The Accent and Prosodic Constraints

Borim Lee

(Wonkwang University)

Borim Lee (1994) The Accent and Prosodic Constraints. *Linguistics* vol. 2. In this paper we will discuss the phenomena of vowel insertion and glide vocalization occurring at the periphery of stems in Takelma. In this language, when CVC stems surface with accents, either a morphologically empty vowel *a* is inserted after the stem or a glide *y* is vocalized to be assigned accent. If a CVC stem has undergone lengthening of the stem vowel resulting in a CVVC stem, no further changes occur. It is argued that all these processes are best explained as requirements to satisfy a bimoraic prosodic constraint on accented stems.

1. Introduction

Languages may enforce well-formedness requirements in order to mend prosodic structures. There may be phonological processes imposed on the syllable level. Epenthesis of vowels to properly syllabify stray consonants or closed syllable shortening to shorten superheavy syllables to conform to a language's syllable template, both of which occur in well-known languages like Yawelmani (Archangeli 1984), can be considered as processes motivated at the syllable level.

On the other hand, some languages make use of strategies at higher prosodic levels than the syllable to mend prosodic structure (Woodbury 1987 for Central Alaskan Yup'ik Eskimo, McCarthy and Prince 1986, Weeda 1992). For example, Lardil (Hale 1973, McCarthy and Prince 1986) enforces a minimum word size requirement of two moras: if a word contains only one mora, a morphologically meaningless vowel a is added at the end of the word.

(1) Lardil   (taken from McCarthy and Prince 1986:32)

	Underlying	Uninflected	Accusative	
a.	/peer/	peer	peerin	'ti-tree sp.'
	/maan/	maan	maanin	'spear gen.'
b.	/parna/	parna	parnan	'stone'

/kela/	kela	kelan	'beach'
c. /wik/	wika	wikin	'shade'
/wun/	wunta	wunin	'rain'

In Lardil only vowels count as moras. The nouns in (1a) and (b) satisfy the minimal word requirement. Underlyingly monomoraic nouns in (1c), however, undergo augmentation in the uninflected form to fulfill the minimum word-size constraint of two moras.

In this paper, we will examine some phenomena ordinarily attributed to syllabification, i.e., epenthesis and glide vocalization, and argue that these processes are in fact governed by a higher level of prosodic organization, formalized in terms of a minimal bimoraic foot constraint on accented stems. Before going into details, let us examine the possible internal nuclear structure in Takelma

2. The Nucleus as a Tone Bearing Unit

Takelma, which is an extinct Penutian American-Indian language, has ten vowels, /i, ii, e, ee, a, aa, o, oo, u, uu/, which function as syllable nuclei. The fact that vowel length is phonemic is best illustrated by the fact that some verb stems distinguish aorist stems from their corresponding nonaorist stems merely by lengthening the vowel.[1]

(2)	Nonaorist	Aorist		
	CVC	CVVC		
	wok	wook	'arrive'	(S:98)
	(?)uk^w	(?)uuk^w	'drink'	
	yim	yiim	'lend'	
	t'at	t'aat	'rush'	(T:228)
	k'ew	k'eew	'whirl'	(T:212)

Other minimal pairs with only a difference in vocalic length are also found:

(3) a.	kay	'eat'	(nonaorist)	(S:12)
	kaay	'grow'	(nonaorist)	
b.	taa-	'ear'	(body-part prefix)	
	ta-	'mouth'	(body-part prefix)	
c.	sin-	'nose'	(body-part prefix)	(T:254)
	siín	'wood-coals'		

I

d. t'aák^h 'fresh-water mussel'   (T:256)

    t'ák^h 'spring month when there is much wind'

Let us here briefly consider the pitch-accent phenomena of this language. Long and short vowels may contrast for tone as shown in (3d), i.e., an accent on the second mora of long vowels is realized as a rising pitch, whereas short vowels never show up with rising pitch.[2] Furthermore, placement of accents on long vowels is distinctive in that minimal pairs involving different tonal patterns are found:[3]

