible for the fact that the featural exponent of a mobile morpheme sometimes extends over more than one segment, producing a harmonic effect.

I argue in this paper that morphological alignment is necessary but not sufficient to account for the positioning of a mobile morpheme in relation to the edge of a stem. It must be supplemented by a provision for the prosodic licensing of the exponent of the morpheme. Furthermore, recognition of licensing renders superfluous the need to assume that constraints like those in (2) play any role in the realization of mobile morphemes. In other words, the positioning of mobile morphemes provides no justification for postulating phonological constraints that command the alignment of the edges of grammatical morphemes (that is, affixes) and prosodic categories (that is, syllables, feet, prosodic words, etc.). Undermining the evidence from mobile morphemes for featural alignment obviously casts doubt on the need for such constraints. My alternative to Akinlabi's (1996) analysis will also be presented in the optimality-theoretic framework, because the issue here is the role of particular constraints and not the appropriateness of the theory of constraint-interaction.

2. An alignment account of mobile morphology

Akinlabi's (1996) analysis adopts McCarthy & Prince's (1993) idea that affixes are required to be aligned with either the left or right edge of stems. When a featural affix obeys such a requirement absolutely, it will invariably be associated with the first or last segment that may bear the feature. However, in the OT framework such requirements can be violated, thereby resulting in affix misalignment. In the case of featural affixes, violations of a morphological alignment constraint may be forced by the need to satisfy a superordinate demand imposed by a feature cooccurrence constraint (FCC). When the latter constraint forces a featural affix away from the edge of a stem, it may be realized elsewhere within the stem under pressure to ensure that morphemes are realized whenever possible (PARSE MORPH). The constraint interaction just described produces the mobility effect that often characterizes these morphemes. Akinlabi's account of the manifestation of the 3rd masculine singular object in the Ethio-Semitic language, Chaha, may be used to illustrate his approach. He reproduces from familiar sources (see Johnson 1975, McCarthy 1983, Rose 1993) examples like those in (3), showing that affixation of this morpheme produces labialization of a stem consonant.

(3)	Without object	With object affix	
(a)	näkäb	näkäb^w	'find'
(b)	näkäs	näk^{w}äs	'bite'
(c)	mäsär	m^{w}äsär	'seem'
(d)	sädäd	sädäd	'chase'

From these representative examples, it can be deduced that only one consonant is labialized and it is always the rightmost labial or velar. Coronal consonants are never labialized and are ignored in the computation of rightmost (3b, c). If no labials or velars are available within a stem, labialization does not occur (3d).

Akinlabi follows a number of earlier proposals in assuming that the 3rd person masculine singular object in Chaha is represented by the feature [round]. He postulates that it is basically a suffix and must therefore satisfy the constraint in (4).

(4) *ALIGN AFFIX*: Align (3m. sg., R; Stem, R)
The right edge of the 3m. sg. must be aligned with the right edge of a stem.

The preference for the Chaha affix to be in a stem-final position is exercised in (3a) where the labialization indicates that the feature [round] is part of the last consonant of the stem. However, when the last consonant is coronal (3b, c), the alignment requirement cannot be met, because of the enforcement of a constraint (*COR/LAB) which prohibits labialized coronals.[2] In the optimality-theoretic framework, this misalignment is an indication that *COR/LAB takes precedence over ALIGN. Indeed, the FCC is inviolable in Chaha and must be undominated in the constraint hierarchy. Given this ranking, the affix can be realized in cases like those in (3b, c) only by becoming part of a non-final labial or velar consonant. If a stem contains only coronals (3d), the affix must be unrealized. The two tableaux in (5) illustrate the mobility of the 3rd person masculine singular morpheme in Chaha.

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[2] The ban on labialized coronals might be captured in feature-geometric terms by assuming that coronals are unspecified for a Place node (Paradis & Prunet 1991). This possibility is not pursued in this paper.

(5) (a) Input: näkäb, [round]

	*COR/LAB	PARSE MORPH	ALIGN-R
☞ näkäbʷ			
näkʷäb			*!
näkäb		*!	

(b) Input: näkäs, [round]

	*COR/LAB	PARSE MORPH	ALIGN-R
näkäsʷ	*!		
☞ näkʷäs			*
näkäs		*!	

The second type of featural alignment, the phonological type, is supposed to be the engine that drives multiple association of featural affixes. Akinlabi considers the manifestation of the 1st person affix in the Arawakan language, Terena, to be a classic case. Like most other analyses of this pattern, the data are drawn from Bendor-Samuel (1960, 1966). Some of these data are reproduced in (6).

(6)	3rd person	1st person (sg)	
(a)	piho	ᵐbiho	‘went’
	paho	ᵐbaho	‘mouth’
	owoku	õw̃õⁿgu	‘house’
	nokone	nõⁿgone	‘need’
	tuti	ⁿduti	‘head’
	iwatako	ĩw̃ãⁿdako	‘sat’
	otopiko	õⁿdopiko	‘chopped’
(b)	simoa	ⁿzimoa	‘came’
	šeʔeša	ⁿžeʔeša	‘son’
	iwuʔišo	ĩw̃ũʔĩⁿžo	‘ride’
(c)	haʔa	ⁿzaʔa	‘father’
	ahyaʔašo	ãnžaʔašo	‘desire’

The relevant observations about these data are the following. The presence of the 1st person singular morpheme is marked by the prenasalization and voicing of the leftmost obstruent in a stem, accompanied by the nasalization of all segments preceding the prenasal. Both stops (6a) and fricatives (6b) are prenasalized. The segments which Bendor-Samuel transcribe as /h/ and /hy/ pattern with the obstruents (6c).

When a Terena stem contains no obstruents, affixation results in the extension of nasality over all its segments.

(7)

	3rd person	1st person (sg)	
(a)	emoʔu	êmõʔũ	‘word’
(b)	anu	ãnũ	‘neck’
(c)	ayo	ãỹõ	‘brother’
(d)	yono	ỹõnõ	‘walked’
(e)	arunoe	ãr̃ũnõẽ	‘girl’
(f)	arine	ãr̃inẽ	‘sickness’

Glottal stop is transparent to nasalization, while all sonorants, including nasals, are targets. It is clear from the above data that nasalization is not arrested by underlying nasals.

For Akinlabi, the Terena 1st person affix is the feature [nasal]. The dominance of the morphological alignment constraint in (8) compels this feature to be associated with the first segment in a stem; it is basically a prefix.

(8) *ALIGN* (*AFFIX*)-*LEFT*: Align (1p., L; Stem, L)
The left edge of the 1st person affix must be aligned with the left edge of a stem.

From the stem-initial position, this morpheme must extend rightwards, because it has to satisfy the demands of the phonological constraint in (9).

(9) *ALIGN* (*AFFIX*)-*RIGHT*: Align (1p., R; PWd, R)
The right edge of the 1st person affix must be aligned with the right edge of a prosodic word.

The satisfaction of the two alignment constraints is responsible for the fact that affixation of the 1st person morpheme distributes nasality over the entire word in the manner illustrated in (7). In a word like *ãnũ* ‘my neck’, the 1st person affix has a presence at both the left edge of the stem and the right edge of the prosodic word.

However, while the demands of morphological alignment are always met in Terena, the phonological constraint (9) is sometimes violated, forcing misalignment between the right edges of the affix and the prosodic word. Akinlabi attributes such misalignment to the satisfaction of a feature cooccurrence constraint (*NAS/SON) which prevents the nasalization of obstruents. The formulation of the constraint carries a special codicil that limits its scope to the release phase of a stop, assuming the aperture theory of segment structure proposed by Steriade (1993). The effect is to allow nasality to be associated with the closure phase of a stop, thereby producing prenasals. Obstruent stops are therefore both targets of nasalization and opaque to the process. The constraint ranking which Akinlabi postulates to ensure this opacity is reproduced below.

(10) *NAS/SON, ALIGN-L ≫ ALIGN-R

This ranking forces the affix to extend itself rightward, without violating *NAS/SON or ALIGN-L. Nasalization cannot skip an obstruent, because of the enforcement of a universal Locality Condition that prohibits the appearance of gaps within a featural span (Steriade 1995; Piggott & Hulst 1997). It must therefore be limited to the first segment of *ᵐbiho* 'I went' but must encompass part of the first obstruent of *ĩw̃ã*ⁿ*dako* 'I sat' and all preceding segments.

2.1 *The inadequacy of the alignment account*

Chaha labialization and Terena nasalization are presented as paradigm cases of featural affixation. If, therefore, it can be shown that the appeal to featural alignment fails to yield an adequate analysis of these phenomena, some alternative account must be considered. I will first show that the attraction of the feature [round] to the rightmost consonant of a Chaha stem cannot be straightforwardly derived from the best satisfaction of a morphological alignment constraint of the type described in (1); some additional machinery is required. I will next argue that the attribution of the extension of a featural affix to the satisfaction of an alignment constraints like that in (2) is an undesirable increase in the power of phonological theory; it predicts the occurrence of patterns that have never been attested. Then, I will demonstrate that an analysis of Terena nasalization in terms of featural alignment must be rejected, because it is descriptively inadequate.

Let us now consider my claim that the target of labialization in Chaha is not selected on the basis of how the demands of morphological alignment are met. The point of departure for this discussion must be the representation of the 3rd masculine singular object affix. Akinlabi (1996) agrees with others that, in addition to the feature [round], it also contains a coronal nasal. Rose (1997) explicitly describes it as the suffix /[round]n/, the two components being sequentially ordered as indicated.[3] The bearer of [round] can be either an affix or root consonant. Rose (1997: 24) points out that the consonant of the subject suffix /xä/ is labialized when this morpheme appears between the root and the object suffix. Thus, from underlying /käfät-xä-[round]n-m/ 'you (masc) opened it', [round] surfaces on the suffix consonant

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[3] The assumption that the two components are sequenced is not crucial to the arguments in this section. It is only necessary that the affix be represented by both [round] and [n].

([käfätx^{w}änɨm]) and not on a root consonant (*[käf^{w}ätxänɨm]). Notice also that labialization is not triggered to the right of the nasal component of the 3rd masculine singular object (*[käfätxänɨm^{w}]).

Given then that the 3rd masculine singular object is the sequence /[round]n/, both components of the affix must be taken into consideration in any evaluation of its manifestation. Outputs containing this morpheme are evaluated by the constraint ranking proposed for Chaha as illustrated below. For convenience, I identify the output that corresponds to the correct surface form with a check mark (√).

(11) Input: näkäb, [round] n

	*COR/LAB	PARSE MORPH	ALIGN-R
(a) n^{w}äkäb-n	*!		
☞ (b) näk^{w}äb-n			
√☞ (c) näkäb^{w}-n			
☞ (d) näkäb-n			

The violation of the feature cooccurrence constraint *COR/LAB is fatal to (11a), but the remaining constraints cannot choose between the other candidates. Since *n* must be at the right edge of the affix, the morphological demand that the affix must be right-aligned in a stem is met in (11b–d). Morever, the presence of *n* guarantees that 3rd masculine singular object is realized in each output. From the interaction of these constraints, we therefore have no explanation for the restriction on the occurrence of labialization to the rightmost labial or velar.

