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Anticipatory and progressive vowel lowering in Interior Salish, with notes on consonant retraction

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0. INTRODUCTION. Two connected phenomena occur in the Interior Salish languages, one of vowel lowering, and one of consonant retraction. The synchronic trigger for the lowering of a vowel is the presence of a faucal or retracting element in the word. A faucal element in a suffix causes the lowering of the root vowel; a retracting element in the root causes the lowering of the suffix vowel. Some of the languages of the interior include retracted consonants in their inventories, and these correlate with lowered vowels.

This is the broad outline of the facts, elaboration of which follows in sections 1 and 2. I describe my present understanding of the details of vowel lowering and consonant retraction in each language in sections 3.1-3.8. The paper aims to bring together relevant data from all the languages of the Interior, a collation that should help sort out the connection and sequence of these phenomena, and, once the facts are all in, aid in the search for theoretical explanations.[1]

1. VOWEL LOWERING. Two such types occur: lowering of the root vowel; and lowering of the suffix vowel. Occasionally more than one vowel in a word may lower; and it may also be the case that vowel lowering occurs across word boundaries.

1.1. LOWERING OF THE ROOT VOWEL. This is long distance lowering: it takes place when some material intervenes between the root vowel and the faucal of the suffix.

1. Ka e → a; iq̓ʷéc esq̓ʷác+qən

1.2. LOWERING OF THE SUFFIX VOWEL. This is also long distance lowering: it is triggered by some roots, with intervening material between them and the vowel of the suffix:

2. Ka -mi > -má after √*pat, esənpətpə+má for expected *esənpətpəmí

[1]I thank the members of my 1998 Salish seminar for interesting and challenging discussions of these topics: Daryl Baldwin, Sandol Brinig, and Matt Hayes.

2. RETRACTED CONSONANTS AND ADJACENT VOWELS. Retracted consonants are reported in four of the languages of the Interior: Lillooet, Thompson, Shuswap, and Columbian. There are some reports that retracted consonants occur in Okanagan too. If there is widespread consonant retraction in the language then it has eluded me.[2] Retraction refers to the tongue root. I will reproduce here the brief discussion that Czaykowska-Higgins gives of retracted consonants in Columbian, and I make that suffice for my immediate purpose.

> The Columbian coronals /c s l l' n/ all have retracted counterparts [ç ʂ ɬ ɬ' ɳ]. As in Lilloet and Thompson, the unretracted fricative s and affricate c in Columbian are pronounced with tongue blade articulation and resemble [š] and [č], respectively, while retracted ʂ and ç sound "darkened". In discussing the corresponding sounds in Lillooet, van Eijk (1985) suggests that they sound velarized, and similar to Arabic emphatic coronals. It seems to me that in Columbian the "darkened" timbre of these sounds is due to uvularization rather than velarization... Unretracted l, l', and n sound just like their counterparts in English, while the corresponding retracted ɬ, ɬ', and ɳ are "darkened". Retracted ɳ rarely appears in the data and it is still uncertain to what extent /n/ is regularly retracted in retracting environments. Similarly, it is unclear whether the other coronal laterals /ɬ, ƛ/ and the coronal stops /t, ƭ/ ever undergo retraction. Czaykowska-Higgins 1990, p. 82.[3]

3. VOWEL LOWERING IN THE LANGUAGES OF THE INTERIOR.

3.1. COEUR D'ALENE. Cr has both anticipatory (root) vowel lowering, and progressive suffix vowel lowering. These phenomena have been analyzed by several investigators. Here I provide yet another survey of the accounts, intertwined with my own synthesis of the known facts.

3.1.1. ANTICIPATORY LOWERING. According to Reichard there is a regular rule that gives rise to "faucally weak" counterparts of vowels when "*before* a [post]velar or faucal whether it carries the accent or not" (209, p. 563). This comes close to being a pervasive rule of the language, but not quite. Reichard lists five "exceptions to the rule, [with] the vowel retaining its strength even before a [post]velar or faucal" (210, p. 563):

[2]I have heard some Okanagan speaker use such doublets as [šípən ~ sípən]. In the English of these same speakers the contrast /s/ /š/ is neutralized, so that, for example, English /si/ and /ši/ are homophonous. Amongst Natives jokes abound that capitalize on this areal feature, one of which, for example, plays on misunderstanding "you're passionate" for "you're passing it." I have dismissed these cases of alternation as attributable to this areal feature. Ok lacks the /s/ /š/ distinction, while English has it; speakers treat the palatalization of /š/ as a redundant optional feature of /s/. The fact that Ok /c/ has allophones [c] and [č], while /s/ is [s], probably plays a role in this, but what it is remains to be seen.

[3]Keep in mind these uncertainties, especially regarding n, in general, and when reading my comments about the Columbian data.

3. t-ʕʃʔ-ʕiʔd-eʔst rocks become hot
4. t-ʕíc̓-ʕic̓-elgʷes he is persistent
5. qfʔxʷ-qiʔxʷ Sprague, it smells and smells
6. i-t-x̌és-iʔqs he enjoys food immensely
7. ʕec-íčn'-alqʷ bowwood

Doak 1992 attempts to account for these exceptions, reporting "lack of verification" of forms 3 and 4, but based on evidence from comparable forms, concludes that these are "aberrant," and that "more data is necessary to determine whether these forms represent an as yet unrecognized process ... or are simply errors in recording" (p. 29). In addition, Doak attributes the unexpected high vowels of 5 to "stem repetition" (and not reduplication, which otherwise allows vowel-lowering)[4] typical of "relatively new introductions" into the language (p. 30); and shows that *-iʔqs* (form 6) comes from underlying *-y'qs* (and thus the form does not violate the interdiction against high vowels before faucals).[5] Forms in the work of Lawrence Nicodemus can be found that show high vowels cooccuring with faucals. Many of these can be shown to be only apparent contraventions. *i(ʔ)* and *u(ʔ)* can usually be shown to derive from their non-syllabic counterparts, as

8. hngʷiʔyqínmstxʷ you caused h/h to mature (91) **/**gʷeẏ**/** → gʷiʔ
9. miyqnílš it (dirt) turned to mud (152) **/**smayqn**/** 'mud'

u contiguous to a rounded segment is the assimilation of a (non-phonemic) transitional vowel to the rounded segment,

10. puqʷílš to spy (167)
11. sc̓áx̌ʷc̓ux̌ʷum advice (240)

but a tighter definition of the interdiction against high vowels in forms with following faucals will be required to account for forms with some prefixal *i*, for example

12. ʔicʷɛʕʷɬʕəsm he is smiling

where Doak 1992 says "the prefix *ʔic-* 'continuative' is never subject to harmony" (p. 28), but does not rule out *i* < *y*: "This surface form may reflect glide vocalization" (ibid.)[6] and for compounds,

13. ec̓iɬsqílč carnivorous, lit. he eats flesh (78)
14. čaʔm'eluʔɬx̌alx̌elexʷ toothless (35) (stress ?)

Other forms will need to be verified, for example,

swiɬčalqʷ type of pine on top of Mt Grizzly, has edible cones once every seven years (245).

[4]CVCC reduplication is otherwise unknown in the language. See, however, example 53.

[5]Doak could not elicit any word for 'bowwood', but suggests that "the form is a typo: the vowel of -ičn' normally lowers when it should, and -alqʷ normally triggers lowering. Unless the stress is incorrect also, I'd expect ʕecéčn'alqʷʷ (p.c.).

[6]See Doak's related discussion, pp. 28-33.

In sum, there are cases, or at least traces, of high vowels occurring in forms with faucals, so that the lowering process is not yet completely phonologized.

3.1.1.1. ROOT FAUCALS AND THEIR EFFECT ON (PRECEDING) ROOT VOWELS. Apart from the long-distance lowering of vowels due to (following) faucals, Doak 1992 proposes the following constraint: "there are no Coeur d'Alene roots that have a high ... vowel occurring before a faucal consonant" (p. 30), a constraint that Fitzgerald echoes: "there are no roots of the shapes **CiF* or **CuF*, where *F* represents a faucal consonant" (p. 364). Apparent counterexamples found in the works of Lawrence Nicodemus can be corrected or otherwise explained.[7] For example,

qiqʷ to root, unearth (p. 174)

is a typographical error for qigʷ;

x̌aʔyx̌íq̓m he has a big head (p. 185)

should be corrected to x̌áʔyx̌iʔq̓m (*iʔ* < *y'*)

yenúqʷ to coil suddenly (p. 307)

should be corrected to yanqʷʷ[8], and

sc̓aqʷc̓úqʷm catechism (p. 240)

should be sc̓áq̓ʷc̓uq̓ʷm (*u* < *ə*).