(4) a.   séel   'black paint, writing'   (S:20)

    séel   'kingfisher'

  b.   sáat^h 'his discharge of wind'

    saát^h 'mash it'

  c.   héel   'song'

    heél   'sing it'

As Sapir (S:15) notes, the placement of accents is not always predictable. Nouns and suffixes are usually accented underlyingly with high or falling accents and there are morphemes with no accents. In verb forms, which usually consist of stems and suffixes, the placement of accents is usually predictable: verb stems usually surface with an accent which is realized as a high or rising tone, depending on whether the accented syllable has a simplex or complex nucleus; a glottal stop following the accent induces a falling pitch on the accented syllable. Quite a few pronominal subjects are also underlyingly accented, and when they are incorporated into a verb form, either the stem or suffix accent surfaces (as in (5)). The claim is that verb stems and suffixes form a close unit, which allows no more than one accent. Sometimes, the same verb forms with only a difference in accent are found (the h in (5a) is inserted by the preceding accent):

(5) a.   wayaá-n-h-a?n   'I put him to sleep'   (S:51)

  b.   wayaa-n-á?n   (same aorist form)

Following Sapir, we treat a vowel plus any one of the sonorant segments *l, m, n, y, w* as diphthongs in Takelma, based on parallel treatments of them for the purposes of pitch-accent and grammatical processes.[4]

(6) a.   kayaú   'he ate it'   (S:19)

(<kaya-w)   aorist stem

b.   k'ayaíthe?   'I grew'   (S:107)

(<k'aya-y)   aorist stem

c.   tasmayam   'he smiled'   (S:19)

(<ta-smaya-m) aorist stem

mouth-aorist-PS

d.   wulx   'enemy'   (S:17)

e.   nank^h 'he will say, do' (S:17)

f.   k^{wh}eteíth k^h 'my name'   (S:21)

(<k^{wh}etei-t^{h}k^h)

name-my

    Since Sapir (S:10) remarks that long vowels (Sapir's pseudo-diphthong) and diphthongs have the same absolute quantity, and experience the same accentual treatment, we further propose that both long vowels and diphthongs be treated as complex nuclei and that nuclear elements be tone bearing units (TBU's) of Takelma. We will maintain that complex nuclei in Takelma consist of two moras (Levin 1985:106), based on the fact that there are no triply long vowels and that tonal contrasts within a nucleus are limited to two types, i.e., HL or LH.

    Given this, we may represent geminate (long vowel) and bisegmental complex nuclei as follows (Levin 1985:105):

(7) a.   Geminate   b.   Bisegmental

N   N

X   X   X   X

[-cons]   [-cons] [+son]
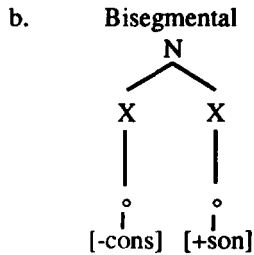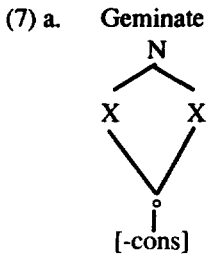
3. Bimoraic Constraint on accented stems

    In this section we will discuss the phenomena of vowel insertion and glide vocalization at the periphery of stems and we will argue that these processes are generalized as requirements to satisfy a bimoraic prosodic constraint on accented stems. For the purpose of stem morphology, only

vowels are treated as moras, thus both CV and CVC syllables count as monomoraic syllables. When CVC stems with petrified suffixes[5] surface with accents, however, either a morphologically empty vowel *a*, the default vowel of the language, is inserted after the stem to receive the accent, or a glide *y* is vocalized and is assigned accent when it occurs in the proper environment. If a CVC stem has undergone lengthening of the stem vowel resulting in a CVVC stem, no further changes occur and the stems surface with a rising pitch on the long vowel.

