PROTO-SALISH *r REVISITED

Steve Egesdal
Salish Kootenai College

M. Terry Thompson
University of Hawaii

1. Introduction. Several Interior Salish languages (Cm, Cr, Ok, Sp) have *r r'* as marginal phonemes.[1] *r* corresponds to *l* in other Salishan languages.[2] *r* is rare and occurs only as C_2 in $C_1VC_2(C_3)$ roots, where C_1 is not a uvular (*q, q', q^w, q'^{w}, χ, χ^w*) or pharyngeal (ʕ, ʕ', ʕ^w, ʕ'^{w}). Based on that occurrence, Kinkade and Thompson (1974) establish Proto-Salish **r*, following Swadesh (1952). Kuipers, van Eijk, and Timmers (1973) and Kuipers (1976, 1981, 1982) instead treat *r* as an innovation.[3] Kuipers derives *r* from PS **l* retracted as a secondary development, either by a preceding 'darkening feature' (Kuipers 1981:324) or by a preceding retracted vowel (Kuipers 1982:72). Doak (1989) more recently presents a nonlinear solution for *r*. Doak argues that a certain retractive feature ('pharyngeal node') attaches to C_2 *l*, yielding *r*. Doak and Kuipers avoid reconstructing PS **r*, primarily because *r* occurs only in C_2 position.

The change of PS **y* > Th, Li *z* presents a striking parallel to proposed PS **r* > *r, l*. We will argue that changes of PS **r* and **y* into their various reflexes both can be explained as a central resonant becoming velarized and retroflex generally, with an accompanying lateral effect in C_2 position. In C_2 position, Th, Li *z* has a lateral effect that has caused *z* to be confused with *l* or even replaced by *l*. We will argue that PS **r* similarly was velarized and had a lateral effect that caused it to be confused with *l* and replaced in some languages by *l*. Where PS **r* became *l*, that intermediate sound was misinterpreted as a lateral approximant in C_2 position (just as in one Li dialect, where PS **y* (> *z*) > C_2 *l*). Where PS **r* remained *r*, the intermediate sound lost such velarization and accompanying lateral effect (as is happening with Th *z*, where PS **y* > ƛ' > ʒ in C_2 position). Retroflexion was likely a key factor in the development of PS **y* and **r*. We also will argue that velarized PS **r* retracted preceding vowels, which contradicts Kuipers's assertion that a proto-'darkening feature' or darkened vowel retracted following PS **l* (> **l*) > *r*. Th, Li *z* in C_2 position is velarized and retracts preceding vowels, as does Cr *r*.

The details of the PS **y* > Th, Li *z* change will explain the limited distribution of PS **r* in C_2 position and how the reflexes of PS **r* may have developed. The modern reflexes of PS **y* in Th and Li dialects are shown below, followed by the reflexes of proposed PS **r* > *r, l*.

PS **y* >	C_1	C_2 /__ $C_{[+coronal]}$	C_2/ __ $C_{[-coronal]}$
Th	ʒ	ƛ' (- ʒ)	ƛ' (- ʒ)
Li_1	ʒ	y	ƛ'
Li_2	ʒ	y	l

PS **r* >	C_1	C_2
Li	l	l [ɬ]
Sh	l	ɬ, l [ɬ], l
Th	l	ɬ, l [ɬ] [ɬˠ], l
Cm	l	r [ɾ], [ɽ]
Cr	l	r [ʂ]
Fl, Ka	l	l [ɬ], [ɬˠ]
Ok	l	r [ɾ], [r]
Sp	l	r [ɾ], [ɽ]

The full implication of those reflexes and additional phonetic detail are presented below.[4] Importantly, PS **y* does not become Li *z* if PS **y* precedes a coronal (it remains *y*); PS **y* otherwise becomes Li C_1 ʒ and C_2 *l* in one Li dialect. Those distributions alone indicate that a Salish protosegment can develop differently in C_1 position vis-à-vis C_2 position. Further parallels between the PS **r* and **y* changes will unfold below.

2. Thompson and Lillooet z. The phonetic details and phonological behavior of the reflexes of PS **y* in Th, Li are relevant to the PS **r* issue. PS **y* developed into Th *z*, Li *z, y, l*. PS **y* > Th *z* in all positions; e.g., Th *zúyt* 'bulky, big around,' Ka *yúlt* id.; *sk^{w}úz* 'aunt,' Ka *sk^{w}úy* 'man's mother.' PS **y* > Li *z* in C_1, PS **y* > Li *z, l* in C_2 when not followed by a coronal consonant; PS **y* > Li *y* in C_2 when followed by a coronal consonant.[5] Compare these Li and Th forms, showing a cognate root and suffix: Li *q'áy-lax* [é] 'jump'; cf. Th *q'áz-ix* [á] 'jump' (PS **l* > Th *y*). A few Th forms sporadically show PS **y* > Th *y* before a coronal; e.g., Th *séy'·si?* 'play, but Th *səz'·sz'=ékst-m'* 'play with things' (Li *sáy'·səz'* [é] 'play'; Sh *séyse* 'play (of children'), *syéksɪn* 'toy'); Th *méyt* 'shaman cures' (Li *máyt* [é] id.); Th *qáyt* 'reach top' (Li *sqáyt* [é] 'summit'); Th *=éyn* ~ *=áyn* 'net' (Ka *=éyn* id.; Sh *=éy'n* id.), Th *cw=ázn* 'make net,' *?əc'ɣ=áyn* 'check net,' *ʕac-p=éyn* 'catch fish in stationary net.'

2.1. Thompson z. Th *z* is an apico-dental, slit spirant, velarized, with some lateral effect in C_2 position (especially before another C): [z] / [ƛ'].[6] *z* may differ, in part, from English *z* as Russian *з* differs from English *з*. Russian *з* is velarized and articulated with the tongue slightly further forward. Th *z* also is fronter (slightly more toward teeth) than English *z*, and Th *z* is velarized with a lateral effect in C_2 position,

especially so before another consonant or when laryngealized. Th *z* generally has a lesser sibilant quality than English *z*, especially in C_2 position or when laryngealized.[7] We summarize the relative phonetic shape of Th *z* as C_1 and C_2: C_1 = [z̪], C_2 / V __# = [z̪ˡ], C_2 / V __ C_3 = [ɬᶻ]; laryngealized *z'* = [ɬ̰ᶻ].[8]

Th *z* may approach an interdental articulation and can sound like *ð*.[9] Egesdal has not heard such a pronunciation, however, at Lytton (Upper Th dialect). Th *z* differs from English *ð* as it relates to the wideness of the channel (and consequently the velocity of air flow and high frequency). English *ð* is articulated with a flatter tongue, allowing a wider channel; *ð* accordingly is less sonorous than Th *z*. Th *z* is articulated with a narrower channel, is more sonorous, and has a more definite sibilant effect (especially in C_1 position). We would expect acoustic studies to show comparatively larger energy at high frequencies for Th *z* (especially in C_1 position) than for English *ð*. In C_1 position especially, Th *z* has a definite sibilant quality.

Finally, Th *z* involves some retroflexion, with some hollowing of the tongue, which gives Th *z* an *r*-like quality (cf. Thompson and Thompson 1992:8). Laurence C. Thompson, in fact, in his first fieldwork on Thompson in the 1960s transcribed Th *z* as *rᶻ*, reflecting the *r*-coloring of retroflexion. That perception of Th *z* as *r*-like further indicates the relevance of PS **y* > Th *z* to the issue of PS **r* > *r*, *l*: Th *z* can have *l*- or *r*-like qualities, and Li *z* can have an *l*-like quality and is [l] in one Li dialect (discussed immediately below). Importantly, Th *z* exhibits velarization and varying degrees of laterality (depending on syllable position or laryngealization), shows some retroflexion, and retracts preceding vowels. We will argue that PS **r* had similar qualities.

2.2. Lillooet z. Li *z* is phonetically similar to Th *z*. van Eijk (1985:4) describes Li *z*:

> Phonetically, *z z'* are lax fricatives, varying from a purely dental articulation (with the tongue-tip more forward than in English "z") to an interdental articulation (where *z z'* sound somewhat like lax variants of English "th"); the former pronunciation is generally more common in the Fountain dialect (F), the latter in the Mount Currie dialect (M); in phonetic transcriptions we use [z z'] for both F and M variants; after vowels *z'* in M allows the variant [l̪] besides [z'], e.g. [x̌əz'p x̌əl'p] "ember(s)" . . . .[10]

van Eijk (1985:15 n. 1) adds:

> The interdental articulation is also somewhat more lax than the dental one (i.e., in the interdental articulation the tongue-tip is allowed to drop from a position behind the upper teeth to a position closer to the edge of the upper teeth); occasionally, *z'* is pronounced [l'] in the position C--, or *z* is pronounced [l] (after or before vowels); the phonemes *l l'* do not allow the variants [z z'], e.g. pəl'p "lost": [pəl'p], never *[pəz'p].

van Eijk (p.c.) further explains concerning Li *z*:

> Lillooet /z z'/ are very lax dental/interdental spirants, their laxness being particularly noticeable in postvocalic position, where /z z'/ sound like [l l'], especially in the Mount Currie dialect where [l l'] are actually the preferred pronunciation.

In the Li Mount Currie dialect, then, PS C_2 **y* > *z* > *l* /__$C_{[-coronal]}$ or /__#.[11] That change shows how a central approximant in C_2 position can become velarized with an accompanying lateral effect and ultimately be reinterpreted (or misinterpreted) as a lateral approximant.[12]

2.3. Th, Li z and vowel retraction. Th *z* and Li *z* retract preceding vowels similarly. van Eijk (p.c.) explains concerning Li *z*:

> Neutralization of vowels takes place before /z z'/. In both the Fountain (F) and Mount Currie (M) dialects, /i ~ i̯/ and /ə ~ ə̯/ are neutralized and only /i/ and /ə/ occur here. /u ~ u̯/ are also neutralized here, with /u/ occurring only in F, /u̯/ only in M . . . . /a ~ a̯/ is neutralized before /z z'/ in M, where only the variants of /a̯/ are heard, but not in F.

