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CONDITIONS ON DELINKING IN SYLLABLE TEMPLATE PHONOLOGY*

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As has often been discussed in the syllable structure literature, when conditions on syllable structure are violated, a repair strategy can be invoked to yield a well-formed syllable. In recent research on syllable templates, three different repair strategies have been proposed. These are outlined in (1).

(1) a. Stray erasure: erasure of material not satisfying the syllable template.
b. Epenthesis: a position is inserted to accommodate unsyllabifiable material into a template.
c. Delinking (desyllabification in Ito (1986)): adjustment of a syllable to accommodate new material. Following desyllabification, stray erasure may operate to eliminate unsyllabifiable material.

These three strategies are motivated by the requirement that all units be prosodically licensed, or belong to higher prosodic structure. (See Ito (1986) for discussion.)

The purpose of this paper is threefold. One goal is to reach a better understanding of the repair strategy of delinking. Following Ito, I suggest that delinking can occur to repair a structure that violates a well-formedness condition. Furthermore, it is constrained in that it is permissible only if it results in a well-formed structure of the language.

The second goal of the paper is to show that for at least two languages, English and Slave (an Athapaskan language of Canada), the conditions under which a syllable template is ill-formed, leading to desyllabification, are identical: the non-onset portion of a well-formed syllable in both languages cannot contain more than two elements.[1] This observation lends support to the claim made by Kaye (1987) that a well-formed syllable is maximally binary.

The third goal of the paper is to provide an analysis of vowel alternations found in verb stems in Slave, in particular in the Hare dialect of Slave.[2] Verb stem variation in Athapaskan languages is complex, with suffixation for mode and aspect affecting vowel quality and quantity. I will offer an account of the stem variation that suggests that once syllable structure is understood, the working of this highly complex system actually follows from general constraints on syllable structure.

I begin by summarizing the analysis of English vowel shortening presented by Myers (1987) and Borowsky (1986). I then turn to an analysis of vowel alternations found in verb stems in Hare. Both languages are shown to be similar in several ways. The two languages have identical syllable templates, with the non-onset portion of the syllable being maximally binary. When material that must be syllabified is added to a word, the two languages employ the same strategy, delinking, to repair ill-formed syllables that arise. In both languages, delinking is constrained by structure preservation (Kiparsky 1982, Borowsky 1986), with delinking triggered by the need to maintain a well-formed syllable. The differences between the languages follow from the existence of a language specific process found in Hare which creates a single vowel out of a vowel-sonorant sequence.

1. Assumptions

Before turning to specific analyses, I list several assumptions that I make in this paper.

Prosodic licensing: All phonological units belong to higher prosodic structure. Delinking and stray erasure are two processes that ensure prosodic licensing. See Ito (1986) for details.

Extraprosodicity: Word-final consonants are extraprosodic, and are thus not visible for syllabification. In both Hare and English, apparent violations of the proposed syllable structure template arise on word edge. If the final consonants are extraprosodic, these violations are systematic, and can be explained by the invisibility of the final consonants at the relevant stage of the derivaton.

Structure preservation: Rules of the lexical phonology cannot create structures that do not exist lexically.

Moraic structure: The mora is a well-defined level of syllable structure, as argued by Hyman (1985), McCarthy and Prince (1986), and Hayes (1987).[3] While a moraic analysis is proposed for Hare, I do not reanalyze the English data in this way.