It is reasonable to infer that (11d) can be eliminated as the optimal candidate by assuming that it violates some constraint that commands the surface presence of an input feature whenever possible (Faithfulness), but this would still leave unresolved the problem of deciding how the choice between (11b) and (11c) is made. Clearly, we must appeal to some constraint which is independent of morphological ALIGN-R to explain why (11c) is the best candidate. This constraint cannot be the phonological requirement that the affix must be right-aligned with the prosodic word, because the competitors (11b, c) are equal with respect to the satisfaction of such a demand. This conclusion is obvious, because the right edge of the affix is defined by the occurrence of the coronal nasal. The appearance of [round] must be commanded by a constraint that makes reference to this feature.

Constraints in the morphological alignment sub-family are justified independently of any role that they might play in the manifestation of mobile morphemes. This type is responsible for the positioning of the 3rd masculine singular object affix in Chaha, although it plays no other role in determining why and where the affixal feature [round] is realized. In contrast, there is no independent justification of phonological alignment constraints that command the extension of morpheme-specific features. In other words, if the satisfaction of ALIGN-R (9) were responsible for the rightward propagation of nasality, we would expect cases where featural affixes are distinguished in a language solely on the basis of the presence of absence of propagation. A hypothetical example of such a prediction is the occurrence of two [nasal] affixes, where one triggers spreading but the other does not. To my knowledge, this type of morphemic contrast has not been reported. In the attempt to subsume morphologically-induced harmony under the general rubric of alignment, Akinlabi (1996) actually fails to explain why this pattern involves featural affixes. Why are there no cases of harmony restricted to a specific morpheme where the trigger is a fully specified segment?

An analysis that attributes rightward [nasal] propagation in Terena to the satisfaction of (9) is not only theoretically suspect but also empirically inadequate. It would have to be supplemented by ad hoc stipulations to explain the emergence of voicing in the prenasalized obstruents. Piggott (1997) and Piggott & Humbert (1997) draw attention to the fact that opaque obstruents in phonologically governed nasal harmony are never voiced. Furthermore, it is not obvious how nasal spreading would result in the prenasalization of fricatives. Akinlabi (1996: 277) asserts that 'prenasalization in fricatives involves a concomitant projection of a closure phase' but offers no explanation for why such a projection is necessary. In other words, we do not know why the constraint ranking in Terena selects [ĩw̃ũʔĩ^{n}žo] as a better output than *[ĩw̃ũʔĩšo] or *[ĩw̃ũʔĩžo].

In summary, I have shown that morphological alignment does not participate in the choice of segment that bears labialization in Chaha. Secondly, I have argued that the type of phonological alignment constraint that applies to specific affixes is too powerful a device to be an explanatory tool of phonology; it overgenerates. Thirdly, I maintain that, even if phonological alignment were a licit tool, it still would not explain how rightward propagation of nasality is manifested in Terena. I will now proceed to outline in the next section an alternative proposal for the analysis of mobile morphemes.

3. The role of licensing in Mobile Morphology

Since the theory of prosodic licensing was spelled out by Itô (1986), it is generally accepted that elements can be manifested phonetically only if they are licensed by being incorporated into a position in a hierarchical prosodic structure. This entails that features must be incorporated into segments, segments into syllables, syllables into feet/prosodic words, etc. Features introduced by affixes therefore cannot be autonomous at the level of realization but must be parasitic on some independently occurring segment. Either implicitly or explicitly, licensing theory figures in some of the best known analyses of mobile morphemes in the generative phonological literature (see McCarthy 1983, Lieber 1987, Rose 1993). For example, McCarthy (1983) proposes that the feature [round] introduced by the 3rd person masculine singular object in Chaha be incorporated into the rightmost consonant that can be labialized. Piggott (1988, 1997) extends and refines this idea.

3.1 *Chaha labialization*

Piggott's proposal makes explicit provisions for the prosodic licensing of mobile morphological elements. One option is for such elements to be licensed by a suprasegmental category. When this mode of licensing is in effect, the element must be parsed into a constituent at either the right or left edge of the licensing category (Piggott 1997: 444). Of course, the edgemost host is not necessarily at the absolute edge. For example, a tonal feature may be licensed at the left edge of a word when it is associated with the first vowel, even if the vowel is preceded by consonants.[4] From such a perspective, if the host of a non-tonal feature is a consonant, we can consider vowels to be irrelevant in the computation of edgemost. Against this background, I hypothesize that Chaha labialization results from a combination of the Faithfulness requirement that underlying elements must be parsed whenever possible and the satisfaction of the following constraint, a member of the FEATURE LICENSING family.

(12) [*ROUND*] *LICENSING* ([*RND*]-*LIC*)
The feature [round] is licensed by the prosodic word.[5]

This constraint regulates the appearance of a feature that is segmentally-unaffiliated in the input; it does not apply to [round] as an underlying property of a segment. This restriction is achieved straightforwardly in the OT framework by hypothesizing that [RND]-LIC is dominated in Chaha by a constraint requiring segmentally-affiliated [round] to be parsed as a feature of the underlying host. The formulation of the latter is ignored here, but examples of this type of constraint are encountered later in this paper.

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[4] Akinlabi (1996) makes a similar point.

[5] In the clearest cases of licensing by the prosodic word, the licensed element is at the end of the word (Piggott 1997, 1999). It seems therefore that the right edge of a word might be unmarked for the purpose of discharging the licensing function.

[RND]-LIC provides the Chaha grammar with a basis to choose between competing candidate outputs like those in (11b) and (11c), identified in the tableau below as (13a) and (13b), respectively.

(13) Input: näkäb, [round] n

		[RND]-LIC	ALIGN-R
	(a) näkʷäb-n	**!	
☞	(b) näkäbʷ-n	*	

Each of the candidates in (13) incurs a violation of [RND]-LIC that can be attributed to the dominance of the ban on labialized coronals. Hence, *COR/LAB must outrank [RND]-LIC in the Chaha constraint hierarchy. The effect of this ranking is displayed below.

(14) Input: näkäb, [round] n

		*COR/LAB	[RND]-LIC	ALIGN-R
	(a) näkäsʷ-n	*!	*	
☞	(b) näkʷäs-n		**	

This analysis achieves the effect that Akinlabi attributes to the dominance of the feature cooccurrence constraint over alignment. Invoking a derivational metaphor, it forces [round] to move leftward in search of a licenser until the rightmost non-coronal consonant is located. If there are no non-coronals to the left of the affix, the feature cannot be realized (for example, sädäd-n).

Another constraint that outranks [RND]-LIC in Chaha is one that preserves the underlying linear order of segments within a morpheme; this would be a member of the LINEARITY family of constraints (see McCarthy & Prince 1995). Given that the suffix marking the 3rd person masculine singular object is the sequence /[round]n/, the dominance of LINEARITY over [RND]-LIC prevents [round] from being realized to the right of the coronal nasal. Therefore, [käfätxʷänɨm] must be a better realization of underlying /käfät-xä-[round]n-m/ 'you (masc) opened it' than (*[käfätxänɨmʷ]).

It is possible to formulate an alignment-theoretic equivalent of [ROUND]-LICENSING (12) that makes specific reference to the right-alignment of the feature [round]. This type of alignment constraint would not be specific to the morpheme marking the 3rd person masculine singular object in Chaha and would therefore not justify postulating the type described in (2). However, featural alignment alternatives to licensing constraints are not always available. Consequently, the superiority of the appeal to prosodic licensing emerges in those cases where featural alignment fails to provide a descriptively adequate account of the facts. The realization of the 1st person affix in Terena is such an example.

3.2 *Terena nasalization*

The interaction of feature licensing and morphological alignment produces discontinuity in the realization of the 3rd person masculine singular object morpheme in Chaha. Part of the morpheme appears at the right edge of a stem, as demanded by its status as a suffix, while the other part can appear as far to the left as the stem-initial position in order to ensure its licensing (for example, m^wäsär-n). However, the satisfaction of licensing and alignment in different stem positions does not always produce discontinuity. The realization of the Terena 1st person affix confirms the correctness of this claim. As a prefix, this morpheme is always present at the left edge of a stem. It therefore always meets the alignment requirement in (8), repeated below as (15).

(15) *ALIGN* (*AFFIX*)-*LEFT*: Align (1p., L; Stem, L)
The left edge of the 1st person affix must be aligned with the left edge of a stem.

However, the exponent of this affix is sometimes licensed in a non-initial position. When the latter situation obtains the morpheme occupies a continuous span from the left stem-edge where it is placed by the morphology to the position where phonology provides for its licensing. The surface manifestation of this extension of the morpheme is obviously harmony. This overview of Terena nasalization provides the essence of Piggott's (1997) analysis. The crucial elements will now be spelled out.

First, there is the question of the phonological content of the Terena 1st person morpheme. I pointed out above that the traditional identification of this affix as just the feature [nasal] does not yield a principled explanation of the emergence of prenasalized obstruents. Such a hypothesis is confronted with two problems. First, there is no unambiguous, independent evidence that the combination of the feature [nasal] and an obstruent results in an invariable nasal contour. Secondly, the prenasalization of a fricative is completely unpredictable in terms of any established model of segment structure. The alternative hypothesis defended by Piggott (1988, 1997) is that the Terena 1st person morpheme is a nasal consonant with all the attributes of such a consonant except that it lacks specification for place features. This type of segment is recognized by a number of people (Trigo 1988, Padgett 1994, Humbert 1995). Assuming such a representation of the Terena affix, independent evidence can be provided for the occurrence of obstruent prenasalization and the concomitant voicing.

The Bantu family is a source of unambiguous evidence that a nasal can combine with a following obstruent to form a nasal contour (Herbert 1986, Rosenthall 1989, Padgett 1994).

(16) *Prenasalization in Bantu*

(a)	N-bala [^{m}bala]	‘I count’	(Ganda)
(b)	N-gaba [^{ŋ}gaba]	‘I divide’	(Ganda)
(c)	N-dizi [^{n}dizi]	‘banana’	(Swahili)
(d)	iN-puno [i^{m}buno]	‘nose’	(Ndali)
(e)	iN-tunye [i^{n}dunye]	‘banana’	(Ndali)
(f)	iN-ku^{n}da [i^{N}gu^{n}da]	’dove’	(Ndali)
(g)	N-šona [^{n}ǰona]	‘lick me’	(Gikuyu)

Most of the current theories of segment structure readily accommodate the prenasalization of fricatives from such nasal-consonant combinations.

Prenasalization has a distinct function; it allows the deficient placeless nasal to acquire the place features of the obstruent with which it combines. Place specification is an important prerequisite for the realization of a consonant (Padgett 1994, Humbert 1995). A nasal consonant also provides a context for the voicing of a following obstruent. According to Itô, Mester & Padgett (1995), postnasal voicing is a consequence of conflict between the demand that a nasal consonant be voiced and the redundancy of [voice] specification for sonorants. The conflict can be resolved in nasal-obstruents sequences by assigning the role of the licenser of [voice] to the obstruent. The phenomenon of postnasal voicing is supported by evidence from a number of languages. The nasal and obstruent segments that constitute a Terena nasal contour are in a sort of symbiotic relationship. The obstruent contributes two crucial properties to the wellformedness of the nasal; it is the source of vital place features, while providing a perfect host for the [voice] specification that nasals demand but cannot license.

