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The various ways in which a language may acquire distinctive tone have long been of interest to students of phonological change. In a few cases, tonogenesis clearly is a result of language contact and borrowing (e.g., Li 1986). Most commonly, tone is seen as having arisen from the perturbations of vocalic fundamental frequency caused by adjacent consonants (Matisoff 1973, Hombert 1975). Little attention has been given in the literature to the comparatively rare cases of tone developing from another suprasegmental feature, such as stress or pitch accent. Hombert, for example, in his study of tonogenesis, gives less than a page to the relation of tone and stress, saying that "cases of development from one system to the other are rare" (1975:19).

In this paper I will examine what I believe to be one example of such a development, the introduction of phonemic tone in Heiltsuq, a Wakashan language of northern British Columbia. The presence of tone in Heiltsuq is unique among the members of the Wakashan family[1]; most of the languages display a common, non-phonemic stress system which can be reconstructed in its general outlines for Proto-Wakashan (Wilson 1986). Some speakers of Haisla, a close relative of Heiltsuq, show an alternation between the historical stress system and a restricted pitch-accent (Lincoln and Rath 1980). This alternation will be discussed further in Section 3.

The phonemic status of tone in Heiltsuq and the lack of any accessible source for borrowing tone into the language[2], led Kortlandt (1975) to suggest that tone was present in the proto-language, and was lost in all the other Wakashan languages. However, besides the inherent unlikeliness of the total loss of tone in five of the six members of the family, there are a number of facts that argue against such a theory. All of the Wakashan languages, including Heiltsuq, undergo a number of phonological processes (vowel contraction and loss are the most prominent) that are historically conditioned by stress, pointing to the early status of the Wakashan stress rules. Lincoln and Rath (1980) describe what appears to be a dialect of Heiltsuq, called ʔOʔowekyala, practically identical to standard Heiltsuq segmentally, but showing the common Wakashan stress system rather than tone. This also points to the early date of the Proto-Wakashan stress.

Additionally, if Heiltsuq tone was the original state of affairs in Wakashan, we should expect some of the normal environments leading to

tonogenesis to show up in the data, but this is not the case. There is no correlation between Heiltsuq tone distribution and surrounding consonants, except for the effect of syllable-final glottal stops discussed below. However, rather than raising pitch, as would be expected based on previous studies (Hombert 1975, Lea 1973), the presence of a glottal stop here lowers pitch. Heiltsuq thus shows none of the most common features associated with spontaneous tonogenesis.

Instead of seeing the situation in Heiltsuq as archaic, I propose to view the tones as a direct development from the older common stress rules. Evidence for such development comes primarily from the parallel effects of certain phonological environments and processes on both stress and tone assignment, as well as a number of cognate sets showing the historical relationship between high tone and stress. A possible mechanism for such a re-analysis of stress as tone can be suggested by the existence of pitch accent as an alternative for stress in Haisla.

1. Background

Before discussing the specifics of Heiltsuq tone, some remarks on general Wakashan phonology will be necessary.

All of the languages in the family are heavily polysynthetic and share a large number of related morphophonemic processes in lexical derivation. These include glottalization, voicing, several patterns of reduplication, some infixation, and a wide variety of root-vowel changes such as lengthening, shortening, insertion, deletion, contraction and umlaut.

All of Wakashan except, significantly, Heiltsuq itself, shows a distinction in vowel length. In the Nootkan branch of the family, this is a long vs. short opposition. In Kwakiutlan, the opposition is full vowels vs. reduced (schwa and a number of phonetically determined variants[3]). Syllable structure can be described as $CV(R)C_0$. Syllable weight is determined by the nucleus only. A heavy syllable contains a branching nucleus (a long vowel, diphthong, or short vowel plus resonant); a light syllable contains a short vowel, the consonants in the coda having no effect on syllable weight. Significantly for this discussion, a glottal stop may occupy the (R) slot in a syllable; in this case, the vowel of the nucleus must be short and the syllable accordingly light. Sonorants can be glottalized by regular morphophonemic processes, having the same vowel shortening effects.

The common Wakashan stress system assigns primary stress to the first heavy syllable of a word, with alternating secondary stress thereafter. This rule has undergone major restructuring in Nootkan, but survives largely intact in Kwakw'ala (see Wilson 1986 for details).