CONDITIONS ON DELINKING

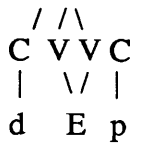
2. English

Following Ito (1986), Myers (1987) and Borowsky (1986) suggest that there is a universal process of delinking that functions to adjust syllable structure by delinking syllabified material from the syllable. Such material is either accommodated into a new syllable or is lost by stray erasure if it does not satisfy the syllable template. Myers claims that in English there is not a vowel shortening rule, but rather vowel shortening results from the delinking which occurs to preserve a well-formed syllable. Specifically, Myers and Borowsky suggest that the syllable template in English is as shown in (2).[4]

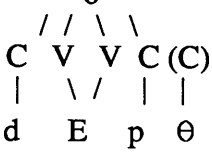
(2) C* V (X) where X is C or V

Myers proposes that in a word such as 'depth,' there is an underlying long vowel. In the word 'deep,' the final consonant is extraprosodic and the long vowel surfaces as the English syllable template in (1) is not violated. In 'depth,' on the other hand, the addition of the suffix /θ/ forces the final /p/ to lose its extraprosodic status. If possible, the /p/ must then be incorporated into the syllable. It can be syllabified, Myers suggests, if desyllabification occurs. The derivation proposed by Myers is shown in (3).

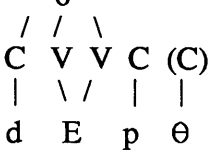
(3) a.



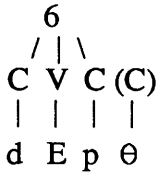
b. *



c.



d.



Following the syllabification of /p/ (shown in (3a), a violation of the syllable well-formedness template in (2) arises, as shown in (3b). This violation can be removed by delinking one of the vowels, as shown in (3c). The delinked vowel is not prosodically licensed since it does not belong to a higher level of prosodic structure and therefore must be deleted by stray erasure (3d).

Myers concludes that vowel shortening need not be stated as a rule of English, but follows from the enforcement of the language particular syllable template and the universal convention of delinking.

Vowel shortening in English applies not just at word edge, but also word internally. For instance, in a word like 'sanity,' Myers argues that the [n] is first syllabified as the onset of the second syllable and is later resyllabified into the rhyme of the first syllable. (See Borowsky 1986, Myers 1987 for arguments.) This resyllabification causes a violation of the syllable template in (2), and delinking can apply, resulting in the effect of vowel shortening. Myers considers other cases in which the structural description of resyllabification is met but it fails to apply. For instance, in the word 'falsity,' the [s] onset of the second syllable cannot be resyllabified into the first syllable. Myers suggests that the failure of the /s/ to resyllabifiy is due to a language specific well-formedness condition for English, stated in (4).

(4) A feature matrix must be associated with a timing unit. (page 55)

If the /s/ were resyllabified into the first syllable, one of the segments already part of that syllable would have to be desyllabified. Delinking would lead to a violation of the well-formedness condition in (4) in that there would be a feature matrix that is not prosodically licensed (rather than just a timing unit that is not prosodically licensed, as in 'sanity.') Therefore, resyllabification of the /s/ in 'falsity' cannot occur.

3. Background on Slave
3.1 The vowel system

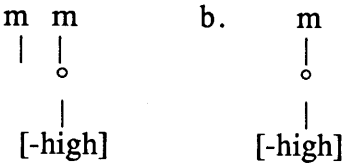
The Hare dialect of Slave has the vowel inventory shown in (5) and the default rules given in (6).

(5)

	i	i͡e	ɛ	a	o	u
high		-	-		-	
low				+		
back					+	+

(6) [ ] --> [-high] / [+low]
[ ] --> [+high]
[ ] --> [+back, -round] / [+low]
[ ] --> [-back]
[ ] --> [+low] / [-high]
[ ] --> [-low]

The features in (5) are the lexically specified vowel features.[5] (Various sources of evidence suggest the underspecification in (5); see Rice (ms.) for some discussion.) Notice that the vowels /i͡e/, a mid front tense vowel with an onglide, and /ɛ/, a mid front lax vowel, do not differ in terms of segmental features, but rather in terms of prosodic structure. I assume that /i͡e/ consists of two mora lexically while the other vowels are single mora.[6] /i͡e/ thus has the structure given in (7a), while /ɛ/ has the structure shown in (7b).

(7)a. 

b.

