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Abstract

Investigated is a morphophonemic entity that manifests itself in a rich variety of ways including doubling or glottalization of a resonant; the phonemes /a/, /i/, /u/; the morpheme boundary marker /ə/ and, in the variety of North Wakashan made famous by Franz Boas, an opposition type unknown in the other varieties. It is a byproduct of some of the complex processes triggered by attaching certain types of suffix to a stem but occurs also as a constituent of morphemes and as a device to turn bound roots into free forms. It has never before been identified and is a warning that we are nowhere near understanding the history of North Wakashan, let alone its possible relationships to neighbouring languages. No North Wakashan expertise is necessary to follow the discussion which is preceded by essential comparative phonemic and morphophonemic information.

Keywords

Wakashan, Heiltsuk, Oowekyala, Haisla, Kwakwala, comparative linguistics

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1. Introduction

1.1 The four main varieties of North Wakashan are Haisla (henceforth HA) once spoken in villages in the north of the British Columbia coast but today enduring in Kitamaat Village, Heiltsuk (HE) and Oowekyala (OO) on the central coast (HE villages: Klemtu, Bella Bella; OO village: Rivers Inlet) and Kwakwala (KW) on northern Vancouver Island and the adjacent mainland in several villages the better known ones of which are Fort Rupert, Alert Bay, Cape Mudge. These varieties have been called different languages, including by this writer, but their similarity would also justify calling them major dialects of one North Wakashan language. To avoid the issue this paper will call them isolects. Each of the four isolects was at one time a group of regional variants and some of this diversity persists to this day, particularly in the case of Haisla and Kwakwala. Indeed the native terms of which "Haisla" and "Kwakwala" are anglicizations once did not refer to whole isolects but only to particular local variants. Pace Fontesciu (2007) a genetic relationship between North Wakashan and the South Wakashan isolects of western Vancouver Island and the Makah Peninsula remains to be demonstrated since their lexical and structural similarities could as well be due to borrowing from each other or a third party.

1.2 The HE and OO data in this paper is from this author's fieldwork that started in 1974 and was conducted for many years as resident linguist of the Heiltsuk Cultural Education Centre, Bella Bella, BC. HA data collection started in 1978 but most of it took place in the early 1980's in cooperation with Neville Lincoln of SFU. The KW data is from Boas's Kwakiutl Grammar (1947) and unpublished Kwakiutl Dictionary but always checked against Neville Lincoln's unpublished KW dictionary and where necessary corrected. Boas's transcriptions are often unreliable, a matter on which see also Bermann (1994). Neville Lincoln is herewith thanked for making his typescript available to this writer. The production of this paper did not receive any kind of financial support from funding agencies in the public, commercial, or not-for-profit sectors. In running text slants surround phonemic notations, as in HE /yík^w/, and swung brackets morphophonemic ones, as in {ys=^wk} and its constituents {ys-} and {-^wk}. Components below the level of morpheme are cited between verticals, as in |=|. An asterisk precedes hypothetical

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forms, as in KW */ǰva/. Word and morpheme glosses favour terseness over completeness and from their syntactic class (e.g. nominal or verbal) nothing can be inferred regarding the native expression's syntactic class, cf. Lincoln & Rath (1986:52) and Rath (1984). Glosses are written between single quotes. Double quotes are used in other contexts. Commas and periods are placed outside single quotes but inside double quotes. In glosses "sth." and "sb." abbreviate "something" and "somebody."

2. Phonemic Essentials

2.1 Obstruents and Resonants, Voiceless and Voiced

Voice is not a distinctive feature of any obstruent in the below chart of North Wakashan phonemes. The two types of lenis plosive can have a degree of voicing but this is a concomitant feature, not a communicatively relevant one. The phenomenon is more pronounced with the plain plosives than with the glottalized ones, and more so in HA/KW than HE/OO.¹

	Obstruents				
	plosives				homorganic fricatives
	lenis		fortis		
	plain	postglottalized	postaspirated	affricate	
labial	b	p̰	p		
alveolar	d	t̰	t		
alveolar (affricate)	z	c̰	c		s
lateral	λ	λ̰		λ̰	ɬ
palatal-velar	g	k̰		k	x
velar (rounded)	gʷ	k̰ʷ		kʷ	xʷ
uvular (rounded)	ǧʷ	q̰ʷ		qʷ	ǧʷ
uvular	ǧ	q̰		q	ǧ

¹ It is therefore admittedly awkward that for the plain plosives symbols are used usually associated with voicing. Unfortunately using /p, t, c, λ, k, kʷ, q/ for the plain ones would necessitate using something like /p^f, t^f, c^f, .../ or /p̰, t̰, c̰, .../ for the fortis ones and having two sets of symbols with diacritics on top is typographically undesirable.

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	Resonants			
	consonantal		vocalic	
	plain	preglottalized	plain	postglottalized
labial nasal	m	m̥	m̩	m̩̥
labial (rounded)	w	w̥	(HE/OO/HA) u (KW) ʊ, u	(HE/OO/HA) ʊ̥ (KW) ʊ̥, ʊ̥
alveolar nasal	n	n̥	n̩	n̩̥
lateral	l	l̥	l̩	l̩̥
palatal	y	y̥	(HE/OO/HA) i (KW) ɪ, i	(HE/OO/HA) i̥ (KW) ɪ̥, i̥
laryngeal	h	h̥	a	ã

Other Elements			
high tone (HE)	ˈ		
accent (OO/HA/KW)	ˑ		
reduplication boundary	:		
junctures	.	h̥	(HA/KW) ə
vowels (KW)	ɛ, ê, ɔ, ɔ̥		

The resonants including /h/ are voiced but /h̥/ is a special case. It has many environment-coloured allophones that involve voicing but can also be just a glottal stop, notably word-initially. The vocalic nasal and lateral resonants can be syllabic (i.e. [m̩], [m̩ʔ], [n̩], [n̩ʔ], [l̩], [l̩ʔ]), particularly in OO, but more frequently consist of a murmur vowel plus [m], [mʔ], etc. The murmur vowel is environment-coloured in HE/OO/HA with variants including [ə], [ɪ], [ʊ], [ɔ], [ʌ] and more. In KW it can also be [ʌ] in any environment. In some environments the murmur vowel may also be absent; for example, HE /s|á/ 'to twist, etc.' can be pronounced [səlá] and

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[slá]. Typical values of /i/ and /i̥/ are [i] and [i̥], in KW tending towards [e] and [e̥]. Similarly, typical values of /u/ and /u̥/ are [u] and [u̥] in KW tending towards [o] and [o̥]. KW /ɛ, ɛ̥, ɔ, ɔ̥/ is broadly [ɛ, ɛ̥, ɔ, ɔ̥] but see footnote 5 on complications in the case of /ɛ̥/.

2.2 Consecutive Obstruents

Series of obstruents are possible and in OO pronounced without intervening murmur vowel. Consequently an all-obstruent word like OO /ʎx̥s/ 'boat thwart' can only be whispered. HE is like OO but an automatic murmur vowel does separate a postglottalized plosive from a following obstruent. In HA/KW an obstruent is always separated phonetically from a following one by a murmur vowel, except that a word-medial fricative that is not the reduplicate of the initial phoneme can both cluster vowellessly with a following obstruent or be separated from it by a murmur vowel that in this case is a phonemic schwa. Compare vowelless /χz/ of KW /lḁχzm̥/ HA */l'ḁχzm̥/ 'taken aboard the boat' and /χ̥z/ of KW /ʎi̥χ̥əzu/ HA /ʎ'i̥χ̥əzu/ 'board for beating time' (cf. OO /ʎi̥χ̥zu/ = [...χ̥t̥s̥..]). HA */l'ḁχzm̥/ is not factually attested but likely exists in light of HE /lḁχzm̥/ OO /lḁχzm̥/.

2.3 Consonantal Resonants

Unlike obstruents, consonantal resonants cannot occur in series. Word-initially in all isolects they can be followed by an obstruent in which case a murmur vowel intervenes phonetically, cf. HE /ṇ̥lá/ OO/HA/KW /ṇ̥la/ 'lean back' with [ə] between the first two phonemes and HE /mxá/ OO/HA/KW /mxa/ with [ɪ] or, in KW also, [ʌ]. Word-medially a consonantal resonant does not occur before an obstruent except in HA where a glottalized consonantal one can occur before an obstruent throughout the word. Compare HA /hi̥ls/ 'right/proper on ground outside' (with [ə] between /i̥/ and /s/) and its counterparts HE /hi̥ls/ OO /hi̥ls/ KW /hi̥ls/; more details on this example in 4.2.1.

2.4 Vocalic Resonants and KW Vowels

Vocalic resonants can occur in series. In the case of plain ones the maximum length of a series is two in HE/OO/HA or, in HE/HA but not OO, three if /a/ is in the middle, cf. HE /ḥmá/ OO/HA /ḥma/ 'to build dam, block off, make watertight'; HE /ḥmái/ HA /ḥmai/ 'the-one-there blocks off'. The latter corresponds to OO /ḥmi/; OO does not normally allow /a/ between vocalic plain

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resonants. Series of two vocalic plain resonants also occur in KW and follow the HE/OO/HA pattern except that, as explained further in 2.4.1, KW can have /ɪ/ and /ʊ/ as well as /i/ and /u/ before another vocalic resonant but HE/OO/HA only /i/ and /u/, cf. KW /h̥ma/ 'build dam'; KW /h̥ŋsa/ (HE /y̥iŋca/ OO /y̥iŋca/ HA /hi̥ŋca/) 'to sink straight down'; KW /dvi̥ʌ/ (HE /dui̥ʌ/ OO/HA /dui̥ʌ/) 'to jump into the house, burst into the room'. Unlike HE/OO/HA, KW allows the last one of a series of vocalic resonants to be glottalized, cf. KW /q̥w̥l̥asta/ 'water of life'. HE/OO/HA /i/ or /u/ preceded or followed by /a/ corresponds to the KW monophthongs /ɛ/ and /ɔ/, cf. HE /diá/ OO/HA /dia/ KW /dɛ/ 'to wipe'; HE /ǵáik̥w/ OO /ǵaik̥w/ KW /ǵɛk̥w/ '(berries) preserved in oil'; HE /buá/ OO/HA /bua/ KW /bɔ/ 'to flee'; HE /ǵáuk̥w/ OO/HA /ǵauk̥w/ KW /ǵɔk̥w/ 'strong, etc.' KW /ɛ̥/ and /ɔ̥/ typically correspond to HE/OO/HA /a/ plus (never glottalized) /i/ or /u/, cf. HE /láista/ OO /laista/ HA /l'aista/ KW /l̥ɛsta/ 'to go around sth.'; HE /láus/ KW /l̥ɔs/ 'to transfer, go over to sth.' Examples of the KW equivalent of a HE/HA series of three vocalic plain resonants with /a/ in the middle are KW /ǵm̥ɛ̥/ (HE /ǵm̥ái/ HA /ǵmai/ but OO /ǵmi/) 'scab'; KW /q̥w̥l̥ɛd/ 'saviour'; KW /ǵl̥ɔk̥w̥la/ (HA /ǵl̥auk̥w̥la/) 'to train, strengthen, encourage'; KW /q̥w̥l̥ɔsu/ 'to save unintentionally'. The KW vowels are the result of morphophonemic processes but not reinterpretable as combinations of their underlying phonemes, for example by replacing KW /ǵɔ/ 'split wood evenly' by */ǵva/ (cf. HE /ǵuá/ OO/HA /ǵua/) but KW /ǵɔk̥w/ 'strong, etc.' by */ǵauk̥w/ (cf. HE /ǵáuk̥w/ OO/HA /ǵauk̥w/). The problem is first of all that KW has (rare) examples of opposition between /ɔ/ and /au/ (cf. /ǵɔ/ 'split wood' and /ǵau/ = [ǵau] 'fur seal') and between /ɛ/ and /ai/ = [ai]. The inevitability of the KW vowels is taken up again in section 8. Series of vocalic glottalized resonants are comparatively rare and don't exceed two members in lexical words. Examples are HE /ǵm̥ái/ OO/KW /ǵm̥ái/ 'stay overnight at a house', KW /n̥ms̥ǵm̥u̥x̥w/ 'priced at one dollar', HA /zaz̥u̥a/ 'go after coho salmon'.