That vowel neutralization combined with varying dialectal reflexes for postvocalic PS **y* can lead to rather different pronunciations: /x̌'laz'/ 'canoe' is [x̌'lɛz'] in the Fountain dialect, but [x̌'lal'] in the Mount Currie dialect (van Eijk, p.c.). Those Li data raise some very interesting parallels with the reflexes of PS **r* and preceding vowels. Consider these correspondences within the Spokane-Kalispel dialect continuum relative to the development of PS **y* in Li (Mount Currie dialect): Sp *er*, Ka *al* < PS **ar*; Li (F) *ez'*, Li (M) *al'* < PS **ay'*.

Neutralization of vowels also takes place before Th /z z'/. In all dialects, /i ~ i̯/ and /ə ~ ə̯/ are neutralized; only /i/ and /ə/ occur. /u ~ o/ also are neutralized, as /o/ [ɔ]. /a ~ e/ are neutralized, as /a/ [ɑ]. Put another way, /u/ > [ɔ] and /e/ > [ɑ] before Th *z*, *z'*. Th *e* also may alternate with *ɐ* [ʌ] before *z*, *z'*; e.g., *ʔézkst* ~ *ʔɐ́zkst* 'revenge'; cf. Fl *ʔéyčst* id. Th *ə* alternates with *ɐ* in a pair of roots with slightly different meanings: *ʔestáz* 'it sticks out gradually,' and *ʔestɐ́z* 'it's crooked, protrudes, sticks out a little (beyond main point of something).' The difference may reflect sound symbolism of retracted versus unretracted vowels, as discussed by van Eijk (1983:286) and Kuipers (1981:332).[13]

What is of paramount importance here is that Th, Li *z* retracts preceding vowels, not vice versa. Th Li *z* derives from a proto-consonant (PS **y*) that clearly did not retract preceding vowels. The sequence was: PS **y* retracts to Th, Li *z*, which then retracts preceding vowels. The same sequence has occurred in British English, where postvocalic *l* is velarized, and such *ɫ* then velarizes the preceding vowel (Ladefoged 1993:96). That attested sequence argues against Kuipers's position that a 'darkening feature' or darkened vowel retracted PS **l* (> **ɫ*) > *r*.

We connect retraction and retroflexion of the tongue with the lateral effect of Th *z*. Consider the description in Heffner (1969:144) of lateral *s* and *z* in Bantu languages:

> The sounds usually classed as lateral consonants are the various "L" sounds, but it must be observed that other lateral sounds occur. There are lateral [s] and [z] sounds, for example in the Bantu languages. [Note omitted.] These Bantu sounds are strongly retroflex articulations which force the breath to flow over the lateral margins of the tongue.

The retroflex articulation of Th *z* similarly forces the breath to flow over the lateral margins of the tongue, giving Th *z* a lateral effect (in postvocalic position). When Th *z* is laryngealized as *z'*, that secondary articulation also increases the lateral effect. The motivation is unclear. Perhaps greater retraction of the tongue or pharyngeal constriction exaggerates retroflexion, which, in turn, causes greater laterality of Th *z'*. Th *z'* [$\underline{\underline{z}}^{z}$], perceptually if not actually, is very difficult to distinguish from Th *l'* [$\underline{\underline{l}}$]. We learned to distinguish Th *z'* from *l'* by listening for some sibilance [^{z}] for *z'*, albeit greatly reduced relative to Th *z*.

That explanation would be consistent with the Li dialectal doublet for 'canoe,' Fountain *ƛ'lézˀ*, Mount Currie *ƛ'lálˀ*, where the more retracted phoneme is the lateral *l'* (which retracts the preceding vowel), while the less retracted phoneme is the spirant *z'* (which does not retract the preceding vowel). It may be difficult to maintain the laryngealization and a narrow channel for spirantization. Th C_2 *z* > [z^{l}] ~ [l^{z}] and Li C_2 *z* > [l] (especially Mount Currie dialect) represents a move away from a central approximant toward a lateral approximant (as would PS C_2 **r* > Th *l*). Th *l l'* and Li *l l'*, however, are never confused with *z z'*, respectively; that will be important regarding a Cm doublet and Ok (Methow) doublet showing *r'* varying with *l'* below.

3. PS *y > Th, Li z. The sequence for PS **y* > Th, Li *z* can be outlined as follows:[14]

	Change	*Position*	*Language*
1.	PS **y* > *z*	C_1	Th, Li
2.	PS **y* > *z*	C_2	Th; Li *z* varies with *y*, except before coronals, where PS **y* > *y*.[15]
3.	PS *V > $V_{[+rtr]}$	/__ *z*	Th, Li
4.	*z* loses retraction	C_1 [z]	Th, Li
5.	*z* loses retraction	C_2 [z]	Th (in progress); Li (in progress?)
6.	PS *V > $V_{[-rtr]}$	/ __ *z* [z]	Th (in progress); Li (in progress?)

Th appears further along in the PS **y* > *z* change than Li, at least as it relates to *z* generalizing to both C_1 and C_2 positions. PS **y* > *z* perhaps was a change that originated in Th and spread to Li. Th otherwise has been more innovative in terms of phonological change than Li; e.g., PS **l* > Th *y* (which had to occur after PS **y* > Th *z*), whereas PS **l* > Li *l*. We addressed the first three stages of PS **y* > Th, Li *z* above. We now discuss the last three stages.

3.1. z loses retraction (C_1). Th *z* in C_1 position has lost velarization. Such loss is confirmed by *z* no longer retracting preceding vowels in reduplicative forms. Th forms a diminutive by reduplicating (symbolized with raised dot ·) the consonant preceding the word's stressed vowel and infixing it (symbolized by square brackets [ ]) after that stressed vowel: $C_1\acute{V}C_2$ > $C_1\acute{V}[\cdot C_1]C_2$. If the reduplicated, infixed consonant is a resonant (such as *z*), it becomes secondarily laryngealized: *z* > *z'*. There are several examples of a C_1 *z* becoming infixed as *z'* in diminutives; the vowel preceding that infixed *z'* does not retract. E.g., Th *szélt* 'plate,' *széz'l't* 'little plate'; *zúmt* 'menstruate,' *zúz'm't* id. (less formal); *zúxʷesc* 'say goodbye to someone,' *zúz'xʷesc* id. (affectionate). The retracted vowels otherwise would be [ɑ] for *e* and [ɔ] for *u*.

There is one example where infixed Th [·z'] still retracts: *szi?záz'i?tn'* (from *s-zəy·zé[·z]y-tən* plus secondary laryngealization of resonants; *(ə)y'* syllabifies as *i?*) 'little things people do'; compare *szizéytn* (from *s-zəy·zéy-tən*) 'things people do.' The form *szi?záz'i?tn'* suggests that C_1 *z* has not lost fully its retraction. It alternatively might reflect a lag from the change in the consonant to a change in the neighboring vowel. Compare the effect that Russian *ʒ* and *ʃ*, velarized consonants, have on following *o*. In Russian, *o* > *i* after palatalized consonants; *o* > *a* after velarized consonants. After *ʒ* and *ʃ*, however, *o* > *i*. *ʒ* and *ʃ* still act like the palatalized consonants they once were (Ward 1965:31). Th C_1 *z* (infixed as *z'*) may be acting similarly in Th *szi?záz'i?tn'*, reflecting an earlier shape of C_1 *z*.

3.2. z loses retraction (C_2). The following examples show that Th *z* is losing velarization, and consequently its retractive effect on preceding vowels. Th *skʷóze?* ~ *skʷúze?* 'child'; *skáze?* ~ *skéze?* 'a lie'; *qʷ?áz* ~ *qʷ?éz* 'turn (black and) blue,' *xzúm* 'big,' *xzúz'm* 'a little bigger'; *spzú?* 'animal,' *spzúz'u?* 'bird.' The forms with reatracted vowels show [ʒ]; those with unretracted vowels show [z]. Many if not most examples still show a retracted vowel before z, but there are several examples showing *e* ~ *a* or *ə* [ʌ] and *u* ~ *o* [ɔ]. An example with the plural infix [ze] is perhaps of special interest in showing Th *z* has not lost its retractive effect completely in C_2 position; e.g., *sc'éxt* 'male's male in-law,' *sc'áz'ext* id. (plural). Actually, the plural infix [z'e] is not C_1 or C_2 of a root; as an infix it may act conservatively.

3.3. Vowels are not being retracted before z. The preceding two sections show generally that vowels no longer retract before Th C_1 *z* infixed as *z'* in diminutives, and that the same result is in progress before Th *z* in C_2 position.

The vowel change of PS **a* > *e* provides a special insight into the loss of retraction of Th *z*. PS **y* > Th *z* preceded PS **a* > Th *e*. PS **a* > Th *e* is not yet complete (Thompson and Thompson 1992:12;

Thompson 1979:704). That suggests that Th *z* is losing its retractive quality, allowing the PS **a* > *e* change to be realized phonetically or no longer impeding this change in progress. E.g., variants *kéze?s* [ɛ]/[a$^+$], *káze?s* [ɑ] 'he lied to her.'

Retraction of other underlying vowels (e.g., *u*) preceding Th *z* likewise is being lost. An underlying vowel may remain even though retracted phonetically: *c'úc'ɬ'c'əɬ'ɬ* 'a little sour,' *c'óɬc'əɬ* 'sour.' In that form, the diminutive infix separates *u* from the retractive effect of *ɬ'*. (*ɬ* is secondarily laryngealized because of diminutive formation.) The converse also is true; a retracting consonant may be inserted by diminutive reduplication, affecting the preceding vowel: *q^{w}əmq^{w}énɬ* 'pitiful,' *q^{w}əmq^{w}áq^{w}n'ɬ* 'a little pitiful.' Concerning Th *z*, one Th elder (Hilda Austin) says *sk^{w}óze?* [ɔ], while her younger sister (Millie Michel) says *sk^{w}úze?* [u] 'child.' The diminutive for them is *sk^{w}úk^{w}z'e?*, showing that the underlying vowel is *u*.[16] That indicates that Th *z* is losing its retractive quality, allowing /u/ to be realized as [u], instead of *o* [ɔ].