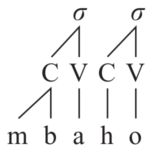
As a result of prenasalization, the underlying placeless nasal introduced by the Terena 1st person affix is parsed into the onset position of a syllable. The following licensing requirement is therefore met.

(17) *Segment Licensing/Syllable* (*SegLic/σ*)
The licenser of a segment is a syllable.

According to Piggott's (1997) analysis of Terena, the nasal exponent of the 1st person affix meets this requirement only when it merges with an obstruent. In other words, to be licensed by a syllable, a nasal consonant must have place features.

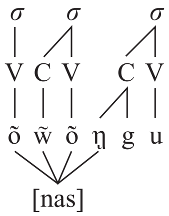
When the obstruent is in stem-initial position, both the licensing and alignment demands are met at the left edge of the stem, as illustrated by a form like ^{m}*baho* ‘my mouth’.

(18) (a) Input: N, paho
(b) Output:



The location of the host obstruent in a non-initial position entails that the demands of both SegLic/σ and ALIGN-L can be met only by extending the morpheme from its left-aligned position to the position in which the nasal exponent of the affix is licensed.

(19) (a) Input: N, owoku
(b) Output:



Output (19b) is assured in a grammar in which the demands of SegLic/σ, ALIGN-L and a constraint requiring input segments be present in an output are all enforced. In the language of Correspondence Theory (McCarthy & Prince 1995), the latter constraint is considered to be a member of the MAX (seg)-IO family.

(20) Input: N, owoku

	MAX(seg)-IO	SegLic/σ	ALIGN-L
(a) owoku	*!		
(b) õwoku		*!	
☞ (c) õw̃õ^{ŋ}gu			

In Terena, the host obstruent for the placeless nasal is always the leftmost (for example, ĩw̃ã^{n}dako, *iwata^{ŋ}go). The selection of an obstruent in a different position would make it impossible to meet the alignment demands. When the licensing position is non-initial, the alignment and licensing demands can be met only if nasality extends over a sequence of segments.

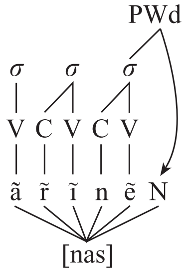
Voiceless obstruents cannot be fully nasalized (see Piggott 1992), and the universality of the Locality Condition prevents a nasal span from containing oral segments. Underlying /N, iwatako/ can therefore not be optimally paired with the surface form *[ĩw̃ãtãⁿgo]. Indeed, the latter output is universally ruled out when nasalization is a segment-to-segment relation, as it is in the emergent Terena harmony.

When a Terena stem contains no obstruents, the placeless nasal is anchored at the right edge of the word. Licensing in such instances is commanded by the same constraint that sanctions the appearance of the so-called extraprosodic consonants (see Spaelti 1994; Piggott 1997, 1999).

(21) *Consonant Licensing/Prosodic Word* (*CnsLic/PWd*)
The licenser of a consonant is a prosodic word.

A consonant that is licensed by the prosodic word is obligatorily at the edge of the word. Cross-linguistically, the preferred position of these 'extraprosodic' elements is word-final, where they are usually realized as full segments (see also footnote (5)). However, full realization of a placeless nasal at the right edge of a Terena word is impossible, because there is no contextual source for the vital place features.[6] Nevertheless, being licensed, the surface presence of the nasal is guaranteed. This is accomplished by merger or fusion with the last vowel, in violation of what McCarthy & Prince (1995) call UNIFORMITY. For maximum transparency, the licensed placeless nasal is shown in the illustration below and the licensing relation is also graphically displayed.[7]

(22) (a) Input: N, arine
(b) Output:



The recognition of this mode of segment licensing means that there are two potential licensers of the nasal exponent of the Terena 1st person morpheme,

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[6] This claim is predicated on the assumption that the option of providing some default place specification is not exploited by Terena (Rice 1996). The exclusion of this option leaves only one other possibility of a unique correspondent of an underlying placeless nasal. Evidence from Arabela (Rich 1963) indicates that the nasalized laryngeal [h̃] may fill this role. However, the optimality of such a surface correspondent entails the loss of sonorancy. I interpret the preservation of nasality in Terena as proof that sonorancy is retained.

[7] This display does not mean that the licenser is an immediate constituent of the prosodic word.

the syllable and the prosodic word. Licensing by the prosodic word is the option only when licensing by the syllable is not possible (that is, when no obstruent is available). Piggott (1997) claims that this precedence is fixed by a universal principle. An equivalent effect is obtained in the OT framework by the absolute dominance of ALIGN-L in Terena, even if SegLic/σ and CnsLic/PWd are unranked with respect to each other. The following tableau indicates how the selection of the optimal output would be determined, when a stem contains an obstruent.

(23) Input: N, owoku

		MAX(seg)-IO	ALIGN-L	SegLic/σ	CnsLic/PWd
	(a) owoku	*!			
	(b) owokũN		*!	*	
☞	(c) õw̃õᵑgu				*

Since ALIGN-L is inviolable, the placeless nasal can be licensed at the right edge of a Terena word only when there are no obstruents in the word.

(24) Input: N, arine

		MAX(seg)-IO	ALIGN-L	SegLic/σ	CnsLic/PWd
	(a) arine	*!			
	(b) arinẽN		*!	*	
☞	(c) ãr̃ĩnẽN			*	

Significantly, nasal consonants are not opaque to the extension of the exponent of the Terena 1st person affix. In other words, the nasal span that expresses this affix may include underlying root nasals. This pattern is the predictable result of the dominance of the morphological demand that the affix be left-aligned in a stem. We might assume that affix nasality absorbs the stem specification in order to conform to the demands of the Obligatory Contour Principle.[8]

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[8] This is the position taken by Piggott (1997). Akinlabi's (1996) analysis of this pattern presupposes the nasal feature of the nasal consonant is underparsed.

3.3 *The Edoid Associative morpheme*

The realization of the associative morpheme (AM) in a number of Edoid languages is analyzed by Akinlabi (1996) as offering additional support for the recognition of the two types of alignment constraints. I claim that an analysis in which licensing plays a crucial role is also viable. Hence, the unambiguous support for featural alignment is not forthcoming from this source. I will first present an overview of the relevant facts. Only the Etsako case is reviewed in any detail here, and the facts are restricted to those cited by Akinlabi to make the comparison of the two analyses easier. In this language, the associative morpheme, when overtly manifested, takes the form of a High tone associated with the first (that is, head) noun in the construction. The following groups of examples illustrate how the underlying tones of head nouns are affected.

(25)	(a)	àmɛ̀	òké	[ámɛ́òké]	‘ram’s water’
		àɣòɣò	òké	[áɣóɣóòké]	‘ram’s skull’
	(b)	únò	òké	[únóòké]	‘ram’s mouth’
		únò	ódzí	[únòódzí]	‘crab’s mouth’
	(c)	àtásà	òké	[àtásáòké]	‘ram’s plate’
		àtásà	ɔ́mɔ̀	[àtásáɔ́mɔ̀]	‘child’s plate’
	(d)	ódž	òké	[ódzíòké]	‘ram’s crab’
		ódzí	ɔ́mɔ̀	[ódzíɔ́mɔ̀]	‘child’s crab’
	(e)	ɔ̀tɛ́	òké	[ɔ̀tɛ́òké]	‘ram’s cricket’
		ɔ̀tɛ́	ɔ́mɔ̀	[ɔ̀tɛ́ɔ́mɔ̀]	‘child’s cricket’

From such data it can be inferred that a Low tone is overtly replaced by a High, if it (the Low) is the only root tone or if it is last in a tonal sequence. Superficially, H and LH input tones are unchanged in the optimal outputs. The following descriptive summary should be useful.

(26) (a) L → H
(b) HL → HH
(c) LHL → LHH
(d) H → H
(e) LH → LH

Given just the type of data in (25), it is indeterminate whether the Edoid associative morpheme is basically a prefix or a suffix. I propose to treat is as a prefix, and therefore its appearance is regulated by the following constraint.[9]

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[9] Akinlabi (1996: 262) considers it to be a suffix but provides no evidence that compels such an analysis. This difference between the two analyses is not crucial. My reason for taking a different position is partly to demonstrate that, because the positioning of mobile morphemes is determined by the ranking of constraints, it is impossible to infer their affixal status from their behaviour alone. Indirect (but hardly unambiguous) evidence from the positioning of functionally related morphemes in the language would have to be invoked.

(27) *ALIGN-AM-L*
Align (AM, L; Stem, L): The left edge of AM must be aligned with the left edge of a stem.

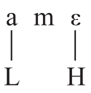
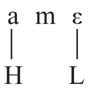
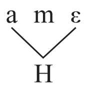
However, since the exponent of AM is a segmentally-unaffiliated feature, phonology must also provide for its licensing. The following member of the Feature Licensing family is the relevant constraint that is best satisfied.

(28) *HIGH TONE LICENSING* (*H-LIC*)
A segmentally-unaffiliated High tone in an input must be licensed at the right edge of a prosodic word in the output.

Of course, the edge is defined by the rightmost tone-bearing position (that is, the rightmost vowel).

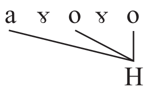
In the L → H pattern (26a), the alignment and licensing constraints are satisfied at the expense of the Low tone. This effect is readily explained, if Low is a default tone and therefore not underlyingly present. However, maintaining the optimality-theoretic approach, I attribute the output to a constraint hierarchy which ranks ALIGN-AM-L and H-LIC higher than the faithfulness constraint demanding the parsing of underlying Low. Akinlabi's label for the latter constraint is PARSE-L, redefinable in the language of the Correspondence Theory as MAX(L)-IO. Affixation of the associative morpheme to the head noun /àmὲ/ must yield the output selected in (29), if AM is to have a surface presence and the associative H tone cannot be part of a contour. (For the moment, I will ignore the ranking of the constraints that impose the latter two demands.)

(29) Input: àmὲ, H

	H-LIC	ALIGN-AM-L	MAX(L)-IO
(a) 		*!	
(b) 	*!		
☞ (c) 			*

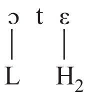
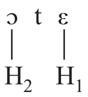
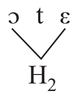
In the selection of (29c), the interaction of alignment and licensing forces the associative morpheme to occupy a continous span from the beginning to the end of a word. This effect is familiar from the manifestation of nasalization in Terena. The emergence of High tone harmony in Etsako is further illustrated below.