The first mora of the representation in (7a) receives the feature specifications [+high, -back] by the default rules in (6). Evidence for this analysis of the vowel /i͡e/ comes from alternations of this diphthong with the vowel [ɛ], as discussed below.

3.2 Root forms

Another feature of Hare must be mentioned. It has been argued (Leer 1981, Kari 1981, and others) that in Athapaskan languages, two classes of roots, open and closed, are found. In Hare, the open roots have the canonical form CV and the closed roots are of the shape CVC. While final consonants are frequently not present phonetically in Hare, there is evidence from a variety of sources that the underlying distinction between open and closed roots nevertheless remains, and I shall assume this distinction in root types. (See Rice (forthcoming a) for some discussion.)

3.3 Syllable structure

The maximal syllable found in Slave is represented by the template in (8).

(8) C m m]6

A syllable is composed maximally of an onset and two mora.[7] Any postvocalic tautosyllabic segment can occupy the second mora. (8) is thus equivalent to the English syllable template shown in (2): both allow maximally two non-onset positions in the syllable.

In cases where the syllable template is violated, delinking must occur in order to maintain a well-formed structure. The evidence for this comes from two processes, known in the Athapaskan literature as ablaut and vowel reduction.

3.4 Vowel alternations

Three types of vowel alternations are found in Hare, nasalization, ablaut, and vowel reduction. Only the latter two are discussed as nasalization is not relevant to the discussion.[8]

3.4.1 Ablaut

In many verb stems in Hare, a process occurs that is traditionally known as ablaut. The ablaut alternations are illustrated in (9).

(9)

ablaut form	nonablaut form
a. raising ([+high] postvocalically)	
i	a
u	o
i	ɛ
b. fronting ([-back] postvocalically)	
ɛ	a
ɛ	o

In the underlying representations of verbs exhibiting ablaut, two non-onset positions are present. The first position is filled by vowel features for the vowel listed under 'nonablaut form' in (9). The second position is filled by a single feature This feature raises the vowel in the forms in (9a) and is therefore

considered to be [+high]. In the ablaut forms, this feature is incorporated postlexically into the vowel in the first position, while in the nonablaut forms it is lost. In the forms in (9b), the feature in the second position fronts the vowel and is therefore identified as [-back]. In the ablaut forms, this feature is incorporated postlexically into the vowel in the first position; it is lost in the nonablaut forms.[9]

The template in (8) allows the ablaut features, [-back] and [+high], to be assigned to a mora.[10] Under certain conditions, however, they cannot remain in the mora and must be delinked. When delinking occurs, these features are not prosodically licensed. The loss of prosodic licensing triggers the application of stray erasure, causing the feature to delete. In the cases that the feature remains, a postlexical process of monophthongization applies, incorporating features of the second mora into the first.[11]

The question of when the feature is incorporated into a vowel and when it is lost is explored in section 4.

3.4.2 Vowel reduction

The vowel /i͡e/, a bimoraic structure, reduces to the vowel [ɛ]. (Note that what is called 'vowel reduction' here is identical in nature to what is called 'vowel shortening' in English. I use the traditional Athapaskan terminology.) Examples are given in section 4. As will be shown that section, the ablaut form of the vowel and the diphthong occur under the same circumstances; the nonablaut form and the reduced vowel also occur under the same circumstances.

4. The environment for ablaut and vowel reduction

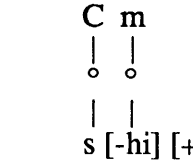
The vowel alternations in question can be seen by comparing verb forms that are unsuffixed with those that are suffixed. No suffix is found in the imperfective aspect of Hare verbs, while a suffix occurs in the perfective and a variety of other aspect forms. The basic generalization that can be drawn is that the ablaut feature is present and the diphthong occurs in the unsuffixed form while the nonablaut vowel and the reduced form of the diphthong (ɛ) occur in the suffixed form. Thus, the imperfective, being nonsuffixed, can have an ablaut vowel or a diphthong while the perfective cannot.[12]

When the root is either open or closed, the ablaut form of the vowel is found in the imperfective. While open and closed roots are superficially different, given the extraprosodicity of final segments, they are equivalent in the nonsuffixed form, with the vowel in both cases occurring at the edge of the visible structure.