2.4.1 The KW Split between /i, u, ɪ, ʊ/ and /ɪ, ʊ, i, u/

Each one of HE/OO/HA /i, u, ɪ, ʊ/ corresponds to a pair of elements in KW, cf. /i, ɪ/, /u, ʊ/, /i, i/, /u, u/ in which "ɪ" and "ʊ" are ad hoc symbols. The typical phonetic values of the KW pairs' members are /i/ = [i, e], /ɪ/ = [ɛy], /u/ = [u, o], /ʊ/ = [ɔw], /i/ = [iʔ, eʔ], /ɪ/ = [ɛʔy], /u/ = [uʔ, oʔ], /u/ = [ɔʔw]. The members of each pair alternate morphophonemically. To give one example, /i/ in KW /wi̥xs/ 'fail to go aboard, miss boat or train' alternates with /ɪ/ in KW /wu̥ʌ/ 'fail to obtain'. Yet the members of a pair are not in complementary distribution; they are in paradigmatic

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opposition before a vocalic element, compare /iu/ and /u/, /im/ and /im/ of KW /qisiu/ '(person with) smooth shining forehead, smooth mountain' and KW /mxuud/ 'to give a punch in the forehead'; KW /mim^wat/ (plural of /mig^wat/ 'hair seal') and KW /çim/ 'intestines, guts'. The elements /ɪ/, /ʊ/, /i/ and /u/ occur exclusively before a vocalic element and unlike /i, u, i, u/ cannot also occur word-finally or before an obstruent. The opposition within each of the KW pairs /i, ɪ/, /u, ʊ/, /i, i/ and /u, u/ is nonetheless resolvable because when /i/, /i/, /u/ and /u/ rather than /ɪ/, /i/, /ʊ/ and /u/ occur before a vocalic element, then this vocalic element is typically the result of one of the following. (1) A morphophonemic process involving an entity with many possible realizations that is discussed extensively in this paper. (2) Reduplication of the word-initial phoneme.² It should be noted that KW examples of /i/ or /u/ plus vocalic element are rare compared to those of /i/ and /u/ plus same, and they are plural forms such as the mentioned /mim^wat/ and the following two words, KW /hiinu^{xw}/ 'the one who always does that' and KW /çiniisla/ 'salmon with roe in body'.³ The /ii/ in these two items is correlated with a stem ending in a palatal resonant adjoining a suffix beginning in one, an environment that is known to cause morphophonemic irregularities in all four isolects and does not involve the morphophonemic entity this paper is about.

2.5 Tones and Accent

A HE vocalic plain resonant that is neither preceded nor followed by another one has either high tone indicated by an acute, or low tone indicated by its absence, cf. HE /k^hás/ 'mussel' versus HE /k^has/ 'sit on the ground outside'. The other isolects have accent instead. In HA it is free and to be indicated whenever not automatic, in this paper by the prime symbol before the accent bearer. Thus, HA /ʔi^xəzu/ 'board for beating time' but HA /çxa/ 'to singe'. In OO/KW the accent is not written in the vast number of cases it is predictable with the simple rule stated below. Vocalic glottalized resonants never have HE high tone or distinctive HA/OO accent. They don't as a rule

² Lincoln & Rath (1980) was unaware of this and saw no alternative but to interpret KW [ʔy], [ʔy], [ʔw] and [ʔw] as the consonantal resonants /y/, /y/, /w/ and /w/ separated by an automatic murmur vowel from the phoneme preceding them.

³ A third one could be KW /qasuiisla/ 'to promise feast to all houses' but although it seems to contain familiar morphemes it is not clear how they add up to the word's meaning. It could be a misrecording and therefore needs reeliciting from someone who knows the cultural practice referred to.

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have distinctive accent in KW either but there are numerous exceptions, all explicable morphophonemically, e.g. KW /h'ista/ 'to go right around' in which /i/ stems from telescoping of /ii/.

A series of vocalic plain resonants has only one tone or accent; the placement of the tone or accent in the series is not distinctive. For example, HE /dúnt/ = [..ún.., .. ún..] and /duńt/ = [..uwún..] 'name' are free variants.

In OO the accent falls on the phonemic word's first vocalic plain resonant but if it is followed by another one it can fall phonetically on the first, on the second, or equally on both. The accent needs indicating only in exceptions to this rule, e.g. OO /tuń'akvɫa/ 'start walking one after another'. Most of these exceptions are predictable morphophonemically. In KW the accent also falls on the phonemic word's first vocalic plain resonant, but if it is followed by another one, which unlike HE/OO/HA can be glottalized, the accent falls on the latter. Thus, /i/ is accented in KW /pɲisa/ 'to warm in front of fire', as is /i/ in KW /q̣'ɲista/ 'go back and forth often, walk about often'. The KW vowels /ɛ, ɛ̣, ɔ, ɔ̣/ count as vocalic resonants for the accent rule. The HA accent often follows the OO pattern, cf. HA /m'aɭa/ (HE /málɭá OO /maɭa/) 'to swim (for pleasure)' and HA /maɭ'a/ (HE /maɭá/ OO málɭa/) 'two people doing sth.' The accent may however also fall at word's end, cf. HA /zazũɳ'a/ 'go after coho salmon'; HA /mamaɭ'a/ 'to try to swim'; HA /yud'ukʷ/ (HE /yúdúkʷ/ OO /yudukʷ/) 'three'; HA /ỵ'ugʷa/ (HE /ỵ'úgʷa/ OO/KW /ỵ'ugʷa/) 'rain, to rain'. Some HA words have been recorded with the accent placed differently in different elicitations. The topic awaits further investigation. The HE tones are often predictable morphophonemically but the rules are too many to be explained in this paper and the reader has to be referred to Rath (1985). It is useful to remember at least this. After consecutive vocalic plain resonants or a series of plain resonants with vocalic and consonantal alternating, no more high tones are possible. Allowing for this rule which overrides even the lexical high tone of some suffixes, any series of vocalic plain resonants takes one high tone while two plain vocalic ones separated by a consonantal one have high tone on both vocalic ones. Seeming exceptions to this rule have a morphophonemic cause. For example, HE /xálá/ 'come!' exhibits the default tone pattern whereas the high-low pattern of HE /pála/ 'to work, worker, etc.' stems from its /á/ being two identical plain resonants that have telescoped into one phonetically but nevertheless still block further high tones.

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2.6 Gemination

Only OO and HA allow geminate vocalic plain resonants. They are phonetically long in duration. Examples: OO/HA /k^waas/ 'mussel', OO/HA /ʔiis/ 'skin', OO /t̥l̥c/ HA /t̥l̥s/ 'highbush cranberries'. The HE item /p̥ála/ mentioned a few lines earlier corresponds to OO /paala/.

2.7 Reduplication Boundary, Junctures

The reduplication boundary /:/ occurs in e.g. KW /ł̥x:ł̥xa/ (frequentative of KW /ł̥xa/ 'loose or string-like things are somewhere') and signals that the following element is to be pronounced like word-initially; accordingly not only initial /ł̥/ but also its repeat is separated by a murmur vowel from /ł̥/. The juncture /./ marks exceptions to normal rule at certain morpheme boundaries. This paper only shows it between a fricative and a consonantal glottalized resonant where it signals exception to the rule that only vocalic resonants can adjoin an obstruent. An example is HE /q̥^wáx̣.ḥlá/ OO /q̥^wax̣.ḥla/ HA /q̥^wq̥^wax̣.ḥla/ KW /q̥^wq̥^wax̣.ḥla/ 'to cause to grow' in which /x̣.ḥ/ = [x̣ʔ]. The juncture /h/ typically separates a stem ending in two consecutive vocalic plain resonants or two vocalic plain resonants separated by a consonantal one, from a suffix beginning in a vocalic resonant (that is always plain in HE/OO/HA). It is pronounced as the consonantal counterpart of the vocalic plain resonant it follows but in KW and very occasionally HA with an alternative. Here are first examples of the two types of environment of /h/. (1) HE /m̥ṇḥḥgiu/ OO /m̥ṇḥḥgiu/ KW /ṇm̥ḥgiu/ 'eleven' in which /h/ = [m] while /m̥/ in the KW item results from /m̥m̥/ telescoping; HE /m̥úḥḥgiu/ OO /muuḥgiu/ HA /muḥ'ḥgiu/ KW /muḥḥgiu/ 'fourteen' in which /h/ = [w] while only OO actually shows consecutive vocalic plain resonants before /h/ whereas in the other isolects they have telescoped into one.⁴ (2) HE /túx^w.ḥidáyúhi/ OO /tux^w.ḥidayuhi/ HA /q̥aḥ.ḥidayuhi/ 'the-one-there is taken for a walk' (with /h/ followed by a deictic referring to one that is near neither speaker nor listener); KW /qayayuḥṇ/ 'I am taken on a walk' (with /h/ followed by a first person reference). Here /h/ can be pronounced [w] but in KW there is an alternate lax kind of pronunciation of /m̥ḥ, ṇḥ, l̥ḥ, iḥ, uḥ/, namely as [ʌm, ʌn, ʌl, ʌy, ʌw], if the vocalic resonant preceding /h/ is unaccented, as is the case in KW /qayayuḥṇ/. In a set of derivatives of KW /qayayu/ 'taken on a walk' Boas (1947:262) shows both pronunciation options for /uḥ/; his notations indicate that /uḥ/ = [uw, ow] in KW /qayayuḥṇ/ but [ʌw] in e.g.

⁴ In Lincoln & Rath (1986) /h/ is replaced by its allophone.

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/qayayuhik/ (in which latter /h/ is followed by a deictic referring to sth. absent; it may no longer exist in KW but still does in HA). Another example of the alternation is KW /siwayuhùl/ 'former paddle'; Boas (1947:334) lists it with /uh/ = [uw, ow] whereas it was reelicited by Neville Lincoln with /uh/ = [Λw]. There are also two possible pronunciations for KW unaccented /m, n, l, i, u/ plus glottal stop as in KW /kik'uhñǵ/ 'time when there was nothing'. Boas (n.d.:284) indicates that its /uh/ is pronounced [..oʔw..] but it could likely also be pronounced [Λʔw] as suggested by e.g. KW /tatinuha/ 'to try to pole' which Boas records with /uh/ = [Λʔw], and KW /lawihak^w/ 'taken off' for which Boas records that /ih/ = [..Λʔy..]. On the juncture /ə/ see 2.2 and 4.1.

2.8 Redundancy of Resonants' Consonantal-Vocalic Distinction

HE/OO/HA vocalic resonants are in complementary distribution with their consonantal counterparts; therefore the pairs /m, m̥/, /m̥, m̥/, /n, n̥/, /n̥, n̥/, /y, i/, /y̥, i̥/, /w, u/, /w̥, u̥/, /h, a/, /h̥, ḁ/ can be collapsed into single phonemes while leaving it to rules rather than typography to determine when to pronounce consonantly or vocally. In this paper these abstract single phonemes will only be used in morphophonemic transcriptions of the kind introduced in section 3. For lack of suitable symbols for resonants that can be consonantal or vocalic the consonantal symbols will represent them. As for the rules determining when a resonant is consonantal or vocalic, those for HA are in Lincoln & Rath (1986:4-8) and those for HE in Rath (1981:61-62). The OO rules are like those for HE except that OO does not allow 3 consecutive vocalic plain resonants with /a/ in the middle (see also the beginning of 2.4). The collapse into single phonemes is difficult for KW due to the split in two of the vocalic palatal and rounded labial resonants. However, these KW idiosyncrasies result from morphophonemic processes and are not part of morphemes' sound constituents. The consonantal-vocalic distinction can therefore be dropped from KW morphophonemic notations too as will be shown in what follows.

3. Morphophonemic Essentials

North Wakashan roots and suffixes (there are no prefixes) exhibit a great deal of allomorphic variation. The root allomorphs in the following three data sets illustrate variation associated with

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a morpheme boundary (indicated by a hyphen). There is also a type of variation associated with reduplication of all or part of a morpheme but it is of no concern in this paper.

	HE	OO	HA	KW	
1	/dúḡ ^w -ás/	/duḡ ^w -as/	/duḡ ^w -'as/	/duḡ ^w -as/	'gun sight, peep-hole in door'
2	/dúq ^w -lá/	/duq ^w -la/	/d'uq ^w -la/	/duq ^w -la/	'to see, to look'
3	/dúq̣ ^w -ǰ̣la/	/duq̣ ^w -ǰ̣la/	/d'uq̣ ^w -ǰ̣la/	/duq̣ ^w -ǰ̣la/	'to look back'
4	/duḡ ^w -sú-t/	/duḡ ^w -su-t/	/d'uḡ ^w -su-d/	/duḡ ^w -su-d/	'to look through sth.'