(30) (a) Input: àɤòɤò, H
(b) Output:



Let us next consider the LH → LH pattern. Part of its significance lies in the evidence that the final High tone is not the correspondent of just the affix High tone. In other words, affix High cannot completely displace root High. Henceforth, I will distinguish these tones as H_1 (root) and H_2 (affix). If H_1 were displaceable, an LH sequence on a head noun would yield an HH output rather than the attested LH. The displacement would have to be in response to the demand that the associative morpheme must be realized (PARSE-MORPH) and the dominance of this constraint over the low-ranking MAX(L)-IO.

(31) Input: ɔ̀tɛ́, H_2

		H-LIC	ALIGN-AM-L	PARSE-MORPH	MAX(L)-IO
	(a) 			*!	
	(b) 		*!		
	(c) 	*!			*
☞	(d) 				*

The HH pattern (31d) emerges as the winner in this tableau, because it incurs no violations of the three top-ranked constraints. Of course, this does not coincide with the correct surface form.

Since (31d) is an undesirable winner, it must be eliminated from the competition for the optimal output of an LH input. The most transparent reason for discarding this output is because it does not contain a correspondent of the root High tone (H$_1$). Akinlabi (1996) agrees that Etsako enforces the satisfaction of an undominated constraint requiring the parsing of a lexical High tone. The following is a redefinition of this constraint.

(32) *MAX(H)-IO*
A lexical (that is, root) High tone in an input must have a correspondent in an output.

The dominance of this constraint over PARSE-MORPH is fatal to any candidate in (31) from which H$_1$ is missing. The victims are (31b, d), thereby leaving the competition to (31a, c). In (31c), the parsing of H$_2$ does not reflect the H-LIC preference that this tone be licensed at the right edge of the word. This candidate can therefore be eliminated by assuming that H-LIC also outranks PARSE-MORPH We can therefore justify the following ranking of the constraints proposed so far.

(33) *Etsako Constraint Ranking* (preliminary)
MAX(H)-IO, H-LIC, ALIGN-AM-L $\gg$ PARSE-MORPH $\gg$ MAX(L)-IO

The tableau in (34) illustrates how this hierarchy evaluates the candidates presented earlier in (31).

(34) Input: ɔ̀tɛ́, H$_2$

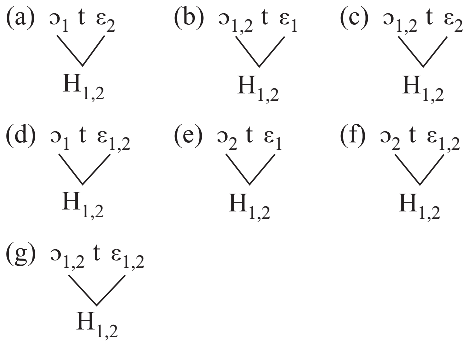
	MAX(H)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH	MAX(L)-IO
☞ (a) ɔ t ɛ | | L H$_1$				*!	
(b) ɔ t ɛ | | L H$_2$	*!		*!		
(c) ɔ t ɛ | | H$_2$ H$_1$		*!			*
(d) ɔ t ɛ \ / H$_2$	*!				*

The implication of this analysis of the LH → LH pattern is that the associative High is unparsed in the associative construction, if it cannot be licensed by the last position in the word. The constraint ranking does not permit the licenser to be located elsewhere.

The explanation of the LH → LH is not complete, however, because there are candidate HH outputs other than those in (34) that must be evaluated. These candidates contain a single surface High tone, but it is a correspondent of both the root High tone and the affix High. It satisfies demands requiring both input tones to be present in the output. A representation in which both tones surface independently would contain a fatal violation of the Obligatory Contour Principle (OCP). (34c), for example, is therefore doubly flawed. An output that respects the faithfulness requirements and is also in accord with the OCP contains the result of the merger or coalescence of the input High tones. McCarthy & Prince (1995:314) recommend the use of subscripts to capture the crucial properties of such a representation. Inputs H_1 (root) and H_2 (affix) might therefore correspond to the output $H_{1,2}$.

Proper evaluation of output tones with multiple correspondents must still be able to determine how such entities are licensed and aligned. Consequently, licit representations must identify the bearers of the correspondent tones.

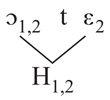
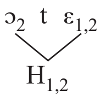
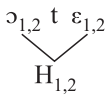
(35)



These configurations exhaust the logical possibilities by which a High tone with multiple correspondents might be related to tone-bearing elements. A vowel position may be associated with just one of the correspondents, or it may be associated with both. Given such possibilities, an analysis must determine whether any of them is a better output for the input /ɔ̀tɛ́, H_2/ than the one selected in (34).

Each of the vowels in (35) is identified as being associated with a correspondent that bears the affix or root tone. Therefore, these representations meet the demands of MAX(H)-IO and PARSE-MORPH. Since each violates MAX(L)-IO, this constraint cannot be a factor in their evaluation. We may now consider how these candidates survive the scrutiny of the remaining two constraints, H-LIC and ALIGN-AM-L. Any output in which H_2 is not associated with the last position is fatally flawed. (35b) and (35e) are therefore out of the running. Two of the remaining candidates (35a, d) are doomed, because they violate ALIGN-AM-L. The three survivors (35c, f, g) are therefore the competitors of (34a = 36a) for the optimal output of the identified input.

(36) Input: ɔ̀tɛ́, H_2

	MAX(H)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH	MAX(L)-IO
(a) 				*!	
☞ (b) 					*
☞ (c) 					*
☞ (d) 					*

According to this tableau, the former winner is now the loser; any one of its competitors is better than (36a). However, the results are not satisfactory, because, apart from the indeterminacy in the choice of the preferred output, we have now claimed that the HH output is best for the LH input.

The unsatisfactory state of affairs in (36) can be remedied only by eliminating (36b, c, d). An easy place to start is with the last candidate (36d). The association of H_1 with the initial vowel is completely gratuitous, because it is not commanded by any of the identified constraints. Moreover, it violates an injunction against the 'spreading' of a root High tone.[10] I concur with Akinlabi (1996) that such a ban must be in effect in Etsako, because the only evidence of 'spreading' comes from the behaviour of the affix High

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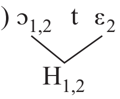
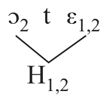
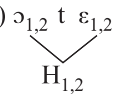
[10] Since 'spreading' must involve a relation which is not present in the input, it is distinguishable from a multiple linking that is lexically specified.

tone. However this constraint is formulated, it must have the effect captured by the following member of the DEP family (McCarthy & Prince 1995).

(37) *DEP(H$_1$)-IO*
An element bearing the lexical High tone in an output must correspond to an element bearing the lexical High tone in an input.

This type of 'no-spreading' constraint enjoys considerable cross-linguistic support, because grammars must contain a mechanism that blocks multiple feature linking. It is considered to be undominated and, hence, inviolable in Etsako. Since it outranks PARSE-MORPH, the violation of DEP(H$_1$)-IO incurred by (36d) is fatal. Significantly, (36b) is condemned for violating the same constraint, because the first vowel is not specified for a High tone in the input.

(38) Input: ɔ̀tɛ́, H$_2$

		DEP(H$_1$)-IO	PARSE-MORPH	MAX(L)-IO
	(a) 		*!	
	(b) 	*!		*
☞	(c) 			*
	(d) 	*!		*

It obvious from the above tableau that violations of high-ranking DEP(H$_1$)-IO in Etsako result in a reduction of the competitors. Nevertheless, we are still claiming that an HH output is superior. The implication in the OT framework is that (38c) must be violating some other constraint, not yet identified. When the inappropriate winner in (38) is examined closely an interesting revelation emerges. H$_2$, the exponent of the associative morpheme, must be licensed by the last position, and the root High tone, H$_1$, must also be licensed by the same position. This representation evidently gives a licenser the function of licensing the same feature twice. I propose to locate the fatal flaw in this type of licensing relation. (38c) violates a principle of Universal Grammar, a universally undominated constraint, which I call the UNIQUENESS OF LICENSING.

(39) *UNIQUENESS OF LICENSING* (*UNI-LIC*)
A licenser may license no more than one correspondent of a feature.

The principle can only come into play when a surface feature is the correspondent of more than one input feature. It can therefore never be violated by a representation like (38a = 40a).

(40) Input: ɔ̀tɛ́, H_2

	UNI-LIC	DEP(H_1)-IO	PARSE-MORPH	MAX(L)-IO
☞ (a) ɔ t ɛ L H_1			*!	
(b) ɔ$_{1,2}$ t ɛ$_2$ $H_{1,2}$		*!		*
(c) ɔ$_2$ t ɛ$_{1,2}$ $H_{1,2}$	*!			*
(d) ɔ$_{1,2}$ t ɛ$_{1,2}$ $H_{1,2}$		*!		*

I assume that candidates (40b,c,d) all satisfy the undominated H-LIC constraint which demands that H_2 be licensed at the right edge. Therefore, (40c) must incur a violation of UNI-LIC, because in this representation H_1 must also be licensed at the right edge. In both (40b) and (40d), the licenser of H_1 does not have to be the rightmost element. Hence, neither incurs a violation of UNI-LIC. The analysis of the LH → LH pattern is now complete. The constraints and the ranking in (41) ensure that an HH output cannot be optimal in Etsako.

(41) *Etsako Constraint Ranking* (revised)
UNI-LIC, DEP(H_1)-IO, MAX(H)-IO, H-LIC, ALIGN-AM-L $\gg$ PARSE-MORPH $\gg$ MAX(L)-IO

Let us now consider whether the constraint ranking in (41) can explain why affixation of the associative morpheme to an HL root produces an HH output. Because UNI-LIC is a principle of Universal Grammar, no serious candidate can require the licensing of the correspondents of both High tones at the right edge of the word. In addition, the inviolability of DEP(H_1)-IO prevents the spreading or reassignment of the root High tone. These two restrictions reduce the serious competitors for the optimal output of the input /únò, H_2/ to the ones in (42).

(42) Input: únò, H_2

	MAX(L)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH	MAX(L)-IO
(a) u_1 n o_2 $H_{1,2}$			*!		*
☞ (b) $u_{1,2}$ n o_2 $H_{1,2}$		*!			*
(c) u_2 n o_2 H_2	*!				*

The constraint ALIGN-AM-L plays the pivotal role in the designation of (42b) as optimal. In (42a) the affix High tone conforms to the licensing requirement but it is not left-aligned. (42c) satisfies the alignment constraint but the lexical High tone is not present in the output. Finally, (42b) is the obvious winner, because the affix High tone is properly licensed at the right edge and it is also left-aligned in a stem.

The analysis of the HL → HH and LH → LH patterns holds some significance for our understanding of what is involved in the H → H pattern (26d). The constraint ranking that selects (42b) must decide on (43f) below as the best output for the identified input.[11]

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[11] Another possibility is an output in which the rightmost and leftmost positions are both specified for the two High tones. This option might even be superior to (41f), because the latter might be considered to be less faithful to the input if it is assumed that the root High tone is linked to both positions in the input.