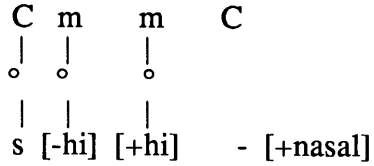
Examples of representations of closed ablaut roots are shown in (10).[13]

CONDITIONS ON DELINKING

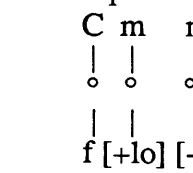
(10)a. imperfective -si



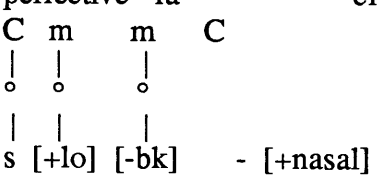
perfective -sɛ 'handle'



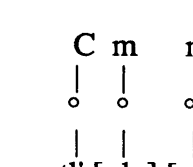
b. imperfective -fɛ



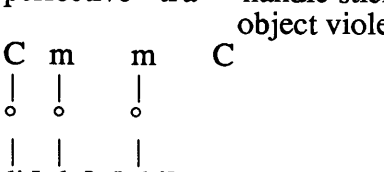
perfective -fa 'crawl'



c. imperfective -tl'í

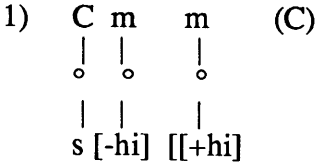


perfective -tl'a 'handle sticklike object violently'



No suffix is present in the imperfective form. I have identified the suffix found in the perfective form as [+nasal], a floating feature. The reason for this is not clear in the closed roots but becomes more obvious when open roots are examined. A closed root in which the ablaut feature can be incorporated thus has the representation shown in (11) after the marking of extraprosodicity.

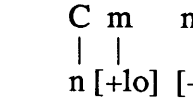
(11)



Open roots exhibit the same type of alternation: the ablaut form of the vowel is found when no suffix is present and the nonablaut form when a suffix is added. This can be seen in the data in (12). I omit the root nodes here in order to save space.

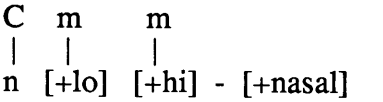
(12) imperfective

-di



perfective

-nǫ 'win'[14]



Again, the ablaut feature is phonetically present in the nonsuffixed form, the imperfective, but not in the suffixed form, the perfective.

Diphthongs in closed roots are illustrated in (13).

(13)

imperfective	perfective	
-di̯e	-dɛ	pl. go'
C m m C | | d [-hi]	C m m C | | d [-hi]	-[+nasal]
-dzi̯e	-dzɛ	'eat. pl. objects'
-xi̯e	-xɛ	'pack'

The diphthong occurs when no suffix is present, in the imperfective, and the reduced vowel when a suffix is present, in the perfective.

In the suffixed form of an open root, again a diphthong fails to occur. In this case, vowel reduction is not found, instead a nasalized high front vowel occurs, as in (14).

(14)

imperfective	perfective	
-bi̯e	-mį	'swim'
-ti̯e	-tį	'handle animate object'
-ki̯e	-kį	'loose object falls, 2 sit

In this case, a diphthong occurs in the imperfective and a nondiphthong in the perfective.

5. An account

So far the generalization that I have made is that the diphthong or ablaut feature is found in a nonderived form and the reduced or nonablaut vowel in a derived form. I would like now to offer an account of why this is the case. I suggest that these results follow from the existence of universal principles of prosodic licensing and delinking coupled with well-formedness conditions of the language. I will first sketch the analysis and then look at several examples in detail.