Under such a system, stress assignment will vary due to two common alternations. First, if a stem with the shape CVR- is followed by a consonant-initial suffix, the stem syllable will be heavy because of the branching nucleus -VR-. If such a stem is followed by a vowel-initial suffix,

the resonant will resyllabify as the onset of the second syllable, and the stem will count as light. Thus, stress will shift depending on the shape of the suffix. For example, we find in Kwakw'ala such alternations as:

n'ə́m-sGəm 'one round object' (root counts as heavy)

n'əm-ók 'one person', n'əm-éxsa 'one flat object'
(root counts as light)

Second, if the final resonant is glottalized by the following suffix, the syllable will be light, as discussed above:

gə́l-c'od 'to crawl into (something)'

but: gəl'-nákwəla 'to crawl along (something)'

dzə́m-bətəls 'bury in the ground'

but: dzəm'-stód 'bury at the door'

2. The Situation in Heiltsuq

We turn now to the patterns of tone distribution in Heiltsuq itself. Heiltsuq has two tones, high and low (a mid tone can occur as a phonetic variant of low in certain positions). A maximum of three high-toned syllables can occur in a word, and then only if the last two high tones are on adjacent syllables with the general shape -V.RV-:

p'qá 'to taste'   kw'ás 'mussel'   cqə́m 'dirty face'

ɫə̀l 'dead'   kw'às 'to sit outside'

hádání 'black cod'   lágwùstíwá 'to go up (the mountain)'

The restriction on the occurance of the third high tone can be accounted for if we assume a maximum of two underlying high tones, with a tone spreading rule allowing the continuation of the second tone through a following sonorant onto an adjacent syllable.

Forms such as *p'qa* and *cqəm* exemplify a specifically Heiltsuq process, the loss of schwas in initial syllables before obstruents. This loss causes a restricted violation of the pan-Wakashan syllable canon, which otherwise allows one and only one consonant in the onset. In addition, other schwas not preceding sonorants are strengthened to full vowels (either /a/ or /i/), so that Heiltsuq no longer maintains a vowel length distinction.

It is clear that tone assignment is not predictable from synchronic segmental information, and a number of minimal pairs distinguished only by

tone exist. Consider the pair *kw'as* and *kw'às* given above. Other examples are the second person singular and the passive infinitive of many verbs, such as

wáta-sú 'you pull'   wáta-sú 'to be pulled'

lasá-su 'you plant'   lasá-sú 'to be planted'

While synchronic tone patterns cannot be predicted, there is a clear relationship between tonal distribution and stress placement in the other Wakashan languages. High tone in Heiltsuq not surprisingly corresponds to stressed positions in general Wakashan. In the corpus I have been able to examine, Heiltsuq never shows a high tone on a syllable to the right of the common Wakashan primary stress. This is not, however, as tidy as it might appear, since the set of reliable cognates is still quite small, and the loss of schwa in first syllables eliminates a good number of unstressed syllables from consideration for tone assignment.

More significantly, there is a strong parallelism in the effect of syllable weight alternations on Heiltsuq tone and Wakashan stress. Going back to the cases discussed for Kwakw'ala, in the case of CVR- stems, we find the same alternations occuring with consonant- and vowel-initial suffixes:

m'ən-sGə̀m 'one round object'   (H tone on the root)

m'ə̀n-(ə)xλá 'one dish',   m'ə̀n-(ə)xsá 'one flat object'   (L tone on root)

In these examples, Heiltsuq has metathesized the sonorants in the root meaning 'one', while retaining glottalization in initial position. Notice that the alternation in tone here perfectly mirrors the change from heavy to light syllable in the older language (though the change is now phonemic).

The schwas in the last two examples are given in parentheses because they are not given by Kortlandt in his description (1975), from which these examples are taken. However, they must be assumed for any underlying description of the suffixes, given their form when attached to the root for the number 'four', *mu- : muwixλa, muwixsa*. This breaking of /u/ (historically a long vowel in this root) into [uw-] is a common feature in Wakashan, and occurs only before vowels. We can also compare the Kwakw'ala form of this suffix, *-exλa*, where the vowel is clearly present. Kortlandt's division of the suffix without the vowel masks the regularity of the alternation and leads him to attribute the loss of high tone on the root to morphological conditioning (1975:34).

