Long Vowels and Stress in Kwakiutl

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1. Kwakiutl has the following surface vowels:

ī				ū
	ɛ̄	ə	ɔ̄	
		a		
		ā		

In addition, it has the syllabic resonants m̩ n̩ l̩, which (following Boas 1947) I analyze as sequences of ə and the respective resonants m n l.

I would like to address here the question: what are the underlying representations of these vowels? The question is intimately related to the analysis of stress in Kwakiutl, and it is with the latter that I begin.[1]

2. For a first approximation to the stress rules of Kwakiutl, let's consider the following forms (Boas 1947: pp. 218-219, hereafter I will cite this work simply by page):

1. nəpá 'to throw a round thing'
2. bəxá 'to cut'
3. c̓əmá 'to point'
4. w̓ədá 'to be cold'
5. xəká 'to stay away'
6. c̓ə́txa 'to squirt'
7. qə́sa 'to walk'
8. yə́xka 'to hop on one foot'
9. nā́la 'day'
10. cī́kwa 'bird'

At this point it looks as if one can say that stress is final if the first syllable contains ə (or possibly any short vowel), initial (or penultimate) if the first syllable contains a long vowel (or non-schwa). But the following show that this is incorrect:

11. mə́nsa 'to measure'
12. də́lxa 'damp'
13. tə́lqwa 'soft'
14. mə́nza 'to make kindling wood'

So it looks as if sequences of vowels and tautosyllabic resonants act like long vowels (as Boas repeatedly suggests, e.g. 209).

Some words of three or more syllables will help us decide among the many alternative hypotheses consistent with the data just given:

15. gəgənə́m 'wives' (sg. g n m)

16. bíbəgwānəm 'people' (sg. bə́gwānəm

17. bābagwəm 'boys' (sg. bāgwəm)

18. naə́nga 'mountains' (sg. nagá)

19. maəmkɔ́la 'islands' (sg. məkɔ́la)

20. c̓əmaātud 'melt away something in ear' (316)

From these examples it would appear that if we have several syllables meeting our tentative condition (long vowel or VRC with R a resonant) the first takes stress. So we might state a rule as follows:

> A. Stress first syllable with long vowel or vowel plus tautosyllabic resonant or if none stress last syllable.

Vergnaud, Prince, and Halle[2] have suggested that there is a connection between stress placement defined in terms of some environment and the placement of stress when that environment is not present: If the first occurrence of the stress-defining environment takes stress, then in the absence of that environment within a word the last syllable will be stressed; if the last occurrence takes precedence, then in case the environment is lacking the first syllable will b stressed. It is as if the stress rules scan from one end of a word to the other and if they never meet the conditioning environment they hit the last syllable that could be stressed. The formalism intended to capture this connection makes use of a special type of variable (P, Q, etc.) ranging over segments and interpreted as the longest string of segments meeting some negative condition. With this notation it is possible to state rules which guarantee the proper placement of stress in the elsewhere cases. The first type of system ('first shall be last') can be represented like this:

B. V $\rightarrow$ [+stress] / #P__ (where P $\neq$ ...)

A last-first system would look like this:

C. V $\rightarrow$ [+stress] / __P# (where P $\neq$ ...)

If something like this convention is adopted then it should be possible to formulate a very simple rule for stress placement in Kwakiutl, since the language obviously conforms to the first-last type. The difficulty with stating Rule A in this formalism, however, is that we cannot state our condition in terms of a single segment.[3] At this point there three possible moves: (i) we could reanalyze Kwakiutl by claiming that <u>all</u> vowels that take stress are long; (ii) we could abandon the claim implicit in the Vergnaud-Prince-Halle formalism that P-variables range over single segments; (iii) we could adopt a system in which stress rules are stated by using variables over syllables and that syllable predicates like 'heavy,' 'light,' are available to phonological theory. The first alternative strikes me initially as implausible. It would necessitate a special lengthening rule that would have the effect of fixing up the forms to fit a stress rule utilizing length as a feature and a special shortening rule to undo its effect after the uniform stress rule had applied. In the remainder of the paper I will show that most long vowels in Kwakiutl are to be analyzed as sequences of short vowels and resonants, thus bolstering the case against (i). I will not attempt to decide between the remaining two alternatives.[4] For present purposes, then, let us adopt a rough-and-ready statement of basic stress as follows:

$$\text{D. } V \rightarrow +\text{stress} \;/\; \#X\_\_ \qquad \text{where X does not contain } \left\{ \begin{array}{c} \begin{bmatrix} V \\ +\text{long} \end{bmatrix} \\ VRC \end{array} \right\}$$

Kwakiutl has the following consonants:

p	t	c	ƛ	k	k^w	q	q^w	
b	d	z	λ	g	g^w	ġ	$ġ^w$	ʔ
p̓	t̓	c̓	ƛ̓	k̓	$k̓^w$	q̓	$q̓^w$	
								h
		s	ł	x	x^w	x̣	$x̣^w$	
m̓	n̓		l̓	w̓	y̓			
m	n		l	w	y			

It should be noted that for BASIC STRESS (and some other rules) the resonants (sonorants) include the plain and voiced laterals and nasals, not the glottalized ones. This fact is illustrated in forms like these:

21. təłc̓á 'to warm oneself' (cf.(12))
22. wəl̓nákwəla 'to stop' (219)
23. gəm̓x̣á 'to use the left hand' (219)

At this point, we have a rule that treats sequences of short vowels and tautosyllabic resonants in the same way as long vowels. Before turning to the analysis of the vowels themselves, it is necessary to explain certain morphonemic processes of Kwakiutl.

3. As in all Wakashan languages (the Nootkan languages like Nootka, Nitinat, Makah and the Kwakiutlan languages like Kwakiutl proper, Bella-Bella, Haisla), the phonological word in Kwakiutl consists of a complex sequence of morphemes: a root or extended root followed by zero or more suffixes, the latter roughly divisible into derivational and grammatical suffixes. Root extensions involve various kinds of partial or complete reduplication, infixation, vowel changes.

In Kwakiutl, the derivational suffixes--expressing all kinds of concepts--must be divided into three major types (with some minor subtypes) according to the effect of the suffix on the final segment of the form to which they are added. Some suffixes--called 'hardening' by Boas--glottalize final segments of the forms to which they are added; some voice ('soften') final segments; some have no effect ('indifferent'). Following Boas, I will denote these types by prefixing "!" or "=" or neither to an affix according to whether the affix belongs to the hardening, weakening, or indifferent classes respectively.[5] For example, from a root wəng- 'deep' we can form derived forms such as

24. wənq- + =iɫ 'in house'.
    wə́ngil 'deep on floor'
25 " + !a 'on rocks'
    wə́nq̓a 'deep on rock'

With underlying stemfinal voiceless stops the results are straightforward and as stated above. With other final segments a number of special effects arise. Of special concern to us here are effects which move segments from one class to another as far as our stress rule is concerned: First, ɫ softens to l (an obstuent becomes a resonant); second, m n l (resonants become m n l (obstruents); third, some spirants change to glides. These special effects are summarized in the following chart:

stem final	+ !	+ =
s	{ y̓ / c̓ }	{ y / z }
x	n̓	n
x^w, $\dot{x}^w$	w̓	w
ɫ	l̓	l
l	l̓	l̓ (!)
m	m̓	m̓ (!)
n	n̓	n̓ (!)

(The two pairs of correspondents to s make it appear as if s has two underlying sources: s and c. However, these relationships have been obscured synchronically, Boas list doublets where a single stem occurs with both s - ỷ - y and s - č - z alternations.)