While roots can be either open or closed underlyingly, these are essentially equivalent prosodically in a nonsuffixed form since word-final consonants are extraprosodic. The ablaut roots contain a feature, either [+high] or [-back], that occupies a mora following the vowel and in roots with diphthongs, there are two mora underlyingly. In both cases, when syllabification occurs, the syllable template given in (8) is met, with both moraic positions being filled. The structural description for monophthongization is met, and it can apply postlexically.

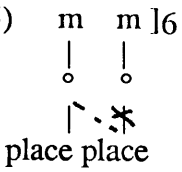
The situation is different in the suffixed forms. The syllable template is filled before suffixation occurs in ablaut forms and forms with the diphthong. When a suffix is added to these forms, it may lead to a violation of the syllable template. This occurs in the closed roots because material which has been extraprosidic becomes visible and, as in English, is syllabified (see the derivation in (3)). The

syllable template is violated and must be repaired so as not to violate the constraint. In the open roots, the addition of the perfective suffix also creates a violation of the syllable template. The perfective morpheme [+nasal] is, I suggest, a floating feature[15] that must be prosodically licensed and must therefore dock somewhere. Once it is assigned to a mora, the syllable template is violated. A repair strategy, delinking, is required to fix the impermissible structure.

The addition of originally extraprosodic material or of visible morphological material to the syllable thus creates a violation of the syllable template that must be repaired. This repair can be accomplished by delinking. Features that are delinked are not prosodically licensed. They can either become licensed by incorporation into the syllable or they can be lost by stray erasure.

While the bimoraic structures are produced lexically, they do not represent the actually occurring phonetic forms. The ablaut and nasalization that occur phonetically arise due to the existence of the postlexical rule of monophthongization, given in (15).

(15)

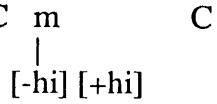


This rule is similar to the rule of contraction proposed for Latin by Schein and Steriade (1986). The second mora, with no phonetic content after delinking of the place features, is pruned. The marked feature of the nonhead, the right hand mora, is maintained, and combined with the other features from the lefthand mora. Monophthongization is blocked lexically since it is not structure preserving: it maintains lexically unmarked features in a head, a structure not allowed lexically. With the diphthong, the [+high] feature of the left branch attaches phonetically to the preceding consonant following its delinking by monophthongization, giving phonetically a palatalized consonant, an accurate phonetic representation of the onglide vowel.

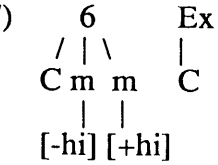
6. Exemplification

I will now look at several examples to show just how this process works. I first consider a closed ablaut root that has the vowel [i] in the imperfective and the vowel [ɛ] in the perfective. Such a root has the underlying representation shown in (16).

(16)

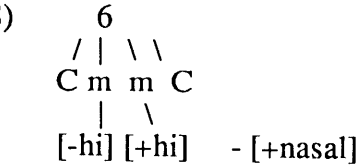


On the first cycle, the final consonant is extraprosodic. All other segments must be prosodically licensed, so the postvocalic feature is assigned to a mora as shown in (17).

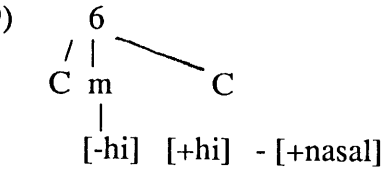
(17)


This prosodic structure is a permissible lexical one, not violating any well-formedness conditions. Monophthongization is unable to apply because the feature [+hi] is not lexically allowed in the first vowel position by structure preservation. Postlexically, monophthongization creates a nonbranching structure, with the nonhead feature from the right branch maintained along with the head features from the left branch.

In the perfective form, the nasal perfective suffix is added to the representation in (17), giving (18).