Li *z* also may be losing its retractive effect on a preceding vowel. The dialectal variation [ƛ'lɛz'] ~ [ƛ'lal'] 'canoe' suggests a change in progress: [ɛ] ~ [ɑ], where [ɛ] occurs before *z'* (a central resonant) and [ɑ] occurs before *l'* (a lateral resonant). Furthermore, Li *i* does not retract before *z*. The loss or lack *ab initio* of retraction with preceding front vowels before *z* is understandable, versus the retention of retraction with preceding back or low vowels.[17]

4. PS *y > Th, Li z parallels PS *r > r, ɬ. Together, the state of affairs in Th and Li with the development of PS **y* > Th, Li *z* offer an interesting model with which to consider the PS **r* > Interior Salish *r, l* change. Consider the following stages outlined for PS **r* (> **ɾ*) > *ɾ, r, l*, which parallel the stages outlined above for PS **y* > *z* > Th, Li *z*.

PS **r* > *ɾ, r, l, l* [ɾ, ɽ/r, ɬ/ɬ$^{\prime}$, l]

	Change	*Position*	*Language*
1.	PS **r* > *ɾ*	C_1	Li, Th, Sh, Ka, Sp, Ok, Cr, Cm (assumed)
2.	PS **r* > *l*	C_1	Li, Th, Sh, Ka, Sp, Ok, Cr, Cm (attested)
3.	PS **r* > *ɾ*	C_2	Li, Th, Sh, Ka, (assumed); Ok (?), Cm (?), Sp (attested indirectly), Cr (attested)
4.	PS **r* > *l*	C_2	Li, Th, Sh, Ka (attested)

5.	V > $V_{[+rtr]}$	/ __ *l*	Li, Th, Sh, Ka (attested)
	V > $V_{[+rtr]}$	/ __ *ɾ*	Sp, Ok, Cm (assumed); Cr (attested)
6.	*l* loses retraction	C_1	Li, Th, Sh, Ka, Sp, Ok, Cr, Cm (attested)
7.	*ɾ* loses retraction	C_2	Sp, Cm, Ok (attested); Cr no
8.	*l* loses retraction	C_2	Th (in process?); Sh; Ka no; Li?
9.	V > $V_{[-rtr]}$	/ __ *r*	Sp, Cm, Ok (attested); Cr (in progress?)
10.	V > $V_{[-rtr]}$	/ __ *l*	Sh, Th (in progress); Li?; Ka no

We discuss each stage *seriatim* below.

We will argue that PS **r* was a velarized flap (i.e., retroflex),[18] with some lateral effect: [ɽ^{l}]. The data below support that reconstruction. The reflexes of PS **r* in Interior Salish include [ʂ ʈ ɾ r ɬ ɬ$^{\prime}$ l], showing some retroflex and/or retracted *r* and *l* sounds. The *r* sounds have a central articulation (air passes out in the center of mouth); the *l* sounds have a lateral articulation (air passes out at the side(s) of mouth). PS **r* would have been somewhere between those articulations: a central flap, whose retroflexion created some lateral effect.[19] Ladefoged (1971:51) explains:

> The central-lateral dichotomy may be applied to flaps, but not to taps and trills. There are a number of languages in which sounds having the characteristic gesture involved in making a flap have in addition a distinctly lateral quality; when the articulation is formed there is contact only in the center of the mouth, so that momentarily there is a position similar to that of an l.

Retroflexion similarly accounts, at least in part, for the lateral effect of Th *z*.

4.1 PS *r > ɾ (C_1). This change is assumed based on the parallel change of PS **y* > *z* > Th, Li *z* in C_1 position.

4.2 PS *r > l (C_1). Kinkade and Thompson (1974:24) provide several examples of initial PS **r*: PS **rap'* 'bend (wood), **riwə* 'rumble,' **rix-* 'slime, fishy taste.'[20] Consider also PS **raχ*: Cr *laχ* 'lighten, be electric,' Th *láχɬaχ* 'Female Thunder Spirit'; PS **raʕ*: Th *laʕ* 'water runs' (*lʕáp* '[water in creek] rushes down'), Cm *ʔacláhp* 'river' (PS **ʕ* > Cm *h* here); PS **riχ* 'fanned out': Cm *slíχkst* 'finger,' Th *líχkst* id. (perhaps Sh loanword *líχkst*); PS **rʕəc'*, Th *lʔác'* 'soaking wet,' Sp *lʕác'* 'soaked through.' The change of C_1 PS **r* > *l*

would be dissimilatory and otherwise consistent with the above analysis.

4.3 PS *r > ɾ (C$_2$). An intermediate retractive **r*, similar to Cr [ɻ] but with a lateral effect, is assumed for the northern Interior languages to account for the Li, Sh, Th (and Ka) *l* that corresponds with *r* in the southern Interior languages. That *l* retracts a preceding vowel in Li, Sh, Th, and Ka, although *l* is losing its retractive effect in some of those languages, as discussed below. One also can infer reasonably from the evidence that all of the southern Interior languages had an intermediate velarized *r* [ɻˠ] in C$_2$ position, perhaps similar to present day Cr *r* [ɻ].

4.31. Coeur d'Alene r. Reichard (1938:532) describes Cr *r*: "There is a general tendency to draw back the throat in enunciating velars and faucals. In anticipating these sounds the vowels also become affected, so that for instance, *a* before *r* becomes ɔ." Reichard (1958:297) further describes Cr *r*: "For *r* the back of the tongue is pulled down as the apex is turned upward and back, and the voiced trill is exceedingly light." That sounds like a velarized and flapped *r* [ɻˠ], or [ɾˠ], using the IPA diacritic for velarization [ˠ], which might represent more transparently Reichard's description of Cr *r*.[21] Consider the cognates Cr *ʔór(-t)* 'frozen stiff,' Fl *ʔól(-t)* id., Sh *ʔál(-t)* 'frozen up,' Th *ʔál(-t)* 'icy.' Cr *o* [ɔ] suggests velarization of an earlier **á*, reflected by Sh, *Th á* [ɑ]. Consider also Cr *tor* [ɔ] 'stretch,' Fl *tol* [ɔ] 'stretch [e.g. arm],' Sp *tur* [u] id., Th *tal* [ʌ] 'strain [muscle],' Sh *tal* 'extend, stretch.' Those cognates also suggest the effect of velarization on a preceding vowel in Cr and Fl. Doak (1992) and Johnson (1975) treat Cr *r* as retracted.

Ladefoged (1993:231) considers velarization as a secondary articulation that adds a [u]-like tongue position, but without lip-rounding; he characterizes velarization as superimposition of [ɯ] on a consonant. Compare the sets of cognates for 'sour' or 'acrid': Cr *c'ór* [ɔ], Cm *c'ár*, Sp *c'úr*, Fl *c'ól* [ɔ] (*čc'lc'ó* 'lime'), Th *c'ól* [ɔ] (*c'ʔól* 'sour'), Li *c'ɫl'c'ól''* 'sour.' PIS **á* > ó [ɔ] /__ **r* ; Sp *o* > *u*, when intermediate **r* lost its velarization.

Reichard (1958:297), quoted above, supplies an important phonetic feature for Cr *r*: retroflexion. Again, Reichard's description sounds like a velarized retroflex flap, perhaps [ɻˠ].[22] Retroflexion for Cr *r* would parallel the retroflexion evident with Th *z*. Retroflexion combined with velarization would explain a lateral effect for PS **r*, as with Th *z*.

4.32. Okanagan r. Ok *r* is an alveolar tap [ɾ] or apical trill [r], is not a retroflex flap [ɻ], and does not retract preceding vowels (Athony Mattina, p.c.).

Mattina (1978:58) suggests that Ok *r* retracted vowels: "In Cv, as in Cr, a back consonant or *r* prevented the **a* > *i* shift, as evidenced by the following items which are numbered to correspond to the KS [Kinkade & Sloat 1972] lists: (2) *w'ar'* frog . . . ." (bracketed material added). The word Mattina has in mind is Ok *sw'ar'ák'xn* 'frog' (Sp *sw'ar'ák'* id.)[23] Ok *sw'ar'ák'xn* appears to be of onomatopoeic origin, which may explain the *ar.* Mattina (1978) otherwise gives no other evidence for a retracting Ok *r*. Fl shows some cases of retained, unstressed *a* before *l* < PS **r* (cf. Mattina 1979:20). E.g., *x^{w}alíp* 'it shook,'

χalíp 'it got light,' *talíp* 'it [knot] got untied.' The retained *a* before Ok Sp *r'* in 'frog' might reflect a similar phenomenon. If so, the unstressed *a* vowel in 'frog' would reflect PIS **a*, which would have become Ok *i* and Sp *e* (or have been lost), if Ok Sp intermediate **r* was not retractive. Th *wəlák'ze* 'tree frog' and Li *wəlík'* 'sound made by frogs' may suggest PS **ər*, which would develop as Ok *ar.*[24]

Consider, alternatively, these cognates for 'turtle': Sp *ʔersík^{w}(m)*, Ok *ʔarsík^{w}*, Th *ʔəl'ʂík^{w}* [ʔʌɬsík^{w}], Cm *ʔarasík^{w}* (M. Dale Kinkade, p.c.).[25] The PIS form would be **ʔar(a)sík^{w}*.[26] That suggests Ok *r* was retractive, as otherwise PIS **a* preceding PS **r* would have become *Ok i* (if not lost).

Methow is a southern Ok dialect (Kinkade 1967:194). O'Brien (1967) describes an alternation of *l* for *r* in Methow. O'Brien states that phonemic /ssársr/ 'cricket' alternates with /ssársl/.[27] O'Brien identifies the form as a diminutive and transcribes the first *r* example [sˢsáɾ'səɾ']. O'Brien describes *ɾ'* as a "flapped *r*," perhaps IPA *ɾ* or *ɾˠ*.) O'Brien notes the glottalization of sonants in diminutives (which we would describe as secondary laryngealization of resonants). We extrapolate the second *l* example phonetically as [sˢsáɾ'səl']. That doublet shows final *r'* being replaced by a lateral, most likely *l'*. The *r'* arguably was (mis)perceived as *l'* due to the laryngealization of Cm *r'* exaggerating the perceptual ambiguity of already phonetically similar Methow C$_2$ *r* and *l*. O'Brien also gives a Methow doublet for 'grapes,' transparently an English loan: [kléps] and [kréps]. American English [ɻ] (Ladefoged 1993:169), a retroflex approximant, was apparently was perceptually ambiguous enough to be interpreted as both Methow *r* and *l*. That suggests something about Methow *r*: it may have been retroflex, which gave it some lateral effect.