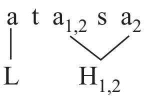
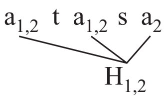
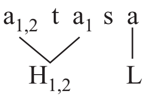
(43) Input: ódzí, H_2

	MAX(H)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH
(a) o_1 dz i_1 H_1			*!	
(b) $o_{1,2}$ dz i_1 $H_{1,2}$		*!		
(c) o_1 dz $i_{1,2}$ $H_{1,2}$			*!	
(d) o_1 dz i_2 $H_{1,2}$			*!	
(e) o_1 dz i_1 $H_{1,2}$		*!		
☞ (f) $o_{1,2}$ dz i_2 $H_{1,2}$				

(43f) wins by virtue of its conformity to the demands of the licensing and left-alignment constraints. On the basis of the analysis of the H → H and HL → HH patterns, we must conclude that whenever a correspondent of the affix High tone is present in an output selected as optimal, the associative morpheme must extend as far leftward as possible.

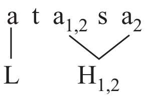
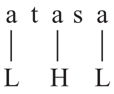
The machinery is now in place to explain the last pattern that instantiates the occurrence of the associative morpheme in Etsako; affixation to an LHL sequence produces an LHH output. We know from the attested output that the associative High tone is parsed and licensed at the right edge of the word, but the affix is not left-aligned in the stem. The fact that the affix tone does not extend to the left edge is explained by the constraint ranking in (41) and general principles of phonological wellformedness. The basis for the explanation is found in the following tableau where all candidates satisfy UNI-LIC and MAX(H)-IO.

(44) Input: àtásà, H_2

	DEP(H1)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH
☞ (a) 			*!	
(b) 	*!			
(c) 		*!		

The candidate (44b) satisfies ALIGN-AM-L but the spreading of the lexical High tone incurs a violation of high ranking DEP(H_1)-IO. The affix also satisfies left alignment in (44c), but H_2 is not properly licensed. However, while (44a) is the best choice of the three candidates, it competes less successfully against an output from which H_2 is missing.

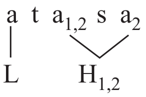
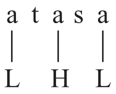
(45) Input: àtásà, H_2

	DEP(H1)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH
(a) 			*!	
☞ (b) 				*

The violation of PARSE-MORPH incurred by (45b) is irrelevant, because this candidate better satisfies higher ranking ALIGN-AM-L.

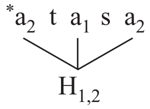
The declaration of (45b) as the winner is a problem, because it does not correspond to the surface form. However, an optimality-theoretic solution is readily available. None of the earlier patterns provides evidence for the ranking of PARSE-MORPH and ALIGN-AM-L, but the LHL > LHH pattern does. The simple assumption that PARSE-MORPH takes precedence over ALIGN-AM-L in the Etsako constraint hierarchy predicts that (45a) is a better choice for the optimal output than (45b). The demonstration follows.

(46) Input: àtásà, H_2

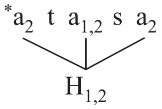
		DEP(HI)-IO	H-LIC	ALIGN-AM-L	PARSE-MORPH
☞	(a) 				*
	(b) 			*!	

The Etsako ban on the spreading of the lexical High tone (DEP(H_1)-IO) is one reason why the affix High tone cannot be licensed and left-aligned when the head noun of the associative construction contains the LHL sequence. The other reason is not language-particular; it rules out the possibility of the two representations in (47)

(47) (a)



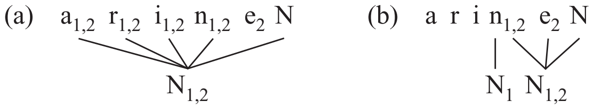
(b)



The flaw in these candidates lies in the fact that the medial vowel bears a different tonal specification than the initial and final vowels. The conventional description of this flaw in autosegmental terms is that it involves an illegal crossing of lines of association (Goldsmith 1976). However, since the affix and root tones are fused, the relevance of the No-Crossing Constraint is not obvious. A more principled explanation of the illformedness of the representations in (47) is that they violate the universal Locality Condition referred to earlier which requires elements in a linguistic relation to be adjacent. In this instance, the relation is defined by the requirement that a position must share its specification for High tone with a preceding position. The fact that the medial vowel in each of the representations in (47) has a different tonal specification from the initial vowel entails that High tone sharing in these patterns does not conform to the Locality Condition.

An important claim of this analysis of the phonology of the associative morpheme is that the ban on the spreading of the lexical High tone may prevent the affix High tone from being left-aligned. This effect is attributed to the ranking of DEP(H_1)-IO over ALIGN-AM-L. In the OT framework, we would expect that the reverse ranking would result in an override of the restriction on spreading. Support for such a prediction comes from Terena nasalization, analyzed in section 3.2. Recall that, normally, nasality does not spread from root nasals in this language, as commanded by the constraint DEP(N_1)-IO (where N_1 identifies the lexical feature). However, the nasal feature (N_2) introduced by the 1st person morpheme extends leftwards from the position where it is licensed to the right edge of a word, unimpeded by the presence of a nasal consonant (for example, *ãr̃ĩnẽ*N). The dominance of ALIGN-L over DEP(N_1)-IO in Terena ensures that (48a), where affix nasality extends through the word, is a better output than (48b), where the root nasal functions as an opaque segment.

(48)



According to this analysis, Terena nasalization may sometimes involve the spreading of both root and affix nasals. ALIGN-L is satisfied in (48a) without violating the Locality Condition, because the nasal specification of a segment is always fully shared with the segment to its left.

In summary, the manifestation of the associative morpheme in Etsako is determined by the satisfaction of the constraint hierarchy in (49) and other principles of Universal Phonology such as the Locality Condition.

(49) *Etsako Constraint Ranking* (final version)
UNI-LIC, DEP(H_1)-IO, MAX(H)-IO, H-LIC, PARSE-MORPH $\gg$ ALIGN-AM-L $\gg$ MAX(L)-IO

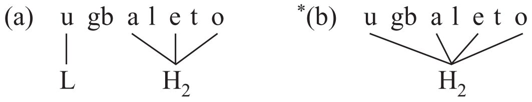
The associative morpheme is a High tone which must be licensed at the right edge of the head noun of the associative construction, except when the licensing of a root High tone in this position takes precedence. Universal Phonology does not permit the licensing of more than one instance of a feature by a given element. Although the affix is basically a prefix, it is not always left-aligned. The violation of the alignment requirement results from the fact that priority is given to the satisfaction of the licensing constraint. The combination UNI-LIC, DEP(H_1)-IO and MAX(H)-IO might then prevent the affix from being realized in the stem-initial position.

The associative construction in Bini, another Edoid language, differs from that in Etsako in one significant respect. In the former, a Low on the initial vowel of a head noun is never displaced.

(50) (a)	òwɛ̀	ɔ̀sà – òwɛ́ ɔ̀sà [òwɔ́!sà]	‘chimpanzee’s leg’
(b)	ùgbàlètò	áyí – ùgbáléto áyí [ùgbálétáyì]	‘Ayi’s head tie’

In a disyllabic head, only the second vowel bears a High tone (50a), while the Low tone is replaced on all the vowels of a polysyllabic head, except the first vowel. Akinlabi attributes this Bini pattern to an arbitrary feature of the associative morpheme. In his analysis, the phonological alignment constraint that favours the location of this morpheme at the left edge (ALIGN-AM-L) is outranked in Bini by the constraint that commands the parsing of Low (MAX(L)-IO). Since the appropriateness of phonological featural alignment is called into question in this paper, an alternative analysis of Bini must be available.

In my alternative account, the retention of the Low tone on the initial vowel of head nouns is linked to the special status of such vowels in the representation of nouns. Edoid languages seem to share the peculiarity that nouns must begin with vowels (Stewart 1998). I propose that two constraints, high ranking in Bini but not in Etsako, impose an extraprosodic status on the initial vowel.[12] One constraint prohibits the alignment of the left edge of a prosodic word with the left edge of a vowel (*Align-PWd). The second constraint requires the left edge of prosodic word to coincide with the left edge of a stem. Both types of constraints have precedents in McCarthy & Prince (1993). Independent evidence for the extraprosodic status of initial vowels is provided by Aikhionbare (1989) and Stewart (1993), where it is pointed out that in Edo (= Bini) such vowels are also excluded from nasalization. Assuming that the constraint ranking proposed for Etsako otherwise applies in Bini, affixation of the associative morpheme to the noun *ùgbàlètò* must produce (51a) rather than (51b).

(51)


ALIGN-AM-L requires the associative High tone to be left-aligned in a stem, but the initial vowel of a noun is not part of the stem. Therefore, a configuration like (51b) incurs a fatal violation of the left alignment constraint.

A description of the Etsako associative morpheme in which both phonological and morphological alignment play pivotal roles is certainly possible, but Akinlabi's (1996) attempt has certain weaknesses. Let us consider its basic features. It postulates that the morpheme is basically a suffix, positioned in accordance with ALIGN-AM-R. The dominance of this constraint together with the satisfaction of PARSE-MORPH ensures that the affix must always be realized. Consequently, each of the patterns in (26) is analyzed as involving the presence of the associative High tone at the right edge of the output. The rightmost tone in an input can be displaced when it is Low, because the equivalent of MAX(L)-IO is low ranking (for example, HL → HH, LHL → LHH). However, when the rightmost input tone is High, the output is considered to contain correspondents of the root and affix High tones (for example, LH → LH, H → H). The presence of multiple corre-

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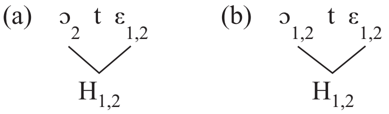
[12] Akinlabi (1996) recognizes such a possibility but only from the perspective of a rule-based approach.

spondents is obligatory, because a lexical High tone is always preserved in an output. The occurrence of the affix at the left edge is commanded by the phonological alignment constraint (ALIGN-AM-L). The satisfaction of both alignment constraints causes the morpheme to be extended throughout a word (for example, L → H).

In his analysis of the LH → LH and H → H patterns, Akinlabi does not spell out the formal details of the configurations that satisfy both ALIGN-AM-R and MAX(H)-IO, but, as we saw earlier, the issue is far from trivial. Because a surface High tone may have multiple correspondents, Akinlabi's analysis must sanction the following as logically possible outputs that must be evaluated as best for the LH input /ɔ̀tɛ́, H_2/.

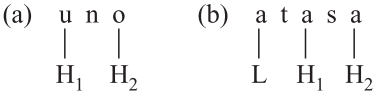
(52)



Both representations in (52) satisfy the demands of constraints that are considered to be undominated (that is, ALIGN-AM-R, MAX(H)-IO and PARSE-MORPH). In addition, both satisfy the lower ranking ALIGN-AM-L constraint. Hence, the proposed constraint ranking must prefer one of these as the output for the input /ɔ̀tɛ́, H_2/. It falsely predicts that the LH input corresponds to an HH output. Akinlabi's analysis is incomplete, because it does not rule out the possibility of the HH output as optimal for an LH input and, therefore, does not account for the LH → LH pattern in the manifestation of the Etsako associative morpheme.