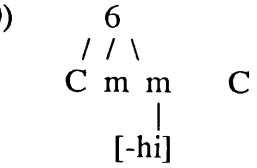
(18)


With the addition of the suffix, the extraprosodic consonant loses its extraprosodicity and must be syllabified, creating a violation of the syllable template. Structure preservation requires that the structure be repaired so as not to violate this well-formedness condition. This is done by delinking the nonhead, the feature [+high] as illustrated in (19).[16]

(19)


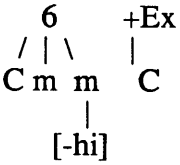
Once delinking occurs, the ablaut feature is no longer prosodically licensed, but it must be licensed in order to have a well-formed representation. It cannot be reassigned to the syllable and it cannot be added to the syllable head without violating structure preservation. This feature is therefore deleted by stray erasure.

A closed stem with a diphthong is similar. In this case, the representation is as shown in (20).

(20)


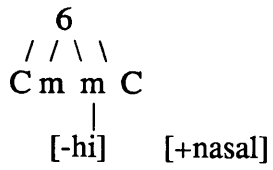
Extraprosodicity gives the representation in (21).

CONDITIONS ON DELINKING

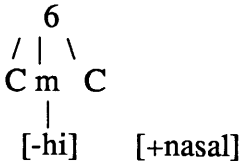
(21)


Since the final consonant is extraprosodic and the syllable template is met, the syllable is well formed. Postlexically, monophthongization creates a single moraic structure, with the feature [+high] that is assigned by default to the left mora associated to the onset consonant.

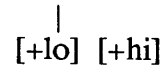
When the perfective suffix is added, the form in (22) results.

(22)


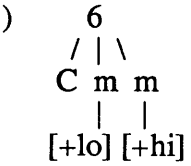
The syllable template is violated once the originally extraprosodic consonant is syllabified. The violation can be repaired by delinking the nonhead, creating a syllable that does not violate the template. In this case, the feature [-high] is maintained because it is allowed lexically as the marked feature on a vowel. It can dock on the head. The representation simplifies lexically to (23) by delinking.

(23)


Nonsuffixed open ablauting roots have the type of representation in (24). This representation is for a root showing an [i]-[a] alternation.

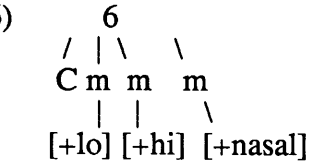
(24)


The feature [+hi] must be prosodically licensed. This can be accomplished by assigning it to a moraic position, as in (25).

(25)


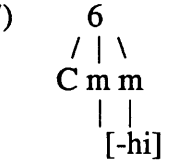
Monophthongization applies postlexically to create a nonbranching structure, with the nonhead feature [+high] incorporated into the head.

When the open root is suffixed, the form in (26) arises.

(26)


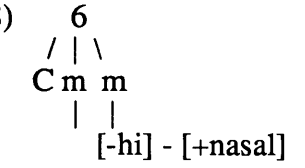
In this form the perfective suffix must be licensed and is therefore syllabified, creating a violation of the syllable template. Delinking can take place to yield a well-formed structure, with structure preservation requiring that it be the feature [+high] that delinks. This feature is then lost by stray erasure because it is not prosodically licensed. The [+nasal] syllabifies and postlexical monophthongization creates a nasalized vowel.

The open roots with diphthongs are similar. An example of the imperfective is given in (27).

(27)


Everything in this structure is licensed. Postlexically, monophthongization occurs and the high feature on the left branch of the vowel associates to the consonant.

The perfective has the form given in (28).

(28)


This structure violates the syllable template once the suffix is licensed, and delinking occurs. The occurrence of the high vowel before the nasal follows from redundancy rules not discussed in this paper. Postlexically, the nasal becomes part of the vowel by monophthongization.

