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Author(s): Stephen A. Wilson

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## Metrical Structure in Wakashan Phonology

Stephen A. Wilson

University of California, Berkeley

0. Introduction

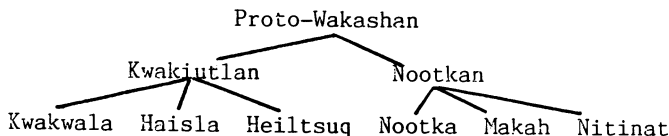
In spite of the current popularity of metrical theory as a model for describing the prosodic features of various languages, little has been said concerning the interaction of metrical structures with the rules of segmental phonology. If the often complex notations proposed by a tree-based metrical theory (binary feet, word trees, extrametrical elements) are accurate depictions of a speaker's internalized knowledge of suprasegmental patterns, we should expect them to play a role in defining the domains of a variety of processes, not just some pre-selected subset of productive rules.

Only a few such examples have appeared in the literature to date. Hayes (1981) has analyzed two rules in Yidin<sup>y</sup>, a vowel lengthening and a deletion rule, as being sensitive to metrical structure as part of their environment. Kiparsky (1979) and Selkirk (1980) have made similar suggestions for rules in English. Still, the number of clear examples cited and the generality of these cases have been quite restricted.

This paper will present data from the Wakashan family of languages spoken in British Columbia which demonstrate a greater degree of interaction between metrical and segmental rules than has previously been detailed. Specifically, changes in metrical structure in certain of the Wakashan languages have led to a number of re-analyses of older segmental processes, playing a role in general diachronic change.

1. Wakashan Background

Wakashan can be divided into two main branches, the Northern or Kwakiutlan group, and the Southern or Nootkan group. The distribution of languages within the sub-groups is as follows:



The relationships within each of the main subgroupings are relatively close, while Nootkan and Kwakiutlan are quite distant cousins. A large amount of areal contact and borrowing has hampered reconstructive work. The general outlines of the family tree as developed by Sapir, Boaz, Jacobsen and others, however, are quite clear.

In this paper, most of the data cited will be drawn from the best attested languages, Kwakwala from the Kwakiutlan branch and Nootka proper (Tsishath dialect) from the Nootkan branch. Other languages will be consulted as necessary.

All of the Wakashan languages are polysynthetic and

exclusively suffixing. All make use of several types of reduplication, as well as morphologically conditioned lenition, two types of glottalization, and vowel lengthening and shortening processes. As examples of word formation are given these forms as analyzed by Swadesh (1939):

wikʔayʔaqʰsilayoʔat 'see someone act foolishly'

root: wik- 'no, not'

suffixes: -ʔat 'aware of...', -aqʰ 'inside' (a leniting suffix, here turning t to y for historical reasons), -sita 'act, do...', -yoʔat 'see...'

ʔo:ʔotahsimcyʔak 'device for ritual training for success in hunting or whaling'

root: ʔo- 'it, such-and-such'

suffixes: -atah 'hunting, catching...' (causes reduplication of the stem), -simč 'ritual training for success in...' (causes lengthening of the first vowel), -yʔak 'instrument, device for...'

processes: ʔo-atah-simč-yʔak > ʔoʔo-atah-simč-yʔak (by reduplication) > ʔoʔotah-simč-yʔak (by vowel contraction, see below) > ʔo:ʔotahsimčyʔak (by vowel lengthening)

ʔa:ʰʔa:ʰqimta 'handling two round objects at a time'

root: ʔaʰ- 'two'

suffixes: -qimt '...many round objects', -a durative aspect

processes: stem lengthened and initial CVC- reduplication to express repetitive aspect

Similar word formation processes are found in all of the Wakashan languages. The languages of the Nootkan group, however, have innovated a number of morphological and phonological processes, and have changed a number of inherited Wakashan rules in comparison with the more archaic Kwakiutlan group. The innovations germane to this discussion share an unusual feature: they all make reference to a phonological distinction between the first two syllables of a word and the following syllables. In every case, the vowels of the first two syllables appear "stronger" than following vowels. No such distinction occurs in any of the languages of the Kwakiutlan group. The origin of this distinction is the main focus of this paper.