	HE	OO	HA	KW	
5	/mx-lá/	/mx-la/	/mx-la/	/mx-la/	'beat (e.g. drum) with fist'
6	/mṇ-bú-t/	/mṇ-bu-t/	/mṇ-b'u-d/	/mṇ-bu-d/	'strike chest with fist'
7	/mṇ-áçi/	/mṇ-açi/	/mṇ-'açi/	/mṇ-açi/	'drum'
8		/mṇṇ-k ^w / and /mṇ-k ^w /	/mṇu-k ^w /	/mṇ-k ^w /	'punched, sth. punched'
9	/mámán'-a/	/maman'-a/	/maman'-a/	/maman'-a/	'try to punch'

	HE	OO	HA	KW	
10	/ẉu-ála/	/ẉu-ala/	/ḥu-'ala/	*/ḥv-ala/ > /ḥola/	'very, real(ly), actual(ly)'
11	/ẉú-ptá/	/ẉu-ptá/	/ḥ'u-bta/	/ḥu-bta/	'hole, opening in surface'
12	/ẉu-s/	/ẉu-s/	/ḥu-s/	/ḥu-s/	'surface of the ground'
13	/ẉu-iḡ/	/ẉu-iḡ/	/ḥu-iḡ/	/ḥv-iḡ/	'inland, etc.'

Often one allomorph can be identified as the base form from which others derive because it occurs before a suffix that can be demonstrated not to affect the make-up of the stem it is joined to. A very productive diagnostic suffix is the one in rows nos. 2, 5 and 10. It has continuative-

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durative meaning. Abstracting away from tone or accent (see 2.5) and ignoring resonants' consonantal-vocalic distinction (see 2.8), this suffix identifies the base forms of the data sets' roots as {dwq^w-} 'see, look, pay attention, etc.', {mx-} 'to punch, hit with fist' and HE/OO {w̥w-} HA/KW {h̥w-} (a dummy root building a word out of certain suffixes; it may have once been a prefix). The base form of the continuative-durative suffix itself, as diagnosed by certain grammatical suffixes, is {-lh} after a stem ending in a fortis plosive or fricative and {-hlh} elsewhere. So {dwq^w-lh} is the base form of all the variants on row no. 2, {mx-lh} that of row no. 5, and HE/OO {w̥w-hlh} HA/KW {h̥w-hlh} that of row no. 10. For more information on identifying the base form of morphemes, see Lincoln & Rath (1980:36-45), pages written in response to Vink (1977).

A morpheme's base form can become modified by environment-triggered rules. For example, in HE/OO only, a plain plosive that lands morphophonemically before any other kind of obstruent or word-finally, will turn into its fortis counterpart. That's why in rows 4 and 6 the transitivity marker {-d} becomes /t/ in HE/OO. An all-North Wakashan rule is that a fortis plosive landing directly before an obstruent will turn into its homorganic fricative (with special provisions for |p| and |t| that need not concern us here and exemption for reduplicating initial fortis plosives). A good example is |q^w| > /č^w/ in KW {dwq^w-bh} > /duč^wba/ (glossed by the sources as 'to see end, to see point'). Not a good example is |q^w| > /č^w/ in the items on row no. 4 because in HA/KW directly before /s/ the opposition is neutralized between a non-initial velar or uvular fortis plosive and its homorganic fricative, see Lincoln & Rath (1986:11). In HE/OO the opposition is not neutralized but there is another complication, the low tone of HE /u/ and the glottalization of OO /ù/. It forces recognizing that the row 4 items contain a suffix {-sw} in HA/KW but {-'sw} in HE/OO. The element |'| is assumed to glottalize the plain resonant |w| in {dwq^w-} and, generally, stems (not necessarily just roots) ending in a fortis plosive preceded by a plain resonant that in its turn is preceded by an obstruent, glottalized resonant or word-initial plain resonant. |'| has no diagnosable effect on stems ending differently. Thus, HE/OO {dwq^w-'sw-d} > {d̥wč^w-sw-d} > HE /duč^wsút/ OO /d̥uč^wsut/. The step from {d̥wč^w-sw-d} to HE /duč^wsút/ is governed by the tone rules which have to be taken for granted in this paper, see 2.5. This |'| is just one of a set of environment-modifying morphophonemic elements that will be referred to as adaptives in this paper. The set is listed below and will give the reader an inkling of the complexity of North

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Wakashan morphophonemics. The following abbreviations are used. P^{pl}, P̣, P^{fo} mean the 3 kinds of plosive. F is a fricative, O any obstruent, C any obstruent, glottalized resonant or root-initial plain resonant, R a plain resonant and Ṛ a glottalized one. The description of their effect is broad; for example, ignored are constraints on the obstruents following HE/OO |'| and |!!| and the fact that some adaptives are suffix-like and can occur word-finally.

Isolect	Adaptive	Diagnosable Effect
HE/OO	'	CRP ^{fo} - 'O > CṚF-O
HE/OO	!!	CRP ^{fo} -!!O > CṚF-O (like ') CR-!!O > CṚ-O
HE	↔	Attested before k and s . Imparts high tone to stem-final R. If stem does not end in R but ↔k or ↔s is followed by R, the high tone goes to the latter R. ↔ is overridden by the general rules mandating or prohibiting high tone, see 2.5.
KW	i	R- _i s > Ṛ-s P ^{pl} /P̣/Ṛ- _i s > P ^{pl} /P̣/Ṛ- _h s
All	%	P ^{fo} -% > P ^{pl} - F-% > R∞-; on ∞ see text to follow
All	=	P ^{fo} -= > P ^{pl} - (like %) F-= > R∞- (like %) CR-= > CṚ- but sometimes CR∞- with ∞ becoming y or a replica of R. <i>Special case:</i> Ch-=h and Cy-=y behave irregularly in HE/OO/HA. P ^{pl} /P̣/Ṛ-= > P ^{pl} /P̣/Ṛ- _h (KW) RR-=O > RṚ-O (HE/OO/HA) RR-=O > RR-O (i.e. ineffective =) RR-=R/Ṛ > RR- _h R/Ṛ

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Isolect	Adaptive	Diagnosable Effect
		<i>Special case:</i> if RR is Rh, = may also be ineffective while in KW there is a third option, Rh-= > $\dot{R}$ -
All	+	$P^{fo}-+ > \dot{P}$ - $F-+ > \dot{R}$ - <i>Elsewhere</i> like =
All	&	$P^{fo}/F-\&RO > (HE/OO) F-\dot{h}RO$, (HA/KW) $F-\dot{R}O$ $P^{fo}/F-\&RR > (HE/HA/KW) F-\dot{R}R$, (OO) $F-\dot{h}RR$ <i>Elsewhere</i> like = or ineffective
All	∞	See text to follow.
All	Δ	(HE/OO/HA) $P^{fo}-\Delta O > P^{fo}-O$ (i.e. no fricativization of P^{fo}) (KW) $P^{fo}-\Delta O > P^{pl}-O$ but sometimes $P^{fo}-O$ like in HE/OO/HA (HA/KW) $F-\Delta O > F\text{ə}-O$ but KW = sometimes like % (HE/OO) $F-\Delta O > F-O$ (i.e. no observable effect of $ \Delta $)
All	•	See 5.4

Illustrating all adaptives of the chart is desirable but not the aim of this short paper the remainder of which is about $|\infty|$. First we shall look at it as byproduct of other adaptives and next at its occurrence as lexical component of morphemes.

4. $|\infty|$ as Morphophonemic Byproduct of |%|, |=| and Perhaps |+|

4.1 The Effect of |%| and |=| on a Fricative

|%| and |=| coalesce with |s, ʃ, x, x^w, ʃ^w| into |y ∞ , l ∞ , n ∞ , w ∞ , w ∞ |, respectively, and note the identical effect on |x^w| and |ʃ^w|. As demonstrated below, $|\infty|$ can become a replica of the plain resonant before it, turn it into a glottalized resonant, turn itself into |w| and eventually /u/ (if a rounded obstruent follows), turn into |y|, turn into /ə/ (in HA and KW only) or, if followed by a plain resonant in vocalic position (as when adjoining an obstruent or the word end), become

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elided. Its elision may or may not leave a ghost in the form of seeming phonotactic irregularity. As illustrated in the below example no. 7, if $|\infty|$ is preceded by consecutive plain resonants belonging to the same morpheme it may turn into $|\infty|$ (in HA/KW) or become a replica of the plain resonant immediately before it (in HE/OO but also KW). In the latter case the identical resonants will telescope. A special case is $|s=|$ which may beside $|y\infty|$ give $|z|$. Another one is $|\check{x}=|$ which leaves the fricative unaffected but forces $|=|$ to become $|\infty|$ and ultimately in HA/KW if an obstruent follows, $|\infty|$. The reader is reminded that glosses for words and morphemes do not pretend to be exhaustive. If a morpheme is used more than once, only its first occurrence may be glossed.

Example 1 with root $\{ys-\}$ 'to hit with stick' and $\{-=k^w\}$ 'subjected to'. $\{ys=-k^w\}$ 'pounded inner red cedar bark' > (1) HA $\{yz-k^w\} = /yzk^w/$ and (2) HE/OO/HA $\{yy\infty-k^w\} > (2a)$ HE/OO $\{yyy-k^w\} > OO /yiik^w/$ HE $/yik^w/$ but (2b) HA $\{hyw-k^w\} = /hiuk^w/$ (i.e. with dissimilation of initial $|y|$ of $\{yy\infty-k^w\}$ and $|\infty|$ assimilating to $|k^w|$). The telescoping of $|yy|$ into $|y|$ in the HE item leaves a ghost in the form of excluding high tones in suffixes added, cf. HE $\{yyy-k^w\#y\}$ 'the-one-there is ...' > $/yik^wi/$ in which the lexical high tone of the deictic is overridden by the high tone inhibiting rule mentioned towards the end of 2.5. The notation "#" is used instead of the hyphen to flag a potential word boundary.

Example 2 with $\{ts-\}$ 'to push, press on' and $\{-=nhk^w|_h\}$ 'gradual development'. $\{ts=-nhk^w|_h\}$ 'to push along, pole little by little' > $\{ty\infty-nhk^w|_h\} > (1)$ HE/OO $\{tyy-nhk^w|_h\} > OO /tiinak^w|_a/$ HE $/tinaak^w|_a/$ and (2) KW $\{ty-nhk^w|_h\} > /tin'ak^w|_a/$. In the HE item the low tone of $/|_a/$ gives away that $/i/$ results from telescoping of $|yy|$.

Example 3. HA $\{ts=-k^w\}$ 'pushed' > $\{ty\infty-k^w\} > \{tyw-k^w\} = /tiuk^w/$. The suffix $\{-=ys\}$ '(in) open space, etc.' before $\{-=k^w\}$ makes $|\infty|$ surface as accented $/u/$ in many HA examples, see the following one in which the root $\{zwp-\}$ means 'fill opening or cover surface with soft material.' HA $\{zwp=-ys=-kv\} > \{zwb-ys=-kv\} > \{zwb-yy\infty-kv\} > /zubiy'ukv/$ 'soft material (e.g. blanket) put on beach, seaweed stuffed underneath salmon roe on a dish'. Compare this example's accent with that in HA $\{zwp=-ys-h\} > \{zwb-ys-h\} > /z'ubisa/$ 'to put soft material on (e.g.) the beach'.

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Example 4 uses {*kʷs-*} 'group of people sitting' (a KW-only root corresponding to HE/OO {*kʷy-*}) and {*-%m*} 'embodiment, etc.' The reader is reminded that |%| is like |=| but ineffective if stem doesn't end in a fortis plosive or a fricative. KW {*kʷs-%m*} 'crew of warriors' > {*kʷy∞-m*} > /*kʷim*/ (with elision of |∞|) and /*kʷim*/ (with |∞| leaving an irregular /i/ before /m/). It is unfortunate that Boas (n.d.) is the only source for these two words, Neville Lincoln could not relicit them, possibly because Boas states their meaning incorrectly.

Example 5 uses {*sms-*} 'mouth' and {*-%hd*} 'to possess' and illustrates that |s%| behaves like |s|=| in example 1 and can yield both |y∞| and |z|, cf. {*sms-%hd*} 'to have a mouth' > (1) {*smy∞-hd*} > {*smy-hd*} > HE /*smyát*/ OO/*smyat*/ KW /*smyad*/ and (2) {*smz-hd*} > HE /*smyzat*/ OO /*smzat*/ HA /*smz'ad*/. Note elision of |∞| from {*smy∞-hd*}.