The same type of alternations can occur with glottalizing suffixes:

gə́l-k'nà 'crawl along a log'   but gə̀l'-lə́m 'weasel'

tə́m-kwà 'tap with a stick'   but tə̀m'-cás 'snare drum'

These parallels also help to explain tone alternations in suffixes which previously had to be described in terms of tone dissimilation. Kortlandt gives a set of suffixes "marked by a tone opposite to that of the stem." One example he gives of this type is the suffix *-(x)ʔə nx*, '...many years, many seasons'. However, if we compare some of the Heiltsuq forms with their Kwakw'ala cognates (from Boas 1947), we can see that the observed patterns are regular given the conditions above:

	Heiltsuq	Kwakw'ala
1 year	m'ə́n-x?ə̀nx	n'ə́m-x?ə nx
2 years	màɬ-?ə́nx	maɬ'-?ə̂nx
3 years	yútxw-?ə̀nx	yúdxw-?ə nx
4 years	mū-xw?ə̀nx	mō-xw?ə nx

(The -(x) appearing after vowels and sonorants is typical of a class of "movable consonants" in Wakashan.)

As these data show, the "opposite tone" pattern is in actuality simply one possible result of the stnadard tone alternations based on historical syllable weight. The root for 'one' receives high tone and stress in Heiltsuq and Kwakw'ala respectively because of the following consonant makes the stem syllable heavy. In the root for 'two', the glottalization of the syllable final /ɬ/, seen in Kwakw'ala, guarantees that the first syllable will count as light, and thus be ineligle for stress/tone. The roots for 'three' and 'four', with full vowels, receive stress and high tone normally. Thus, the tone patterns in Heiltsuq in these cases does not require any special conditioning, being a standard reflex of the historical stress rules.

All together then, the evidence demonstrates that the tone pattern of Heiltsuq clearly reflects the older, family wide basic stress system. In cognates, stress and tone appear in identical positions in most cases, and the placcment of high tone is sensitive to the same factors affecting stress assignment in the other languages. What remains, then, is to motivate such a development and take the first tentative steps toward suggesting a mechanism for the change.

3. The Development of Phonemic Tone from Stress

Within a standard metrical framework, stress is seen as the phonetic instantiation of rule-assigned phonological prominence to some subset of a phonological domain. Given such a theory, it is clear that the actual feature used to mark prominence is not specifically linked to the metrical

structure; as long as it faithfully indicates relative prominence, it should be free to vary among any of the relevant parameters of suprasegmental features. Thus, a shift from marking "strong" positions with stress to marking the same positions with pitch distinctions would not be a major restructuring of the system. (See Goldsmith in this volume for further discussion along these lines.)

But this is not an explanation for change, merely a restating of oportunities for variation within a workable framework. In order to account for the development of Heiltsuq tone, we will need to find both a clear motivation for picking pitch as the significant marker of prominence, and for the loss of the predictability of tone assignment. The second requirement, I believe, can be explained by the neutralization of vowel length in Heiltsuq. As reduced vowels were lost, the inherited stress rules would become increasingly opaque as their environments could no longer be distinguished. Thus, the old stresses would increasingly be identified with specific lexical forms and morphemes, rather than with a regular assignment rule.

Pinning down the mechanism for the transition from stress to tone is more difficult. Without careful experimental data on the phonetic details of suprasegmental features in Wakashan and reliable reconstructions of the relevant forms (neither currently available), our theorizing at this point must be stated very broadly. However, the existence of pitch-accent as an alternative prosodic system for a least some speakers of Haisla may present a first direction for analysis.

Lincoln and Rath, in their study of Kwakiutlan roots, mention a dialect split in Haisla.[4] While one group maintains the rough outlines of the historical system (stress sometimes accompanied by pharyngealization of the vowel), the other group uses stress only in words given in isolation. In connected discourse, stress is replaced by thes speakers with a HLH pitch pattern on the accented syllable, with the first high apparently appearing only if the accent falls on the second or a later syllable. Haisla stress/pitch, while largely predictable by the standard rules, is not nearly so regular as Nootkan or Kwakw'ala stress. Most of the irregularities appear to be due to paradigmatic leveling with commonly used suffixes.