7. Summary

To summarize the account of vowel alternations in Slave, I propose that there is a well-formedness template that allows a bimoraic syllable only if the second mora occurs at the edge of a syllable. When a violation of this template is created by the loss of extraprosodicity or the addition of (visible) morphological material, the structure must be repaired. Repair must create a structure that meets the well-formedness template. This is accomplished by the universal strategy of delinking, with delinking constrained to meet requirements of structure preservation. Monophthongization occurs postlexically to create a nonbranching structure, the only structure that actually occurs phonetically.

In the first part of this paper I presented an account of English vowel shortening. This process results, Myers claims, from the interaction of the universal process of delinking with a language specific syllable well formedness template. Delinking is constrained in that the structure arising from its application must be structure preserving.

English and Hare thus share certain properties:

(a) The syllable, onset excluded, branches maximally binarily.
(b) Violations of this syllable structure may arise through loss of extraprosodicity, resyllabification, and addition of visible morphological material.
(c) Violations are repaired by delinking (and stray erasure).
(d) Delinking is subject to structure preservation.

They differ in just one way:

In Hare, there is a monophthongization process which collapses two mora into one, incorporating features of the nonhead into the head. In English, there is no such process. Correlated with this, English allows delinking only if head and nonhead features are identical while Slave allows it when they are different.

These properties suggest that Engish vowel shortening and Hare ablaut and vowel reduction both result from the interaction of a universal constraint on syllable shape coupled with the universal process of delinking. A learner of Hare needs to learn the representations and monophthongization; a learner of English the representations. A line of research worthy of further attention is the delinking strategy since it is in what can be delinked that these languages differ. I have suggested that what can be delinking results from structure preservation; this requires additional testing.

Notes

* This is a revised version of the paper presented at NELS 18. Many thanks to Peter Avery for a careful reading of the paper. I also benefitted from discussion with Elan Dresher, Jonathan Kaye, and Tom Wilson. None of these people necessarily share the views expressed here.

1. I am assuming that word final consonants are extraprosodic, so violations of binarity may arise at word edge.

2. Fieldwork for this research was funded by the Northern Social Research Division of the Department of Indian and Northern Affairs, Ottawa, Ontario, Canada. All data in this paper is from the Hare dialect of Slave, spoken in Fort Good Hope, Northwest Territories, Canada. I would like to thank the many people from Fort Good Hope who contributed their time in providing data for this work.

3. This assumption is not argued for in this paper. Hare does not appear phonetically to be a language that is sensitive to prosodic weight. However, desyllabification occurs in Hare to create a structure that contains maximally two non-onset positions, suggesting that weight is relevant. Syllable weight was definitely important in Proto-Athapaskan, and thus its continued existence, albeit in a very abstract form, in a daughter language is perhaps not surprising. See Leer (1981) for discussion of Proto-Athapaskan.

4. Recall that apparent violations can arise because of extraprosodicity.

5. We will see that the unmarked values can occur following the vowel of a stem.

6. I will not here address the issue of whether moraic structure is present lexically or is assigned by rule. For the diphthong at least, it appears that a mora must be present lexically. See McCarthy and Prince (1986) and Hayes (1987) for discussion of possible strategies of morafication. The diphthong under discussion in this paper is one that is rising in sonority. Rising diphthongs are often considered to arise from two syllables (see, for instance, Kaye 1983). Their source is not relevant to the argument made here. It is interesting to note that the diphthong arises from Proto-Athapaskan *e, a 'full' vowel.

7. This statement holds at the lexical phonology in both languages. Since final consonants are extraprosodic in the lexical phonology, the possibility of a syllable that is phonetically of the shape CmmC arises in Hare. This shape is possible only due to late adjunction of the final consonant. If such a structure arises lexically, it must, I argue, be repaired to meet the syllable template. In most cases, a syllable contains only a single mora phonetically. This, I suggest, comes from the existence of a late rule of monophthongization which reduces a vowel and a following sonorant to a single mora.