Example 6 with {*ył-*} 'spread out, spread apart' and {*-=kʷ*}. {*ył-=kʷ*} 'spread out, spread open' > HE/OO/HA {*ył∞-kʷ*} > (1) {*yłw-kʷ*} > HE /*yłúkʷ*/ OO/HA /*yłukʷ*/ but OO also (2) {*ył-kʷ*} = /*yłkʷ*/.

Example 7 with {*gʷył-*} 'dismantle, pull apart, scatter' and {*-=kʷ*}. {*gʷył-=kʷ*} 'dismantled' > {*gʷył∞-kʷ*} > KW /*gʷiləkʷ*/ but OO {*gʷyll-kʷ*} > /*gʷilkʷ*/, with telescoping of |ll|. KW /*gʷiləkʷ*/ is found in Lincoln (n.d.) only; it may have an alternant KW */*gʷilkʷ*/ because Lincoln (n.d.) lists /*gʷiləzud*/ < {*gʷył-=zw-d*} 'to spread out on table or mat' (with {*-=zw*} 'flat surface, etc.') whereas Boas (n.d.:295) reports /*gʷilzud*/. The presence of /i/ rather than /ʌ/ before a resonant in vocalic position such as /l/ in KW */*gʷilkʷ*/ and /*gʷilzud*/ is just like /ə/ evidence of |∞|. In HA in particular the suffix {*-=ył*} '(in) bounded space, etc.' before {*-=kʷ*} or {*-=zw*} makes |∞| surface as /ə/, cf. HA {*mwkʷ-=ył-=kʷ*} > {*mwgʷ-ył-=kʷ*} > {*mwgʷ-ył∞-kʷ*} > /*mugʷ'iləkʷ* 'sth. (e.g. knot) tied indoors'. Compare this example's accent with that in HA {*mwkʷ-=ył-h*} > /*m'ugʷila*/ 'to tie sth. indoors'.

Example 8 with root {*mx-*} 'to punch' and suffix {*-=kʷ*}; it is row no. 8 in the data sets of section 3. {*mx-=kʷ*} 'punched' > {*mn∞-kʷ*} > (1) OO/KW {*mnn-kʷ*} > OO /*mnnkʷ*/ KW /*mṇkʷ*/ but HA {*mnn-kʷ*} = /*mṇukʷ*/; (2) OO {*mṇ-kʷ*} = /*mṇkʷ*/. In the KW item telescoping of |nn| takes place.

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Example 9 with {mx-}, {-zw} and the transitivity marker {-d}. {mx=-zw-d} 'bang fist on table' > {mn∞-zw-d} > (1) HE/OO {mnn-zw-d} > HE /mńzut/ OO /mńzut/ and (2) HE/HA {mń-zw-d} > HE /mńzut/ HA /mńz'ud/. In HE /mńzut/ telescoping of |nn| takes place but the doubling leaves a ghost in the form of only low tones being allowed in suffixes added, cf. HE {mx=-zw-d#ý} > /mńzudi/ 'the-one-there does ...'

Example 10 with {mx-} and {-hčy} 'receptacle, etc.' is another illustration of the elision of |∞|. {mx=-hčy} 'drum (for drumming)' > {mn∞-hčy} > {mn-hčy} > HE /mńáci/ OO/KW /mńáci/ HA /mń'áci/. This example is on row 7 of the data sets of section 3.

Example 11 with {pwx^w-} 'blow air, inflate' and {-k^w}. {pwx^w=k^w} 'blown on, blown up' > {pww∞-k^w} > HA /puwək^w/ and HE/OO/HA/KW {pww-k^w} > HE /púk^w/ OO/HA /puuk^w/ KW /puk^w/. Change from {pww∞-k^w} to {pww-k^w} is probably change of |∞| to |w| and subsequent telescoping into |ww|.

Example 12 with {kx^w-} 'blow out forcefully' and {-hčy} illustrates that |∞| may optionally block normal KW monophthongization, cf. {kx^w=hčy} 'dish into which shaman spits sucked-out disease' > {kw∞-hčy} which gives both KW /kōči/ (in which |∞| is elided like in example 10 while |wh| > /ɔ/) and irregular and rather exceptional non-monophthongized /kvači/ (with /va/ = [awa]). Boas (n.d.:278) lists both word forms but Lincoln (n.d.) only the latter.

Example 13 with {ýǎ^w-} 'rising tide, flood' and {-nhk^wlh}. {ýǎ^w=nhk^wlh} 'gradual rising of tide' > {ýw∞-nhk^wlh} > (1) {ýww-nhk^wlh} > HE /ýuńak^wla/ (note low tone of /la/) OO /ýuuńak^wla/ HA /ý'uuńak^wla/ KW /ýuńak^wla/ and (2) HE {ýwy-nhk^wlh} > /ýuíńak^wla/ and (3) HE {ýẉ-nhk^wlh} > /ýuńak^wlá/ (note high tone of /lá/).

Example 14 with HE/OO/KW {ǎhǎ-} HA {ǎǎ-} 'stiff, rigid' and {-zw}. {ǎhǎ=-zw} 'hard to bend flat thing' > KW /ǎaǎəzu/ (listed in Boas (1947:445) but never yet elicited) HE /ǎáǎzu/ OO /ǎaǎzu/ (both with vowelless [ǎt^s]) HA {ǎǎ=-zw} > /ǎǎəzu/.

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4.2 The Effect of |+| on a Fricative

|+| coalesces with |s, ʃ, x, xʷ, ʃʷ| into |ȳ, ĩ, ñ, w̃, w̃|, respectively, while |ǰ+| yields /ǰ.h̃/ (= [ǰʔ], see 2.7). |s+| may beside |ȳ| give |č|. Examples: {ȳʃ-+s} 'spread open on ground outside' > {ȳĩ-s} > HE /ȳʃs/ (with low tone) OO/KW /ȳĩs/ HA /ȳʃs/; HE/OO {ǰʷhǰ-+lh} HA/KW {[ǰʷ]ǰʷhǰ-+lh} 'to cause to grow' (with {ǰʷhǰ-} 'grow' and causative {-+lh}) > HE /ǰʷáǰ.h̃|á/ OO /ǰʷáǰ.h̃|a/ HA /ǰʷǰʷáǰ.h̃|a/ KW /ǰʷǰʷáǰ.h̃|a/. The result of the coalescence is remarkable, first because as shown in 4.1 examples 2, 6, 8, 9 and 13, glottalized resonants can also be an effect of |=| and second because there is no obvious sign of |∞|. For the absence of |∞| two hypotheses come to mind. One is that just as |+| after a fortis plosive adds glottalization to the effect of |=| (which is the stripping away of the fortis feature), so too does |+| after a fricative cumulatively add glottalization to the effect of |=| (which consists in coalescing with most fricatives into a plain resonant plus |∞|). In other words, the coalescence results in |y∞h̃, l∞h̃, n∞h̃, w∞h̃, w∞h̃, ʃ∞h̃| but as the reasoning must go on, |∞|, for phonetic reasons not yet known, disappears after acting as a catalyst forcing |h̃| to become the glottalization of |y, l, n, w| and to turn into consonantal /h̃/ rather than /á/ after /ǰ/. Let's call this the catalyst hypothesis. The other explanation of |∞|'s absence is that it isn't really absent. The |ȳ, ĩ, ñ, w̃, ǰ.h̃| resulting from |+| occurring after a fricative are phonemicized allophones of |y∞, l∞, n∞, w∞, ʃ∞|. As demonstrated in 4.1, |∞| resulting from |=| most often ends up as lengthening of resonance or addition of |y|, |w| or |ə|, but can also become glottalization. Initial |=| of some suffixes must at one time have become linked to resonant glottalization to the exclusion of other phonetic options. One can only speculate why this happened. It could be correlated with the genesis in North Wakashan of the opposition between plain and glottalized among what were to become resonants and lenis plosives. Let's call this the phonemicization hypothesis.

4.2.1 Special Cases

A few KW cases are attested in which |+| does more than changing a fricative into a glottalized resonant. The glottalized resonant may become separated by /ə/ from a following obstruent (see the below examples 1 and 2) or end up preceded by /i/ or /u/ rather than morphophonemically regular /ɪ/ or /ʊ/ (examples 3 and 4).

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Example 1 with {λhǰw-} 'stand upright, stick up' and {-+s} '(on) ground outside'. {λhǰw-+s} 'tree, etc.' regularly gives {λhw-s} > HA /laŋs/ (with automatic murmur vowel between /w/ and /s/). In HE/OO, {λhw-s} > {λhw-s} > OO /laús/ HE /laús/; this regression of glottalization is the usual HE/OO way of disposing morphophonemically of a glottalized resonant occurring before an obstruent or word-finally and preceded by a plain resonant (|h| in this example) that in its turn is preceded by obstruent, glottalized resonant or initial plain resonant (|λ| in this example). KW sometimes also applies regression of glottalization but standardly it leaves the glottalized resonant alone which therefore becomes a vocalic one occurring as it does before an obstruent, in this particular example with subsequent monophthongization of /aù/. Thus, KW {λhw-s} > */laús/ > /laôs/. What makes this example special is that Boas (1947:329) mentions that the Blunden Harbour dialect used /laŋəs/ instead of /laôs/.

Example 2 with {kʷnxʷ-} 'rumbling/loud noise' and {-+ghǰ} 'sudden noise' is from Lincoln (n.d.). KW {kʷnxʷ-+ghǰ} 'clap of thunder' gives not only regular /kʷnǰgʷǰ/ but also /kʷnǰgʷǰ/.

Example 3 with {hyǰ-} 'right/proper' and {-+s}. {hyǰ-+s} 'right/proper on ground outside' > {hyǰ-s} > HA /hiǰs/ (with predictable murmur vowel between /ǰ/ and /s/). In HE/OO regression of glottalization takes place (as in example 1) so {hyǰ-s} > {hyǰ-s} > HE /hiǰs/ OO /hiǰs/. One would expect the corresponding KW word to be */hiǰs/ or, if KW applied regression of glottalization, */hiǰs/ but neither is attested. What is attested is KW /hiǰs/.

Example 4 with {bwǰ-} 'swelling, bulging', {-+ǰsd} '(at) rear, etc.' and {-αǰ} 'instance of'. One would expect KW {bwǰ-+ǰsd-αǰ} 'musk bag of mink' to give {bwǰ-ǰsd-αǰ} > */buǰǰsdǰ/. The attested form is /buǰǰsdǰ/.⁵

⁵ |αǰ| occurs as (1) a suffix-like word extender with no stable meaning, as in this example; (2) a suffix meaning 'in/on/onto the surface of the water, etc.' and (3) at the end of some suffixes, e.g. KW {-yŋαǰ} 'on forehead, etc.' Its phonetic variation is somewhat complex in all isolects but particularly in KW; let it here suffice to mention that in KW it may surface as /aǰ/ and /ǰ/ and that this /ǰ/ is pronounced [ɛʔ] or, especially outside accent, [eʔ] or [iʔ]. In the case of /vǰ/ (as in KW /pǰvǰ/ 'halibut') there is still more free variation because it can not only be pronounced [Λwɛʔ, Λwɛʔ Λwiʔ], but also [ɔʔi, ɔʔy, ɔʔyi], cf. Lincoln (n.d.), Boas (n.d.: 126).

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A proponent of the catalyst hypothesis could argue that /ə/ in examples 1 and 2 and /i, u/ rather than /ɪ, ʊ/ occurring in examples 3 and 4 are traces of |∞|. The reasoning is that |+| coalesces with a fricative into |y∞ḥ, l∞ḥ, n∞ḥ, w∞ḥ, w∞ḥ, ʃ∞ḥ| but in these examples |∞| doesn't just disappear after making the glottal stop coalesce with a plain resonant, it leaves a ghost in the form of /ə/ or, if |y| or |w| preceded the fricative, in the form of |y| > /i/ and |w| > /u/. A proponent of the phonemicisation hypothesis would agree with the diagnosis that /ə/ and the occurrence of /i, u/ rather than /ɪ, ʊ/ are traces of |∞| but say they are due to hesitation between |+| and |=|. For example, KW /λawəs/ represents hesitation between *{λhǎw-s} > {λhw∞-s} > /λawəs/ and {λhǎw-s} > {λhẉ-s}. The reader is reminded that *{λhǎw-s} > {λhw∞-s} > /λawəs/ parallels {g̣wył-ḳw} > {g̣wyl∞-ḳw} > KW /g̣wıləḳw/ in example 7 of 4.1. Similarly, KW /hiłs/ in example 3 could be a blend of */hiləs/ and */hiłs/.