Importantly, the examples of Methow *r* above (and examples of Ok *r* below) show *r* misperceived as *l*, not vice versa. Th Li *z* similarly is misperceived (or replaced) by *l*, never vice versa. That direction of misperception supports a change of PS **r* > *l* in the *l* languages, not PS **l* (or **ɫ*) > *r* in the *r* languages. The direction of the misperception is from a central resonant, velarized and retroflex, toward a lateral approximant, not vice versa.

4.33 Spokane r. Spokane *r* is not retracted; nor does Sp *r* retract a preceding vowel. Carlson (1973:3) describes Sp *r* as an "alveolar flap," which might be IPA [ɾ] (Ladefoged 1993:169) or [ɾ]. Robert Sherwood (p.c.) describes Sp *r* as "rolled slightly by some, not rolled by others." Sp *r* shows slight retroflexion in words such as *c'úr* 'salt' (cf. Fl *c'ól* id.) or *c'ért* 'cold' (cf. Fl *c'álɫ* id.).[28] Retroflexion of the tongue is visible, and the effects are audible. Sp *r* therefore may be described as flapped (showing retroflexion) in some forms; it might have a tapped articulation (no retroflexion) in other forms.

One set of cognates indicates Sp *r* once was retractive. PIS **á* > Cm *á*, Sp *í* in non-retracting environments; PIS **á* > Cm *á*, Sp *á* in retracting environments. PIS **á* > Cm *á*, Sp *é* (a later Sp change). See Kinkade and Sloat (1972) for the development of PIS vowels, summarized in Kinkade and Thompson (1974:24). Consider these cognates for 'bent, crooked': Cm *yárk^{w}*, Sp *yérk^{w}* (Fl, Ka *yálk^{w}* id., Ok *yárk^{w}* 'curved,' Th *zlk^{w}áp* 'curl up'). The PIS form would be **yárk^{w}*, whose development in Sp would be: PIS

**yárkʷ* > **yárkʷ* > Sp *yérkʷ*. Intermediate Sp *r* was retractive and thus prevented PIS **á* from shifting to otherwise expected Sp *í* (while that change was productive). Intermediate Sp **yárkʷ* later shifted to Sp *yérkʷ*, after Sp *r* lost retraction and as the shift of *á* to *é* became productive. (The fronting and raising of **á* to *é* [ɑ > a > æ > ɛ] likely originated in Ok, where PIS **á* shifted even further to Ok *í*.) In any case, Sp *yérkʷ* neatly exemplifies an earlier retractive *r* in Sp.

Another set of cognates adds a special twist to the above: Cm *yár*, Sp *yúr*, Ka *yáɻ* 'round.' In that set, PIS **á* did shift to Sp *í*, because the intermediate **r* already had lost its retractive effect. Th *z* is much more retractive in postvocalic position before a consonant (*z* / V__C) than in postvocalic position in word final position (*z* / __#). Sp intermediate **r* likely was more retractive in postvocalic position before a consonant (*r* / V__C) than in postvocalic position in word final position (*r* / __#). That would explain the divergent developments of Sp *yérkʷ* and Sp *yúr*, which ultimately may be related roots (semantics: 'bent/crooked' and 'round').

4.34. Columbian r. Kinkade (1981:ix) describes Cm *r*: "flap the tip of the tongue against the hard ridge back of the upper teeth." M. Dale Kinkade (p.c.) further explains that Cm *r* is a retroflex flap [ɽ] in some forms: e.g., *wərwərúwaʔ* 'blackbird,' *ʔarasíkʷ* 'turtle,' *wárk* 'frog'; Cm *r* is a non-retroflex tap [ɾ] in other forms: e.g., *c'árt* 'cold,' *mərúmɬp* 'spruce tree,' *kʷráyq* 'yellow.'

Cm *r* is not retractive, and evidence it once was retractive is elusive. There are, however, several tantalizing clues. First, a Cm doublet suggests that Cm *r* once was velarized and retroflex with a lateral effect: *xár'xər'* and *xál'xəl'* 'steep' (Fl *šlšált*, Ok *xərxárt*, Sh *xlxált*, Cr *šárš(a)rt* id.).[29] The *r'* arguably was (mis)perceived as *l'* due to the laryngealization of Cm *r'* exaggerating the perceptual ambiguity of already phonetically similar *ɾ* (perhaps [ɾˡ]) and *l*.[30] Second, there is an interesting Cr *r* : Cm *ɻ* correspondence between apparent cognates Cr *tor* [ɔ] 'be tough, as meat, leather,' and Cm *tạɻ* [ʌ] 'hard, tough, stiff (ground).'[31] An earlier Cm **r* may have been misinterpreted as Cm *ɻ*, which remained as such with a retracted vowel (similar to Ka $V_{[+rtr]}l$), while Cm then lost retraction and no longer retracted preceding vowels (similar to Sp $V_{[-rtr]}r$). Third, Cm 'rice' is *ɻáyṣ*. If Cm *ɻáyṣ* reflects a direct English borrowing, initial English *r* [ɻ] was interpreted as retracted *ɻ*. The interpretation of American English [ɻ] as Cm *ɻ* would suggest a lateral quality for (earlier) Cm **r*, resulting from retraction and retroflexion.

4.35. Summary on Interior Salish r. Modern Interior Salish *r* includes as variants a velarized retroflex flap [ɾ̴], a plain retroflex flap [ɽ], and a plain, non-retroflex tap [ɾ]. Earlier PIS **r* was retractive, likely a velarized, retroflex flap [ɾ̴]. The correspondence of *r* with *l* in the Northern Interior and Ka suggests that the earlier retroflex flap also had some lateral effect: [ɾ̴ˡ].

4.4 PS *r > ɬ (C_2) Li, Th, Sh, Ka. That PS **r* in C_2 position was retracted and had a lateral effect would explain the change of PS **r* > *ɻ*. Velarization and retroflexion would have created the lateral effect, as with Th and Li C_2 *z* (velarized and retroflex) being confused with or replaced by *l*. Li *z'* neutralizes with *l'*, and Th *z'* nearly neutralizes with *l'*. Laryngealization exaggerates an already existing perceptual

ambiguity between phonetically similar sounds. For example, the Ok (Methow) doublet *ssár'sər'* ~ *ssár'sl'* 'cricket' and the Cm doublet *xár'xər'* ~ *xál'xəl'* 'steep,' discussed above, suggest that Ok and Cm *r* once were velarized with a lateral effect.

Intermediate PIS **ɾ̴* would have been a marginal phoneme, both in terms of distribution, functional load, and its place within the phonological system. That marginality, combined with the perceptual ambiguity with *l*, perhaps led to its association with *l* in Ka, Li, Sh, and Th. The change was perhaps similar to West Germanic **z* > *ř* > Scandinavian *r*, where marginal *ř* merged with *r* (Smirnitskij 1990:202-203).

Interestingly, Li, Sh, Th all have merged PS **ƛ'* and **ɬ'* as *ƛ'*. (The change in Sh is perhaps not complete.) *ƛ'* and *ɬ'* are audibly similar, enough so for perceptual ambiguity to allow reinterpretation of *ɬ'* as the lateral *ƛ'*. Li, Sh, and Th also reinterpreted PS **r* as lateral *ɻ*. Cr merged PS **ƛ'* and **ɬ'* differently, as the non-lateral *ɬ'*. Cr also did not reinterpret PS **r* as lateral *ɻ*. That direction of reinterpretation is significant: the *l* languages chose the lateral *ƛ'*; the *r* language chose non-lateral *ɬ'*. Such differences hint at the efficacy of phonology as functional phonetics (Martinet 1949).

Doak (1983:108) gives several examples of James Teit (in 1908) writing *r* and *l* in cognate or related roots across Okanagan dialects.; e.g., words with Ok roots *tr'q* 'kick'[32] (cf. Fl *tl'q*), *yalxʷ* 'cover' (Sp, Fl *yel'xʷ* 'cover, drape,' Cr *yel'xʷ*, Nicodemus 1975:308), *yr* 'round' (cf. Th *zəl* 'round/oval') and *yirkʷ* 'curved' (cf. Th *zlukʷ* 'curled up,' Sh *yelkʷ* 'bent'), and the word *skʷrxán* 'sandhill crane' (Fl *skʷalšín* id.) The Ok items showing *r* have cognates in Interior Salish showing *l* (Ka, Li, Sh, Th) or *r* (Cr, Cm, Sp). With Ok *tr'q* 'kick,' *yirkʷ* 'curved,' and *skʷrxán* 'sandhill crane,' the *r*, (mis)interpreted as *l*, occurs as C_2 before another consonant. That position is precisely where Th *z* is most easily misperceived as *l*. Ok *yalxʷ* 'cover, wrap' may reflect earlier **yarxʷ* (< **yər-lxʷ* round-covering), where earlier **r* was misinterpreted as *l* as C_2 before another consonant. Doak (1983:108) suggests that the Ok roots *yal[xʷ]*, *yr*, and *yirkʷ* are related historically. Those examples support reconstructing an intermediate velarized **ɾ̴* with a lateral effect, [ɾ̴ˡ]. Again, Mattina (1978:58) indicates that Ok *r* was retractive.