8. Nasalization accounts for the alternations found in Hare between nasalized vowels and oral vowel-nasal consonant sequences. The nasalized vowel occurs when the nasal is tautosyllabic with the preceding vowel and the oral vowel-nasal consonant sequence when the nasal is in the onset of the following syllable. See Rice forthcoming a, b for discussion.

9. It should be noted that not all roots in Slave contain an ablaut feature: in most roots, there is no variation in stem vowel and thus the stem consists of just a single vowel.

10. They do not appear to ocupy a mora underlyingly. This can be seen in the case of velar-vowel-sonorant sequences. The sequence velar-i which would arise from

an underlying velar-a-[+high] sequence is not a permissible sequence, either underlyingly or phonetically. Instead, the form velar-a-y is found, as in (i).

i. xay winter
k'áy 'willow'

The expected form is *[xi]. Evidence that the feature [+high] is not lexically moraic can be seen from the possessed form, where the vowel-initial suffix -é is added, as in the forms in (ii).

ii. -ghéyé 'winter, year'
-k'éyé 'willow'

Here the [y] occupies an onset. This is expected if the feature [+high] is originally extraprosodic. In the possessed form, the addition of the suffix causes it to lose its extraprosodicity. In the nonpossessed form, it remains extraprosodic until the word level, when extraprosodicity is lost (see Borowsky, Ito). At this point, it cannot be incorporated by monophthongization since the sequence velar-i is blocked; it is instead assigned a mora. If it started out as moraic, the fact that it surfaces as an onset would require extra explanation.

11. The rule must be postlexical. The features [+high] and [-back] represent the marked feature values. They cannot be incorporated into the first position vowel without violating structure preservation.

12. I discuss only the perfective suffix in this paper. Other suffixes in Hare occupy a timing unit. They pattern identically to the perfective with closed roots but differently with open roots.

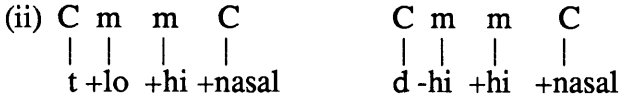
13. The representations given here and elsewhere do not represent the most underlying representations. As discussed in note 9, the ablaut feature does not appear to occupy a moraic position underlyingly. For ease of reading, I include a mora in this position in the representations.

14. Some other phonological processes in Hare are in evidence here. An underlying stem initial nasal becomes a [d] if the following vowel is oral. In addition, the nasalized vowel [ą] is rare is Hare, usually neutralizing to [ǫ].

15. Evidence for the floating nature of the perfective suffix comes from a difference in patterning between roots with a final nasal consonant and roots with a nasal suffix. Consider the roots below.

(i) -tį, -tǫ 'handle sticklike object' (imperfective, perfective)
-dį, -dę 'learn' (imperfective, perfective)

These have the representations in (ii).

(ii)


In the imperfective, the final consonant is extraprosodic and so the ablaut feature can be incorporated postlexically. Once extraprosodicity is lost, the final nasal can also be incorporated by monophthongization. In the perfective, the extraprosodicity is lost lexically when the suffix is added. This produces a syllable violating the binarity condition, and desyllabification and stray erasure occur.
In a open root ablaut form, the addition of the nasal suffix leads to desyllabification and stray erasure of the ablaut feature. If the perfective suffix were extraprosodic, the mora containing the ablaut feature would remain on an edge and an ablaut vowel would be expected in the perfective, as in the imperfectives of the above forms.

16. In a process not of relevance to this paper, the feature [+nasal] is incorporated into the stem-final consonant, producing a voiced consonant in languages such as Chipewyan. In Hare, voiced final consonants are not pronounced syllable-finally, and thus the perfective stem is always open. It appears that [+nasal] is not actually the best feature to characterize the perfective suffix; it may well better be thought of as being [-spread glottis], which is redundantly [+nasal] when incorporated into a vowel.

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