It is unknown if the above special cases triggered a search for more examples when first recorded. Perhaps alternation between e.g. KW /ḳẉṇg̣ẉał/ and /ḳẉṇẉəg̣ał/ or between KW */hiłs/, */hiłs/ and /hiłs/ was once common but we may never know.

4.3 |=| and |+| after a Single Plain Resonant

|=| and |+| usually both have the effect of glottalizing a single stem-final plain resonant, "single" meaning "not preceded by another non-initial plain resonant." Compare (1) {gy=-zw-d} > {g̣y-zw-d} > HE /giz'ut/ OO /gizut/ HA /giz'ud/ KW /gizud/ 'place sth. on a small surface' (with {gy-} 'located somewhere', {-zw} 'flat surface, etc.' and the transitivity marker {-d}) and (2) {gy-s-h} 'place sth. on the ground outside' > {g̣y-s-h} > HE /gisá/ OO/KW /gisa/ HA /gis'a/. In a few examples, however, instead of glottalization there is duplication (phonetically lengthening, see 2.6) of the plain resonant, or addition of |y|, phenomena indicative of |∞| (see 4.1).

Example 1 with {ǎw-} 'splitting of wood' and {-ḳw} (see example 1 in 4.1). {ǎw=ḳw} > {ǎw∞-ḳw} > {ǎww-ḳw} > OO/HA /ǎuuḳw/ KW /ǎuḳw/ '(wood) split evenly'.

Example 2 with {q̣h-} 'knowledge, news heard' and {-ł} 'affected by'. It shows a mixture of effects of |=|. {q̣h=ł} > (1) HE/OO/KW {q̣h-ł} > HE /q̣ał/(with low tone) OO/KW /q̣ał/ but (2) HA {q̣h∞-ł} > {q̣hh-ł} = /q̣aał/.

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Example 3 with {ǰh-} 'outlying' and {-+s} '(on) ground outside'. HA {ǰh-+s} > {ǰh∞-s} > {ǰhh-s} = /ǰaas/ 'outside the house'.

Example 4 with {yw-} 'wind, etc.' and {-nḥkʷlh} 'gradual development'. {yw=-nḥkʷlh} 'wind rising gradually' > (1) {yṵ-nḥkʷlh} > HE /yuṵákʷlá/ OO/KW /yuṵ'akʷla/ but also (2) {yw∞-nḥkʷlh} > OO /yuunákʷla/ and /yuiṵakʷla/. The KW counterpart to the latter is /yuiṵakʷla/ (listed only in Lincoln (n.d.)). See also example 13 in 4.1.

4.4 The Heterogeneity of the effects of |%|, |=|, |+|

The pioneer of North Wakashan studies, Franz Boas, was aware of the adaptives |%|, |=| and |+| (1911:430; 1947:226) but unaware of |∞|, which can be blamed on considering only KW data and not analyzing it phonemically. Believing that |=| and |%| coalesce with a fricative into just a plain resonant (e.g. |ǰʷ|=| > |w| instead of |ǰʷ|=| > |w∞|) he took it to be another case of the articulatory weakening that occurs when |=| coalesces with a fortis plosive into a plain lenis one (e.g. |qʷ|=| > |ǰʷ|). Similarly, he didn't question that |+| coalesces with a fricative into a glottalized resonant and paralleled it with |+| coalescing with a fortis plosive into a glottalized lenis one (e.g. |qʷ+| > |q̰ʷ|). He called this process hardening. A note Boas adds under his table of weakening and hardening effects (1947:226) and examples he gives on the next page of |=| and |+| after a stem not ending in a fortis plosive or fricative, indicate he was aware that |=| and |+| turn into glottal stop or glottalization in these environments but do not make clear if he believed these effects could be classed as weakening or hardening. Among his examples are KW {ṵd=-htw} > {ṵd-ḥhtw} = /ṵdāatu/ 'to have cold ear' and KW {hn-=ys-=hs} > {hn-yz-hs} = /hṵizas/ 'place where canoe is lying on the beach'.

Once the involvement of |∞| is recognized in the effect of |%|, |=| and possibly |+| on a fricative, there doesn't seem to be a single simple system in these adaptives' effects on the various possible kinds of stem-final element. They have one type of effect on a fortis plosive, another on a fricative, and a third on other stem-final elements, see the chart at the end of section 3. They may however have had a phonetically more uniform effect in an earlier stage of the North Wakashan phoneme system. A warning that today's plosives, fricatives and resonants were not necessarily

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inherited from proto-North Wakashan is provided by the case of HE /nʰwsk/ OO /nʰwstkin/ KW /nʰwəskɪ/ 'soapberries'.⁶ The term must be a loanword of unknown origin for it is hard to analyze and variants of it occur outside North Wakashan, cf. Bella Coola Salishan /nuʰwski/.

Backformation has spawned words that seem to contain a root {nʰw-} in KW, for example KW {nʰw-h} > /nʰwa/ 'to beat soapberries (to make the delicacy known as Indian ice-cream)' but a root {nqʷ-} in HE/OO, cf. {nqʷ-h} > HE /nqʷá/ OO /nqʷa/ 'to pick soapberries'. Perhaps, therefore, at the time the product and its name became popular the phonemes that were to become today's /qʷ/ and /ʰw/ were less different phonetically than their descendants and may even have been allophones of one phoneme. There are more examples of inter-isolect alternation of fortis plosive and fricative.

Lengthening and postglottalization of a vocalic element are just two of the many possible effects of |∞| in North Wakashan but it is interesting that alternation of these two phenomena in particular seems to be wide-spread geographically, allowing for the possibility of the glottalization coalescing with the next phoneme. Jacobsen (1968) reports the alternation for South Wakashan. One of his examples is the word for 'picking berries'. Using his transcriptions which employ /·/ to denote length, one isolect has /ča·yax/ but another /čaŷax/. In the latter the length feature of /a·/ has been replaced with a glottal stop that becomes the preglottalization of /ŷ/ rather than the postglottalization of a short vowel */ǎ/. Another example is the length feature in /ti·las/ 'wet spot on ground'. The length is absent in e.g. /tilis/ 'wet spot on beach'. The cause of its presence in the root allomorph /ti·l-/ is an adaptive in the suffix that is known to glottalize non-glottalized plosives, compare /tiqʷis/ 'to sit on the beach' and /tiqʷas/ 'to sit on the ground'. Powell & Woodruff Sr. (1976: 517-519) report that in Quileute the length feature of a long stressed vowel can be actualized as [h], [ʔ], [ʔ] + echo vowel or even as length of the next vowel, depending on environment.

⁶ The OO and KW transcriptions of this word in Lincoln & Rath (1980) are in error. Note further that in HE/OO after a palatal phoneme such as /k/ it has not been possible to demonstrate opposition between /i/ + /m, n, l/ and just /m, n, l/, the only exception being OO /nʰwstkin/ which the consultant pronounced with emphatic /kin/ upon hearing this writer pronounce /kɪ/. It is another indication that OO /nʰwstkin/ is of foreign origin.

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5. |∞| in the Base Form of Morphemes

5.1 |∞| at the End of Roots

A few roots consist of an obstruent or resonant followed by two plain resonants and |∞|. A case in point is the bound root {wyn∞-} 'to raid, attack, make war, challenge' as in {wyn∞-sǧmh̃} > HE /wíñsǧm̃i/ OO /wĩnsǧm̃i/ HA /winəsǧm̃i/ KW /wĩnsǧm̃ɛ/ 'to pursue in war' (with an idiomatic compound suffix {-sǧm̃əỹ} 'follow behind' and see footnote 5 on |əỹ|). In the HE/OO/KW items |∞| has become a duplicate of |n| with |nn| subsequently telescoping. For another example of this telescoping see OO {g̃wyll-k̃} > /g̃wĩlk̃/ in example 7 of 4.1. In the KW item |∞| still leaves a trace in the form of /wĩnsǧm̃ɛ/ having /in/ instead of /ɪn/. This {wyn∞-} and several other root forms ending in |∞| have alternants ending in |h|, cf. the free form {wynh-} > HE /wíná/ OO/KW /wina/ HA /win'a/ 'war, attack, fight, a fighter, etc.' and KW {wynh-+h̃xsm̃} > /winah̃xsm̃/ 'warrior's wife'. Another example of root-final |∞| is {t̃wm∞-} which is attested only in KW /t̃wm̃/ and its regularized form /t̃wm̃/ 'to belch, to have an aftertaste of grease'. Boas (n.d.:407) lists both word forms but unfortunately neither could be elicited by Neville Lincoln. A root {čhw∞-} is no doubt present in KW /čau/ 'beaver' (with /au/ pronounced as in OO, i.e. as [a] juxtaposed to [u]) and its alternant /čawi/. That |∞| should surface as /i/ is no surprise because |∞| alternates with |h| which in its turn alternates with |y| within and between isolects. One example is HE {hyhx-č̃hs} > /hiáxc̃as/, a plural form of HE {hhx-č̃hs} > /háxc̃ás/ 'singing for the dancers'; the expanded root {hyhx-} could stem from {hh[h]x-} or {[h]hhx-}. Another is HE /hílig̃wĩla/ OO /hilig̃wĩla/ KW /hilag̃wĩla/ 'to hire beforehand' (from a root {hy-} augmented to HE/OO {hy[ly]-} KW {hy[lh]-} 'to hire'). In HA a yes-no question can be concluded optionally with emphatically accented /ha/ or /ya/. Klemtu HE says /p̃álahãxi/ but Bella Bella HE /p̃álayãxi/ 'the worker(s) there'. Another root ending in |∞| is KW {šhw∞-} > /šau/ 'fur seal' which rhymes with /čau/. /šau/ has a synonym /šawa/ which likely has a structure {šhw̃-h}, with {šhw̃-} resulting from {šhw∞-} while {-h} is an extender that is ubiquitous in North Wakashan and for example differentiates Klemtu HE {wyl̃-h} > /wĩla/ 'beach' from its Bella Bella HE counterpart {wyl̃-} > /wĩl̃/. That {šhw̃-} results from {šhw∞-} is similar to {t̃ỹ-} resulting from {ty∞-} in {ts- =nh̃k̃w̃lh̃} > {ty∞-nh̃k̃w̃lh̃} > KW {t̃ỹ-nh̃k̃w̃lh̃} > /tiñ'ak̃w̃la/ (see example 2 in 4.1).

5.2 |∞| Inserted in Roots

|∞| is inserted in the bound root {sms-} 'mouth' to turn it into a free form, with different formal effects in HE/OO/KW and HA. In HE/OO/KW it becomes a replica of |m|, cf. {sm[∞]s-} 'mouth' > {smms} > HE /sṁs/ OO /sṁms/ KW /sṁs/. That /ṁ/ in the HE word stems from |mm| is shown by the ineffectiveness of the deictic's lexical high tone in HE /sṁsi/ < {smms#ý} 'that-there is a mouth' (see 2.5). In the HA counterpart, |∞| glottalizes |m|, cf. {sm[∞]s-} > HA {sṁs-} > /sṁs/. The HA word happens to have automatic accent but see it shift in HA {sṁs#nwkw} > /sṁsn'ukw/ 'having a mouth'. Another example of free root creation with |∞| is {ǰnw[∞]kw-} > {ǰnwkw} > HE /ǰnwúk/ OO/HA/KW /ǰnwúk/ 'offspring' in which |∞| becomes |w| before a rounded obstruent instead of a replica of |n|. For other examples of this progressive assimilation of |∞| see examples 1, 3, 6 and 8 in 4.1. The unaugmented root {ǰnwkw-} 'offspring' occurs in e.g. {ǰnwkw-%hd} > HE /ǰngwat/ OO /ǰngwat/ HA /ǰngwad/ KW /ǰngwad/ 'to have offspring'. Instead of |∞|, |h| is used as word-forming root augment in e.g. {mn[h]k-} > HE /mṁák/ OO/HA/KW /mṁak/ 'manure'; for the unaugmented root see e.g. {mnk-ṗhlh} 'smell of manure' > HE /mṁxpálá/ OO/KW /mṁxpála/ HA /m'ṁxpála/. In the following example the causative suffix {-+lh} makes HE/OO insert |∞| in the root {mlq^w-} 'to turn, twist, fold, curl; to mull over, reminisce, remember' whereas KW doubles the root's initial element, cf. HE/OO {ml[∞]q^w-+lh} > {mllq^w-lh} > HE /mṁlq^w!a/ OO /mṁlq^w!a/ but KW {[m]mlq^w-+lh} > {hmlq^w-lh} > /hṁlq^w!a/ 'to remind'. Note the low tone of /!a/ in the HE item; it would be high if |l| weren't doubled. The dissimilation of initial |m| to /h/ in the KW item is predictable. For another example of this pattern see HA /hiuk^w/ in 4.1, example 1.