For example, suppose we have a stem ending on a resonant. If we add a consonant-initial suffix of the indifferent class the syllable before the suffix will qualify for BASIC STRESS:

26. gəl- 'crawl on four legs' + -čud 'into a hole, inchoative'

gə́lčud 'crawl into a hole'

But if we add either a hardening or a softening suffix to the same root, the final resonant will be glottalized, the conditions for stress placement will no longer be met by the first syllable and stress will fall on a later syllable:

27. gəl- + =zud 'onto a flat thing, inchoative'

gəlzúd 'crawl onto a flat thing'[6]

For another example, suppose we have a stem ending on an obstruent and a consonant-initial suffix that changes this obstruent to a resonant. The syllable will now qualify for BASIC STRESS and stress will now fall on a syllable that would otherwise have been excluded:

28. cəx- 'to get sick' + =n̓ākwəla 'gradually'

cə́nhākwəla

4. We are now in a position to ask about the underlying forms of the surface vowels listed in Section 1.

Boas himself concludes that the open mid vowels and are not primary but derived. To see this let's look at a typical partial paradigm of some verbs that exhibit these vowels and compare the paradigms with a consonant-final verb:

		'infinitive'	1 sg. decl.	1st sg. interr.
29.	'aim'	nɔ̄	nəwə́n	nɔ̄ən
30.	'draw water'	cɛ̄	cəyə́n	cɛ́ən
31.	'strike'	məxá	məxə́n	məxā́ən

Comparison of these forms suggests that the marker of the infinitive (citation) form is -a, that of the interrogative -a, and that of the first person - n (or -n). The underlying forms of the first two verbs involve sequences of plus a glide followed by a in the infinitive and interrogative:

32. nəw + a   nəw + ā + ən

33. cəy + a   cəy + ā + ən

and we can posit a rule (MONO I)[7]:

$$\text{E.}\ \text{ə}\left\{\begin{matrix} w \\ y \end{matrix}\right\} a \dashrightarrow \left\{\begin{matrix} \bar{u} \\ \bar{\imath} \end{matrix}\right\}$$

So we now have the following inventory of underlying vowels and vocalic sequences:

ī			ū
(əya)	ə	(əwa)	
	a		
	ā		

I will now concentrate on the high vowels ī and ū.

Let us note first that when forms containing these vowels in final position are followed by suffixes with initial vowels they appear as a sequence of and a glide. Typical alternations are these:

34. =nu   =nəw   'side'

35. =suʔ   =səʔw   'passive'

36. dī-   dəy-   'wipe"

So also from the verbs listed above (29,30) we have the following with a suffix x id 'inchoative'"

37. cíxʔid 'start to draw water'

38. núxwʔid 'start to aim'

(The x is labialized by the preceding rounded vowel.)

From such examples we can conclude that we must either have a rule that monophthongizes a schwa plus a glide or a rule which inserts a glide and reduces a vowel, that is

$$\text{F.}\ \text{ə}\left\{\begin{matrix} y \\ w \end{matrix}\right\} \dashrightarrow \left\{\begin{matrix} i \\ u \end{matrix}\right\} / \ \_\_ \left\{\begin{matrix} C \\ \# \end{matrix}\right\}$$

or

$$\text{G.}\ \left\{\begin{matrix} i \\ u \end{matrix}\right\} \dashrightarrow \text{ə}\left\{\begin{matrix} y \\ w \end{matrix}\right\} / \ \_\_V$$

In the remainder of the paper I will give evidence that the first alternative (MONO II) is to be preferred to the latter, that is, that the underlying forms of i and u are əy and əw, respectively.