As I have said, I do not consider this root-internal vowel lowering the same as the suffix-triggered anticipatory vowel lowering because this latter is a long-distance phenomenon, while root-internal vowel lowering is not. However, we need to study these forms because they might give us clues about the chronology and interplay of these two vowel lowering rules, the long-distance one, and the root-internal phonotactic interdiction *iF *uF. Fitzgerald p. 367-376 discusses roots with faucal consonants in historical perspective.

To review then, the long-distance vowel lowering rule is triggered by a suffixal faucal segment. All preceding stressed and unstressed vowels, high and mid, are subject to it, with the exceptions reported. Of the Interior languages, Cr is the one that comes closest to have phonologized this rule, and as we will see, the other languages that have a similar rule can be ranked by the extent to which this rule operates.

3.1.1.2. ROOT-INTERNAL VOWEL LOWERING NOT TRIGGERED BY FAUCALS. Coeur d'Alene exhibits some instances of root vowel lowering that are not triggered by suffixal faucals. Reichard calls this phenomenon "vocalic

[7]I thank Ivy Doak and Raymond Brinkman for their help with these and other forms.

[8]Raymond Brinkman has re-elicited the form and reports that Nicodemus has "chang[ed] his mind about the ... vowel" (p.c.).

dissimilation ... used primarily for derivation" (246, p. 567). The exact function of this lowering has not been determined by either Reichard or the more recent investigators of the language.[9] Reichard had stated that "there is sufficient evidence to indicate that this process differentiates meanings" (id.), and had listed "a few" (seven) cases:

15.	puʔus foam	pɔʔɔs joke
16.	quʔuɬ be dust	qɔʔɔɬ dust flies about
17.	ƛæm be damp	ƛam make damp, dampen
18.	p'æƛ' be smooth	p'aƛ' be mushy
19.	p'ic' squeeze, push	p'ac' squirt, exert pressure by squeezing
20.	c'am' bone	c'ɔm' suck (marrow was sucked)

Other examples of vowel alternations or changes are not difficult to find in Nicodemus, and, as Doak suggests, these too have to be sorted out. A few examples should suffice to give an idea of the range of the ablaut. Of some pairs one may be a borrowing, as

21.	lᶜwlᶜútm dale (142)	loʔloʔótm valley (a Spokane word),
22.	luᶜwluᶜútm valley, dell (142)	valley, especially Spokane Valley (140)

Others may be (optional ʔ) variants of one another,

23.	uǩʷeʔlé like ... (Nii p. 290)	uǩʷaʔlá like ...

Still others may correlate with some inflectional function,

24.	ultsnfllš it is theirs (Nii p. 295)	ultsénel it belongs to him

or derivational function,

25.	p'ix" agleam	hnp'eʔxʷtʃwes it was all aglow with light (11)

Again, the point of these example is that these are cases of vowel lowering not triggered by faucals. Are there any cases of vowel lowering where the faucals are incidental to the phenomenon? What is the domain of the long-distance vowel lowering rule? The (phonological) word? A longer constituent?

3.1.1.3. OTHER LONG-DISTANCE VOWEL LOWERING. There are also cases that may not fall into the category of word-internal vowel lowering. One such is the Cr form *kʷnɛʔ*. This form can be found as "*kʷnɛʔ*, future" under "Adverbs, Conjunctions, Interjections" of Reichard 1939, p. 103; it is translated as "soon" in the same author's interlinear text (Reichard 1938, p. 698). Doak 1997 lists the form as *kʷnɛʔ* 'immediate future,' "often translated as 'soon'" (p. 186); she writes it as an independent word, and shows that it undergoes affixation as *k'ukʷənɬ* < *CVC/kʷneʔ-iyɛʔ* aug/soon-[ʔ]" in Doak 1997, p. 188. Pages 128-133 of Nicodemus are but a list of future forms, 126 such forms, where *kʷneʔ* alternates with *kʷnaʔ*. Nicodemus puts no word breaks between *kʷneʔ* and the

[9]Doak 1997 says "the ablaut data Reichard presents are interesting, but all must be verified" (p. 21), and "all possible ablaut forms must be verified in order to determine whether the root pairs are phonologically predictable variants of a single morpheme" (ibid.).

(following) verb. Of 38 instances of *kʷnaʔ*, 36 precede a faucal by two segments (the vowel is separated from the faucal by the ʔ); in the remaining two the faucal follows at a greater distance:

23.	kʷnaʔčnqʷáʔqʷeʔel I am going to speak
24.	kʷnaʔdéǩtlš They are going to walk

Of 88 instances of *kʷneʔ*, 16 occur preceding a faucal, all at a distance of two or more segments. Here I list five such examples:

25.	kʷneʔčqʷáy'mncut we will dance
26.	kʷneʔčnqʷéy'mncut I will dance, I am going to dance
27.	kʷneʔkupdéǩt you (pl) are going to walk
28.	kʷneʔčnqʷáʔqʷeʔel I am going to speak
29.	kʷneʔnmáy'ay'qnmlš They are going to dine

Note the e/a alternation in the root vowel in 25/26; note the suffixal faucal in 29 (and the absence of a root faucal).

Similar is the behavior of neʔ / naʔ 'maybe' (cf. Ni, pp. 154-157), and that of other forms.

While the examples found in Nicodemus 1975b do not consistently show this, Nicodemus 1975a does call attention to what seems to be a sandhi phenomenon of genuine vowel harmony, "REMEMBER *khwe [xʷe]* before words in e and i, but *khwa [xʷa]* before words in a, o, and u" (p 10).[10] In sum, I'd like to study in more detail the workings shown in the above cases, before I can be sure I understand the whole story.

3.1.1.4. WORD-INTERNAL VOWEL LOWERING. Here I recapitulate the details that have been discussed, and are well known through the work of Reichard, Sloat, Johnson, Doak, Bessell, Fitzgerald, and perhaps others, of the Cr rule that a faucal element in a suffix causes the lowering of root vowel(s). I also add my comments and observations. Schematically the attested changes are:

u → o
e → a
i → a
i → e

Examples of each follow, as provided by Reichard.

3.1.1.4.1. u → o (208, p. 562)

30.	púxʷ-ənts he blew on it	t-póxʷ-qənts he blew on her head
31.	e-lúp it is dried	č-lóp-qənts she dried his hair
32.	ec-kús it is curled	a-t-kós-qən his hair is curled

[10]Ray Brinkman pointed out this remark to me.

33. ʔupən ten — ópan-čt-alqʷ ten poles, trees
34. axus look for — aẋós-qən-əm he deloused
35. us — in-seʔɣ-ós-alpqʷ he got food in the wrong throat

Note that in 32 two vowels seem to have been lowered, one of them a prefix vowel. Also two vowels have been lowered in 33, and one of these is a presumably non-phonemic *ə* lowered to *a*. Reichard calls examples 34 and 35 "very exceptional" (p. 563, no. 212). With reference to 34, where we see *x* in the form without faucal and *ẋ* in the form with the faucal, Reichard says: "I think this is the stem *axus*, look for, which has taken on *ẋ* before *q*" (p. 563). Similarly, referring to 35 Reichard says that "ɣ is foreign to Coeur d'Alene but the influence of *qʷ* seems to be so strong that *ɣ* is drawn back with the vowels, becoming the velar sonant" (p. 563). I see, however, that the influence of *qʷ* is not strong enough to lower the prefix vowel i, and I see further that comparison with the form found in Nicodemus's dictionary, p. 101: hnsiʔgósalpqʷ he had a tickle in the throat, shows *i*, not *e*.

3.1.1.4.2. e → a (205, p. 562)

36. ƛ̓ékʷ-ənts he laid one down — anƛ̓ákʷ-qən it lies on top
37. léj-ənts he stabbed it — niʔláj-iʔqs-ənts he stabbed her nose
38. ekʷn he said — akóstq he answered back
39. sétč-ənts he twisted it — niʔ-sátč-iʔqs-ən crank, what twists nose
40. p̓eg̓ʷ echo — p̓ág̓ʷuʔs-qən nagger, loud talker

Forms 36 and 38 have two lowered vowels. Form 37 has two *iʔ* sequences, one of which is clearly < *y'*. Form 40, which Reichard gives as one of several examples where "one part of the complex is affected, but the other is not, or perhaps the stem does not influence the suffix" (p 566, no. 243), shows a lowered vowel as expected, and a sequence *-uʔs* which Reichard glosses 'spang', and which can be inferred as < *-w'ʔs* (see, however, ex 58, where we have *-oʔs-*).