Krueger (1960:34) provides: "[I]n the Flathead pronunciations which I have heard, the *l* has a distinct *r* quality, so much so that in my early work I was transcribing it by the make shift symbol ɻ . It gives the auditory impression of an ordinary sonant *l* with simultaneous articulation of an American-type *r*." The direction of the change of Krueger's perceived ɻ , perhaps [ɾ̴ˡ], followed through to Fl *l*, not to *r*. The change Fl *ɾ̴ˡ* > *ɻ* would be similar to the perception of Th *z'* closer to [ɬˢ] than [ǯ]. The direction and momentum of ɻ > *ɻ* would parallel the change of PS **y* > Li *z* (postvocalic), pronounced [l] (especially for the Mount Currie dialect): PS **y* > *ʒˡ* > Li *l* (/ V__). That supports reconstructing an intermediate **r* with a lateral effect.[33]

Krueger comments that Fl *l* had the quality of an "American-type r." As mentioned above in discussing Ok (Methow) *r*, American *r* [ɻ] is a retroflex approximant. Krueger's description suggests that

Fl *l* involved some retroflexion. Krueger does not distinguish between Fl *l* and *ɭ*; Egesdal's Fl research indicates that Krueger's comments suggesting retroflexion would pertain to Fl *ɭ*, not *l*. Retroflexion for Fl *ɭ* would be a vestige of earlier retroflex PS **r*.

Fl has a retracted, retroflex *l* in certain words. Fl elder Joe Cullooyah (p.c.) describes the *ɭ* of *c'óɭ* [c'ɔ́·ɬ] 'salt': "The tongue turns back, and the sound comes from the sides of the tongue." He describes the *ɭ* of *c'áɭt* [c'á·ɬt] 'salt,' however, as he does the *l* of *cíl* [cíl] 'five': "The tongue stays straight, and the sound comes from the sides of the tongue." Fl elder Felicite McDonald (p.c.) confirms such retroflexion for Fl *ɭ*, describing the *ɭ* of *c'óɭ* (and *?estóɭmi* 'he reached for it') as: "it curls back." Fl elder Dolly Linsebiegler (p.c.) describes the *ɭ* in those words: "the tongue turns back behind the teeth." Retroflexion in those forms is visible and audible. No similar retroflexion of *ɭ* is evident in *c'áɭt* 'cold' or *cíl* 'five' for Ms. McDonald or Ms. Linsebiegler. Ms. McDonald describes that *ɭ*: "The tongue is flat." Fl therefore has three phonetic variants for Fl *l*: plain [l] in *cíl* (<PIS **cíl*), velarized [ɬ] in *c'áɭt* (< PIS **cárt*), velarized and retroflex [ɬˠ] in *c'óɭ* (< PIS **c'ór*). That distribution suggests that Fl *ɭ* (< PS **r*) has lost retroflexion in all but several forms with *oɭ*.

Cr *tal'q* 'kick' also may exemplify velarized *ɾ* being misinterpreted as *l*. Kinkade and Sloat (1972:37, item 437) and Kinkade and Thompson (1974:25) consider Cr *tal'q* to be borrowed from Ka *təl'q*. If Cr *tal'q* is a loanword, borrowing from Fl might be as likely as Ka, given the relative contact between Cr and Fl vis-à-vis Cr and Ka. In either case, the phonetics of such a borrowing are problematic. Fl and Ka frequently retain *a* before *ɭ* (< PS **r*), as mentioned above. In Ka, Fl *tɭ'q* 'kick' no such *a* is retained. The Fl root, in fact, has no vowel, and *ɭ'* is devoiced: *tɭ'qént* [tʰɬ'qént] 'kick it!' Ka *ɭ*, *ɭ'* also would devoice (Vogt 1940a:13; Vogt 1940b:11). It therefore is plausible that Cr *tal'q* derives from earlier **tar'q*, where **r'* (velarized and retroflex *r* with a lateral effect) was misinterpreted as *ɭ'* (as Th velarized and retroflex *z* with a lateral effect is misinterpreted as *l'*).

Moreover, a PIS root **tərq* 'kick' is still well-represented in Southern Interior Salish: Cm *tər'q*, Cr *tal'q*, Fl *tl'q*, Ka *təl'q* (Vogt 1940a:168), Ka *talq* (Carlson and Flett 1989:209), Ok tr'q, Sp *tárq*. (Kinkade and Thompson 1974:25 reconstruct PIS **tərq* 'kick, dance.') The supposed Fl, Ka borrowing would have supplanted a native Cr root with a very similar phonetic shape. That Cr root still exists in Cr *staréqšn* 'mudhen' (Fl *stláqšn* id.), which Kinkade and Thompson (1974:25) reconstruct as PIS **stəráq(s)xən* 'mudhen.' That same root *tr'q* 'kick' was written by Teit with an *l* and *r* across Colville-Okanagan dialects (Doak 1983:89, 108), as discussed above. A laryngealized *r'* would have had a greater lateral effect than simple velarized **ɾ*, and thus have been more readily misinterpreted and replaced by *l*. That lateral effect would have been further exaggerated by the position before __ C_3. PS **ɾ'* > Cr *ɭ'* would parallel neatly Th laryngealized *z'* [ɬˤ] being misinterpreted as *ɭ'* [ɬ], or Li laryngealized *z'* being replaced by *ɭ'* [ɬ].

To summarize, at an intermediate stage PS **r* was velarized and retroflex with a lateral effect, similar to Th and Li postvocalic *z* being velarized and retroflex with a lateral effect (or in one Li dialect actually becoming *l*).

4.5. Vowels are retracted before reflexes ɭ, ɾ. Vowels are retracted before Cr *r* (Doak 1992). Vowels are retracted generally before the Ka, Li, Sh, Th *l* that corresponds to Cm, Sp, Ok, Cr *r*. Kuipers (1982:72), in fact, eliminates **r* in favor of *l* retracted to *ɭ* in roots where such *ɭ* is preceded by his reconstructed darkened vowels (**ạ*, **ẹ*, **ụ*). E.g, PS **k'ər* 'cut, shear' (Kuipers 1982:327 item 44 reconstructs **kạɭ*): Th *k'ə́ɭ* [ʌ] 'cut sheet,' Sh *k'ə́ɭ* [ʌ] ~ *k'el* [ɛ] 'cut,' Fl Ka *č'al* [ɑ] 'cut with scissors', Sp *č'er* [ɛ] id., Cm *k'ər* [ə] 'cut flimsy object with shears,' Ok *k'ar* [ɑ] 'to cut thin material.'

4.6. ɬ loses retraction (C_1). Ka, Li, Sh, Th usually show a heavily retracted *l* as C_2, which corresponds with *r* in Cm, Cr, Ok, and/or Sp. A heavily retracted *ɭ* also occurs in Ka, Li, Sh, Th following retracted vowels; e.g., Th *k'ə́ɭ* [ʌ] 'cut sheet.' A heavily retracted *ɭ*, however, does not occur in C_1 position in Ka, Li, Sh, and Th. Based on that distribution, we reasonably infer that an earlier retracted *ɭ* lost such retraction in C_1 position, paralleling the loss of velarization by Th, Li *z* in C_1 position.

4.7. ɾ loses retraction (C_2). Only Cr *r* is retracted; Cm, Ok, and Sp *r* are not retracted. The discussion above, however, indicates that Sp *r* once was retractive. The evidence for retractive Ok *r* and Cm *r* is suggestive, but elusive. Based primarily on Cr *r* being retractive, and corresponding Ka, Li, Sh, Th *l* being retractive, we assume that an earlier velarized PIS **r* has lost retraction in Cm, Ok, and Sp.

Cr *ɾ* may be losing retraction. Consider these cognates: Cr *p'ér(-t)* [p'ért] 'flooded,' Fl *p'ál(-t)* [p'á·ɬt] id., Sh *p'el ~ p'ʌl*, 'overflowing'; Ok *p'ír(-t)* 'overflowed (as from bucket, creek),' Sp (*čɬ-*)*p'ér*(*=nɛʔ*) 'flooded' (Ewa Boyd, p.c.), Th *p'ə́ɬp* 'water springs up out of ground'; Cm *p'ə́r* 'flood' (Kuipers 1981:331), Cm *p'ə́rmənct* 'spread of water' (Kuipers 1982:75); Li *p'ɬéx̣ʷəx̣ʷ* 'overflow, boil over' (Kuipers 1982:75). Those cognates suggest PIS **pár* 'flood(ed),' consistent with the reflexes for **ə* in Kinkade and Sloat (1972:29,37) and Kinkade and Thompson (1974:24). If Cr *r* were retractive in that root, the vowel would be *a* [ɑ], not *e* [ɛ]. Fl *a* here reflects the earlier shape of the vowel before retractive **r*. One might explain Cr *é* [é] as retracted *í* before *r* (Doak 1992). That would require Cr *pért* to have a different vowel, through ablaut, from the other languages (except possibly Ok). Semantic or other motivation for such ablaut, however, would be unclear. Adducing such irregularities to ablaut itself is problematic. Ablaut in Indo-European refers to vowel differentiation that serves a grammatical function (e.g., sing, sang, sung). No such system of ablaut has been established compellingly for PS.[34] A more plausible explanation is Cr *ɾ* lost retraction, and preceding **ə́* developed to Cr *é*.

4.8. ɭ loses retraction (C_2). Sh and Th *ɭ* is losing retraction, as shown by vowels preceding Sh, Th *l* (< **r*) not being retracted.