3.1 Epenthetic vowels

Let us first consider the examples in (8), contrasting forms with an intrusive *a* bearing a high tone surfacing before a petrified suffix in CVC-(C) nonaorist stems, with corresponding CVCV-(C) aorist stems with all stem vowels.[6]

(8) a. xutá-tʰee   'I shall whistle'   (S:100)
        /xut-m/   nonaorist stem
        xutum-tʰe?   'I whistled'
        /xutu-m/   aorist stem

   b.   tʰkisátʰee   'I (as plant) shall get green'(S:99)
        /tʰkis-m/   nonaorist stem
        tʰkisim-the?   'I get green'
        /tʰkisi-m/   aorist stem

   c.   k'iyákʰ-tee   'I shall go, come'   (S:28)
        /k'iy-k/   nonaorist stem
        k'iyíkʰ-te?   'I went, came'
        /k'iyi-k/   aorist stem

   d.   al-tʰkeyá-p-x   'it is round' (lit. it rolls)   (S:119)
        /tʰkey/   nonaorist stem
        tʰkeye-p-á?n   'I roll it'
        /tʰkeye/   aorist stem

   e.   kinákʰ-tee   'I shall go somewhere'   (S:28)
        /kin-k/   nonaorist stem
        kiníkʰ-te?   'I go somewhere'
        /kini-k/   aorist stem

   f.   xumákʰ-tee   'I shall be satiated'   (S:100)
        /xum-k/   nonaorist stem
        xumúkʰ-te?   'I was satiated'
        /xumu-k/

The nonaorist forms in (8a,b) may be explained in terms of syllabification. The petrified suffixes are sonorants immediately following stem-final obstruents and cannot be syllabified, since this would violate the sonority sequencing generalization.[7]

The rest of the epenthetic cases (8c-f) deserve some discussion. The following forms in (9) also include postvocalic sonorant-obstruent clusters as those in (8); however, vowel insertion is not observed.

(9) a. sin-xiní-xan-**pʰ**-te? 'I sniff' (S:119)
      nose   redup.   intr.suf.

  b. luk'ú-xa-kw-an-**tʰ**-kwi-te?'I trap for myself' (S:139)
      trap   intr. com.caus.ind.refl.

  c. skele-w-á-**ltʰ**   'he shouted to him' (S:38)
          ind.suf.

  d. ta-skaaípx-tee   'I shall lie down' (S:99)
      (<skay-p-x-tee)

For easier comparison, the relevant forms from (8) are repeated.[8]

(10)a. k'iyákʰ-tee   'I shall go, come' (S:28)
      /k'iy-k/   nonaorist stem

  b. al-tʰkeyá-p-x   'it is round' (lit. it rolls) (S:119)
      /tʰkey/   nonaorist stem

  c. kinákʰ-tee   'I shall go somewhere' (S:28)
      /kin-k/   nonaorist stem

  d. xumákʰ-tee   'I shall be satiated' (S:100)
      /xum-k/   nonaorist stem

Note that we observe vowel insertion only with CVC stems at the boundary between the stem and the petrified suffix and that the inserted vowel *a* always surfaces with the accent. We hypothesize that vowel insertion is triggered by a prosodic requirement enforcing a minimal bimoraic foot for accented stems.

3.2. Glide vocalization

Besides vowel insertion, Takelma manifests another strategy to meet the bimoraic foot requirement for accented stems, i.e., vocalization of the glide *y*. A *y* immediately following a CVC stem as in (11), is a petrified suffix with no specific meaning or function.

(11)a. yawí-tʰee   'I shall talk'   (S:29)
         /yaw-y/   nonaorist stem
    b.   yawa-y-átʰ   'you talked'
         /yawa-y/   aorist stem
    c.   yawaí-tʰe?   'I talked'   (S:110)
         /yawa-y/   aorist stem
    d.   ts'awí-kʰ   'he ran fast'   (S:29)
         /ts'aw-y/   nonaorist stem
    e.   ts'aw-y-â?s   'fast runner'
         /ts'aw-y/   nonaorist stem
    f.   ts'awaí-tʰe?   'I ran fast'   (S:101)
         /ts'awa-y/   aorist stem

In the above examples, /-aw-y-/ becomes [-awi-] by vocalizing the glide *y* if the stem is accented (11a and d).