5.3 Suffix-Final |∞|

Suffixes, like roots, can end in two plain resonants plus |∞|. An example is {-yw∞} 'on forehead' (ignoring polysemy), cf. KW {qys-yw∞} > /qisiu/ '(person with) smooth shining forehead, smooth mountain', KW {qwq^w-yw∞} > /quq^wiu/ (glossed in Boas (n.d.:340) as 'round forehead' which should probably be 'lumpy forehead' and/or 'frontal bone'). In both examples |∞| becomes a replica of |w| with |ww| subsequently telescoping. That the examples have /i/ and not /u/ before /u/ is the ghost left by |∞|. Much more frequently than {-yw∞} one finds its alternants {-yw}, {-ywh} and {-yway} (see footnote 5 on |ay|). The form {-yw}, if unaffected by another suffix, gives a regular allomorph /u/ in KW, cf. {hq-yw} > KW /hqu/ (HE /hqiú/ OO /hqui/) '(having a)

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wide forehead'. Another example of a suffix with final $|\infty|$ are the members $\{-yn\infty\}$ and $\{=yn\infty\}$ of a large set of alternants also including many ending in $|h|$, e.g. $\{-ynh\}$, $\{-=ynh\}$, $\{-+ynh\}$. The meaning of the set is unknown but its examples are often names of plants, animals and their products. Thus, KW $\{\dot{h}b-yn\infty\} > /hbin/$ 'mother! (address used by children)' which alternates with $\{\dot{h}b-ynh\} > /hbina/$; HE/OO $\{k^{wt}=yn\infty\} > HE /k^{wd}in/$ OO $/k^{wd}in/$ HA/KW $\{g^{wt}=yn\infty\} > /g^{wd}in/$ 'goldeneye duck' (though the HA consultant wasn't sure of the kind of duck). The KW form $/g^{wd}in/$ is from Boas (n.d.) only; it occurs in Lincoln (n.d.) as $/g^{wd}ina/$. In case the reader is wondering, the root forms HA/KW $\{g^{wt}-\}$ and HE/OO $\{k^{wt}-\}$ probably stem from a single base form historically but the nature of that form is problematic. Mindful of the HE/OO morphophonemic rule mentioned in 3 that a plain plosive landing before any kind of obstruent or word-finally will turn into its fortis counterpart, one might posit a proto-North Wakashan base form $*\{g^{wt}-\}$ and explain the change from $*\{g^{wt}-\}$ to HE/OO $\{k^{wt}-\}$ as based on analogy to cases where this type of change occurs after actual movement of a plain plosive, as e.g. in $\{g^{ww}[g^w]g^{w\dot{y}}\} > HE /g^{w\acute{u}}k^{wg^{w\acute{y}}}/$, plural of $\{g^{ww}g^{w\dot{y}}\} > HE /g^{w\acute{u}}g^{w\acute{y}}/$ 'leg, foot'. The problem with this invocation of analogy is that there are countless examples of an all-North Wakashan rule also mentioned in 3, namely that a fortis plosive changes into its homorganic fricative if it lands before an obstruent, and that analogy to these examples should for example have changed possible proto-North Wakashan $*\{k^{ws}-\}$ 'to splash, spray, wash, bathe' into $\{x^{ws}-\}$ in all isolects but it hasn't. The attested root form is HE/OO/HA/KW $\{k^{ws}-\}$. There is therefore no way of avoiding assuming two root forms, HE/OO $\{k^{wt}-\}$ and HA/KW $\{g^{wt}-\}$, and leaving their common origin to be determined. An additional reason for positing HE/OO $\{k^{wt}-\}$ beside HA/KW $\{g^{wt}-\}$ is that in HE/OO/HA and often also KW, biphonemic roots signal reference to a plurality through an augment added before the original root and consisting of the root-initial element plus $|y|$. As the following examples show, whichever type of obstruent occurs at the beginning of the original biphonemic root, it reduplicates unmodified by $|y|$. Therefore the word form HE $/k^{w\acute{y}}k^{wd}in/$ proves that the unreduplicated HE (and OO) root is $\{k^{wt}-\}$ and not $*\{g^{wt}-\}$.

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{[g ^w y]g ^w y-h}	>	HE /g ^w í g ^w íá/	plural of {g ^w y-h} > HE /g ^w íá/ 'to awaken'
{[k ^w y]k ^w t-yn∞}	>	HE /k ^w ík ^w dín/	plural of {k ^w t-yn∞} > HE /k ^w dín/ 'goldeneye duck'
{[k ^w y]k ^w s-lh}	>	HE /k ^w ík ^w słá/	plural of {k ^w s-lh} > HE /k ^w słá/ 'spray, splash, swirl'
{[k ^w y]k ^w t-h}	>	HE /k ^w ík ^w ta/	plural of {k ^w t-h} > HE /k ^w ta/ 'sticky, to stick on'
{[x ^w y]x ^w s-lh}	>	HE /x ^w í x ^w słá/	plural of {x ^w s-lh} > HE /x ^w słá/ 'sweep/sway across etc.'

5.4 The Case of Morpheme-final |•|

Many suffixes take one form after a fortis plosive or fricative and another one elsewhere. Just one example of this is the continuative-durative suffix which, as observed in 3, takes the form of {-lh} after a fortis plosive or fricative and that of {-hlh} elsewhere. As signaled for roots in Lincoln & Rath (1980:43), sometimes an allomorph ending in a fortis plosive or a fricative is followed by what seems to be an allomorph of the wrong suffix alternant. This phenomenon was assumed to be caused by an adaptive element |•| at the end of the roots' base form. Thus, for example, we have the alternant {-hlh} of the continuative-durative suffix in HE/OO/HA {ǰ^wys•-hlh} > HE /ǰ^wísálá/ OO /ǰ^wísala/ HA /ǰ^wísala/ KW {q^wys•-hlh} > /q^wísala/ 'far away' whereas it would have been the alternant {-lh} if the root ended in just |s|. This |•| could be |∞| because (1) in HA it surfaces as /ə/ between a fricative and a suffix-initial obstruent, cf. HA {ǰ^wys•-bh} > /ǰ^wisəba/ '(on) far side of something long', and (2) it alternates with |h| and in one example |y|. ⁷

An example of the alternation with |h| is {ńx^w•-} and {ńx^wh-} 'near, close, in vicinity'. The form {ńx^w•-} occurs in e.g. HE/OO/HA/KW {ńx^w•-hlh} > {ńx^w-hlh} > HE /ńx^wálá/ OO/KW /ńx^wala/ HA /ńx^wala/ 'in the vicinity, near to, etc.'. Compare this to HE/OO/HA/KW {ńx^wh-hł-h} > HE /ńx^wála/ OO /ńx^waała/ HA /ńx^waała/ KW /ńx^wala/ 'near, close' (semantic difference with preceding example problematic). That /á/ in the HE item stems from |hh| is demonstrated by the low tones of /anu/ in e.g. HE {ńx^wh-hł-h#nw g^wh} > /ńx^wálanug^wa/ 'I am near' (for the rule see the end of 2.5).

⁷ Lincoln & Rath (1986) interprets {-s•-} in {ǰ^wys•-} and other orientational roots as a suffix and in addition replaces |•| by |ə|, though not always consistently. There is evidence that beside for example {ǰ^wys•-} there is a shorter root {ǰ^wy-} with the meaning of {ǰ^wys•-} but that {-s•-} is a suffix is problematic. It is part of a huge family of elements sharing the component |s| whose status seems to be that of submorphemic partial but awaits further study.

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There is however a complication. When $|\bullet|$ becomes $/ə/$ in HA as in the mentioned $\{\check{x}^wys\text{-}bh\} > /ḡ^wisəba/$, one would expect KW also to have $/ə/$ but it doesn't. The KW counterpart to HA $/ḡ^wisəba/$ is $/q^wisba/$, without phonetic vowel between $/s/$ and $/b/$, and its root must be a $|\bullet|$ -less alternant $\{q^wys\text{-}\}$ of the $\{q^wys\text{-}\}$ we have in KW $\{q^wys\text{-}hlh\} > /q^wisala/$. In fact the one and only available KW example in which $/ə/$ demonstrably stems from $|\bullet|$ is $\{\check{\lambda}hs\text{-}xz\dot{m}w\text{-}h\dot{y}\} > /ḡasəxz\dot{m}w\dot{e}/$ 'in front of seaside, towards fire in front' (with $\{\check{\lambda}hs\text{-}\}$ 'towards open space, seaward, etc.', $\{-xz\dot{m}w\}$ 'in front of house or body' and $\{-\dot{a}y\}$ on which latter see footnote 5). Of the thousands of North Wakashan roots a mere 33 involve $|\bullet|$ and in most cases they are sets of alternants one of which ends in $|\bullet|$ whereas the others lack $|\bullet|$ and/or end in $|h|$. A record proliferation of alternants is shown by the KW antonym of the $\{\check{\lambda}hs\text{-}\}$ just mentioned, cf. $\{\check{h}h\check{\lambda}\text{-}\}$, $\check{h}h\check{\lambda}\text{-}$, $\check{h}h\check{\lambda}y\text{-}$, $\check{h}h\check{\lambda}\text{-}$. Examples: KW $\{\check{h}h\check{\lambda}\text{-}hlh\} > /ḡaḡala/$ and $\{\check{h}h\check{\lambda}\text{-}lh\} > /ḡaḡla/$ 'away from open space, landwards, inland, etc.'; KW $\{\check{h}h\check{\lambda}y\text{-}\Delta\check{\lambda}\text{-}\dot{a}y\} > /ḡaḡiḡ\dot{e}/$ 'move landwards while on water' (with $\{-\Delta\check{\lambda}\text{-}\}$ 'moving (etc.)' and $\{-\dot{a}y\}$ 'in/on/onto surface of water'; HA counterpart is $\{\check{h}h\check{\lambda}\text{-}g\check{\lambda}\text{-}\dot{a}y\} > /ḡaḡg\check{\lambda}i/$ and $\{\check{h}h\check{\lambda}\text{-}\Delta\check{\lambda}\text{-}\dot{a}y\} > /ḡaḡḡi/$); KW $\{\check{h}h\check{\lambda}\text{-}\check{g}m\text{-}hlh\} > /ḡaḡḡmala/$ 'facing inland' (with $\{-\check{g}m\}$ '(on) face, facing, ahead, in front, etc.').⁸ The alternant ending in $|\lambda|$ is intriguing. If $|\bullet|$ equals $|\infty|$, then $|\infty|$ must have coalesced with $|\lambda|$ into $/\lambda/$ in the manner of $|\text{=}|$. Either way, pending an explanation of the alternant $\{\check{h}h\check{\lambda}\text{-}\}$ the identification of $|\bullet|$ and $|\infty|$ remains only a possibility. Another reason for caution is that $|\text{=}|$ and $|\text{+}|$ seem to coalesce with $|\bullet|$ into $|h|$. In the following examples the root is not known to have an alternant ending in $|h|$ instead of $|\bullet|$ and it is therefore safe to assume that the first suffix's adaptive is operating on $|\bullet|$. KW $\{q^wys\text{-}=\dot{y}lb\text{-}\dot{a}y\} > \{q^wysh\text{-}\dot{y}lb\text{-}\dot{a}y\} > /q^wisailb\dot{e}/$ 'distant point' (example from Lincoln (n.d.) only, with $\{-=\dot{y}lb\text{-}\}$ 'end of long thing'); HE/OO $\{\dot{w}yx\text{-}+lh\} > \{\dot{w}yxh\text{-}lh\} > \text{HE } /wixal\dot{a}/$ OO $/wixal\dot{a}/$ and HA $\{[\dot{w}]\dot{w}yx\text{-}+lh\} > \{\dot{w}w\dot{y}xh\text{-}lh\} > \{\dot{w}w\dot{y}xh\text{-}lh\} > /huixal\dot{a}/$ 'slow sb. down'. (Why HA $|\dot{w}w\dot{y}|$ changes to $|\dot{w}wy|$ is problematic but precedented, cf. HA $\{[\dot{n}]\dot{n}x^wh\text{-}\check{g}w\} > \{\dot{n}nx^wh\text{-}\check{g}w\} > /ḡnx^waḡ'u/$ 'get close together'.)