3.1.1.4.3. i → a, e (206, p. 562)

In this group we see some examples where *i* > *a* bbefore[11] faucals AND *i* > *e* under unclear circumstances:

	i	a bbefore faucal	e
41.	uqʷíc it is warm	qʷác-qən hat, warm head	s-qʷec-úl'umxʷ California, warm land
42.	wíš-ənts he built it	a-t-wáš-alqʷ warehouse, built on long object	ec-wíš-weš there were dwellings
43.	q̓iʔnts he stuck it to it	q̓aʔ-qín cork	q̓eʔcín-əm he put moccasins on
44.	íp̓-ənts he wiped it	niʔáp̓-iʔqs-ən handkerchief	ƛ̓íp-ep̓-eneʔents he wiped his ears

The last example shows *i* > *a* bbefore faucal, then a derived form where *í* is reduplicated as *e*.

[11]Let *bbefore* stand for 'at a distance before.'

Another form, given by Reichard as one of five examples showing that "the faucally weak form of a vowel is used *before* a [post]velar or faucal whether it carries the accent or not" (p. 563, no. 209)

45. emíš one sits — a-tč̓-əméš-aʔst-qən cust. it perches on his head

shows *i* of suffix (-iʔst surface of round object) > *a* bbefore a faucal, and *i* of stem > *e* bbefore faucal. It also shows another prefixal *a*, also unclear, and a case of *e* > *ə*.

3.1.1.4.4. i → e (207, p. 562). In the group of forms that Reichard gives to show this alternation, we should distinguish some cases of *i* > *e* bbefore faucal,

46. cíš-t it is long — čéš-alqʷ he is tall
47. t-kʷínš how many — kʷénš-alqʷ how many poles

from two cases where *i* > *e*, but not bbefore faucal:

48. tč̓-íh-əməncut he turned himself toward — n'-ɛh-íčn' his back was toward, he back turned toward
49. n'-íd-us-ənts he bought it, exchanged for it — n'-ed-us-íwes-əlš they traded — cen'-ád-alqs he changed clothes[12]

In 49, furthermore, we see *i* > *a* bbefore faucal, and *i* > *e* under unclear circumstances.

3.1.1.4.5. MISCELLANEOUS. The remaining four examples where "the faucally weak form of a vowel is used *before* a [post]velar or faucal whether it carries the accent or not" (p. 563, no. 209) show the following alternations:

50. min rub — mén'-kʷp-alqʷ fire drill
51. -ip bottom — a-č̓ar-ép-qən band is around head, on jar
52. ʕiʔd become redhot — t-ʕa-ʕeʔd-íl'š-stus he caused rocks to grow redhot
53. ʕʷíʔƛ̓us he broke into a smile — ʕʷéƛ̓s-ʕʷeƛ̓-s-əm he smiled

50 and 51 show *i* > *e* bbefore faucals; 52 shows *i* > *a*, *e* under unclear circumstances; 53 shows *i* > *e*, plus a reduplicative pattern that is not supposed to be found in the language, except in neologisms.

3.1.2. Progressive lowering. A retracting property of some "stems"[13] causes the lowering of a suffix vowel as follows:

u → o
i → a
i → e

[12]The form scaan'ádal'qs a fresh set of clothing, found in Nicodemus ii, p. 100, confirms *i* > *a* before faucals.

[13]Reichard lists all such she had found. She tried to find what phonological elements contributed to or triggered the lowering, but admitted not having "been able to find a general rule for these" (p. 563).

Reichard lists 27 root/stems that have such a "progressive influence on the vowels." She notes that the facts are messy, including cases where "even the same stem may sometimes cause the changes, and in other cases it does not" (p. 563). She lists the roots with appropriate examples in sections 215-242. I repeat the examples here, rearranged to suit my purposes.[14]

	Cr	R's gloss	Ok
	pas	be astonishing (215)	√pˤs, psˤáyaʔ
54.	u > o	pəs-pəs-ól he is timid (-ul habitually)	
55.	i > a	pəs-áč-stmən I will play a trick on him (-ič deceive)	
56.	i > a	s-pəs-áya folly, error (-iyeʔ playingly)	

These examples show √pəs causing the lowering of u > o and i > a. The last example also shows e > a, and a missing word-final ʔ.

	p'ať	be mushy, pour mushy stuff (218)	√p'ˤť
57.	u > o	hin-p'ať-p'ať-os-əncót he dreamed, self-poured mushy stuff in eyes (-cut reflex.)	
58.	u > o, u > u	p'ať-oʔs-ús-əntəm he was face-mush-poured "spang", mush was poured spang into his face (o, u) (-us face)	
59.	i > e	čen-p'ať-cén-ən cement, under foot-pour mushy (-cin mouth)	
60.	i > e	hin-p'ať-p'ať-cén'-təm' mush stuff was applied to his little mouth (-cin mouth)	
61.	i > a	t-p'ať-áʔs-ənts he poured cement on rock (-iʔst round object[15])	

These examples show √p'ať causing u > o, i > e, and i > a. The problem with 57 and 58 is that in 57 both suffixes show u > o, while in 58 only one suffix has u > o. A further problem is that -oʔs, the suffix with the o, is probably not =us 'face', but a form of =iẇs 'middle', where the o(ʔ) would be the lowered syllabic w(')--something that presumably should not occur (cf. 3.1.1).

	p'ac'	squirt, hence, defecate, urinate (219)	√p'ˤc'
62.	u > o	čeɬ-his-t-p'əc'-ós-əm I will squirt him in the eye (-us eye)	
63.	i > e	s-p'əc'-əm-é·· just dung (f·· exaggeration)	

These examples show √p'ac' causing u > o, and i > e.

[14]Reichard arranged them by phonological types, believing that some labial element triggers the progressive lowering.

[15]Reichard does not show the base morpheme along with the example, but elsewhere she lists -iʔst (-aʔst, -eʔst) as a "nominal suffix" meaning surface of round object, rock (p. 602).

	ť'ap	shoot (222)	√ťˤp
64.	u > o	hin-ť'áp-ɬc'eʔ-encot-ən pineapple, what shoots self through inside (-cut reflex.)	
65.	i > e	ť'apsčént he shot (sčint people)	
		č-ť'ap-ɬnéẇ-əncexʷ (if) you shoot alongside me (-aɬniẇ alongside)	

Here we see that √ť'ap causes u > o, and i > e.

	ɬep'	mark, make welt (225)
66.	i > e	čin-ɬəp'-ɬəp'-ep'-ɛct[16] I hand-marked came to be, my hand became welted (-ičt hand)

	mul	soil, earth (228)
67.	u > o	a-məl-ól'əmxʷ soil, earth (-ul'əmxʷ ground)

	mal'	bubble (226)
68.	i > a; e > a	činiʔ-məl-p-áẇas it bubbles from in between (-iẇes between)

	mal'	heat (227)
69.	i > a	a-məl'-áčt-mən-čelis he is making us too warm (-ičt fingers[17])

	p'uɬ	apply poison ivy, be poison ivy (221)
70.	i > e	p'uɬ-əm-éc'eʔ he applied poison ivy (-ic'eʔ all over)

	p'əsaqʷ	long brittle object breaks (220)
71.	i > e	p'əsaqʷ-éẇes-šən-cexʷ thou brokest my leg (-iẇes together, apart)
but		
72.	i > i	p'əsaqʷ-íẇes-šən-cexʷ

	poʔs, puʔus foam	poʔos joke (cp. puʔus, foam)
73.	i > e	čiʔc-poʔs-cén I am joking hither (-cin mouth)

[16]Along with this form Reichard provides two examples that include the same root, but no evidence of vowel lowering:

ɬəp'-el'sčíče?ents he welted his horse (esčíče? horse)

č-ɬəp'-iʔs-ənts he surface-marked it, made mark on rock

[17]Reichards appends a [?] to the gloss.

mo?ot

74. i>a hin-mo?t-áɬc'e? it (chinkney ?) is smoking (-iɬc'e? inside)

məs masmas vile-smelling vegetable much liked by the Coeur d'Alene

75. i>a an-məs-məs-átk"e? water is full of masmas (-it use ???)

c'om suck

76. i>a ni?-c'om'-áw'es-ənts he sucked amongst (-iw'es together)

but

77. u>u c'om-čs-ən-cút he sucked his own finger (-cut reflex.)

x"əm

78. i>e x"em-éčt woodpecker, perhaps yellow hammer

ta?