3.3. Analysis

Thus far, we have observed two options employed to satisfy the bimoraic prosodic constraint on accented stems: either vowel insertion or glide vocalization, both of which achieve ultimately the same result, i.e., creating an additional mora. Certain stem forms show that the choice between these two strategies is optional. Compare the case of vowel insertion in (12a) with that of glide vocalization in (12b) which applies to the same underlying form.

(12)a. ts'ay-â-m-kʰ   'he hid it'
         /ts'ay-m-kʰ/   nonaorist (inferential)
    b.   ts'aí-m-kʰ   (alternate form of the above)
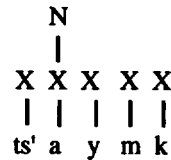   /ts'ay-m-kʰ/

The choice between the two options seems to be lexically marked.[8] In both processes a bimoraic template is imposed and high pitch is associated to the rightmost mora. In (13) we illustrate the two alternate derivations of /ts'ay-m-kʰ/ 'he hid it'.
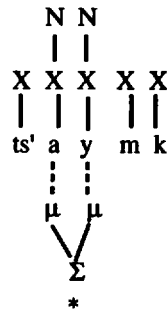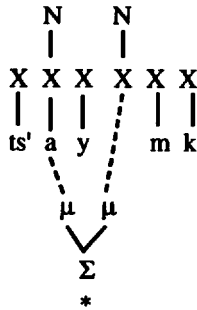
(13)a. [ts'ayámkʰ]   b.   [ts'aímkʰ]
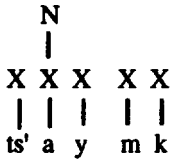
      vowel insertion   vs.   glide vocalization[9]

Let us examine some more cases of alternations involving vowel insertion and glide vocalization. The following forms occur with the petrified suffix *w*.[10]

(14)a.	kay-w-án	'I shall eat it'	(S:30)
	/kay-w/	nonaorist stem	
b.	kaí-kʰ	'he ate it'	
	/kay-w-kʰ/	nonaorist (Inferential)	
c.	kaí	'eat it'	
	/kay-w/	nonaorist stem	
d.	kayaú	'he ate it'	(S:125)
	/kaya-w/	aorist stem	
(15)a.	piláu-kʰ	'he jumped (inferential)	(S:19)
	/pil-w/	nonaorist stem	
b.	piliw-átʰ	'you jump'	(S:11)
	/pili-w/	aorist stem	
c.	piliú-tʰe?	'I jump'	(S:11, T:74)

/pili-w/   aorist stem

(16)a.   skaláuk^h 'he turns his head to look at it'   (S:125)
         /skal-w/   nonaorist stem
    b.   al-skaalw-în   'I shall turn my head to look at him'
         /skal-w/   nonaorist stem
    c.   al-skaál-k^h-a?   'I turned my head to one side to look at him'
         /skal-w/   Inf. I   nonaorist (inferential)
    d.   al-skalawî?`n   'I turn my head to look at him'
         /skala-w/   aorist stem