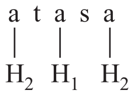
The incompleteness of Akinlabi's analysis also emerges in the descriptions of the HL → HH and LHL → LHH patterns. For descriptive purposes, the favoured outputs are represented by (53a) and (53b), respectively.

(53)



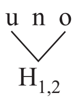
These representations satisfy ALIGN-AM-R but violate ALIGN-AM-L. However, a candidate output for an LHL input is (54), which satisfies both alignment constraints.

(54)

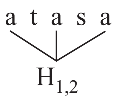


This candidate, which is superior to (53b), is not considered in Akinlabi's (1996) description. It is impossible to ignore, however, especially when it is recognized that (53a) and (54) are just convenient notations for the OCP-dictated outputs like those in (55a) and (55b), respectively.

(55) (a)



(b)



If (55a) is wellformed and optimal, why is (55b) disfavoured?

3.4 *Southern Sami Ablaut*

A review of the cases discussed so far reveals that the licensing of the exponent of a mobile morpheme is accomplished by incorporating it into a syllable (Terena) or the prosodic word (Terena, Chaha, Etsako). The implication is that any prosodic category is potentially a feature-licenser (Piggott 1996, 1997, 1999; Piggott & van der Hulst 1997). Hence, we would expect to find a case where the licenser of an affixal feature is a unit that qualifies as a foot. Southern Sami (Vinka 1997) provides evidence for such a case. It involves a pattern of vowel lowering, triggered by affixation of the present singular morpheme. The following data illustrate the pattern.

(56) (a) *Present tense*

Sing.	Dual	Pl.	
bɛssam	bissen	bissebe	‘1st wash’
bɛssah	bisseden	bissede	‘2nd wash’
bɛssa	bissejegan	bisseh	‘3rd wash’

(b) *Past tense*

Sing.	Dual	Pl.	
bissejim	bissejimen	bissejimh	‘1st wash’
bissejih	bissejiden	bissejidh	‘2nd wash’
bisseji	bissejigan	bissejin	‘3rd wash’

These paradigms show that the vowels of the verb stem /bisse/ ‘wash’ are systematically lowered in the present singular forms. The process must be morphologically-induced, since it is present in 2nd singular /bɛssah/ but not in 3rd plural /bisseh/. When the other affixes are stripped away from these forms, we can identify vowel lowering with the function of marking present tense singular.

Vowel lowering causes high vowels to become mid and mid vowels to become low. The following schema illustrates the alternation.

(57)

$$\begin{tikzcd}
i \arrow[d] & & u \arrow[d] \\
e \arrow[dr] & & o \arrow[dl] \\
& a &
\end{tikzcd}$$

The mid vowel /e/ varies phonetically between [e] and [ɛ], while /o/ varies between [o] and [ɔ], but, at present, the determinants of the variation are not well understood.[13] The stems listed below illustrate how other vowels are affected; the low vowel /a/ is unchanged.

(58)	Stem	3rd sg.pres.	
	bisse	bɛssa	‘wash’
	utne	ɔtna	‘use’
	jotke	jatka	‘take care of’
	g^{w}arka	g^{w}arka	‘understand’

Evidently, both vowels of a disyllabic stem can undergo lowering. It is indeed a property of this pattern that it always affects the last two vowels of a stem.

(59)		Stem	3rd sg. pres.	
	(a)	b^{w}ete	b^{w}ata	‘come’
		b^{w}eteg^{w}ete	b^{w}eteg^{w}ata	‘begin to come’
	(b)	gametete	gametata	‘poison wolves’
		gameteteg^{w}ete	gameteteg^{w}ata	‘begin to poison wolves’
	(c)	rirresjite	rirresjɛta	‘prepare leather’
		rirresjiteg^{w}ete	rirresjiteg^{w}ata	‘begin to prepare leather’

Any deviation from the pattern in (59) is ill-formed (for example, **gamatata*, **gametate*, **gameteta*).

While the present singular morpheme always has a presence at the right edge of the word, its affixal status cannot be unambiguously inferred from this observation. However, there is stronger evidence that it is a suffix. The lowering process only occurs when stems end in vowels. Affixation to a consonant final stem produces an overt suffix with no lowering.

(60)		Stem	3rd sg. pres.	
	(a)	d^{w}ered	d^{w}eredə	‘follow’
			*d^{w}arad	
			*d^{w}aradə	
	(b)	b^{w}etet	b^{w}etetə	‘cause to come’
			*b^{w}atat	
			*b^{w}atatə	

---

[13] Sami also has the rounded vowels /y, ø/ and also /ə/, but apparently these vowels do not alternate.

These forms help us to identify the morpheme as a suffix and also provide us with a clue about the identity of the element that causes vowel lowering. Affixation of /ə/ to a vowel-final stem triggers the loss of the second vowel, one of the documented ways in which the hiatus is resolved. While the second vowel cannot be realized as a full segment, it still maintains a presence in the form of the feature which fuses with a preceding vowel. Vinka (1997) identifies the feature as [Low] (= [Lo]), and this is the position adopted here.

As a suffix, the occurrence of the present singular morpheme in Southern Sami is dictated by the following constraint.

(61) *ALIGN-RIGHT (ALIGN-R)*
Align (Sg. Pres., R; Stem, R): The right edge of the present singular morpheme is aligned with the right edge of a stem.

This undominated constraint is satisfied whether the suffix takes the form of /ə/ or the lowering of the last vowel. In general, the later process is banned by the following constraint.

(62) *DEP(LO)-IO*
A segment bearing [Lo] in an output must correspond to a segment bearing [Lo] in an input.

The demands of this constraint would have to be overriden to allow for the attested vowel lowering. The override is partly determined by the dominance of the constraint requiring the parsing of input [Lo], MAX(LO)-IO, over DEP(LO)-IO. This ranking forces an underlying specification for [Lo] to be preserved in the optimal output even at the expense of violating DEP(LO)-IO.[14]

When the present singular morpheme is attached to a consonant-final stem (for example, *d^{w}ered-ə*), both MAX(LO)-IO and DEP(LO)-IO can be satisfied in the optimal output (for example, *d^{w}eredə*). However, this equilibrium cannot be maintained when the stem is vowel-final (for example, bisse-ə). Without spelling out the irrelevant details, the constraints that prevent vowel hiatus conspire to prevent the parsing of the second vowel in a sequence. The effect of this conspiracy is independently attested. The initial vowel of the gerund suffix/ime/ is realized when the morpheme is attached to a consonant-final stem (for example, *d^{w}ered-ime*) but not when it is attached to a vowel-final stem (for example, bisse-me). Since post-vocalic /ə/ cannot be parsed in an optimal output, it is not possible to satisfy the demands of both MAX(LO)-IO and DEP(LO)-IO in the surface representation corresponding to underlying /bisse-ə/. However, the ranking MAX(LO)-IO ≫ DEP(LO)-IO forces the [Lo] component of /ə/ to be realized somewhere in the output. The issue now is how the interaction of constraints determines where this [Lo] feature is parsed.

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[14] A similar effect is achieved if we assume that PARSE-MORPH outranks DEP(LO)-IO.

The combined demands of ALIGN-R and MAX(LO)-IO force the lowering of the final vowel of the stem /bisse/ in the present singular paradigm, but the lowering of the first vowel is not accounted for. If we adopt the alignment-theoretic approach favoured by Akinlabi (1996), this type of featural extension would be attributed to the demands of a featural alignment constraint. This ALIGN-LEFT constraint would specify that the extended feature is part of the expression of the present singular morpheme in Southern Sami. The formulation would have to specify that the left edge of this affix feature must coincide with the left edge of a prosodic category. This category cannot be the prosodic word, given the impossibility of a form like *[b^{w}atag^{w}ata] from the stem /b^{w}eteg^{w}ete/. The scope of the affixal feature is a disyllabic domain and the only disyllabic constituent that is sanctioned by the theory is the foot.[15] The identification of the category with which the affix feature is left-aligned as a foot provides a ready solution to the domain problem. However, it would still not explain why the demand that the affix feature be left-aligned with a foot is only imposed on [Lo] when its lexical host is unparsed.

Licensing theory does a much better job of capturing the difference between the two realizations of the present singular morpheme. Cross-linguistically, the segment is the most favoured licenser of features like [Lo] (see Itô et al. 1995). Moreover, the licenser is generally the segment that bears the feature in underlying representation. The constraint set must therefore include the following.

(63) *LICENSING DEPENDENCE* (*LIC-DEP*)
The licenser of a feature in an output must have a correspondent that bears the feature in an input.

This restriction might be called licensing in situ. When it is in effect, we would not expect a feature to move away from its underlying host in order to be licensed. This type of movement does occur, however. Capanahua (Loos 1969; Piggott 1988, 1992) provides a good illustration of the conditions that favour such movement. This language manifests a pattern of regressive nasalization in which nasality spreads from a nasal consonant over a nasal span that includes vowels, semivowels and laryngeal glides.

(64)	(a)	h̃ãmawi	'step on it'
	(b)	h̃ãmãʔõna	'coming stepping'
	(c)	bãnawi	'plant it'
	(d)	wirãnai	'I pushed it'
	(e)	cipõŋki	'down river'

---

[15] This observation follows standard thinking in considering that the foot is optimally a binary unit. Disyllabicity would be the unmarked manifestation of binarity.

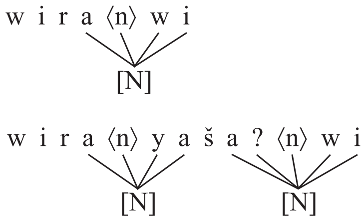
We can readily infer from these data that the feature [nasal] is licensed by an underlying nasal consonant and that nasal harmony is a leftward pattern. Note, for example, that the suffix /wi/ (64a, c), being to the right of the underlying nasal consonant, is not nasalized.

In contrast with the regressive harmony in (64), there is a second pattern in which nasalization affects segments to the right of an underlying nasal consonant. The significant difference is that the nasal is unparsed in this pattern. In the following examples, the verb root is /wiran/ 'to push', which we have already encountered in (64d).

(65) (a) wiran-wi [wirãw̃ĩ] 'push it over'
(b) wiran-yašaʔn-wi [wirãỹãšãʔw̃ĩ] 'push it over sometimes'

The non-parsing of the nasal consonant in these cases can be attributed to the absence of a source of vital place features. Capanahua is one of many languages that require place sharing between a nasal and a following consonant but limits the latter to obstruent stops (Padgett 1994). This restriction makes it impossible for the surface occurrence of the feature [nasal] in (65) to conform to the requirements of LIC-DEP. Licensing is achieved by moving the feature rightward (Piggott 1988). This movement is driven by the demand that [nasal] be licensed by the prosodic word. The satisfaction of this licensing requirement underlies the explanation of the appearance of a bidirectional nasal harmony pattern. The displaced feature is moved as far right as possible, constrained by the fundamental regressive harmony pattern and the universal Locality Condition. The surface representations of (65a, b) are, respectively, shown below. (The unparsed segment is between angled brackets.)