79. u>o hin-ta?-qən-óps name of Grizzly, pounded on end of tail[18]

tam scorch

80. u>o tam-əncót he shorched himself (-cut reflex.)

but

81. u>u k"u?in-təm-áwes-us thou burnt eyebrow (-us eye)

82. k"u?in-təm-áwes-us thou scorched eyebrow, name of ridicule for Coyote (-iw'es together)

83. a-tám-us his face is scorched (-us face)

84. i>a ač-təm-áw'es it exists sorched on the surface -iw'es together

85. č-təm-təm-áčn' Scorched Mountain (-ičn' ridge)

86. i>e č-təm-təm-éčn' Scorched Mountain (-ičn' ridge)

t'am make damp, dampen

87. u>o t'ám-t'əm-yoye? snail, it dampens here and there back and forth (-yuye back and forth)

88. i>e t'am-elg"es-cén-əm he licked his lips (-ilg"es heart [internals ?])

[18]Reichard gives this form as an example of simultaneous progressive and regressive vowel lowering: "One example shows how strong the faucalizing tendency is for it seems to operate in both directions, progressively and regressively" (p. 563). The root √ti? 'pound' has vowel [i]; the [a] of hin-ta?-qən-óps might be interpreted as the (unstressed) variant of [i], protected by the [?] (cf. the analogous Cv-Ok phenomenon); but then cases of *Ce?*, see e.g. #43, also need to be explained. Note the analogous phenomenon in Columbian.

89. t'am-elg"es-cén-əm he licked his lips (-cin mouth)

90. i>a sye-t'am-áləmx" one who licks people (-iləmx" person)

x̌em go to live with in-laws

91. u>o x̌em-en-cót-ən he went to live with his in-laws (-cut reflex.)

ɬəl sprinkle ɬel sprinkle

92. i>e hin-ɬəl-ɬəl-éne?-entəm he was ear sprinkled (-íne? ear)

but

93. i>i hin-ɬəl-ɬəl-íne?-entəm

94. ča-ɬəl-ɬəl-íne?-entəm each lying one is ear-sprinkled over

nas wet

95. i>e a-č-nas-nas-us-čént he wets people's eyes (sčint people) (but note -us)

x"em ?

96. i>e x"em-éčt woodpecker, perhaps yellow hammer (-ičt finger, wing)

sən' san' tame

97. i>e sə-sən'-sən'-t-él'š-stus he broke it (horse) -il'š grow

yəc' yac' be tight, firm

98. i>a č-yəc'-yəc'-am-áčt-əm hold on tight (-ičt finger)

99. u>o? u-yəc'-ó··p it held firm -up ?

co?ot

100. i>a co?ot-ál'əmx" dwarf (-iləmx" person)

č'əx"

101. i>a? hin-č'əx"-č'əx"-áp-enəm' he retired (-ip bottom ?)

k"ar be yellow

102. i>a hin-k"ar-k"ar-áw'es-ən crossbills -iw'es together

pay from Fr. *Espagne*

103. u > o s-pay-óləmš Spanish -uləmš person[19]

According to Fitzgerald, "a given suffix will always have the same harmony vowel" (p. 365), but this does not appear to be so in one or two cases, viz.,

-íẇes ~ -éẇes ~ -áẇas:

104. p'əsaq"-íẇes-šən-cex" thou brokest my leg
105. p'əsaq"-éẇes-šən-cex" thou brokest my leg
106. ač-təm-áẇes it exists sorched on the surface
107. k"u?in-təm-áwes-us thou scorched eyebrow, name of ridicule for Coyote
108. ni?-c'om'-áẇes-ənts he sucked amongst
109. hin-k"ar-k"ar-áẇes-ən crossbills
110. čini?-məl-p-áẇas it bubbles from in between (-iẇes between)

-ičt ~ -ečt ~ -ačt

110. x"em-éčt woodpecker, perhaps yellow hammer
111. a-məl'-áčt-mən-čelis he is making us too warm
112. č-yəc'-yəc'-am-áčt-əm hold on tight

Finally, R. gives four sets of examples, each of a single stem with "two similar suffixes", which she takes as evidence of "derivation":

113. hin-ɬəl-ɬəl-íne?-entəm he was ear-sprinkled in, i. e. someone sprinkled water in his ear (to waken him)

cp.

114. hin-ɬəl-ɬəl-éne?-entəm "with the same literal meaning but actually meaning "he heard sprinkling of rain while he slept" (p. 567).

115. č-ɬɬ-ɬəl-éne?-entəm he was sprinkled on the ears
116. č-ɬəl-ɬəl-íne?-entəm he was sprinkled on the ears

[19]Other forms need to be studied carefully. These include stems with ɔ (mɔ?t *smoke*, c'ɔ?tsob, pɔ?s *joke*, qɔ?ɬ/qu?ɬ *dust*, cf. čin-t-qo-qɔ?ɔɬ-us with o, u); sip'ey' *be buckskin* -iy' *billowy* čin'-səp'-səp'áy'šən *I am wearing moccasins*; ablauting pairs like q'"ed *be black* q'"id *make black*, t'ec *be inherently sweet* t'ic *be sweet* (see Reichard 1935, p. 560, paragraph 198); and čap'ənál' *at least, no matter how little* (Reichard 1935, p. 564), a form that presumably shows vowel lowering, but whose base morpheme I have yet to find. Finally, Reichard gives a form šiɬ-čaɬ-tám-ụps without lowering of the ụ, but if the ụ is correctly identified with schwa, the form is normal.

cp.

117. ča-ɬəl-ɬəl-íne?-entəm (for čat-ɬəl) each one (broad surface, person lying down) is sprinkled over

118. čin-šəť-íp-ənts he set it upright in doorway

cp.

119. čin-šəť-ép threshold or that which projects in the in doorway

120. ťəq"-ťəq"-áčs-ən'cut they clapped hands (ťaq" slap but ťeq" explode, go off) (p.567).

3.2. KALISPEL. Ka has both anticipatory (root) vowel lowering, and progressive suffix vowel lowering.

3.2.1. Anticipatory lowering. Vogt reports that root vowels e and u lower to a and o respectively in the presence of a suffix with a faucal element. In the *Morphophonemics* section, paragraph 34, he explains that "The postpalatals lower *e* to *a* and *u* to *o*, but only when separated from the vowel by a consonant" (p. 19). Thus for e → a we have:

121.	iq"éc	warm	esq"ácqən	his head is warm i.e. he has a hat on
122.	ǩest	good	sǩásəlqs	moose, i.e. a good robe.

A combination of two suffixes also shows lowering of the first vowel:

-ép → -áp in the combination -ápqən:

123.	k"e?ém	he bites	k"a?ápqis	he bites his (an other onés) head off

For u → o we have

124.	iqúɬ	it is dusty	inqóɬqs	the road is dusty
125.	ťúpəm		sťópqs	thread
	he twists something into a rope			
126.	mus	four	mó(sq̓at)	four days

3.2.2. Progressive lowering. In a section he titles "Vowel Harmony," Vogt also reports that suffix vowels i and e lower to a, as follows:

> In some cases the vowels *i* and *e* of a suffix are replaced by *a*, when the stem itself contains the vowel *a*. The stem-vowel is usually lost" (19).

For *i* > *a* we have a group of examples that contain *-mí* cont.):

127. ipás he is bewildered > psáp he gets scared > cont. espəpspəmá (for espəpspəmſ)
128. nptáp the water boils > cont. esənpətpəmá (for esənpətpəmſ) "probably from a stem *pat"
129. naʔás he gets wet > cont. esənaʔsəmá (for esənaʔsəmſ)
130. ƛ'əmám he sucks, cont. esƛ'əmmá "suppose[s] a stem *ƛ'am."
131. iƛ'án it is tight > esƛ'ənpəmá it is tightening[20]

We also have

-ílš > -álš
132. sən'sánt tame > sən'sən'tuwál'š he gets tame
133. tstsálš they jubilate[21]

For *e* > *a* we have

-étkʷ > -átkʷ
134. inƛ'əlátkʷ < ƛ'at it is cold
135. nptátkʷ the water boils

-émən > -ámən
136. šəlláməm < *šall* lazy
137. esƛ'aʔcəmá they are moltiplying < **t'aʔác* ?