In (14b and c), /-ay-w-/ becomes [ai] by vocalizing y and subsequently deleting the unsyllabified *w*. The forms in (15a) and (16a) illustrate that /-Vl-w/ undergoes vowel insertion and the *w* is kept. On the other hand, in (16c) a CVC nonaorist stems has undergone vowel lengthening and *w* deletes. These phenomena, although they look controversial, fall out of our generalizations, once we consider them in terms of the bimoraic constraint on accented stems.
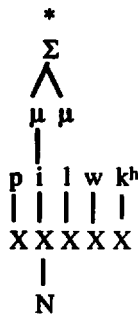
Explanations will be provided by comparing partial derivations for the relevant forms in (11a), (15a), and (16c), all inferential forms derived from nonaorist stems.
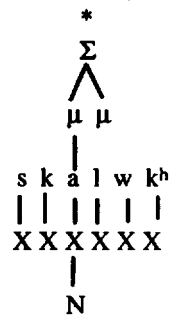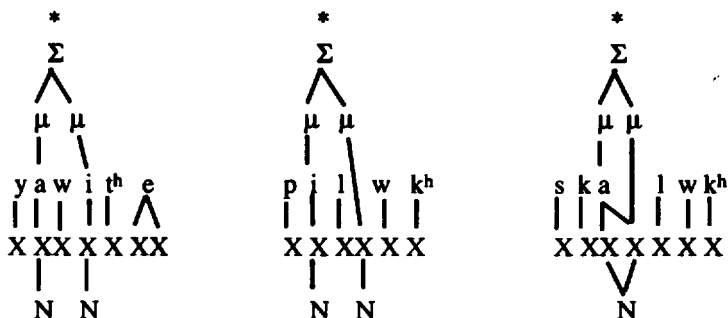
(17)
a.[yawit^{h}ee](11a)   b.[piláwk^h] (15a)   c.[al-skaák^{h}a?] (16c)
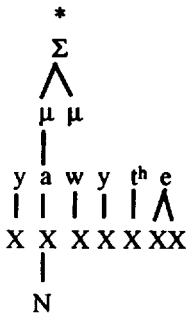
These stems are all accented but lack one mora. In contrast to *y*, *w* does not seem be a candidate for vocalization to meet the bimoraic constraint. In (17a) *y* vocalizes to fill the nuclear position and fulfill the mora requirement. In (17b) a vowel is inserted since stem final (sonorant) consonants do not count as moras. *w* in this case is subsequently syllabified with the inserted vowel and avoids stray erasure. Assuming this, the deletion of *w* in *skaálkha?* from /skal-w-kʰ-a?/ in (17c) is accounted for under the same rubric. That is, this stem has somehow undergone lengthening, making vowel insertion unnecessary, and the stray *w* deletes. Note that vowel lengthening in (16c/17c) has not been caused by the accent, since the nonaccented stem in (16b) also shows a lengthened stem vowel.

3.4. Residual Cases

There are exceptions to this analysis of prosodic requirements on accented stems. As illustrated in the following forms, exceptions occur in the imperative forms which take nonaorist stems. In (18a, c) expected vowel insertion does not occur and we end up with a monomoraic syllable with raised pitch. Note that non-imperative related forms with the same nonaorist stems in (18b, d) undergo vowel insertion to meet the bimoraic foot requirement.

(18)a. kín-kʰ   'go somewhere' (imp.)   (S:28)
     /kin-k/   nonaorist stem
   b. kinákʰ-tee   'I shall go somewhere' (fut.)
     /kin-k/   nonaorist stem
   c. pai-hém-kʰ   'take it out' (imp.)   (S:184)
     /hem-k/   nonaorist stem

d. pai-hemákʰ   'he took it out' (inf.)
   /hem-k-kʰ/   nonaorist stem (inf)

However, not every imperative form is an exception to the prosodic constraint.

(19)a. k'emán   'make it' (imp.)   (S:19)
       /k'em-n/   nonaorist stem
    b. ts'ay-ám   'hide it!'   (S:31)
       /ts'ay-m/   nonaorist stem
    c. kaí   'eat it'
       /kay-w/   nonaorist stem

In (19a) and (b) where the petrified suffix is a sonorant consonant, a vowel is inserted with a high tone as expected. In (19c), a stem final glide *y* is vocalized and the suffixal *w* deletes. Due to the lack of data on imperatives, we cannot provide a satisfactory explanation for these alternations except to suggest that the minimal bimoraic foot constraint may not be absolute in the imperative forms.