The first bit of evidence is that there are instances of i and u that must be derived from y and w independently of how we handle the alternations just described. Recall that hardening and softening suffixes in some case change spirants into glides: s to y, x^w and $\underset{\cdot}{x}^w$ to w. Examples:

39. pəs- 'flatten' pəyáyu 'means of flattening'
40. məns- 'to measure' mə́nyāyu 'means of measuring'
41. kəlxʷ- 'buy' kə́lwala 'ask to buy'
42. yəx̣w- 'dance'' yāyaw̓a 'try to dance'

(42 involves a root extension by vowel lengthening.) What happens if we add a consonant-initial hardening or softening suffix to such forms? We get, as expected, i and u:

43. cəxw- 'to pierce' + =kw 'passive'
    cūkw
44. pəs- 'to flatten" "
    pīkw

The derivation under the MONO II hypothesis is straightforward. Thus we see that some i and u must be derived from sequences of schwa plus glide. So it would clearly be wrong to adopt a diphthongization rule if we get the right results by an independently needed rule.[8]

My second argument for the MONO II hypothesis rests on the observation that we made above that stems with final resonants (m n l) undergo glottalization in the presence of a hardening or softening suffix. If i and u are to be represented as y and w, since y and w are also resonants we would expect them to be glottalized in the same invironments. And this is just what happens. Compare the first two of the following forms with stem-final n and l with the next two:

45. bən- 'fit' + =kw 'passive
    bən̓kw
46. bəl- 'forbid' "
    bəl̓kw
47. cəy- 'draw water" "
    cīʔkw
48. cəw- 'give' "
    cūʔkw

This argument rests on the following basis: If we adopt the hypthesis that the high vowels are derived from schwa plus glides, these results follow from the simplest formulation of the rules which glottalize resonants follwed by suffixes of the appropriate classes. If we adopt the other hypothesis we would have to complicate the glottalizing rule.

The final argument comes from some rather puzzling facts about stress in certain extensions of roots, especially in plural forms. One of the methods of forming a plural is by the insertion of a glottal stop after the vocalic nucleus,/ that is, stems of the shape CVC become CVˀC (the glottal sometimes being lost, see fn. 6). Now consider some forms that have a high vowel in the first syllable. In the singular the stress falls, as expected, on the first syllable:

49. ū́sg̣əmī 'surface'

The plural of this form (and many others) involve insertion of a glottal stop in the first syllable and a concomitant difference in stress:

50. ūˀsg̣əmī́

If we think of the underlying diphthongal representation of such forms the derivation is straightforward. The glottal is absorbed by the resonants w and y and thus the syllable is removed from the domain of the stress rule:

	sg. əwsg̣əmə̄y	pl. əw̓sg̣əmay
BASIC STR	ə́wsg̣ mə̄y	əw̓sg̣əmáy
MONO II	ū́sg̣əmī	ūˀsg̣əmī́

These facts provide particularly clear evidence for the diphthongal analysis. If i and u are represented as such in the systematic phonemic representation we must revise our stress rule so as to exclude just these vowels in the above environment.

5. I hope to have shown that the vowels of Section 1 are derived from the following underlying system:

əy   əw

əya ə əwa

a

ā

Of the remaining contrasts of pure vowels, it appears as if the remaining short a and schwa are not distinct.[9] Thus Kwakiutl appears to have an underlying vowel system with just two(non-high)vowels, one long,one short. To some linguists such a system might appear strange. But it seems that such systems are not rare, especially if the consonant system is rich. Linguists familiar with NW Coast languages or Caucasian will not be surprised.[10]

Footnotes

[1]Most of the forms and ideas for much of the analysis come from Boas 1947, with some additional data from work in Victoria with Emma Hunt and Frances Smith, to whom acknowledgement is gratefully rendered. I would also like to thank Dick Demers, Lisa Selkirk, and Jay Keyser for comments, and David McC. Grubb for help a long time ago in getting started on Kwakiutl. I depart from Boas's rather idiosyncratic orthography. Work with Boas's materials involves a great deal of interpretation. Boas writes i and e for the high front vowel (which varies according to surroundings), similarly u and o for the high back vowel. My and are are Boas's ä and a. Both of the high vowels function as long vowels, but are longer under stress than when unstressed. Boas's use of a is particularly inconsistent. For a recent account of some problems in Kwakiutl phonology and orthography see Grubb 1974.

[2]My knowledge of the work of these linguists is based on an account in Morris Halle's presidential address to the LSA, December 1974, to appear in Language. The languages mentioned there are Eastern Cheremis, Komi, and Huasteco.