4.81 Thompson l. Th *l* that corresponds to Cr, Ok, Sp, or Cm *r* usually is retracted [ɬ], often heavily so; e.g., Th *k'ə́ɭ* [k'ʌɬ] 'cut' (cf. Sp *č'er*, Fl *č'al* id.). Elsewhere, however, such Th *l* is not retracted; Th *zlkʷ́áp* 'curl up' (cf. Sp *yérkʷ́* 'crooked, bent,' Sh *yélkʷ́*, *ylkʷ́ntás* [retracting root] 'it coiled around it'). There are examples of Th *l* (< PS **r*) losing its retractive effect on a preceding vowel: *nc'lc'l'él'tkʷu* 'soda pop,' (*n-c'al·c'al'=él·l'*]*tkʷu*: locative-augmentative·tingle=water[·diminutive]). The root is *c'al*, as in *c'ʔál* 'it

aches, is sore, tingles' (Sp *c'ʔér*, Fl *c'ʔáɬ*, 'it hurts, aches'). 'Soda pop' is a neologism, providing a helpful means to interpret a change in progress of Th *ɬ* > *l*. Consider also Th *kʷlóʔ* 'gall,' *kʷlúl'uʔ* 'a little gall [from small animal]'; PIS ***kʷar*** 'yellow' Fl *kʷaɬíʔ*, Sp *kʷríʔ* 'yellow.' In the Th diminutive for 'gall,' the infix *l'* does not retract the preceding *u* vowel. That confirms that the *l'* is no longer retractive. Consider also Th *wlák'ze* 'tree frog, *wlál'k'ze* 'little tree frog,' (Sp *war'ák'* 'frog'). The reduplicated diminutive *l'* infix does not retract the preceding vowel (*ə* [i] to *ə̓* [ʌ]). Compare also Th *yəlyélt* 'strong,' Sh *yəlyált* id., Cr *ɜar'* 'firm, strong.' The *l* in the Th form has lost retraction, and PS ***a*** preceding such *l* has become Th *é*.[35]

In addition, Th *ɬ* (< PS ***r*) shows retroflexion in some forms; e.g., *mɬámn* 'medicine' (Sp *mryémn* id.), *ɪkʷɬú* 'yellow' (Sp *kʷríʔ* id.). Other forms with *ɬ*, however, do not show retroflexion; e.g., *sə̓ɬsə̓ɬ* 'cricket' (Sp *sérsr* id.).[36]

4.82 Shuswap l. The following Sh forms indicate that Sh *l* (< ***r*) is losing retraction: Sh *p'el* ~ *p'ʌl* 'overflowing' (discussed above); Sh *ck'ʌl* ~ *ck'él* 'board' (Th *k'ə̓ɬ* [ʌ] 'cut'); Sh *yélm* ~ *yálm* 'put rope around s.t.' (Sh *yér* 'round,' Fl *yál* id.), but Sh *ylyál'xn* 'put rope around foot' (Sh *l'* would be more retractive than *l*, given that situation in Th, Li); Sh *yél'kʷ* 'curve, coil' (Cr *yárkʷ* 'curved, crooked'). Kuipers (1974:22) describes Sh retracted vowels: "The vowels *a o ʌ* occur almost exclusively near *l*, *l'* .... The very rare vowel *ʌ* is unstable and is sometimes replaced by *a* or *e*, or has a free variant *a*, an unstable phoneme often replaced by *e*." The replacement of Sh *ʌ* by *e* [ɛ] represents a loss of retraction in the vowel, which also reflects a loss of retraction in a following *l*.

In addition, Southern Sh shows *kʷel* 'yellow,' where northern Sh shows *kʷal* id. Both would reflect PIS ***kʷar*** 'yellow' (Cm, Cr *kʷar*, Fl Ka *kʷaɬ(íʔ)*, Ok *kʷar(ĭʔ)*, Sp *kʷr(íʔ)*, Th *kʷáɬ'* 'yellow, green'; Li *kʷoɬ(ỹ)* 'yellow, green' (Kuipers 1973:14). Southern Sh *kʷel* shows a loss of retractive *l* (*ɬ* > *l*), perhaps influenced by its regular *l*, which tends toward palatal coloring (Gibson 1973:6).

4.9. V > $V_{[-rtr]}$ / __ r. Only Cr *r* retracts preceding vowels. All other *r* languages (Cm, Ok, Sp) have lost retractive *r*. The discussion above indicated that Sp *r* once was retractive (*yerkʷ* 'bent, crooked'), as perhaps was Ok (*ʔar'sík*ʷ 'turtle,' Methow dialect *ssár'sər'* ~ *ssár'səl'*) and Cm (*xár'xər'* ~ *xál'xəl'* 'steep'). Cr *r* also may be losing its retractive effect; Cr *p'er* 'flood' was discussed in section 4.7 above. Another Cr root with *e* [ɛ] before *r* is *ner* 'paint.' That [ɛ], however, might reflect retracted /i/ (Doak 1992:3). Nicodemus (1975:306-07) also has two forms that may suggest loss of retraction before Cr *r*: *yarp* 'it (circle) rolled,' but *yéryerp* 'wagon, carriage (lit. wheel, wheel).'

Loss of retraction of vowels before *r* in Cm, Ok, Sp and perhaps Cr would parallel the loss of retraction of vowels before Th, Li *z*.

4.10. V > V_{-rtr} / __ l. Examples in section 4.8 above indicated that some vowels are no longer retracted before Sh, Th *l* (< PS ***r*). Loss of retraction of vowels before *l* in Th and Sh would parallel the loss of retraction of vowels before Th, Li *z*.

5.0. Perceptual ambiguity of marginal C_2 resulted in PS *r > l. Ohala (1974, 1981, 1986) argues that sound change can result from the listener's misapprehending an inherently ambiguous speech signal. Sound change originates in a listener's misinterpreting synchronic phonetic patterns; sound change results from systematic perceptual errors. That approach may explain certain sound changes better than a strict articulatory approach.[37] Consider the change of [x] to [f] in English, in such words as *enough* (OE *genoh*), *laugh* (OE *hleahhan*). An unconditioned change of velar [x] to labio-dental [f] motivated by articulatory factors would be extraordinary. A change motivated by acoustic (and hence auditory) factors, however, would be transparent. Velar fricative [x] was misperceived and reinterpreted as labiodental fricative [f].

That one dialect in a language has *r* (Sp) and another has *ɬ* (Ka) suggests a phonetically similar, intermediate sound allowing for perceptual ambiguity. That ambiguity could have been interpreted differently (or *mis*interpreted to follow Ohala). That earlier common segment likely was a velarized and retroflex ***ɾ̠***, perhaps [ɻ], with some lateral effect. Ka developed the sound's accompanying lateralness into velarized *ɬ*, which exists today and retracts preceding vowels.[38] Krueger noted some *r*-coloring for Fl *l* (his $\overset{\downarrow}{\mathrm{r}}$), suggesting retroflexion; Fl *ɬ* still shows retroflexion in certain forms (with preceding *o*). Sp would have lost the velarized quality of earlier ***ɾ̠*** --and hence the lateral effect--and it remained *r*. Vowels are not retracted before Spokane *r* (but once were). Cr *ɾ̠* would approximate the intermediate phonetic shape of PS ***r*** in Interior Salish, as [ɾ̠], retracting preceding vowels, not (yet) shifting to *ɬ* (Li, Th, Sh, Ka) or *r* (Cm, Ok, Sp). We do not know whether Cr *ɾ̠* presently has any lateral effect or its degree of retroflexion. Sixty years of interference from English *r* since Reichard did her Cr fieldwork (1927, 1929) may be a problem.[39]

On the perceptual ambiguity of liquids in syllable final position (C_2), consider Lloyd's (1987:246) discussion of frication of Adalusian Spanish *r*:

> The weakening of the pronunciation of /-l/ and /-r/ had reached a point in some areas that they were no longer clearly distinguished in syllable-final position. The resulting articulation may be similar to that of the lateral in other positions. Thus, in modern Andalusia a commonly found realization of the archiphoneme of liquidity is simply an alveolar fricative [ɹ], an alveolar flap [ɾ], more rarely a multiple trill [r:], or an alveolar lateral [l]. Even rarer are a fricative somewhere between a lateral and an alveolar fricative [$\overset{\downarrow}{\mathrm{r}}$], a pharyngeal aspirate [h], a semivowel [i], a palatal [l], or a cacuminal lateral [ɭ] .... Similar realizations are found in America.

The correspondence between Lloyd's descriptions and IPA symbols is problematic, but the point is made nonetheless. (A cacuminal lateral would be a retroflex lateral.) Assuming the accuracy of Lloyd's phonetic descriptions *or* symbols, those reflexes show the potential for considerable perceptual ambiguity with Andalusian Spanish final liquids *r*, *l* and consequent sound change.

Fagan (1989:217-218) adds further guidance on the Andalusian frication of *r*, *l*. Fagan gives as the principal variants of *r* and *l* (using his symbols and descriptions): [ɹ] vd. alveolar fricative, [r] voiced alveolar flap, [ɺ] mixed articulation, and [l] alveolar lateral. The most favored merger is *l* to [ɹ]. *l* also shifts to [ɹ], [r]. In locales where the merger of *l*, *r* is gradual, the majority use [ɺ]. In some locales, the merger is *r* to [l]. That data suggests how an intermediate velarized PS **r* in syllable final position could have been misinterpreted as *l* in one dialect (e.g. Fl, Ka) or reinterpreted as plain *r* in another (e.g. Sp), and across the respective Interior Salishan languages.

The most favored mergers of *l* to [ɹ] and the intermediate sound [ɺ] are significant, as they show the relationship between the lateral *l* and retroflexion (i.e., the retroflex rhotic approximant ɻ). That relationship surfaced several times in the discussion above. It adds further support for retroflexion as a phonetic component of PS **r*, allowing for its misinterpretation as a lateral in the *l* languages.

Two western Amerindian languages, Keresan and Tarascan, show a retroflex *r* misinterpreted as *l* or replaced by *l*. Spencer (1946:233) describes Keresan *r*: "The trill *r* is a voiced retroflexed alveolar flap, alveolar retroflexion imparting a lateral quality." Freidrich's (1971, 1984) descriptions of Tarascan retroflex *r* are especially interesting. Friedrich (1971:165) describes the *r* phonemes in Tarascan as "a front alveolar flapped *r* and a retroflexed flapped *ɾ* with considerable *l* color." Tarascan retroflex *ɾ* is "a phonetically complex realization in contrast to simple flapped *r*, a front alveolar tap." All Tarascan dialects have a marked *l*-color for the retroflex *ɾ*, and some linguists (Foster and Swadesh) refer to Tarascan *ɾ* as a lateral (Friedrich 1971:175). "The retroflex 'Tarascan *ɾ*' with lateral color merges largely or with high frequency the simple lateral *l* in some dialects" (1971:181-82). Friedrich (1984:81) further describes Tarascan *ɾ*: "The lateral /l/ overlaps phonetically with the marked /l/-color of the retroflex lateral /ɽ/, and the two phonemes merge fully in the speech of many children, some adults, and the dialects of two towns."

With the PS **r* and **y* changes, there likely is an articulatory component to sound change, in addition to the perceptual ambiguity component for sound change. A velarized sound involves a secondary raising of the back of the tongue towards the soft palate; a uvularized sound has lower tongue raising and is further back (Catford 1977: 192-93). A lateral sound is produced by lowering the mid section of the tongue, which allows air to flow out the mouth near the molars (Ladefoged 1971:105). The retraction of the tongue apparently would be consistent with some lateral release. The interplay of retraction and retroflexion requires further research; they may tend to cooccur in Salish (e.g., Th *z*, Cr *r*).