3.3. FLATHEAD. Egesdal 1993 is as complete a report on the phenomena under discussion as can be found. The paper asks what the synchronic and diachronic sources of vowel lowering might be, and concludes that "sometimes those vowels require a diachronic explanation; other times they allow a synchronic one" (p. 32). "Noncontiguous regressive retraction probably started as a phonetic rule ... then generalized into a long distance phonological rule... Progressive retraction apparently is a property of the root itself ... just how and why such roots then retracted a following stressed vowel, however, remains a mystery" (p. 32). The paper must be read in its entirety, and all the data studied carefully to see what in other languages corresponds to the Fl phenomena.

3.4. SHUSWAP. Sh has low(ered) root vowels of restricted occurrence; and lowered suffix vowels, triggered by retracting roots.

[20]Vogt adds that "the completive has an unexplained *o*: *c'ənóp* it gets tightened" (p. 19).

[21]Here Vogt adds that "the derived reflexive verb has an unexplained *o*: *tspəməncót* they applaud" (p. 19).

3.4.1. Low(ered) root vowels. Sh does not have the long distance anticipatory vowel lowering triggered by a suffix faucal. It has instead cases of low and lowered root vowels that fit into the system as follows. The vowel inventory includes five stressed vowels, i e a u o, and unstressed ə. Of these, i e u are "most frequent and least limited in distribution," while a o (and ʌ) "occur almost exclusively near l l' or, less often, near m ƛ (p. 22). Of the last three, ʌ is "very rare." ʌ, Kuipers adds, is "unstable, and is sometimes replaced by a or e, or has a free variant a" (p. 22).

Synchronically the language has oppositions il el al ol ul. While Kuipers deduces that

> In Shuswap, Proto-Salish *l and *r merged into l, but *r "darkened" a neighboring vowel, *al *il *ul yielding Sh. el il ul, and *ar *ir *ur yielding Sh. al el ol (p.22)

he also points out that

> The origin of a o in words not containing l < *r remains to be determined (p.22).

In sum, Sh has phonotactically and allophonically lowered root vowels; and some phonemic low root vowels of unexplained origin.

3.4.2. Progressive lowering. In sections 1.4 and 4.1 Kuipers reports that a number of roots trigger a parallel lowering of suffix vowels:

> In suffixes, e i u are replaced by a e o respectively when there suffixes are combined with certain roots (p. 22). ... Though some roots have all suffixes (in so far as recorded) in darkened form, others may have the darkened form in one and the regular form in another suffix... Sometimes both forms are possible... The "regular" form of the suffix has analogically replaced the "darkened" one in a number of cases (p. 31).

The roots and stems listed by Kuipers are:

/paƛ'	kʷl-am
c-mʌƛ'	/kʷal
c-ml-óleʔxʷ	xəp-qin
mləm-	c-xen
mlen-ƛp	xl-xal-t
mlokʷ	xl-elʼx-m
taʔ	/xʷl

tə4áne	xlapt
təxlon	xləp't
s-x-c'mɬ-os	x^{w}el-m
√cnp	x^{w}ʔal
c'al-t	sə-x^{w}y-anst
c'ls-	γl-yal-t
*c'əs-l-	wl-em
stam'	wl-aps
√sel	wl-ank
nk^{w}-	√yel/yal
√ɬaɬ'	√yelk^{w}
c-ɬac	ʔank^{w}-t
c-ɬak	k^{w}úso
k'is-t	

An example of e > a is:

-ekst > -akst

138. x^{w}əl-akst do stg. quickly

An example of u > o is:

-us > -os

139. k'əs-os ugly-looking

An example of i > e is:

-cin > cen

140. x-c'l-cén have onés mouth stung (as by acid)

3.5. THOMPSON. Thompson has some limited anticipatory vowel lowering (not long distance), and progressive vowel lowering. The account Thompson and Thompson give of the vowels of the language, is that these have troublesome characteristics and distribution. They report "primary vowels" /i e ə u/ and retracted (or lowered) vowels ị, a, ə̣, o/. Lowered vowels are "to some extent automatic variants of primary vowels. Allophony involves a complex interplay of free variation and conditioning in terms of surrounding consonants, syllable position, and stress patterns" (p. 11). Vowels "act as homorganic" to consonants as follows:

i	y
u	w
e	ʔ, h
a	ʕ
o	ʕ^{w}

Here TT provide several near minimal pairs that show contrast between /u/ and lowered /o/,

múses	feel of something
nmóces	mash something with spoon
púces	put oil and scatter feathers on someone's head
púses	rub grease on something
pó$\underline{ṣ}$	cat (also, less commonly, pús cat).

and discuss (anticipatory) vowel retraction, which I report in the next section.

3.5.1. ANTICIPATORY VOWEL LOWERING. This is limited to the following cases:

/i/ lowering to /ị/. TT report that this vowel /ị/ is "rare, appearing most commonly before /l, l'/ (< PS *r) where it takes the form [e>]" (p. 12).

141. k'ịlm cut several pieces (of buckskin, cloth, etc.)

142. eskịl' having a gap between two pieces

and that "//i// is retracted to //ị// before //l, l'// (subsequently merged with //l, l'//...). In some cases this seems to be optional, and there is variation in the forms involved:

143. eskịl' ~ eskíl' 'there is a gap between two objects'

In other cases only the retracted vowel has been recorded:[22]

144. k'ịlm cut (buckskin or cloth) (p. 40).

/ə/[23] lowering to /a/

(a) in stressed close syllables before a uvular obstruent:

[22]The allophony of this vowel is further described as follows:

"in other occurrences it is a centralized ... I>"

ṣịkəm	make a sharp, piercing (unmusical) whistle
yịp'es	press, squeeze something
yəmyịm	double rainbow (p. 12).

[23]With respect to ə̣, Thompson and Thompson say that its "status ... is different from that of the other retracted vowels. While it does in some cases supply a retracted counter-part for /ə/ (as, for example, in the suffix //-əp// INCHOATIVE, which takes the form /ə̣p/ after a retracting root...) it is more often simply a vowel of unexpected timbre. It is a serious practical difficulty to determine whether one is dealing with /ə̣/ or, alternatively, with /a/ or /o/, because in allegro speech it optionally replaces either of those sounds" (p. 21). Thompson and Thompson give the following "near minimal sets"

ʔesnk'ə̣ɬ 'dirty. muddled' : ʔeskə̣ɬ 'detached'

pmə̣p '[canoe] gains speed' : qmə́p 'get warm, heated'

145. //es/√saq// ˀes/sáq 'it is split

(b) in closed syllables after //ˤ// when another postvelar follows directly:

146. //nə/√ˤəx̌-min// nˀˤax̌-mín 'frame for working buckskin to make it pliable' (p. 40)

/e/ lowering to /a/[24]

(a) between postvelars
(b) between rounded obstruents
(c) after postvelar continuants
(d) before //z, z'// except when preceded by a prevelar
(e) optionally between labials and uvular obstruents
(f) after a labial or postvelar that does not by itself call for retraction, when there is a postvelar or //z// later in the word

Of all the cases listed above, only (f), /e/ lowering to /a/ "when there is a postvelar or //z// later in the word" is long-distance anticipatory vowel lowering. The examples given are:

147. //√péw=uɬqʷəyt > péwɬqʷyt// /péw=ɬqʷit ~ /páw=ɬqʷit 'throat is swallen'

148. //√míceˀq=eyeqʷ > mìceˀqéyqʷ// /miceˀq=áyqʷ 'he sits on a log (cf. //√xʷesít=eyeqʷ// /xʷesít=eyqʷ// and //√míceˀq=ekeˀ// /míceˀq=ekeˀ'she sits upright')

149. //s/√qéc(k)-zeˀ > sqéczeˀ// s/qác-ze 'father' (cf. /qéck 'elder brother') (p. 41-42).