[3]Emily Siegel (personal communication) suggested a way to accomodate the Kwakiutl stress hypothesis in a rule that would not require that the P-variable range over a sequence of segments. Ignoring the long vowel case we could write the environment as follows:

$$/\_\_\_(RCP)C_o\#$$

This rule will do the same job. But it immediately raises further general questions. If we allow combinations of notations like this (one of which--C_o--being one that the new notation is intended to replace) we lose any connection between elsewhere cases and the definition of stress placement by a first or last occurrence of some environment. For example, we could now write a rule as follows:

$$V \rightarrow +stress\ /\ \_\_\_(RC)P\#$$

This would represent a system just like Kwakiutl (again ignoring long vowels) in the first expansion (stress first heavy nucleus) but predicting initial stress in the elsewhere case--a situation supposedly empirically wrong, if the "last (first) shall be first (last)" hypothesis is correct.

[4]The stress facts we are investigating here constitute a proper subset of the facts that need to be covered by an account of stress in Kwakiutl. Further work remains to be done especially on the behavior of stress in many types of stem extensions, and on stress reduction in long, morphemically complex items, which sometimes seem to have secondary stresses. Note that Boas sometimes writes several stress marks in a long word. As to the two alternatives (ii) and (iii)

note that it is the inability to state rules in terms of syllables that requires both the disjunctive environment in (D) and the necessity to mention C̱ to characterize 'tautosyllabic.'

[5]For synchronic analyses of Kwakiutl these marks may be thought of as denoting arbitrary morpheme features. I do not believe there is any reasonable phonological analysis for these processes.

[6]Boas (218) writes gəlzúd and several other relevant formswithout indication of the glottalization of the liquid or nasal. This representation is inconsistent with his statement (227) that resonants are glottalized before both weakening and hardening suffixes. There are two possible explanations. Either there is simple mistake in the transcription--and there are many inconsistencies and mistakes in the forms cited in this posthumously edited grammar, or there is a rule which deglottalizes resonants before an immediately following voiced or glottalized obstruent, see p. 222 for an explicit statement about the latter case.

[7]It is interesting that the northern Kwakiutlan languages like Haisla and the languages of Bella Bella and Rivers Inlet apparently lack this rule or have it in a different form, since the cognates of such words retain diphthongs, as Boas notes for the latter two. There are some other sources for the mid vowels (a fuller treatment will be presented in a forthcoming paper by myself and Deirdre Wheeler). The reader will note some examples of surface sequences of əyā. I have no explanations for these. Boas lists a few doublets, some with sequences, some with mid vowels.

[8]Stems ending on clusters of some consonant and the segments mentioned above undergo vovalization of the glide when the suffix is consonant initial:

kwəns-	'bake'	kʷəníkw	'passive'
t̓əlxw-	'pound'	t̓əlūkw	"

These forms are the result either of an independent vocalization rule (apparently Boas's view) or the result of schwa-insertion and regular operation of MONO II. Schwa-insertion is independently necessary but I do not know whether it can be formulated so as to cover this case as well. If it can, the result would be interesting since some linguists apparently claim that rules of basic stress assignment must precede all other phonological rules.

[9]Deirdre Wheeler (unpublished paper) has been able to predict most of the occurrences of schwa and short a in Boas transcriptions from the environment. In my own work with Kwakiutl and Haisla I have been unable to discover any

clear contrasts. See Grubb 1974.

[10] See Kuipers 1960 for Kabardian. Amharic exhbibits alternations between schwa-glide sequences and high vowels in exactly parallel environments. I believed at first that a case could be me made for representing the remaining contrast by V vs. Vh (unlike other consonnnts, h appears only initially), and there is some tempting evidence, but Wheeler has shown that even though there is independent need for an h-drop rule, representations of all long a's as əh runs into insuperable difficulties. We deal with this question in a forthcoming paper.

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