⁸ On $|\Delta|$ see the table of adaptives at the end of 3. A fifth KW alternant $\{\check{h}h\check{\lambda}h\text{-}\}$ may exist in KW $/ḡaḡabala/$ but the term's transcription has a question mark in Lincoln (n.d.) and its glosses ('go far into woods, travel close to woods, etc.') differ from those for KW $/ḡaḡbala/$ ('landward wind, wind blowing inland'), which doesn't seem correct. See Boas (n.d.:19; 1947:336, 337).

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Suffixes too can end in |•| and may like roots have alternants without |•| or ending in |h|. The root {lh-} in the following example broadly means 'to go, to reach' and the first suffix '(into) hole, pit, opening in surface'.

HE	{lh-pt•-hlh}	>	/láptálá/	'going into hole, etc.'
OO	{lh-pt•-hlh}	>	/laptala/	
HA/KW	{lh-bt•-hlh}	>	HA /l'abtala/ KW /labtala/	

HE	{lh-pth}	>	/lápta/	'go into hole, etc.'
OO	{lh-pth}	>	/lapta/	
HA/KW	{lh-bth}	>	HA /l'abta/ KW /labta/	

HA	{lh-bth-x.ḥyd}	>	/labtax.ḥid/	'first to go into hole, etc.'
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KW	{lh-bt=hs}	>	/labdas/	'place where one goes into hole'
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It is not possible to replace {-pt•-/-bt•-} before {-hlh} by {-pth/-bth} because HE *{lh-pth-hlh} would give */..ála/, not */..álá/. As shown by e.g. HE {ph-hlh} > /pála/ 'to work, worker, etc.', in spite of |hh| telescoping phonetically it blocks further high tones (see the end of 2.5). It is possible but not provable that |pt| in the HE/OO suffix stems from |bt|. The relationship between the HE/OO and HA/KW forms of the suffix is just as problematic as that between HE/OO {k^{wt}-} and HA/KW {g^{wt}-} (see the end of 5.3). That one must be careful not to jump to conclusions in this matter is brought home by the case of another suffix, HE/OO {-+ytḥ^w} HA {-+ydḥ^w} 'person or people from ...; (in HE/HA also:) geographical place, area'. It resembles HE/OO/KW {-+ynwḥ^w} HA {-+ynyḥ^w} '1. expert at, good at, doing habitually; 2. belonging to a certain tribe or place, belonging to a certain clan associated with an animal; 3. animal.' Let us just assume that the |y| - |w| alternation in the latter suffix is a reflection of |∞|. If the two suffixes are historically related not only HE/OO {-+ytḥ^w} and HA {-+ydḥ^w} but also HE/OO/HA/KW {-+yn∞ḥ^w} would have a common origin.

7. Reduplication and KW /ɹ/, /i/, /u/, /ʊ/

Reduplication of the root-initial element happens in a variety of patterns serving a variety of semantic purposes. In one pattern with usually broadly pluralizing meaning a replica of the initial element is inserted between |y| or |w| and the root-final obstruent, as in KW {^hty[^ht̚]p=kw} > /^ht̪ibk^w/, plural of {^htyp=kw} > /^ht̪ibk^w/ 'shod, wearing something on the feet'. There is a complication if the example's |^ht̪| is replaced by a resonant because its reduplicate can be vocalic (the KW default before an obstruent) or consonantal (and therefore preceded by /:/ in the phonemic word). Furthermore, if the initial resonant is plain, the reduplicate may also be plain or become glottalized, in the latter case with possible regression of the glottalization (see 4.2.1 examples 1 and 3). The various KW morphophonemic options are tabulated below using "r" as a variable ranging over the graphemes "m, n, l, y, w" while "O" represents any obstruent. Initial |h| and |^h| reduplicate idiosyncratically and are not covered. The structures in the leftmost column are the only way that, in KW, reduplication could cause |y| or |w| to occur before a resonant in vocalic position. As shown in the rightmost column, the structures' outcome contains /i/, /i̥/, /u/ or /u̥/ before a vocalic element and not /ɹ/, /ɹ̥/, /ʊ/ or /ʊ̥/.

Reduplication type	Result if reduplicate kept consonantal	Result if reduplicate vocalic
{r y/w [r] O-}	(1a) /r i/u :r O-/	(1b) /r i/u ɹ̥ O-/
{r y/w [r] O-} > {r y/w [r̥] O-}	(2a) /r i/u :r̥ O-/	(2b) /r i/u ɹ̥̥ O-/
{r y/w [r] O-} > {r y/w [r̥] O-} > {r ȳ/w̥ r O-}		(2c) /r i/u̥ ɹ̥ O-/
{r̥ y/w [r̥] O-}	(3a) /r̥ i/u :r̥ O-/	(3b) /r̥ i/u ɹ̥̥ O-/
{r̥ y/w [r̥] O-} > {r̥ ȳ/w̥ [r̥] O-}		(3c) /r̥ i/u̥ ɹ̥̥ O-/

Examples: (1a) KW {yw[y]s-+yq-lh} > /yu:y̥ciqla/ 'think of eating fish soup with a spoon' (with {yws-} 'eat with spoon', {-+yq} 'to desire, want' and the continuative-durative suffix; reduplication not pluralizing here but accompaniment of {-+yq}). (1b) KW {ny[n]l-lh} > /ni̥n̥lla/, plural

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form of {nył-lh} > /niłla/ 'telling, showing, appearing', with {nył-} 'to report, tell, reveal etc.' and the continuative-durative suffix. (2a) KW {nw[n]ł-m-hł} > {nw[ṇ]ł-m-hł} > /nu:ṇłmał/, plural form of {nwł-m-hł} > /nułmał/ 'crazy-man dancer, fool (in winter ceremonial)', with {nwł-} 'obsessed, possessed, etc.', {-m} '(on) face, head, forward, prominent, appearing a certain way, etc.' and {-hł} (meaning unknown). (2c) KW {my[m]g^wht} > {my[ṃ]g^wht} > {ṃy^wmg^wat} > /ṃi^wmg^wat/, plural form of hard to analyze {myg^wht} > /mig^wat/ 'hair seal'.⁹ (3a) KW {mw[ṃ]q^w-+q-lh} > /ṃu:ṃq̣^wq̣la/ 'mixed grey and white' with {ṃwq^w-} 'white, grey, discoloured, etc.', {-+q} 'among, between, mixed in, etc.' and the continuative-durative suffix; reduplication is not pluralizing here but triggered by {-+q}. (3b) KW {ṃy[ṃ]ł--hlh} > /ṃi^wṃłala/ 'teasing talk, talking about dead people' with root {ṃył-} 'devious, etc.' and {-+hlh} 'continuous sound of'. There is no KW example in the database for (2b) and (3c) but this doesn't mean they don't exist. KW forms with plural reduplication are not abundant in the database and systematic KW plural form elicitation would be a worthwhile project. What is certain as of this writing is that there is no KW example in which reduplication of a root-initial plain or glottalized resonant gives rise to a phonemic word with /t, i, v, ʔ/ before a vocalic resonant. We find KW /ni^włla/, for example, and not */nu^włla/. It is not clear why reduplication blocks the use of /t, i, v, ʔ/. Perhaps it is due to the association of the augmented root with the simplex one and the pronunciation of its |y| or |w|. A case, in other words, of analogy trumping morphophonemic rule.

8. Final Considerations: the KW Vowels

8.1 Inconsistent KW Prohibition on /a/ before Another Vocalic Resonant

In HE/OO/HA /a/ can be followed by another vocalic plain resonant (not a glottalized one, see 2.4) and although examples are not particularly numerous among lexical words, they are not rare. Take the 11K⁺ HE items in this writer's database of North Wakashan lexical words. They contain 60 examples of /a^w/ alone. In contrast, the 22K⁺ KW items contain only 12 examples of /a/ plus any other vocalic resonant (which can be glottalized, see 2.4). The reason for this low number is

⁹ KW /mig^wat/ is somewhat reminiscent of Halkomelem Salish /mæk^wəlqəl/ '(have) coarse hair' from a free root {mæk^w-} 'stout, thick, fat, coarse' and a suffix referring to hair, fur, fleece, wool; cf. Galloway (2009:311). Swadesh (1953:291) reports that Boas's unpublished papers contain the observation that KW /mig^wat/ resembles Chehalis Salishan /miwt/ 'seal'.

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a uniquely KW well-confirmed set of morphophonemic rules effectively prohibiting /a/ plus other vocalic resonant but with some troublesome exceptions. The rule set is as follows.

1. Non-initial |h| is elided if a morphophonemic process such as suffixation or reduplicative root augmentation causes it to occur before one of |m, ṁ, n, ṇ, l, ḷ| that is in vocalic position, such as at word end or before an obstruent. Examples: KW {lh-%nsh} > /ḷṇsa/ 'go underwater' (compare HE /láṇca/ OO /laṇca/ HA /l'aṇca/); {ḡ^whł+s} 'finished outside' > {ḡ^whłs} > KW /ḡ^włs/ (with [ɔlʔs, ɛlʔs]) but HA /ḡ^wals/ (with [ə] between /ł/ and /s/) HE /ḡ^wals/ OO /ḡ^wals/ (with [aʔals]); KW {mh[m]k-w-hlh} > /mṁkɔla/ (plural of {mhk-w-hlh} > /makɔla/ 'close together', with root {mhk-} 'close, near, next to', {-w} 'together, etc.' and the continuative-durative suffix; KW {lh[l]-bh-nd} > /lḷbṇd/ (plural of KW {lh-bh-nd} > /labṇd/ 'go to the end of sth.' (with {-bh} 'end, tip, etc.' and transitivity marker {-nd}); compare HE /lábáut/ OO /labut/ HA /lab'aud/).

2. If non-initial |h| occurs before one of |y, ṽ, w, w̃| in vocalic position, there are two options. Under accent |h| will survive as retraction or darkening of |y, ṽ, w, w̃| into /ɛ, ɛ̃, ɔ, ɔ̃/. Examples: KW {nh-%yṇhk^w} > /nɛṇak^w/ 'go home' with {nh-} (alternant of {lh-} 'go, reach' and {-%yṇhk^w} 'home, homewards, etc.' (compare HE /láiniak^w/ OO /lainak^w/ HA /l'aiṇak^w/); {lh-ṽsth} 'to go around sth.' (with {-ṽsth} 'around, etc.') > KW /lɛsta/ (compare HE /l'aista/ OO /laista/ HA /l'aisda/); {lh-wł} 'go and get/catch/obtain' (with {-wł} 'catch, obtain') > KW /lɔł/ (HE /láuł/ OO /lauł/); {łhṡ^w+s} > {łhṡ^w-s} > KW /łɔs/ 'stand upright outside, tree' (compare HE /łáús OO /łáus/ HA /ławs/ and see also example 1 in 4.2.1). Unaccented |h| before one of |y, ṽ, w, w̃| in vocalic position is elided, cf. the second |h| in KW {whyh-wł-+m} > /wayułm/ 'to really fail to obtain' (with augmented form {whyh-} of {wy-} 'to fail, come up short, etc.', {-wł} and {-+m} 'really, exclusively, only, etc.')

Yet as illustrated below, a few KW words flout these morphophonemic rules for non-initial |h| because containing /a/ (pronounced [a]) before all manner of resonants in vocalic position (as in examples 1 to 12 below) or the sequence /ɔłs/ (example 13).

Example 1. KW /maṁ/ 'bedding, blanket, bed cover'. Cognates: HE /mám/ OO /maṁ/ HA /ma:m'am/. It seems to contain the moderately productive root {mh-} 'flat, layer-like, level, etc.'

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that one has in e.g. HE/HA/KW {mh=-hbw-h} (with {-hbw} 'below, underneath, at bottom' and the extender {-h}). This {mh=-hbw-h} yields KW regular /máabɔ/ (via {mh-hbw-h}) but morphophonemically irregular HA /maḥbu'a/ and HE /mabuá/ 'bedsheet, underblanket, blanket underneath' Meaning and form of the suffix in KW /maḥ/ and cognates are uncertain. Joining the HE subject deictic {# ý} 'the one that is there' to /mám/ results in HE /mámḥi/ or its free alternant /mámi/ with no trace of the glottalization we have in the KW item. The low tone of /i/ in HE /mámi/ suggests that its /á/ results from [hh] and that the suffix therefore has the form of {-hm} or {-hm∞} in HE/OO/HA and {-hm} in KW.