3.5.2. PROGRESSIVE VOWEL LOWERING. Th stressed suffixes that follow a retracting root have a retracted vowel, except when before y. Here is TT's account of the process:

> After a root containing //ḷ, ḷ'// or //ạ//, an immediately following stressed vowel (except //i//) is replaced by its retracted counterpart unless it is in turn followed by //y, y'//. (In that syllable postvocalic //s// is also optionally retracted to /ṣ/; //c// would presumably behave similarly, but examples are lacking.)
>
> //nə/√k'ạɬ=us:-n-t-es > nə/√k'ạɬósntes// n/k'ạɬós-e-s// 'he smears the window', //√k'əḷ-əme > k'əḷóme// /k'l-ạm 'she cuts (something)', //nə/√k'ạḷ=us-əme > nək'ạḷósəme// n/k'l=ós-m 'she cuts out a pattern', //pạm-əp > pạmạp// /pm-óp 'it speeds up', //ˀes/√çạm-eleˀ=xən > ˀesçạmáleˀxən// ˀes/çm-áleˀ=xn 'he has feet smeared with dirt'
>
> BUT
>
> //kʷ[ˀ]aḷ=uyəm'xʷ// /kʷa[ˀ]ḷ=úym'xʷ 'earth begins to turn green [with plants growing] (p.31).

[24]TT say that contrast between /e/ and lowered /a/ is not common, but a is common, and is "often very difficult to decide which phoneme [whether a or e] is represented by individual renditions. This of course relates to the fact that in the very recent past all these vowels represented a single phoneme" (p. 16).

3.6. LILLOOET. van Eijk describes Lillooet as having four retracted consonants and four retracted vowels. Retracted phonemes are symbolized with subscript dots, and are the counterparts of l, l', c, s; a, i, u, ə. van Ejik explains that "retraction is basically velarization with concomitant tensing" (p. 3). While /a i u ə/ are "broadly [ɛ e o ə]", the retracted counterparts are [a ɛ/e ɔ ʌ]. As van Eijk points out, "a and ị overlap phonetically in [ɛ]" (p. 3). vE says that "in most roots where retraction occurs, it is characteristic of all phonemes that are susceptible to it" (p. 3). There are "certain suffixes" whose (plain) phonemes are replaced by their retracted counterparts "when these follow retracted roots" (p. 3).

3.6.1. ANTICIPATORY VOWEL LOWERING. There seem to be no cases of long-distance anticipatory vowel lowering in the language. However, under the rubric of vowel lowering we might subsume the series of neutralizations between retracted and non-retracted phonemes that vE discusses in 1.8.2. The opposition of retracted and non-retracted vowels is neutralized before uvulars, so that non-retracted vowels before uvulars are like retracted vowels elsewhere. As already stated, this neutralization, or lowering of vowels before uvulars, obtains only in that immediate environment, because when, "as a result of consonant reduplication ... [the plain vowel] is not immediately followed by [a uvular] any more", the "normal variant" of the plain vowel appears.

In the same section vE explains that retracted vowels do not occur adjacent to non-retracted correlates of retracted consonants (l, l', c, s), nor do plain vowels occur adjacent to retracted consonants, except for i following a retracted consonant followed in turn by a non-retracted correlate of retracted consonants, e. g. kʷḷiˀ green, yellow. Other cases of retracted consonants not adjacent to retracted vowels "are rare but do occur, e.g. ṣtụt cricket, ç'óm'çm'əqʷ to get mired, "with the second ç not adjacent to V̧" (p. 9). "V̧ Ç remain as such also when they become separated from each other by" any other consonant, e.g. √ƛ'aḷ to bite > s-ƛ'ạ́ƛ'ạḷ'-s to carry in one's mouth. Retracted vowels between non-retracted and non-uvular consonants "retain [their] retraction also in reduplicated forms, e.g., √ɬụt to squash a bug > ɬụ́ɬt-ən to squash it well" (p. 9).

Finally, "there is no *ÇVQ[25] or *QV̧T[26] (except for [the hapaxlegomenon] QạT, in qạmḷạ́ˀ young, newly hatched fish...). Moreover *QịÇ does not occur, while other cases of QVÇ, such as qạḷ 'bad,' are rare. Neither do we have *CVQ... Hence, uvulars and retracted phonemes tend to exclude each other" (p. 9).

3.6.2. PROGRESSIVE VOWEL LOWERING. van Eijk lists four types of "retracted roots":

(1) Roots where retraction affects all phonemes that take part in the retraction correlation, e.g., qạḷ bad, √ṣạḷ 'to drip in a string (like syrup),' √ḷạṣ 'to cave in.'

(2) Roots where retraction is only partially applied. Here belong a fairly large number of cases Çi.., e.g., √c'ḷip' 'to pinch,' √kḷip' 'curly,' wạḷịk' 'sound made by frogs,' mạḷịn-ɬəp 'balsam fir.'

[25]Q = uvular consonant.

[26]T = any non retracted, non-uvular consonant.

(3) Roots with a retracted vowel and with ... consonants that do not take part in the retraction correlation, e.g., √ɬʊt 'to squash smt. soft (esp. a bug),' √pəm 'fast.'

(4) One root that consists of neutral consonants but acts as a root with retraction: c̓n̓-qɬus-əm 'to take aim.

As one finds in the other languages, the lowering of suffix vowel(s) in Li. is erratic. vE states that "as a rule, retracted roots require retracted phonemes in lexical suffixes and in certain transitivizing and intransitivizing suffixes..." (p. 29). The progressive lowering is restricted to the (first) suffix vowel following a "retracted" root (contrast this with the Cm case, where more than one vowel can be lowered). Such expected lowering is present in

150. qəlwɬ'x get spoiled (qəl bad)
151. √ƛ̓alqn to bite, tr. (-an tr)
152. √ɬʊt-ʊn' to squash it, tr. (-ʊn tr)
153. k"ʊsʔ-qɬ'nup to wet one's bed (-al'nup)
154. k'l-ʊlm'əx" boundary (-ulməx" earth, land, soil)
155. n-qlqɬc̓aʔ cranky (n-...-aɬc̓aʔ inside of body)

The vowel /i/ is further restricted, in that it is "never retracted before a neutral consonant (T) in a suffix," e.g.,
156. k"l-iʔ green, yellow, k"l-it 'brass' ... k"l-ɬc̓aʔ 'buckskin/leather coat.

As one finds in Shuswap, "suffix retraction is not always implemented, or we have alternative forms" (p. 30):
157. pəmp-sʊ́t ~ pəmp-sút to run on without being able to stop (-sút out of control)

The language also shows cases of lowering of the (first) suffix vowel following a root that is not "retracted"
158. x"ic̓am-qya (-aya) see-saw
159. c̓n̓-qɬ'us-əm to take aim (-al'us eye)
160. pm-ɨmlʼəx to hurry (-ilx)

There are cases of roots with retracted material that do not conform to the canons described elsewhere, e.g.,
161. ʔqɬsəm sick
162. s-pəlx" to stick out; s-pəpl'əx" to stick out a little bit

There is at least one case of consonant retraction, where a (neutral) root consonant becomes retracted contiguous to a (following) suffix with retracted elements:
məkʼilʊlyaʔ sticky oil (s-mɬkʼil fish oil)

And there are some cases of s- *nominalizer* retraction.

3.7. MOSES-COLUMBIAN. Cm has anticipatory vowel lowering, progressive vowel lowering, and consonant retraction. Czaykowska-Higgins 1990 (Cz) is a treatment of "two processes, one that involves a "morphophonemic rule spreading tongue root specifications from roots onto suffixes; the other ... a late rule triggered by retracted vowels, coronals, and uvulars which spreds tongue root specifications bi-directionally" (p. 81). Cz groups the Cm data into words where a property of the root causes the lowering of suffix vowels (a morphophonemic rule); and words which contain retracted segments whose retracting feature spreads bidirectionally.[27] Cz concludes that in Cm "Progressive Harmony obligatorily retracts all ... retractable ... segments in the suffixes ... [while] the second rule of retraction ... spreads tongue root specifications both leftward (as in the case of prefixes) and righward (as in the casse of epenthetic vowels and segments following uvulars)" (p. 94).

I am not sure I understand the extent to which bidirectional retraction spreads. For example, in (4)a ṣnaɬúlmmən neither n is retracted, nor is the schwa retracted; in (5)a klɨy'ánk,[28] again, the n is not retracted; in (5)c niʔnɬslqsən neither n is retracted, nor is the first i or the ə. "Retraction is a property of the root morpheme as a whole, and not of the individual segments contained in that morpheme. If retraction were a property of individual segments ... we would expect to find roots which contained retracted vowels but no retracted coronals, or retracted coronals and no retracted vowels, or some combination of the two" (p. 85). But we should be aware of a small number of possible counterexamples (3.2) and a possible typographical error in (6c) tn̓ with unretracted n.