## 2. Nootkan Variable Vowels

All of the major Nootkan languages (Nootka, Nitinat and Makah) share a set of underlying vowels whose surface length is dependent on their position within a word. Such vowels, dubbed variable vowels by Sapir, are long when they appear in the first or second syllable of a word, and short otherwise. Such lengthening occurs after reduplication, but before vowel contraction. Variable vowels occur in both stems and suffixes; in stems, they are only identifiable as variable when reduplication changes their

syllabic position. Variable length is indicated as V(:). Some examples, again from Nootka:

-na(:)k 'having, possessing...'  
 ?ona:k 'possessing it', but čapacnak 'possessing a canoe'  
-ya(:) 'troubled by, with...'  
 t'ohy'a: 'troubled at the head, headache', but čapacy'a  
 'having trouble with a canoe'  
caqi(:)c- 'twenty'  
 durative aspect caqi:c, but distributive cacaqic

These alternations between short and long surface forms have no parallel in Kwakiutlan. Historically and underlyingly, the variable vowels are short; the details of their development have been a mystery since Sapir's early work. Their significance here is the special form in the first two syllables, indicating some synchronic lengthening at work.

### 3. Rule Innovations in Nootkan

Besides the variable vowels, the following vocalic rules all make reference to the first two syllables of a word as a strong phonological position.

#### a) Vowel Contraction

In all the Wakashan languages, V+V sequences normally contract, though this may be blocked by morphological conditions not relevant here. In the Kwakiutlan languages, such contraction always produces a long vowel regardless of the quantity of the vowels involved:

Kwakwala: ?o:m<sup>e</sup>-a 'that chieftainness' > ?o:m'a:  
la-osdes 'go up from the beach' > la:sdes  
la-ila:la 'to go about' > la:la:la

In the Nootkan languages, however, vowel contraction produces a vowel with the length of the longest component; that is, the resulting vowel is long if either of the original vowels were long, and is short otherwise:

Nootka: no-?ato-ap 'the singing is stopped' > no?atop  
 ?o-k<sup>w</sup>i-a(:)s 'it is on the surface' > ?ok<sup>w</sup>i(:)s >  
 ?ok<sup>w</sup>i:s  
ya:-al 'yonder' > ya:l

However, if the first and second syllables contract in Nootkan, the result is always long, even if both vowels involved are short:

Nootka: ?o-aqsti: 'within it' > ?o:qsti:  
 cf. ?o-?o-aqsti: 'within it here and there' > ?o?oqsti:

b) Vowel Contraction across Glottal Stops

Vowels in Wakashan can normally contract across an intervening glottal stop. In the Kwakiutlan languages, this uniformly produces a long vowel, and is indistinguishable from regular vowel contraction above. In the Nootkan languages, the first and second syllables of a word may not be contracted across a glottal stop. The second and third syllables may so contract, and will produce a long vowel (now, of course, in the second syllable). Any other syllables that contract in this way will produce a short vowel.

Nootka: ma?as 'tribe', no contraction possible, but the reduplicated distributive ma-t-ma?as > matma:s shows contraction

c) Vowel Deletion

In Nitinat, Makah, and the Kyuquot dialect of Nootka, short vowels may optionally delete if the phonotactics would otherwise allow the resulting consonant cluster. Such deletion may only take place in a third or later syllable.

Nitinat: qala:tk 'younger brother', Nootka qala:tik  
Kyuquot: hayuci(:)ɿ 'it went on for ten days' > hayucɿ  
(with variable vowels underlyingly short)

d) Iterative Lengthening

One of the formal markings of the iterative aspect in Nootka is shown by lengthening the first two vowels in a word and shortening all the others except the last. This last syllable generally consists of the morpheme -si:ɿ, part of the iterative marker.

Nootka: ?a:ʌa:k<sup>w</sup>aɿmiksi:ɿ 'become a getter of eight (animals) at intervals' < ?aʌak<sup>w</sup>aɿ- 'eight' + -mi:k 'getter of...' + -si:ɿ iterative marker

In general, lengthening and shortening processes in Nootkan effect only the first two syllables of a word, regardless of the position of the morpheme causing the change in quantity.

These four rules, then, indicate the special status of the first two syllables in Nootkan. Another pattern that may be related to these is a vowel ablaut used in familiar forms of direct address. Jacobsen (mss.) has listed examples from all of the Nootkan languages showing the various vowel changes and word truncations common in such forms. In most cases, words are shortened to mono- or bisyllabic forms, with accompanying change in vowel quality.

Makah: ?abe:ʔiqsu 'mother' > ?e:b  
hitax<sup>w</sup>i:ɿuba 'daughter' > he:tax  
Nootka: ?umʔi:qsu 'mother' > ?o:m'i

Of special interest here is Jacobsen's conclusion that such

ablaut was historically the result of original vowels added to multisyllabic words, and the resulting vowel quality change moving forward to the first or second syllable. These final vowels are still present in vocative forms in Nootka and the Kwakiutlan cognates. Such a shift may have been caused by the higher phonological prominence of the first two syllables, paralleling the sensitivity of the preceding rules. However, the possibility of baby talk influence on these forms limits their value as evidence in this regard.