Example 2. KW /λam/ 'house post' for which Boas (n.d.:421) also reports a regularized alternant /λm/. No HE/OO/HA cognates available. It seems to contain the root {λh-} 'erect, standing up, sticking out; to drive in wedge, etc.' as e.g. in OO/KW {λh-+s} > {λh-s} = OO/KW /λás/ 'standing on the ground outside (like pole or tree)'.

Example 3. KW /x^wsaḥ/ is an unanalyzable place name.

Example 4. KW /naḥ/ 'grizzly bear' is an unanalyzable term also used in HE/OO and Bella Coola Salishan. HA uses /saak/ instead. Many KW derivates have a root allomorph regularized to /nḥ-/, cf. KW {nhn-sǧm} > {nn-sǧm} = /nḥsǧm/ 'grizzly bear blanket' (with {-sǧm} 'round and/or bulky; lump(y), body, etc.'). Joining the HE subject deictic {# ý} 'the one that is there' to HE /nán/ results in HE /nánḥi/ or its free alternant /náni/ and as in example 1 the low tone of the suffix allomorph suggests the stem's /á/ results from [hh], the term thus being analyzable as {nh-hn} or {nh-hn∞}. The supposed root's meaning would be unknown. There is a root {nh-} occurring in words referring to daring and in exclamations expressing affection, pain or fear. It is speculation to assume it is the root of the grizzly bear term.

Example 5. KW /silan/ 'grandchild's spouse' is the only available example of /a/ before another vocalic element not being accented. Boas (n.d.:189) reports a regularized alternant /silana/. The alternants seem to contain a root {sył-} and a suffix {-hn∞, -hnh} but the root is unproductive. There is a root {sył-} but it means 'to snake along, to meander'; maybe it can also mean 'moving

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sideways in the family tree' but this is speculation. { $\text{--hn}\infty$ } and { --hnh } would be members of a large family of root extenders with |n| for a kernel.

Example 6. KW /t̥t̥q̥a/ is the name of a place far up Nimpkish Lake, meaning unknown; listed only in Lincoln (n.d.) but marked as non-reelicitable.

Example 7. KW /ga/|, alternant of /gala/ 'first, at first, etc.' The structure of the alternants would seem to be {ghl ∞ -} and {ghlh-} both of which have many unproblematic derivates, in the case of {ghl ∞ -} with | ∞ | becoming a replica of preceding |l|, |ll| telescoping and |h| being dropped in accordance with the KW rule stated at the beginning of this section 8, cf. KW {ghl ∞ #nwkw} > {ghll#nwkw} > /g̥lnukw/ 'belonging to ancient times, ancestors' (with {#nwkw} 'to have, etc.'). Yet occasionally |h| fails to drop from the root and for example KW {ghl ∞ -zhqw-h} > /g̥lzaqwa/ 'first to speak etc.' (with {-zhqw} 'make sound, perform' and the extender {-h}) has an alternant /gḁlzaqwa/. The forms {ghl ∞ -} and {ghlh-} occur also in HE/OO/HA, with | ∞ | becoming a replica of |l| and telescoping in HE/OO but surfacing as /ə/ in HA, cf. {ghl ∞ -g̥m} > OO /gḁlg̥m/ HA /g'aləg̥m/ 'first in rank, etc.' (personal name, in OO also name of the Creator). The counterparts to KW /g̥lzaqwa/ and /gḁlzaqwa/ are HE /g̥ḁ́lzaqwa/ OO /gḁlzaqwa/ HA /galəz'aqwa/. The HE/OO/HA counterparts to KW /ga/| and /gala/ are HE /g̥ála/ OO /gaala/ HA /g'ala/. The final low tone in the HE item and the doubling (= lengthening) of /a/ in the OO item point to a structure {ghhlh-} and how this analyzes is an unsolved problem that however need not concern us here.

Example 8. Lincoln (n.d.) lists a word meaning 'sudden sound of laughter' whose spelling is ambiguous between KW /dḁlg̥'ḁl/ and /dḁləg̥'ḁl/. It derives via {dh̥l̥-gh̥l̥} from {dh̥l̥-+gh̥l̥}, with {dh̥l̥-} 'to laugh' and {-+gh̥l̥} 'sudden noise'. Its phonemic form is no problem if it is /dḁləg̥'ḁl/ (see examples 1 and 2 in 4.2.1) but /dḁlg̥'ḁl/ is an irregularity. Regular would be */d̥lg̥'ḁl/ (with the accent by default falling on the last vocalic element if there is no vocalic plain resonant).

Example 9. KW /haida/ 'Haida person or people'.

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Example 10. KW /qast'ai/ is the vocative form of /qast/, an address used for male friend of male. It is listed only in Boas (n.d.) along with a regularized alternant /qast'ε/.

Example 11. KW /čau/ < {čhw∞-} 'beaver'. See discussion in 5.1.

Example 12. KW /šau/ < {šhw∞-} 'fur seal'. See discussion in 5.1.

Example 13. If a KW word contains a suffix ending in obstruent plus plain resonant and followed by, respectively, the extender {-h} and the suffix complex {-Δł+s} '(in) area outside', the above-stated rule governing non-initial |h| should cause the extender to leave no trace in the phonemic word. The rule is followed in KW {qhs-wstw-h-Δł+s-lh} > {qhs-wstw-h-l̥-s-lh} > /qasustɔ̌sɬa/ 'walking upwards outdoors', with {qhs-} 'to walk', {-wstw-} 'upwards'. This item is typical in that the suffix before {-h-Δł+s} ends in |w|; there is no example with another plain resonant. That the extender {-h} is part of the structure of /qasustɔ̌sɬa/ follows from the parallelism with {qhs-wstw-h-Δł=yt-lh} > {qhs-wstw-h-l̥-yt-lh} > /qasustɔ̌liɬa/ 'walking up the stairs'. Both words occur only in Lincoln (n.d.). This /qasustɔ̌sɬa/ is however also the only example in the database of the |h|-elision rule being followed with {...w-h-Δł+s}. In the other 8 available examples both Boas and Lincoln have /ɔ̌s/ instead of /v̌s/, cf. KW {ñm-čhq-wstw-h-Δł+s} > {ñm-čhq-wstw-h-l̥-s} > /ñm̥caqustɔ̌s/ 'thing that is long and rises up outdoors (e.g. a tree)'; KW {λhčw-stw-h-Δł+s} > {λhčw-stw-h-l̥-s} > /λačwstɔ̌s/ 'standing at the door outside'. These cases of /ɔ̌s/ are possibly but not likely misrecordings. Their /ɔ̌/ may be another case of analogy trumping morphophonemic rule: if {...w-h-Δł=yt} and {...w-h-Δł=ys} give /ɔ̌/, then why not also {...w-h-Δł+s}. All examples of /ɔ̌s/ could have alternants with /v̌s/.

8.2 The Inevitability of the KW Vowels

Some of the cases of /a/ = [a] followed by a vocalic element could be of foreign origin, for example KW /haida/. Or they could be dialect borrowings. Boas (1947:205) reports that the KW he describes is the dialect "spoken in the area from Fort Rupert south, and on the small islands at the entrance to Johnson Strait" and that it "has encroached considerably upon the other dialects." Among these other dialects is that of "the most northern part of Vancouver Island as far south as Newetee" and in an appendix to his KW grammar (1947:295-296) Boas provides information on

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this "Newettee dialect" (henceforth NE) that is as brief and by his own admission fragmentary as it is precious. NE had diphthongs beginning or ending in /a/ instead of KW /ε, ê, ɔ, ɔ̃/. It was, as Boas observes, more like HE/OO. And we can infer from his examples that it allowed /a/ before /m, n, ŋ, l, ɭ/. Thus, KW /xεqa/ 'to spray water out of mouth' (with root {xs-} 'spray/sprinkle' and {-%hqh} 'spread out') corresponds to NE /xɭaqa/. KW /lɔ̃ʎ/ 'to catch/obtain' corresponds to NE and OO /lauʎ/ (with /au/ = [au]). KW /qpstnd/ 'to pour sth. out of a container into a liquid (as for mixing ingredients)' (with {qp-} 'upset a vessel', {-sth} 'into liquid' and the transitivity marker {-nd}) corresponding to NE /qpstand/ (cf. OO /qɪ̃staut/ < {qp-sth-wd}).

If all cases of KW /a/ = [a] before a vocalic element were borrowings from NE or another erstwhile non-KW source they could be quarantined in the lexicon, such as by replacing their /a/ by a foreign phoneme /A/ or something. It would make it feasible, at least in theory, to reinterpret the KW vowels in terms of their underlying phonemes, as suggested in 2.4. Uncertain as the origin of most of the problematic terms is, it is prudent to decline the reinterpretation and maintain a KW phoneme system with /ε, ê, ɔ, ɔ̃/. Another reason is that the vowels, particularly /ε/ and /ɔ̃/, result from a multitude of morphophonemic configurations which makes their reinterpretation impractical. This is illustrated below for /ε/ only. For the meaning of the variables C, O, R and the adaptives |%|, |=| and |&| see the end of 3, however, O can also be the word end.

Example 1: /ε/ < */ɭa/ < {..Cy-h..}, cf. {ğy-hlh} > KW */ğɭala/ > /ğɛla/ (HE /ğɪála/ OO /ğɪala/ HA /ğɪ'ala/) 'a long time, long ago'. With root {ğy-} 'long in duration, long ago' and the continuative-durative suffix.

Example 2: /ε/ < */iħa/ < {..Ry-h..}, cf. KW {p̥l-wy-hlh} > */p̥lwyħhlh/ > /p̥lwɛla/ 'plucking out, pulling out'. With root {p̥l -} 'pinch and pull', {-wy-} 'out' and the continuative-durative suffix. The emergence of /h/ can be observed in e.g. KW {lh-wy-wd} > /lawiħud/ 'to take off' (with root {lh-} go, reach', {-wy-} and transitivity marker {-wd}). The suffix {-wy-} is the main source of examples of KW /iħ/. Main sources of /uħ/ are the suffixes {-%nw, -%hnw} 'side etc.', {-%hyw} 'implement etc.' and the alternant {-w-} of {-wy-} 'out etc.'.

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Example 3: /ε/ < */ai/ < {..Ch-yO..}, cf. KW {čh-%yk-lh} > /čɛkɭa/ 'going with the tide (like canoe drifting)'. With {čh-} 'mass of water moving, etc.'; {-%yk-} 'at the back, following, etc.' and the continuative-durative suffix.

Example 4: /ε/ < */ai/ < */ayi/ < |hy∞|, cf. {łhs-=k^w} > {łhy∞-k^w} > {łhyy-k^w} > {łhy-k^w} > KW /łɛk^w/ HE /łáik^w/ OO /łáik^w/ '(berries) preserved in oil'. |yy| after |h| telescopes because belonging to same morpheme. With root {łhs-} 'oil, grease, blubber' and {-=k^w} 'subjected to'.

Example 5: /ε/ < */ai/ < */aya/ < |hyh|, cf. KW {[ch]chk-&mwt} > {chyhx-.mwt} > /cɛx.mut/ 'remains of eating sea eggs'. With {chk-} 'to slash, mow, chop' and {-&mwt} 'trace, remains, etc.'. The boundary marker /./ ensures /m/ is consonantal although adjoining an obstruent, see 2.7. The change from |c| to |y| in this example is an instance of the reduplication-driven variation mentioned at the beginning of 3.

There is a third reason to keep the KW vowels. If for example [ε] is interpreted not as /ε/ but as */ia/, */iħa/, */ai/, */ayi/ or */aya/ depending on the morphophonemic environment, cases of phonetic [ɬya] or [aya] could not also be interpreted as /ia/ and /aya/. Yet KW has words with [ɬya] and [aya]; Boas (n.d.) often mentions they are borrowings from the NE and Koskimo dialects. For example, Boas reports (n.d.:297) that beside contemporary KW /k^wɛci/ 'chamber pot' there is a synonym from Koskimo he spells as "kwEya'ts!e" in which "Eya" is [ɬya] in KW; it is unknown how the murmur vowel "E" actually sounded in the Koskimo dialect. Of course one will interpret the synonym as /k^wiaçi/ but it means the /ε/ in /k^wɛci/ has to stay. Another example is KW /tayaq^wayak/ 'small kind of octopus' whose double occurrence of /aya/ is pronounced [aya], not [ε]. If this word is a borrowing it may be of non-North Wakashan origin because it has cognates HE /táyáq^wayax/ and HA /t'ataq^wayak/.

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