3.5. Summary

This study examined phenomena ordinarily attributed to syllabification, i.e., epenthesis and glide vocalization. They turned out to be, however, not related to syllable structure, but rather governed by a higher level of prosodic organization. The constraint at work was formalized in terms of a minimal bimoraic foot on accented stems.

Notes

1   The sources of data referred to in this work will be identified in the following way: Sapir's grammar of 1922 is abbreviated as (S:page number), and the Texts of 1909 as (T:page number).
2   The transcription for accents used in this work differs from that of Sapir as follows:

	Sapir	this work
high(raised)	`	´
rising	~	vv́
falling	˙	v́v

3   Since accents are realized as high or rising pitch in some cases but falling tones in others, we need to assume two different types of accents, i.e., one for (L)H and one

for HL.

4   Sequences of VR in the verb forms which are treated as tone bearing units, i.e., surfacing with a rising tone, are not very common.

5   Sapir notes that the petrified suffixes have no clear functional meaning and, therefore, are apt to be considered as a part of the stem.

6   There is another type of *a*, Sapir's constant *a*, which shows up after petrified suffixes. For details, refer to Lee (1991).

7   Sapir (S:28) seems to treat the insertion of an "inorganic (epenthetic:BL) a" as a case of cluster simplification. However, he often implies the fact that the accentual factor may be behind this process: Sapir (S:30) notes that in *kemán* 'make it' (<kem-n) the inorganic *a* appears "because accent is not thrown forward." He treats the process of glide vocalization we discuss below (in 28) as exceptional cases to epenthesis.

8   There is an exceptional case of vowel insertion which can be explained by neither the foot level prosodic constraint nor by the syllabic constraint.

a.	miilat-á`n	'I shall love her'	(S:99)
	/mil-t/	(nonaorist)	
b.	miliit-á?`n	'I love her'	
	/mili-t/	(aorist)	

This seems to be a purely exceptional case.

9   We assume that glide vocalization results in a violation against conditions on skeletal-tier transformation (a) (Levin 1985:331), and is subsequently reanalyzed to (b).

```
a.   * N   N        b.       N
       |   |                 / \
       X   X                 X X
```

10   There is an interesting aspect of this language which distinguishes an underlying VR sequence from a VR sequence where the vowel is epenthetic (compare 15c with 15a.). The former can have a rising pitch whereas the latter can only have a high (or falling) pitch. Sapir transcribes postvocalic tautosyllabic glides as vowels, i.e., i or u for both cases. The accentual difference on these surface identical representations may suggest the distinction between a branching nucleus and a branching rime.

References

Archangeli, D. (1984) *Underspecification in Yawelmani Phonology and Morphology*, Doctoral dissertation, MIT, Cambridge, Massachusetts.

Hale, K. (1973) "Deep-surface Canonical Disparities in Relation to Analysis and Change:an Australian example, " *Current Trends in Linguistics* 11. 4-1-58.

Lee, B. (1991) *Prosodic Structures in Takelma Phonology and Morphology*. Ph.D. dissertation, University of Texas at Austin.

Levin, J. (1985) *A Metrical Theory of Syllabicity*. Ph.D. dissertation, MIT.

McCarthy, J. and A. Prince (1986) "Prosodic Morphology," ms. University

of Massachusetts, Amherst, and Brandeis University, Waltham.

Sapir, E. (1909) *Takelma Texts*. University of Pennsylvania anthropological publications of the University Museum 2(1). 1-263.

Sapir, E. (1922) *The Takelma Language of Southwestern Oregon*. Handbook of American Indian languages, ed. by Franz Boas. Bulletin of the Bureau of American Ethnology 40(2). 1-296.

Weeda, D. (1992) *Word Truncation in Prosodic Morphology*. Ph.D. dissertation. University of Texas, Austin.

Woodbury, A. (1987) "Meaningful Phonological Processes: A Consideration of Central Alaskan Yup'ik Eskimo Prosody," *Language* 63. 685-740.

Borim Lee
Audio-visual center
Wonkwang University
344-2 Shinyong-dong
Iri, Chonbuk