Why would PS **r* > *ɾ* move more quickly away from velarization (Cm, Sp, Ok), but PS **r* > *ɾ* > *l* (Ka, Li, Sh, Th) not move so quickly away from velarization? Perhaps velarization is more compatible with laterals than with nonlaterals. Consider, for example, Russian velarized *ɬ* with its palatalized counterpart *ɬʲ*; the difference between them is much more pronounced than with velarized *ɾ* and palatalized *ɾʲ* (e.g., Rus. [ɜɑrˠ] 'heat' vs. [ɜɑrʲ] 'cook'). Perhaps a retracted tongue root may be harder to maintain with a central approximant than with a lateral approximant. A retracted tongue root may not be as easy to maintain as an unretracted tongue root. A retracted tongue root (velarization) evidently tends to

destabilize sounds. There are many cases of velarized *ɬ* vocalizing as a labiovelar central approximant (*w* or *w*-like sound) in different regional and social dialects (BEV) of English (and in English historically), in Brazilian Portuguese (postvocalic *l*, Camara 1972:44), and in Russian dialects, Polish, Wendish, Slovak, Serbo-Croatian, and Slovene (Entwistle and Morison 1949:196, 306, 370). Importantly, Li *z* may syllabify as [ə]; e.g., [ʔocz̩] ~ [ʔocə] '_____' (van Eijk 1985:15 n. 5). That suggests that postvocalic velarized sounds tend to vocalize (Li *z* > *ə*) or adjust toward a more oral articulation (Sp *r* ; Russian *l* > *w* > *v*, Entwistle and Morison 1949:196).

There may be greater incompatibility of retracted tongue root for C_1 (pre-vocalic) vis-à-vis C_2 (post-vocalic). There may be a tendency of C_1 segments to front; consider perhaps the change of Proto-Romance **l* to Catalan *ʎ* initially, but to *l* intervocalically. Consider also the pronunciation of (light) *l* in RP British English in C_1 (syllable initial) but of *ɫ* in C_2 (syllable final). There also may be a tendency for C_1 segments to strengthen relative to other positions, as with Proto-Romance **r* > Spanish *rr* in initial position (/#__); e.g. *raro* ['rraro].

Thus, the various reflexes of PS **r* can be explained in terms of adjustments made by both the speaker (articulation) and listener (misperception and reinterpretation).

6.0. Summary. PS **y* > *ʒ* > Th *z/ʒ*, Li *ʒ/l* parallels PS **r* > *ɾ* > *r, l*: (1) Th, Li *z* is velarized in C_2 position; PS **r* was velarized; (2) Th, Li *z* has a lateral effect, leading to perceptual ambiguity with *l* in C_2 position; PS **r* had a lateral effect, leading to perceptual ambiguity with *l* in C_2 position (in Ka, Li, Sh, Th); (3) Th, Li *z* retracts preceding vowels; PS **r* retracted preceding vowels; (4) Th (Li?) *z* is losing its retractive effect on preceding vowels; PS **r* similarly lost its retractive effect on preceding vowels in Cm, Ok, and Sp, and may be losing such effect in Cr. In short, the same general sound change that caused PS **y* to velarize and retract to *ʒ* or even Li *l* also occurred with PS **r*.

Certain sound changes reoccur in languages and within language families. Consider rhotacization in Latin (e.g., *vīs*, *vīres*) and later in Sardinian (Latin *ipsas dentes*, Sardinian *sar dentes* (Mendelhoff 1969:31); rhotacization in Germanic in various forms (e.g., Scandinavian plural marker *-r*); rhotacization in certain Greek dialects (Buck 1928:52-53). Rhotacization of sibilants (*s* or *z*) in and across those Indo-European languages would parallel the retracting and consequent lateral effect on resonants in Salish--affecting first PS **r*, and then PS **y*.

The retracting and consequent lateral effect on resonants also may explain, in part, the change of PS **n* > *l* in eastern Halkomelem (Thompson 1979:706; Elmendorf and Suttles 1960:6-7) and the sporadic correspondence of *n* and *l* in Interior Salish. The *n* ~ *l* interchange may derive from perceptual ambiguity between *l* and a velarized *n*. The retraction of the tongue--as with Th Li *z*--would be accompanied by a lateral effect: [ʁˡ]. Retroflexion may also play a role in the articulatory dynamics and perceptual ambiguity. That lateral effect would be exaggerated by the laryngealization. That ambiguity likely is heightened with laryngealized *n'* and *l'*; Sp *túpn'* and Fl *túpl'* 'spider'; Th *sk'ʷíl'*, Fl *sč'ín'* 'rock rabbit'; Fl *púl'ye?*, Sh *pún'lexʷ*

'mole'; Cm *sʔátwan* ~ *sʔátwal* 'goose or crane'; Ok *kʷútwn* 'eel' Sp, Fl *kʷútul* id.[40]

7.0. Problems with Kuipers's approach. Kuipers (1973, 1976, 1981, 1982) treats *r* as PS **l* retracted by a preceding vowel or feature. Applying that approach evidently would require: PS **V̓l* > **V̓* (Ka, Li, Sh, Th) > **V̓r* (Cr) > *Vr* (Cm, Ok, Sp). There are several problems with that approach.

7.1. Retracted vowels occur before *l* in Cm, Cr, and Sp. Cr has a retracted *a* vowel before *l* (presumably *l̓*) in the following roots: Cr *mal'* 'come to boil' (Reichard 1939:94) or 'bubble' (Doak 1992:92), cf. Ka *mal'* 'bubble' (Vogt 1940a:152); Cr *mal'(-p)* 'uncomfortably warm' cf. Fl *nmál̓* 'lukewarm', Cm *mq̓l̓* 'warm' (Czaykowska-Higgins 1990:93); *χal* 'redhot' cf. Fl *χal̓* 'bright, light.' Sp also shows retracted vowels before *l*, even though there are no retracted vowels before Sp *r*. Sp *mál(ɪ)* 'dirt' (cf. Fl *mál̓ɪt* id., Sh *málɪt* 'deerlick') is retracting: *mlɪáɬxʷ* 'brick house' (< *mal-ɪ=élxʷ* : dirt-durative.aspect=house). That root is likewise retractive in Cr *(a-)mlóləm'xʷ* 'soil, earth' (Reichard 1938:565), Sh *smlóle?xʷ* 'clay,' and Ok *smlʕála?xʷ* 'clay.'[41] Cm has several instances of retracted vowels before *l̓*, but no retracted vowels before *r*. E.g., Cm *nm'm'ə́l̓* 'lukewarm,' *qʷə́li?* 'gall,' *ʂəl'ʂíl̓* 'rag,' *tə́l̓* 'hard, tough, stiff (ground), *=ə́lqs* 'nose, point.' Importantly, Cm shows *r, l, and l̓*. In those *r* languages, one would expect an *l* (likely *l̓*) preceded by a retracted vowel to become to *r* under Kuipers's approach.

Kuipers would have to explain *V̓l* in those forms as a secondary development (cf. Kuipers 1981:330). That secondary development would be an additional kind or stage of retraction from the retraction to which he ascribes *r*. A secondary retractive influence likely did exist in PIS, if not PS. Thompson (1979:723) reconstructs a retracting feature **ʕ*, apparently still evident in certain Ok forms (see Mattina 1979). The Ok retracting root *χʕál* 'crystal, glittering, light, bright in color' suggests PIS **χʕəl* (*ə* also is reconstructed based on *χəl* in Cm *sχə́lpɪəŋ* 'east'). PIS **χʕəl* would explain Cr *χal* 'redhot.' PIS **χʕəl* perhaps also would explain the unstressed surface vowel *a* in Fl *χalíp* 'it's light out': **χʕəl-* > **χʕl-* > **χal-* (ʕ regularly syllabifies as *a*). The Ok root *(n)mʕál̓(m)* 'warm water' suggests PIS **mʕəl*, which would explain Cm *nm'm'ə́l̓* 'lukewarm.' The other roots above might be explained similarly as roots with pharyngeal as C_2 or C_3; i.e., C_1ʕv*l*, C_1v*ʕl* or C_1v*l*ʕ.[42]

It is unclear, however, how or why Kuipers's **C_1V̓l* (> **C_1V̓*) would develop into C_1*Vr*, but PS **C_1ʕv*l* (or perhaps **C_1vʕ*l* or **C_1v*l*ʕ) would develop into C_1*v̓l̓*. Differentiating between the two developments seems artificial if not ad hoc.

7.2. No parallelism exists between retracted vowels across the *l* and *r* languages. Sh (*l* language) shows the following alteration of retracted and plain vowels: *e* [ɛ] ~ *a* [ɑ], *i* ~ *e* [ɛ], *u* ~ *o* [ɔ] (Kuipers (1974:22). That alternation does not parallel the incidence of retracted vowels in Cm (*r* language): *a* [ɑ], *ə* [ʌ], *o* [ɔ]. Nor is there a clear correspondence otherwise between the retracted vowels of the *r* languages (excluding Cr) and the retracted vowels of the *l* languages. Where there is parallelism, it contradicts Kuipers's approach: Cr *or* corresponds with Ka *o̓*; Cr *ar* corresponds with Ka *a̓*. Why is retracted and retractive Cr ≠ not *l̓*?

7.3. Substantiation for PS **ą, *ə̓, *ų lacking. Kuipers (1982) reconstructs three PS retracted vowels **ą, *ə̓, *ų*, without accounting for their reflexes in Interior Salish or elsewhere. The reflexes for PS **ą, *ə̓*, and **ų* in Interior Salish and elsewhere are unsubstantiated and otherwise problematic. That Kuipers would not have good support to reconstruct PS **i̓*, versus **ą, *ə̓, *ų*, actually supports reconstructing a retracting PS **r*. PIS **i* tends not to retract before back consonants; PIS **u, *a*, and **ə* tend to retract before back consonants (cf. Kinkade and Thompson 1974:24). If one interprets PS **r* as a back consonant (reflexes Ka, Li, Sh, and Th *l̓* and Cr ≠ [ɬ] pattern with back consonants), then it would be consistent for PIS **i* to tend not to retract before PS **r*. That also would explain why Kuipers would not have good support to reconstruct PS **i̓*: i̓ did not exist. PS **ą, *ə̓, *ų* also did not exist. Instances of retracted vowels before Ka, Li, Sh, Th *l̓* and Cr *r* reflect retraction before a back consonant, not the converse.