(66) (a)
(b)



(66b) contains two nasal spans because they are two underlying nasal consonants.

The lesson from Capanahua is that, when a feature cannot be licensed in situ, it might move to another position. Extending this lesson to Southern Sami, I postulate that the licensing of [Lo] is determined by the constraint in (67), when its underlying host is unparsed.

(67) [*LOW*] *LICENSING* ([*LO*]-*LIC*)
The feature [Lo] is licensed by the left edge of a foot.[16]

Incorporating [LO]-LIC into the hierarchy of relevant constraints, we recognize the following ranking.

(68) *Southern Sami Constraint Ranking*
ALIGN-R, [LO]-LIC, MAX(LO)-IO ≫ DEP(LO)-IO

The evaluation of candidate outputs by this ranking is illustrated below; foot edges are marked by parentheses.

(69) Input: bisse, ə-[lo]$_2$

	ALIGN-R	[LO]-LIC	MAX(LO)-IO	MAX(LO)-IO
(a) (b i s s e)			*!	
(b) (b i s s a) │ lo		*!		*
(c) (b ɛ s s e) │ lo	*!			*
☞ (d) (b ɛ s s a) │ ⁄ lo				**

The ranking selects (69d) because it is the only candidate in which the underlying [Lo] is parsed while satisfying both the licensing and alignment demands.

The above analysis provides an explanation for the extension of the affix feature; it must 'spread' from its licensed position to the right edge to satisfy the superordinate demand that the affix maintain its status as a suffix. The description of the licensing position as the edge of a foot guarantees that the

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[16] Piggott (1996a, b) points out that the foot referred to here is functionally distinct from the stress foot. Phonological theory has long recognized that the foot fulfills a variety of functions, apart from determining the location of stress. Even when stress is not a relevant factor the head of the foot can still be identified, because, in the unmarked case, the foot is left-headed (i.e. trochaic). The requirement that a feature be licensed at the left edge of a trochee is therefore tantamount to postulating that the head of the foot is the licenser.

[17] /ɨ/ is considered to be the non-low counterpart of /ə/.

extension is maximally disyllabic. For illustrative purposes, the last two syllables of the candidates in (70) are consistently parsed as a foot.

(70) Input: bʷetegʷete, ə-[lo]

	ALIGN-R	[LO]-LIC	MAX(LO)-IO	DEP(LO)-IO
(a) bʷete(gʷete)			*!	
(b) bʷete(gʷeta)		*!		
(c) bʷata(gʷata)				***!*
(d) bʷeta(gʷata)				***!
☞ (e) bʷeta(gʷata)				**

In (70b), [Lo] is licensed at the wrong edge. Licensing is considered to be satisfied by each of the last three candidates, but the winner (70e) incurs fewer violations of the DEP(LO)-IO constraint.

The constraint hierarchy in (68) also determines the location of the foot by which [Lo] is licensed. While any disyllabic sequence might qualify as a wellformed foot, the licenser must be located at the right edge of the word to ensure that both the licensing and alignments requirements are satisfied.

(71) Input: bʷetegʷete, ə-[lo]

	ALIGN-R	[LO]-LIC	MAX(LO)-IO	DEP(LO)-IO
(a) bʷata(gʷete)	*!			**
(b) bʷe(tagʷa)te	*!			**
☞ (c) bʷete(gʷata)				**

The losers (71a, b) are both flawed because the morpheme, represented by the feature [Lo], is not right-aligned.

To complete this analysis of vowel lowering in Southern Sami, we must now explain why [Lo] does not appear to be subject to [LO]-LIC (67) when /ə/ is parsed. A straightforward answer is available in optimality-theoretic terms; [LO]-LIC is outranked by LIC-DEP.

(72) *Southern Sami Constraint Ranking* (*revised*)
ALIGN-R, LIC-DEP, MAX(LO)-IO ≫ [LO]-LIC ≫ DEP(LO)-IO

When the present singular affix follows a consonant-final stem, no high ranking constraint commands the loss of the segmental exponent of the affix. Therefores, /ə/ has to have a correspondent in the output. The dominance of LIC-DEP guarantees that /ə/ is the licenser of the affix feature [Lo] in the optimal output.

(73) Input: d^{w}ered, ə-[lo]

	ALIGN-R	LIC-DEP	DEP(O)-IO	[LO]-LIC	MAX(LO)-IO
(a) d^{w}e(radɨ)[17] | [lo]		*!			*
☞ (b) d^{w}e(redə) | [lo]				*	

A competitor of the candidates in (73) is an output in which the final /e/ shares [Lo] with a preceding vowel (for example, *d^{w}e*(*radə*)). This candidate would be better than either of its competitors only if it satisfies both LIC-DEP and [LO]-LIC. However, the same feature cannot have two licensers (Piggott 1996a, b). Consequently, this output loses out to (73b) either because it violates LIC-DEP or because it violates DEP(LO)-IO.

The licensing constraints that determine the realization of the present singular morpheme in Southern Sami are not particular to this morpheme. They regulate the appearance of the feature [Lo]. We might therefore expect that this feature as a property of other morphemes would be regulated in a similar way. This expectation is borne out. Vinka (1997) cites the behaviour of the suffix that marks the formation of participles. This suffix begins with the low vowel /a/, which surfaces when it follows a consonant.

(74) (a) d^{w}ered-ame [d^{w}eredame] 'have followed'
(b) b^{w}etet-ame [b^{w}etetame] 'have caused to come'

When the suffix follows a vowel, the expected pattern of hiatus resolution occurs and the and the initial vowel of the suffix is not parsed. However, the feature [Lo], a component of this vowel, is still parsed, triggering the lowering of one of the preceding vowels. This pattern is illustrated by the following.

(75) (a) bisse-ame [bɛsseme] ‘have washed’
(b) b^{w}ete-ame [b^{w}ateme] ‘have come’
(c) krikke-ame [krɛkkeme] ‘have relieved oneself’

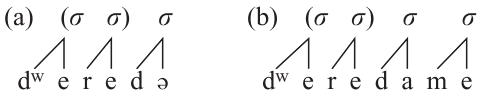
Superficially, [Lo] has moved away from its lexical host to be licensed elsewhere in the word.

The vowel that accommodates dislocated [Lo] is always the surface antepenult. This is confirmed by the following set of verb forms, based on the stems /krikke/.

(76) (a) krikke-ame [krɛkkeme] ‘have relieved oneself’
(b) krikke-tete-ame [krikketateme] ’have made (someone) relieve himself’
(c) krikke-tete-g^{w}ete-ame [krikketeteg^{w}ateme] ‘have begun to make (someone) relieve himself’

These data indicate that it is highly unlikely that the position of the vowel which is targeted for lowering is morphologically defined.

The consistency of the antepenultimate target is an indication that the location is prosodically welldefined. In stress theory, the identification of the antepenultimate syllable as the stress-bearer is achieved by ignoring the last syllable and parsing the next two as a trochaic foot. An equivalent effect is achieved in the present case by postulating that the participle morpheme in Southern Sami is subcategorized for affixation to the foot. This pattern of affixation is reminiscent of the Ulwa case discussed by McCarthy & Prince (1993). Notice that we can also claim that the present singular morpheme is suffixed to a foot.[18] The satisfaction of such subcategorization demands entails that (77a) is a better parse than (73c) and (74a) should correspond to (77b).

(77)


Foot parsing applies to syllables, and the sharing of elements between the stem and the affix means that the edges of the categories are not crisply defined (Itô & Mester 1994).

When the participial ending is attached to a vowel-final stem like /krikketete/, the licensing of dislocated [Lo] is achieved by incorporating this feature into the first vowel of the foot to which the ending must be attached.

(78) (a) Input: krikketete, ame
(b) Output: krikke(tate)⟨a⟩me

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[18] Further investigation is necessary to determine whether all suffixes of Southern Sami are subcategorized as requiring the foot as the base for suffixation.

Respect for the subcategorization requirement and the demands of licensing is not consistent with any of the lowering patterns in (79).

(79) (a) *krɛkke(tete)⟨a⟩me
(b) *krikka(tete)⟨a⟩me
(c) *krikke(teta)⟨a⟩me
(d) *krikke(tete)⟨a⟩ma

While two vowels of present singular forms are subject to lowering (for example, *krikketata*), only one vowel of participles is affected (for example, *krikke*(*tate*)*me*). Vinka (1997) astutely observes that the impossibility of a form like *[krikke(tata)me] is a consequence of the fact that the right-aligment demand of the suffix /ame/ is met whether or not [Lo] spreads from its licensed position. The rightward extension of [Lo] in participles would, therefore, be completely gratuitous. Notice the similarity in the phonological behaviour of the Southern Sami participle affix and the Chaha 3rd masculine singular object marker.

In summary, there is a unity to the behaviour of the affixes marking present singular and participles, respectively, that is difficult to capture in the alignment-theoretic terms advocated by Akinlabi (1996). This unity is brilliantly illuminated in a framework that incorporates the extension of licensing theory proposed by Piggott (1997). A component of both morphemes is a featural element which is licensed at some distance from the position where the affix is morphologically introduced. Both patterns of discontinuity are explained by the interaction of phonological licensing and morphological alignment constraints.

4. SUMMARY AND CONCLUSION

Let me now summarize what the arguments and evidence presented in the preceding four subsections reveal. Overall, I have achieved the goal of demonstrating that constraints which specifically command the alignment of features with edges of prosodic or morphological categories cannot be justified on the basis of the evidence from the manifestation of mobile morphemes. The variability in the realization of these affixes can be explained in terms of morphological demands that characterize their status as prefixes or suffixes and phonological demands that govern how and where they are licensed to appear in outputs. While competing analyses of these morphemes recognize that their exponents are less than full segments, except for Piggott (1997), none makes specific provisions for the phonological incorporation of these elements into prosodic structure.[19] The theory of licensing relates the behaviour of these morphemes to their phonological makeup. Embedded in a theory of prosodic phonology, it predicts specific

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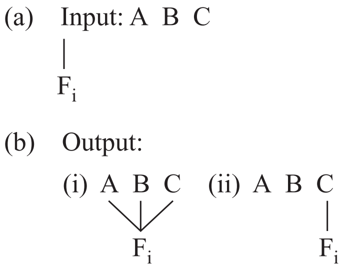
[19] Note that Rose (1997) rejects the featural representation of mobile morphemes and considers some of them to be full segments.

hosts to which non-segmental entities must be attached in order to be realized. In other words, there is a family of licensing constraints that govern the realization of mobile morphemes.