3.8. OKANAGAN.

3.8.1. ANTICIPATORY VOWEL LOWERING. This is sporadic, as many cases of root /i/ in the presence of suffixal faucal elements demonstrate. Note that reduplicated forms with post-vocalic faucals do not undergo vowel lowering:
164. q̓ix̌+q̓əx̌+t stingy.
so that it is only the suffixal faucal material that triggers the lowering of the root vowel. Note further that weak (unstressed) roots do not show any effect of faucal elements in the suffix(es):

[27]Cz makes the observation that, while the rubric back consonants is meant to include uvular and pharyngeal segments, the effect of pharyngeals on adjacent vowels is different from that of uvulars: /i/ and /u/ are "slightly lower and more back than normal ... /ə/ becomes [a] and /ɑ/ is slightly fronted (but only when followed by /ʕ, ʕ'/; vowels also take on a creaky quality in the environment of pharyngeals" (p. 82). The effect of pharyngeals on coronal consonants is also peculiar in that "coronal consonants do not become fully retracted when adjacent to pharyngeals, although it may be the case that they retract slightly" (p. 82). This may suggest that coronal consonant retraction is a consequence of lowered vowels--and historically follows vowel lowering.

[28]The copy of the paper I have actually has klɨy'ánk, but the pertinent discussion leads me to believe the a is meant to be retracted.

165. mƛ̓=ax̌n paint arm
166. mƛ̓=áya?+qn paint head
167. mƛ̓=aqs-m paint nose
168. mƛ̓+p=u?sq-m[29] paint lips
169. q̓ʷ'iɬt pack n+q̓ʷəɬt+sqáx̌a?+tn pack horses

3.8.1.1. Cases of ablauting roots due to faucal elements in subsequent morphological material.
sílxʷa? big sg.
170. n+səlxʷa?+ɬtkʷ ocean
171. k+sálxʷa?+qn Bald Mountain (place name)
k̓ʷixʷ+xʷ come untied
172. k̓ʷixʷ+kn+nt take the saddle off
173. t+k̓ʷáxʷ+xʷ+lq̓ʷ come loose, eg. arrow point
174. (see also k̓ʷəxʷ+k̓ʷxʷáp snake)
k̓ʷin take
175. s+k̓ʷan+x̌n one kidnapped
?ip̓ wipe
176. s+n+?ap̓=qs+tn nose wiper
177. s+n+?ap̓=x̌n+tn arm pit wiper
178. n+?ap̓=qn-m wipe head
179. (s+)n+?ap̓=qn+tn head wiper

All these forms based on ?ip̓ contrast with the following, where there is no faucal suffixal element, and no anticipatory vowel lowering:
180. s+n+?ip̓=ps+tn rear-end wiper, toilet paper
181. s+n+?ip̓=kst+(t)n hand wiper
182. s+n+?ip̓=s-m wipe eye/face/window
183. s+n+?íp̓=xn+tn foot wiper
184. ?ip̓=xn-m wipe foot

Of special interest is a lexicalized form that, in competition with a regularly lowered vowel, shows vowel lowering even though the faucal suffixal element is not present:
185. sən?áp̓əp̓stən kleenex

[29]The make-up of this form is unclear.

There is at least one example of an ablauting suffix due to faucal element in subsequent morphological material
-iw̓s
186. -áw̓s+qn top of head

3.8.1.2. Not all roots participate in the a-lowering process:
p̓ic̓ squeeze
187. p̓ic̓=qs-əm squeeze nose
c̓iw wash
188. n+c̓iw=qn+tn head washer
189. n+c̓iw=ps+tn bottom washer
sic new
190. si+sc+lqʷ+m honeymoon
q̓il+t sick
191. kən_q̓il+qn I have a headache

3.8.2. Here I subsume four cases of /a/ lowering not attributable to faucal elements in the suffix.
3.8.2.1. /a/ as lexically determined variant of /i/. There are cases of lexical variants i ~ a. Because all cases of /i/ /a/ ablaut in suffixes can be interpreted as root-triggered vowel lowering, these will be treated below, and the only examples given here are of /i/ ~ /a/ root vowel alternations.
192. kmix ~ kmax
193. pickɬ ~ packɬ
194. unɬxʷ ~ unáxʷ
195. cq̓ílən ~ cq̓álən
196. k̓ʷm'iɬ ~ k̓ʷm'aɬ

3.8.2.2. Many cases of /a/ are not the result of faucal-triggered lowering, but are examples of ablauting pairs /i/ /a/ with unsystematic meaning change:[30]
qíc+əlx run
197. cqác+əlx one runs
The same root, as well as other roots, do so ablaut in conjunction with C-$_1$ *diminutive*, and other affixation and compounding:
198. qáqc+əlx trot
sqilxʷ

[30]u / i ablaut is also attested: q'ʷuc+t fat, q'ʷic+t full.

199. sqaqlxʷ little Indian
200. sqáq+laʔxʷ shadow
sil' puzzle
201. sl'+al' puzzled
202. sal'+t lost
kʷʷix̌ʷ+xʷ come untied
203. kʷʷəxʷ+kʷʷxʷá+p snake
qmi+nt lay something down
204. qm+qam+t lay around
s+c̓im' bone
205. xʷaʔ+ɬ+c̓ám' 'many bones' (place name)

There is a root that shows /i/ /a/ ablaut with pharyngeal intrusion:
n+c̓ip'+c̓p+s hold eyes shut
206. n+c̓ʕap'+s-m wink

There is a root that shows the following ablauting plural:
qʷəl+qʷíłt
207. kʷu_qʷaʔ+qʷʔál
208. nixʷ ɬə kstqʷaʔqʷʔəlmíntm[31] a nqílxʷcən we will let you know when we will have another meeting

3.8.2.3. Other /a/ lowering. Here I present cases of vowel lowering to /a/ (including vacuous/protected a) contiguous to ʔ:[32]
ʔúluʔs //ʔul+ws// gather

[31]This form shows the regular deletion of the stressed vowel in the presence of a strong suffix. The unstressed stem vowel remains, as expected.

[32]This needs further study. Montler (p.c. [reference to paper or article should eventually be available]) reports that in Klallam "one thing that happens is that stressed vowels are lowered before glottal stop: i > e, u > o, and schwa > a. This is not supposed to happen; glottal articulation is supposed to be independent of tongue position. And this doesn't happen before q or back-x, only glottal stop, and perhaps h. And it doesn't happen at all in Saanich." I should also mention that in Ok one finds such borrowings as kʷʕáta *quarter*, and m(ʕʷ)otó sheep. The intrusion of the pharyngeal (here and in hypocoristic forms) may be the realization of what is percieved as a lower(ed) variety of the Ok /a/; the [o] of the second form reflects the phonetic reality of the French word, while the intruded pharyngeal may reflect the interpretation that [o] is a lowered variety of /u/, triggered by some rule that parallels the pharyngeal movement rule otherwise present in the language.

209. ʔalu?scút crowd together
210. ʔalu?sfkst take up a collection
211. ʔalu?sfsəlp'əm gather wood
212. ʔalu?sqílxʷ people gather
sʔuɬ' dried up
213. saʔɬ'+fc̓aʔ body dries
nʔuɬxʷ //n+ʔuɬxʷ// enter
214. nʔaɬxʷítkʷ dive
ʔum name
215. k+ʔamplaʔncútmǝntǝm claim one as relative
ʔiy change (c+kʼǝɬ+ʔíy+st+xʷ you change it)
216. n+ʔíy+xn+ǝm lace shoes
217. ʔay+m+íẇs+nt cross (bless) someone
218. kʼǝɬ+ʔays+ǝlscút change of clothes
ʔip' wipe
219. n+ʔap'+nk+fc̓aʔ-tn locoweed ('wipes off inner side')
kʼǝɬʔím //kʼɬ+ʔim// wait
220. kʼǝɬʔamnwíxʷ wait for one another
ʔayx̌ʷ+t tired
221. ʔayx̌ʷ+t+áyn tiredness
222. n+ʔayxʷ+t+íls get tired
qʷǝc+qʷác+t warm
223. qʷʔac warm (weather)
224. qʷaʔc+ínaʔ warm weather
qʷʔam accustomed
225. qʷaʔm+(m)ɬ+nt-m get used to something
226. qʷaʔm+mnwíxʷ introduce somebody
227. qʷaʔ+qʷaʔm+ncút practice
228. qʷaʔm+ús broken in
qʔaʔ get stuck (in)
229. qʼaʔ+nt+ín I stuck it in
230. n+qʼaʔ+qʔ+íẇs ~ n+qʼaʔ+qʔ+áẇs 'stuck in the middle' (place name)