Since Haisla is both phonologically and geographically the closest of all the Wakashan languages to Heiltsuq, it is interesting that it should also show a shift away from a strict stress feature to a more pitch-oriented and unpredictable system. Most striking is the appearance of pitch accent only in connected discourse. That is, pitch accent arises exactly in the environments where speakers are already manipulating pitch contours in the form of sentence intonation. A first approximation of the change would suggest that some speakers of Haisla have re-analyzed the older stress differences as perturbations of normal sentential intonation patterns; the raising of fundamental frequency regularly a part of the realization of pulmonic stress was identified as the salient marker of phonological prominence within the

intonational domain.

Thus, syllabic stress came to be marked more and more by a regular rise in pitch, or a fall-rise if preceded by another syllable. Heiltsuq may have gone through a similar stage; this would account for the maximum of two high tones in Heiltsuq words, since these tones would be identified with the two peaks in the Haisla pitch contour. In Heiltsuq, however, such a pitch distinction would be lexicalized because of the opacity of the regular rule. The historical alternations based on syllable weight would fossilize, given the pattern seen today.

Kortlandt presents one set of suffixes that appear to show the old relationship between prominence and syllable weight, though in a different way. These suffixes show an alternation between two forms, one containing a diphthong and high tone, the other a single vowel and low tone. This differs from the inherited vowel-length distinction in two ways: both forms show full vowels, which would be counted equally in any Kwakiutlan syllable weighting, and the nature of the vowel appears to be conditioned by the tone rather than the other way around. Thus we have alternations such as:

m'ə̀n-(ə)x̌ƛáwl, maƚ̓-àx̌ƛáwl, yút-xwƛáwl, múw-ìx̌ƛùl

'1,2,3,4 glasses or cups'

ú-p'ə̀n-sx̌ƛéys, maƚ-p'ə̀n-sx̌ƛéys, yútxw-p'ə̀n-sx̌ƛéys, mú-p'ə̀n-sx̌ƛ̀is

'1,2,3,4 trips behind the village'

Here the appearance of the low-toned, monophthong form appears to be related to a particular feature of the root *mu-*, 'four', which removes all high tones which follow it. Thus, the alternation in the nucleus of these suffixes may be a survival of the older weight-sensitive system.

Thus, an examination of the regular stress systems found in the various Wakashan languages lead to a re-evaluation of the status of the tone system in Heiltsuq. Rather than being an archaic feature, Heiltsuq tone can clearly be related to the standard prosodic system of Proto-Wakashan, as it shares a number of distinct phonological conditioning environments. The transition from stress to tone, perhaps through a stage of pitch-accent as seen in Haisla, challenges some of the typological statements that would keep such systems apart. The evolution of stress in Wakashan presents a rarely seen case that encourages a re-consideration of some of our assumptions concerning the origins of phonemic tone.

Notes

1. The Wakashan family consists of two main branches: the Kwakiutlan, made up of Kwakw'ala (or Kwakiutl), Haisla, and Heiltsuq (formerly called

Bella Bella); and the Nootkan, made up of Nootka, Nitinat, and Makah. The relationships within each subgroup are quite close, while the two branches themselves are distant. Nootkan has innovated a number of major phonological changes compared to the generally more conservative Kwakiutlan branch. The available data for a number of the languages is sparse, especially for Haisla and Makah.

2. The only language with phonemic tone in the general area where Heiltsuq is spoken is Carrier Athapaskan, but even this is quite distant. There is little resemblance between the tone systems of Carrier and Heiltsuq; Carrier has a three-way tone distinction, largely predictable by surrounding consonants, with syllable-final consonants raising rather than lowering pitch (Pike 1986).

3. Many of the schwas in the Kwakiutlan languages are clearly epenthetic, so much so that a number of scholars have analyzed the language with only full vowels underlyingly (so Sapir and Swadesh; Lincoln and Rath go farther, positing /a/ as the only true vowel in underlying forms, but Boas accepts phonemic schwa). Comparison with Nootkan and ongoing work on the reconstruction of Proto-Wakashan, however, appear to indicate that some Kwakiutlan schwas must go back to real reduced vowels in the earlier language.

4. Actually, given that they appear to be working with only two main informants, we should refer to an idiolect split here. It is unclear how representative of the general speech community these features are, but from the amount of space they give to distinguishing the two styles, one can surmise that this in fact represents a legitimate dialect isogloss.

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