First, I show in subsection 3.1 that the positioning of the labialization triggered by the affixation of the Chaha 3rd masculine singular object marker is not determined by the satisfaction of a morphological demand that the affix must be right-aligned in a stem. I argue instead that the feature [round], a component of the affix, must satisfy a requirement that it be prosodically licensed at the right edge of the word. Having established a role for licensing, I then demonstrate in subsection 3.2 that the interaction of morphological alignment and phonological licensing explains the various manifestations of the 1st person affix in Terena, if one assumes that the affix is basically a placeless nasal consonant. Harmony emerges when the licensing and alignment positions do not coincide within a word. For example, when the exponent of the affix is licensed by a prosodic word and appears at the right edge, the morpheme must span the entire word to satisfy the morphological demand of left-alignment. The third subsection is primarily a demonstration that the licensing hypothesis contributes significantly to a comprehensive description of the distribution of the High tone in the associative construction of Edoid languages. I argue that my analysis explains phonological features of this construction that are either overlooked or inexplicable in alternative analyses. For example, we have a deeper understanding of the interaction of the root and affix High tones. Finally, patterns of vowel lowering that are associated with two suffixes of Southern Sami are used as additional support for the role of licensing in explaining how dislocated elements are realized. Additional significance of the Sami data lies in its support for the role of the foot as a feature licenser.

This analysis of mobile morphemes can claim to be superior, because, apart from the constraints that define morphemes as prefixes or suffixes, it does not appeal to arbitrary properties of individual morphemes to explain their behaviour. Featural alignment constraints that include specific morphemes as arguments are not motivated independently of the phenomena they are supposed to explain. In contrast, the licensing constraints recognized in this paper and elsewhere make no reference to specific morphemes and therefore enjoy greater cross-linguistic support.

The absence of support for a family of featural alignment constraints has significance beyond the concerns of this paper. It is appropriate that we re-examine the basis for the assumption that this type of constraint is among the universal set. The usual justification is that it handles the patterns or feature propogation that typifies harmony processes. Requiring that the alignment of the edges of features with the edges of either prosodic or morphological categories might force feature propagation. Notice however that, while rightward progation of F_i achieves right-alignment of this feature in (80b), the same effect can be achieved by feature dislocation (80bii).

(80)


Cases like (80bi) are abundant, but I know of no cases like (80bii). In other words, while featural dislocation is an attested occurrence, there are no cases in which it is commanded simply by the need to ensure that a particular feature must appear at some edge. The extension of Generalized Alignment theory to featural alignment makes phonological theory too powerful.

As indicated at the beginning of section 3, the central claim of this paper that licensing plays a role in the mobility of features is not new. Recently, Zoll (1997) advances a similar hypothesis, but the role attributed to licensing is significantly different from the one developed here. In Zoll's framework, the mobility of an element is the result of a competition between a licensing constraint that restricts 'complex or marked structure' to positions identified as strong and other constraints that designate a preferred edge for the association of a morphological or prosodic element. As an illustration, consider the manner of tonal association in Mende (which is typical of other languages). An alignment constraint (ALIGN-L (tone)) indicates a preference for tones to be associated with the leftmost available position in a prosodic word. The demands of such a constraint would force as many tones as possible to be associated with the leftmost position in a word. Hence, we would expect contour tones to appear at the left edge of prosodic words. However, Zoll recognizes a competitor (ALIGN-R (contour)) that restricts contour tones to the right edge. The dominance of ALIGN-R (contour) over ALIGN-L (tone) in Mende makes the right edge of words the favoured location of contours. Thus, given the underlying elements in (81a), the output (81bi) is better than (81bii).

(81) (a) Underlying: nyaha, L H L
(b) Surface: (i) nyàhâ
(ii) *nyâhà

In (81bii), the underlying H tone is associated with the first vowel and therefore better accords with the demands of ALIGN-L (tone). However the resulting contour produces a fatal violation of ALIGN-R (contour).

Zoll's postulation of constraints that dictate where complex structure is favoured seems plausible. Nevertheless, it seems obvious that, if the account of mobility is extended to the behaviour of featural affixes, it would be vulnerable to similar criticisms to those that have been directed at Akinlabi's.

For example, in such a framework, the manifestation of the Terena 1st person affix would be conditioned by (a) a preference for nasal contours to be at the left edge of words; (b) a morphological constraint that dictates whether the affix is a prefix or a suffix; and (c) a phonological constraint that forces the affix to be aligned with one of the edges of the prosodic word. The last is responsible for the nasal spreading induced by the 1st person affix, and I have argued above that this type of phonological process is too powerful a device. The family of licensing constraints recognized in this paper eliminates the need for morpheme-specific spreading processes, while Zoll's licensing constraints do not impose an equivalent restriction on the power of the theory. Although Zoll's proposal gives more power to phonological theory than the development of licensing proposed in this paper, it offers no obvious insights into the Southern Sami pattern of vowel lowering. Which of the lowered vowels would qualify as complex or marked? What is the relation of markedness to the disyllabic pattern?

In conclusion, let me reiterate the main points of this paper. I argue that, when an affix or part of an affix is represented by an element which is less than a full segment, the appearance of these elements in outputs is regulated by a theory of prosodic licensing that sanctions a set of licensing constraints. These constraints identify the possible licensers of elements and recognize that the licenser function can be discharged by any phonological category (for example, segment, syllable, foot, prosodic word, etc.). These licensing constraints, which enjoy a great deal of cross-linguistic support, render superfluous any need to appeal to a set of featural alignment constraint that make references to specific morphemes. To facilitate the evaluation of alternative analyses, the analysis in this paper is presented in the OT framework. However, this should not be misconstrued as an endorsement of this theory of constraint interaction. The various analyses can be recast within the principles and parameters framework outlined in Piggott (1997) without any loss of explanatory adequacy.

REFERENCES

Aikhionbare. M. O. (1989). Defining the domain of nasality in Edo. *Studies in African Linguistics* **20.3**. 301–315.

Akinlabi, A. (1996). Featural affixation. *Journal of Linguistics* **32**. 239–289.

Bendor-Samuel, J. (1960). Some problems of segmentation in the phonological analysis of Terena. *Word* **16**. 348–355.

Bendor-Samuel, J. (1966). Some prosodic features in Terena. In Bazell, C. E., Catford, J. C., Halliday, M. A. K. & Robins, R. H. (eds.), *In memory of J. R. Firth*. London: Longman. 30–39.

Goldsmith, J. (1976). *Autosegmental phonology*. Ph.D. dissertation, MIT.

Herbert, R. (1986). *Language universals, markedness theory, and natural phonetic processes*. Berlin: Mouton de Gruyter.

Humbert, H. (1995). *Phonological segments: their structure and behaviour*. PhD. dissertation, Holland Institute of Generative Linguistics.

Itô, J. (1986). *Syllable theory in prosodic phonology*. Ph.D. dissertation, University of Massachusetts at Amherst.

Itô, J. & Mester, R. (1994). Realignment. Ms., University of California Santa Cruz.

Itô, J., Mester, R. & Padgett , J. (1995). Licensing and underspecification in Optimality theory. *Linguistic Inquiry* **26**. 571–613.

Johnson, C. D. (1975). Phonological channels in Chaha. *Afroasiatic Linguistics* **2.2**. 1–12.

Lieber, R. (1987). *An integrated theory of autosegmental processes*. Albany, NY: State University of New York Press.

Loos, E. (1969). *The phonology of Capanahua and its grammatical basis*. Publication No. 20, University of Oklahoma, Summer Institute of Linguistics.

McCarthy, J. (1983). Consonantal morphology and the Chaha verb. *Proceedings of WCCFL* **2**. 176–188.

McCarthy, J. & Prince, A. (1993). Generalized alignment. *Yearbook of morphology*: 79–153.

McCarthy, J. & Prince, A. (1995). Faithfulness and reduplicative identity. In Beckman, J., Walsh-Dickey, L. & Urbanczyk, S. (eds.), *Papers in Optimality theory*. University of Massachusetts- Amherst: GLSA. 249–384.

Padgett, J. (1994). Stricture and nasal place assimilation. *Natural Language and Linguistic Theory* **12**. 465–513.

Paradis, C. & Prunet, J.-F. (eds.) (1991). *The special status of coronals: internal and external evidence*. (Phonetics and Phonology 2). San Diego: Academic Press.

Piggott, G. (1988). A parametric approach to nasal harmony. In van der Hulst, H. & Smith, N. (eds.), *Features, segmental structure and harmony processes*, (vol. 1). Dordrecht: Foris. 131–167.

Piggott, G. (1992). Variability and feature dependency: the case of nasality. *Natural Language and Linguistic Theory* **10**. 33–77.

Piggott, G. (1996a). Implications of consonant nasalization for a theory of harmony. *Canadian Journal of Linguistics* **41.2**. 141–174.

Piggott, G. (1996b). Reconfiguring harmony. *McGill Working Papers in Linguistics* **12**. 61–98.

Piggott, G. (1997). Licensing and alignment: a conspiracy in harmony. *Phonology* **14**. 437–477.

Piggott, G. (1999). At the right edge of words. *The Linguistic Review* **16.2**. 143–185.

Piggott, G. & Humbert, H. (1997). Representations and constraints: the case of Guarani nasal harmony. In Booij, G. & van de Weijer, J. (eds.), *Phonology in progress – progress in phonology: HIL Phonology Papers III*. The Hague: Holland Academic Graphics. 219–256.

Piggott, G. L. & van der Hulst, H. (1997). Locality and the nature of nasal harmony. *Lingua* **103**. 85–112.

Prince, A. & Smolensky, P. (1993). *Optimality Theory*. Unpublished ms., Rutgers University & the University of Colorado at Boulder.

Rice, K. (1996). Default variability: the coronal-velar relationship. *Natural Language and Linguistic Theory* **14**. 493–543.

Rich, F. (1963). Arabela phonemes and high-level phonology. In B. Elson (ed.), *Studies in Peruvian Indian Languages* **1**. Norman, OK: The Summer Institute of Linguistics. 193–206.

Rose, S. (1993). Palatalization, underspecification and plane conflation in Chaha. *Proceedings of WCCFL* **12**. 101–116.

Rose, S. (1996). Variable laryngeals and vowel lowering. *Phonology* **13**. 73–117.

Rose, S. (1997). Theoretical Issues in comparative Ethio-Semitic phonology and morphology. Ph.D. dissertation, McGill University.

Rosenthall, S. (1989). The phonology of nasal-obstruent sequences. MA thesis, McGill University.

Spaelti, P. (1994). Weak edges and final geminates in Swiss German. *Proceedings of NELS* **24**. 573–588.

Steriade, D. (1993). Closure, release and nasal contours. In Huffman , M. & Krakow, R. (eds.), *Nasals, nasalization, and the velum*. (Phonetics and Phonology 5). San Diego: Academic Press. 401–470.

Steriade, D. (1995). Underspecification and markedness. In Goldsmith, J. (ed.), *Handbook of phonological theory*. Oxford: Basil Blackwell. 114–174.

Stewart, O. T. (1993). Nasal harmony juncture: the Edo language system. Ms., McGill University.

Stewart, O. T. (1998). The serial verb construction parameter. Ph.D. dissertation, McGill University.

Trigo, L. (1988). On the phonological derivation and behaviour of nasal glides. Ph.D. dissertation, MIT.

Vinka, M. (1997). Southern Sami ablaut and the role of the harmony foot. Ms., McGill University

Zoll, C. (1997). Conflicting directionality. *Phonology* **14**. 263–286.

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