3.8.2.4. Affixal -a-. Roots with /ʔ/ as C_1 show plural reduplicated forms with $ʔaC_2$-:
ʔiɬn eat
231. kʷu_ʔaɬ+ʔíɬǝn we ate

ʔilxʷ+t hungry

232. kʷu_ʔal+ʔílxʷt we are hungry

ʔip' wipe

233. ʔap'+ʔíp'=s-m wipe eyes

234. s+n+ʔap'+ʔíp'=xn+tn feet wiper

235. ʔap'+ʔip'=xn-m wipe feet

236. ʔap'+ʔip'=naʔ-m wipe ears

c̓iw wash (c̓iw=s+nt+xʷ you wash it)

237. k+c̓aw+ʔíw=s+tn (face) wash basin, bar of soap

238. k+c̓aw+ʔíw=kst+(t)n hand washer

There is at least one form that includes repetitive -aʔ-

siwst drink, siwst+m+st-m give someone something to drink

239. saʔs+t̓x+ítkʷ drink soup

240. saʔst+m+sqáx̌aʔ water horse

Somewhat more common is inchoative -aʔ-

q̓ʷuc+t fat (see also q̓ʷic+t full)

241. n+q̓ʷaʔc+mí+nt-m get (someone ?) fat

sxap aired out, sx+nt+is she aired it out

242. k+saʔx+íc̓aʔ cool off

3.8.3. Progressive vowel lowering. Here I divide cases that involve pharyngeal intrusion from those that do not.

3.8.3.1. Cases of suffixes with pharyngeal intrusion.

-itkʷ → -ˤatkʷ

243. nt̓əpxʷˤátkʷ she fell in the water

-iẇs → -ˤaẇs

244. way̓ mat lkʷut iʔ təl kɬʔiʔˤáẇs. Not too far from the crest of the hill. nb25

245. sənpəpt̓ˤáẇsqən. Cap with beak. nb26

-(n)cut → -(n)cˤat

246. t̓i c̓ˤa··l iʔ c̓ˤaʔtáns cc̓əlncˤát. It's making the sound of rattle, its rattle is rattling. nb26

q̓ʷəqʷʔyˤápəlxkn.

little male sheep. may93

-wixʷ → -wˤaxʷ

247. lut ksnc̓ˤap̓sənwíxʷmp don't wink

248. lut ksnc̓əp̓sənwˤáxʷmp don't wink at one another sep93

-us → -as

249. iʔ scəcˤásənt ak̓láʔ the little stars nb09

-is → -ˤas

250. npət̓əntˤás he poured it nb09

-íc̓aʔ → -ˤác̓aʔ

251. n+q̓ʷy+q̓ʷy+ˤác̓aʔ Kamloops trout

and

252. sẇəsẇˤás baby pheasants nb09

To these examples one can add those in Mattina 1979.

There are also cases of suffixes with a and pharyngeal movement, alternating optionally with pharyngealless (and not lowered) vowel:

253. nc̓ˤap̓sənwíxʷ ~ nc̓əp̓sənwˤáxʷ

254. lut aksnc̓ˤap̓səncút ~ lut aksnc̓p̓səncˤát sep93

3.8.3.2. Progressive vowel lowering without pharyngeal intrusion:

-ip ~ -ap

255. ʔuckl̓ípəm ~ ʔuckl̓ápəm

-nwixʷ ~ -nwaxʷ

256. ctkʷənksnwíxʷəlx ~ ctkʷənksnwáxʷəlx

-iẇs ~ -aẇs

257. n+q̓aʔ+q̓ʔ+íẇs ~ n+q̓aʔ+q̓ʔ+áẇs 'stuck in the middle' (place name)

258. nt̓q̓ʷáẇsqnəms she puts it on top of her head (nb25)

259. nɬaʔq̓ʷáẇsqən top of the head appears (nb25)

-ína ʔ ~ -ánaʔ

260. c+n+təq+tq+ánaʔ deaf

261. ɬuʔn̓+ánaʔ orphan (MT dec93)

-íc̓aʔ ~ -ác̓aʔ

262. kɬ-nəqs=ác̓aʔ he has a blanket (cf. xʷíkʷ+c̓aʔ-m tan hides)

-itkʷ ~ -atkʷ

263. nsaʔp̓mnátkʷ (Similk), nsaʔp̓mnítkʷ (Pentic) water bugs that make a shell out of sand and other debris, and crawl around in creek bottoms with their legs sticking out

Cf. also

264. nq̓ʷəyátkʷ Okanagan River

-ikst ~ -akst

265. tx̌cákstməlx they made their fire pile (nb25)
266. sq̓aʔpákstəm snitch something away (nb26)
-cin ~ -can
267. n+kʷn+can sing, n+kʷn+can+m+ɬt sing somebody's song (cf. nkʷnim sing; ckʷnmist sing)
268. spaᶜm+cánəm mouth harp (nb22)

Note that in the last form the root pharyngeal remains in the root, and does not migrate.

4. Summary. All the Interior Salish languages have two kinds of vowel lowering as explained. Some of these same languages, namely the northern languages and Columbian, also have consonant retraction, the most significant type of which is the development of a (voiceless) non-palatal alveolar fricative that contrasts with an alveopalatal /s/--and without a parallel development of the affricate counterpart /c/. Such consonant retraction follows the vowel lowering. An original morphophonemic process of progressive vowel lowering might have provided the stimulus for an analogous process of anticipatory vowel lowering. While the evidence points to a set of roots in the proto-language as the trigger for the progressive vowel lowering, I see no such conditioning set of forms or homogeneous environments that trigger the various kinds of anticipatory vowel lowering. Consonant retraction, finally, seems to have been a consequence of vowel lowering, and the languages are undergoing a restructuring of their vowel and consonant systems.

References

Bessell, Nicola J. 1998. "Local and non-local consonant-vowel interaction in Interior Salish." *Phonology* 15, pp. 1-40.

Czaykowska-Higgins, Ewa 1990. "Retraction in Moses-Columbia Salish. XXV ICSL, Vancouver, pp. 81-96.

Doak, Ivy G. 1987. "Coeur d'Alene vowel harmony." XXII ICSL, Victoria.

_____. 1989. "A non-linear solution to Proto-Salish retraction." XXIV ICSL, Stailacoom, pp. 83-93.

_____. 1992. "Another look at Coeur d'Alene harmony." *International Journal of American Linguistics* Vol 58, pp. 1-35.

_____. 1997. *Coeur d'Alene grammatical relations.* PhD dissertation, The University of Texas at Austin.

Egesdal, Steve 1993. *Retracted vowels in Sélíš (Flathead).* 32nd Conference on American Indian Languages. Washington, D.C. November 17-21, 1993.

Fitzgerald, Susan 1997. "Historical aspects of Coeur d'Alene harmony." *International Journal of American Linguistics* Vol 63, pp. 362-384.

Kuipers, Aert H. 1974. *The Shuswap language. Grammar, texts, dictionary.* Mouton.

Mattina, Anthony 1979. "Pharyngeal movement in Colville and related phenomena in the Interior languages." *International Journal of American Linguistics.* Vol 45, pp. 17-24.

Nicodemus, Lawrence 1975a. *Snchitsu'umshtsn. The Coeur d'Alene language. A modern course.* Southwest Research Associates, Inc. Albuquerque.

_____ 1975b. *Snchitsu'umshtsn. The Coeur d'Alene language. Volume I. The grammar. Coeur d'Alene-English Dictionary. Volume II English-Coeur d'Alene dictionary.* University Press. Spokane, Washington.

Reichard, Gladys A. 1938. *Coeur d'Alene.* In *Handbook of American Indian Languages*, ed. by Franz Boas, 3.517-707. J. J. Augustin, Gluckstadt-Hamgurg-New York.

_____. 1939. "Stem list of the Coeur d'Alene language." *IJAL* 10, p. 92-108.

Sloat, Clarence D. 1972. "Vowel harmony in Coeur d'Alene." *International Journal of American Linguistics.* Vol 38, pp. 234-39.

_____. 1980. "Vowel alternations in Coeur d'Alene." *International Journal of American Linguistics.* Vol 46, pp. 14-20.

Thompson, L. C. and M. T. Thompson 1992. *The Thompson language. UMOPL* No. 8, Missoula.

van Eijk, Jan P. 1997. *The Lillooet language. Phonology, morphology, syntax.* University of British Columbia Press.

Vogt, Hans. 1940. *The Kalispel language.* Det Norske Videnskaps-Academi i Oslo.