Why, then, should the Nootkan languages modify two existing rules (a. & b. above) and innovate two additional rules (c. & d.) to take this syllabic boundary into consideration? Also, what has influenced the evolution of the variable vowels to make them sensitive to the same environment of the apparently unrelated rules we have examined? One clue to all this lies in the nature of the stress systems of the two branches of Wakashan, an area of the phonology unfortunately largely ignored.

#### 4. Stress Rules in the Kwakiutlan Languages

An important feature of the Kwakiutlan languages is the presence of reduced vowels, schwa or certain phonetic variants of schwa. These are lacking in the Nootkan group.

All of the Wakashan languages distinguish between light and heavy syllables, that is, between non-branching and branching rimes. In Kwakiutlan, a light syllable contains a reduced vowel. A heavy syllable contains a full vowel (which may appear on the surface as either long or short), or a reduced vowel followed by a tautosyllabic sonorant that fills the second V-slot in the branching rime.

The basic stress rule of Kwakwala places primary stress on the first heavy syllable in a word. Secondary stresses fall on alternating syllables after the primary stress. Epenthetic schwas, which are inserted after stress assignment, are therefore not counted in placing secondary stresses.

Kwakwala: p'á:dək'əm?idà      wə́lɑ́:so:l'a?e  
góx<sup>w</sup>bidò      but góx<sup>w</sup>bidəwè (with epenthetic  
 schwa resulting from the fracture of o before e)

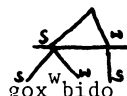
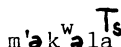
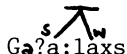
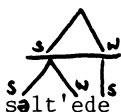
Secondary stresses that would fall on reduced vowels are never marked in the data. It is unclear if reduced vowels are phonetically incapable of bearing stress, or if this is an idiosyncrasy of the transcription.

Heiltsuq, a smaller Kwakiutlan language, has developed phonemic tone (Kortland 1975). Primary stress falls on the first high-tone syllable in a word, and the status of secondary stress is unclear. However, the Heiltsuq tones are generally predictable historically from syllable weight. Heavy syllables came to bear high tone, while light syllables bore low tone. Thus, the underlying stress assignment rule remains, though tonal shifts have rendered it unpredictable synchronically.

Likewise, Haisla, another Kwakiutlan language, appears to have developed a pitch accent (Lincoln & Rath 1980). The accent generally appears to fall where the general stress rules would predict main stress, but the mapping is far from perfect. However, nothing in the Haisla data would argue against taking the Kwakwala rule as basic.

At this point, it is important to emphasize two features of the Kwakwala stress system. First, primary stress may fall on any syllable of a word, as long as all of the preceding syllables are light: səlt'ede, Gəʔá:laxs, m'ək<sup>w</sup>əlá, etc. Second, stress iterates across the Kwakwala word. Both of these features will contrast with the Nootkan situation.

In metrical terms, Kwakwala builds iterative metrical feet from left to right, each foot labelled left is strong. A special condition holds for the first foot, that its strong node must branch. In other words, no metrical structure can be built until a heavy syllable is encountered. The feet are gathered into a left branching word tree.



The secondary stresses marked here are from Boas (1947), and are often spottily recorded. There is evidence that they may be dropping out of Kwakwala, or at least the speech of younger speakers. Still, the analysis presented here is consistent with the historical data as far as is known.

### 5. Stress rules in Nootkan

As mentioned above, the languages of the Nootkan group have no reduced vowels. Historically, schwa appears to have become i in most environments in Nootkan, u when adjacent to a rounded consonant.

Because of this change, Nootkan has a different definition syllable weight than Kwakiutlan. A light syllable contains a short vowel, while a heavy syllable contains either a long vowel or a short vowel plus resonant (which in Nootkan would have to be a nasal). Notice that in an autosegmental analysis, where a short vowel would be mapped to a single vowel slot and a long vowel to a VV sequence, the two definitions of quantity are identical.

In Nootka, stress falls on the first syllable, unless it is light and the second syllable is heavy, in which case the second syllable receives the stress. There are no secondary stresses marked in the data, and stress never falls anywhere but on the first two syllables.

Examples showing the four possible patterns of light and heavy syllables:

L	L	<u>tiq<sup>w</sup>il?a</u>	'now he sat down'
L	H	<u>t'asi:?ak'i</u>	'his door'
H	L	<u>?ink'i</u>	'the fire'
H	H	<u>?o:simc'a</u>	'now trained at...'

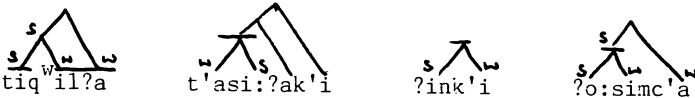
The stress rule of Nootka cannot be "stress the first heavy syllable in a word", which would be the parallel version of the Kwakwala rule. When both of the first two syllables are light, stress falls on the first even when there are other heavy syllables later in the word. Examples (from Sapir 1924):

t'ot'ohcaqc'o:zi 'having a head at each end'

q<sup>w</sup>ayec'i:k 'wolf'

ča?acsi:b 'Nitnat proper name quoted in Nootka text'

A metrical analysis of the stress facts in Nootka would build a single (non-iterating) foot at the beginning of a word, labelled left strong iff it branches. Like Kwakwala, the strong position in the foot must dominate a branching rime. In the case that both of the syllables eligible for strong position are light (non-branching rimes), no foot can be constructed. The left branching word tree would then apply stress to the first syllable by default. Examples of these structures:



Variable vowels, as mentioned earlier, are underlyingly short, and the stress patterns treat them accordingly:

síma(:)cyin 'sticking up at the bow'

k'áyo(:)min 'panther'

In Makah, stress falls on the first syllable if it is heavy, and on the second syllable if the first is light. This rule differs from Nootka only in the case where both syllables are light. Nootka would stress the first syllable, while Makah stresses the second. Makah has thus lost the condition that the strong node of the first metrical foot must branch. The foot is always built, and stress is never applied by the word tree.

No data on stress is available for Nitinat or any of the smaller dialects of Nootka, though given Nitinat's treatment of the first two syllables, we should expect to find quite similar rules of stress placement.

Since Kwakiutlan is the more conservative branch of Wakashan both phonologically and lexically, we can assume that the Kwakwala stress rule represents the older form of the Wakashan stress pattern.

## 6. Historical Changes in Wakashan Prosody

Given the data discussed above, I would suggest the following course of events to account for the changes both in the rules in sections two and three, and the metrical patterns seen in sections four and five.

First, the Nootkan languages neutralized the full vowel vs. reduced vowel distinction, schwa being replaced by i or u. This would have had an immediate effect on the placement of stress in Nootkan. The first metrical foot would always be built over the first pair of syllables in a word, since only reduced syllables could be skipped (assuming the older definition of light and heavy syllables had not yet changed).

Second, the Nootkan languages lost secondary stress. In metrical terms, the stress rule became non-iterating. Though perhaps strengthened by the frozen position of stress in Nootkan, this loss of alternating feet can be seen as an independent change.

Finally, the rules of syllable weight caught up with the new vowel quantities, producing the stress rules now apparent in Nootka and Makah. The important distinction was now between long and short vowels, rather than full and reduced.

The changes and innovations in rules of vowel contraction, lengthening, etc., can now be seen as a reaction of the segmental phonological system to a change in metrical structure. All of these processes became sensitive to the metrical status of a vowel, that is, whether the vowel was within the metrical foot or outside it. Such a distinction could not be made in Kwakiutlan, nor in the older stages of Wakashan, since feet were built over the entire word. Thus, no parallel treatment of specific syllables is found in any of the Kwakiutlan languages.

It could be argued that other, non-metrical, divisions of the word might account for the pattern seen in Nootka, but such a boundary has not been apparent. The division is certainly not one of stem vs. affix. Mary Haas (1972), in her study of Nootka-Nitinat stem structure, has concluded that the canonical shape of Nootkan (and, most probably, Wakashan) stems was CV-(X)-, where X represents an optional "extending" consonant which gave a more focused meaning to a general semantic class of stems. Thus, while a stem vs. affix distinction could set apart the initial syllable for special consideration, there is no good reason why the second syllable should show any increase in prominence compared to the rest of the word.

It is interesting that the Nootka rules, as well as the variable vowels, do not take the specific location of stress in any given word into account. Rather, it is the foot itself that is the strongest candidate for inclusion in their structural descriptions. Even though the weak node of a given metrical foot is identical (in theory) to the weak nodes assigned by the word tree, the generalized strength of the foot itself takes precedence.

Wakashan presents a case of metrical structure playing an integral role in the course of a number of specific changes in the phonology of a language group. The development in Nootkan of a non-iterating stress foot was both a response to segmental change (the loss of reduced vowels) and a cause of it (the creation of variable vowel length, etc.). Metrical change as a form of historical change deserves to be considered in the formulation of a complete model of diachronic phonology, both segmental and prosodic.

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