Kuipers's (1982) approach also creates an unsymmetrical PS vowel system, with four plain vowels and three retracted ones: PS **i, *a, *ə, *u*, but **ą, *ə̓, *ų*. Th shows *i̓* as a rare phoneme, principally before *l̓* (< **r*) (Thompson and Thompson 1992:12); e.g., *k'i̓l̓* 'cut sheets,' *(ʔes)ki̓l̓* 'gap between two pieces.' Th *i̓* in such forms can be explained as **i* retracted by following *l̓*, not vice versa. Th has numerous paired roots, one with *i* and the other with *ə*; the *i* roots have an augmentative meaning, while the *ə* roots have a simplex meaning (Thompson and Thompson 1992:87-88). Th roots showing *i̓* would follow that pattern: *k'i̓l̓* 'cut sheets of cloth,' *k'ə̓l̓* 'cut single sheet of cloth.'

7.5. PS **l* versus **l̓* questionable. Kuipers's approach apparently requires a PS **l* and **l̓*. He states: "One should therefore first reconstruct **l̓ *l* rather than **l *r* . . . ." (1981:324). He adds: "I shall for the moment posit as an ancestor of *r* not **l* but **l̓*" (1981:329). He also states that "PS opposed plain *V̓l* to retracted *V̓l* as a whole" (1981:331). He concludes: "*r* as C_2 developed from **l̓*, which was the positional variant of **l* after the retracted vowels, and the latter were excluded after a uvular C_1--hence *r* is found only as C_2 after a nonuvular C_1" (1981:331). A system with **l* opposed to **l̓*, however, would be extraordinary.[43] "A language with two or more liquids is most likely to include a lateral/nonlateral contrast between them." (Maddieson 1984:88). "A language most often has two liquids (usually one lateral and one *r*-sound)." (Maddieson 1984:89). Kuipers's PS system contradicts what is known about the occurrence of liquids in languages generally.

7.6. Development of PS **l* > r, l problematic. The sequence Kuipers (1982) apparently advocates for PS **l* plus 'darkening feature' > *r, l* is: (1) a 'darkening feature' retracts a vowel (Kuipers 1981), or the vowel is already retracted (Kuipers 1982); (2) the retracted vowel then retracts the following consonant PS **l* to **l̓*, which would have to account for the modern reflexes ≠, *r, l̓, l* (and preceding vowels); (3) the vowel loses retraction (why would it lose retraction before a retracted consonant?); (4) the consonant loses retraction; or, (3b) the consonant loses retraction (why would it lose retraction following a retractive vowel?); (4b) the preceding vowel loses retraction. It is odd that a vowel would retract a consonant, only to then lose retraction after causing the consonant to retract. There are many examples, however, of consonants retracting preceding vowels (especially Th Li *z*), and there is evidence of consonants losing retraction (e.g., Th *l, z*), with consequent effect on preceding vowels.

The PS **r* alternative is better motivated: (1) the PS consonant retracts in C_1 and C_2; (2) the consonant in C_2 position retracts the preceding vowel allophonically (the underlying vowel remains); (3) the consonant in C_1 and then C_2 position loses retraction (because velarized consonants are relatively unstable); (4) the underlying vowel surfaces as unretracted before the unretracted intermediate consonant in C_2 position. The evidence from PS **y* > Th *z* has followed that sequence exactly and strongly supports that sequence for PS **r* > *r*, *l*. The data above on the respective *r* and *l* languages are consistent with that sequence.

8.0. Problems with Doak's approach. Doak (1989) does not reconstruct PS **r*, contrary to Kinkade and Thompson (1974). Nor does Doak reconstruct a 'darkening feature' or darkened vowels that retract PS **l* to *r*, differing from Kuipers (1973, 1976, 1981, 1982). Instead, Doak reconstructs PS retracted roots. Doak argues that a certain retractive feature ('pharyngeal node') attaches to C_2 *l* of a root, yielding *r* in the *r*-languages (Cr, Cm, Ok, Sp). That C_2 *l* of the root is the "least-specified sonorant segment," characterized as a sort of "default consonant" (Doak 1989:88 & n.14). For the *l*-languages, the retractive feature attaches to the syllabic nucleus, not C_2, so the default consonant *l* retains its laterality.

There are several problems with that abstract, nonlinear approach. It does not really *explain* why one language (or dialect) has an *r* and another has an *l*. In historical linguistics, to explain a sound change is to identify the conditions that bring it about, syntagmatic or otherwise. Doak does not explain why Cr *r* retracts preceding vowels, while Cm, Ok, and Sp *r* does not. Simply saying that one language (Cr) has regressive harmony and the others (Cm, Ok, Sp) do not would be conclusory, not explanatory. Doak also does not explain why Th *l* (and apparently Sh *l*) is losing retraction. A rule delinking progressive retraction harmony (from vowel toward *l*) also would not explain that change.

Doak's approach is similar to Kuipers's, and it suffers similar drawbacks. Both focus on an articulatory motivation for corresponding *r* and *l*, where perceptual motivation likely was primary, as with Th, Li *z* > *l*. Both avoid PS **r*, opting instead for an abstract feature to convert a PS **l* into C_2 *r*. Kuipers's (1973, 1976, 1981) 'darkening feature' affects a vowel, retracting it, which then retracts a following consonant, PS **l* > *ɭ*. For Doak, the difference in shape between *r* (Cm, Cr, Ok, Sp) and *l* (Li, Sh, Th) depends on where an abstract retracting feature ('pharyngeal node') attaches in the syllable. If the 'pharyngeal node' attaches directly to the C_2 default consonant *l*, then *r* results. If the 'pharyngeal node' attaches to the syllable's vowel preceding *l*, then *ɭ* results. Doak does not explain why Li, Sh, Th, Ka *ɭ* is retracted (as is Cr *ɾ*), but Cm, Ok, Sp *r* is not. One would expect the opposite result, given that the 'pharyngeal node' is attached directly to the *l* in deriving *r*. Doak also does not explain Cm *r*, *l*, *and ɭ*.

Moreover, with Cr *c'ór* 'sour, salt' and Fl *c'óɭ* id., the vowel is the same, retracted [ɔ]. Both Cr and Fl show a retracted consonant following that [ɔ]. Both Cr and Fl [ɔ] apparently would have the so-called pharyngeal node attached to them *and* the following consonant, Cr *r* [ɻ] and Fl *ɭ* [ɬ], [ɬˠ]. It is suspect to treat the Cr and Fl derivations differently.

Th data show Doak's and Kuipers's approach does not work. Th *ɭ* retracts a preceding vowel, not vice versa: *c'úc'ɭ'c'əɭ't* 'a little sour' (from *c'úɬ·c'ɭ'·c'əɭ'-t*), *c'óɬc'əɭt* 'sour' (from *c'úɬ'·c'əɭ'-t*). The root is *c'uɭ* 'sour.' When underlying *u* is separated from the retractive *ɭ* by the reduplicated diminutive infix [·c'], *u* surfaces as [u], not *o* [ɔ]. When underlying *u* is not so separated, *u* surfaces as *o* [ɔ]. Th *c'uɭ* has cognates in the *r* languages; e.g., Cm *c'ər* 'sour, salty,' Sp *c'úr* id.; Fl Ka *c'óɭ* id.). Those cognates suggest PIS **c'ər*. The change of PS **ə́* > *ó*, *ú* would reflect velarization of the central vowel.[44]

Consider also Th *c'áɬ-t* 'salt' and its diminutive *c'éɬ·c'ɭɬ-t* 'a little salt.'[45] The root is *c'eɬ* 'salt(y).' When underlying *e* is separated from the retractive *ɭ* by the reduplicated diminutive infix [·c'], *e* surfaces as [ɛ], not *a* [ɑ].[46] When underlying *e* is not so separated, *e* surfaces as *a* [ɑ]. Th *c'eɬ* has cognates in the *r* languages; e.g. Cm *c'árt* 'salt' (see cognates above for 'sour'). Doak argues that the 'pharyngeal node' attaches to the vowel (syllable nucleus) in those words, which allows the *ɭ* to surface. The Th data show that retraction is part of *ɭ* itself, not the preceding vowel. Doak's attempt to explain *l* and *r* based on the place (vowel versus consonant) for attachment of an abstract retracting feature ('pharyngeal node') fails.

The change of PS **y* > Th Li *z* provides a more concrete and reasoned means to explain Cm, Cr, Ok, Sp *r* and Ka, Li, Sh, Th *ɭ*. A consonant (PS **y*, **r*) is retracted, which then retracts preceding vowels in C_2 position. The retracted consonant in C_2 position has a lateral effect, which makes it perceptually ambiguous, and ultimately it is misinterpreted as a lateral for some languages or dialects. That change *has* occurred for PS **y* in Th and Li. It is a certainty. One can infer reasonably that the same process occurred with PS **r*. That inference is preferable to speculating about the behavior of autosegments and a default consonant, where one must construct language specific rules for blocking or delinking retraction harmony.

9.0. No PS *Qvr roots and the dissimilation issue. There are no extant reflexes of PS **Qvr* roots showing C_2 *r*. Kinkade and Thompson (1974) suggest that the **r* in such roots dissimilated to *l* (**Qvr* > *Qvl*), accounting for C_2 *l* in roots such as Cm Cr Ka Sp Th *q̓ʷil* 'cheat.' The *l* in such roots is not retracted *ɭ*. The dissimilation suggested by Kinkade and Thompson (1974) remains a promising explanation.[47] Ferguson (1975:186) writes: "[I]n Arabic, as in other Semitic languages, it tends to be true that the closer two consonants are to each other in phonetic content the less likely they are to cooccur in the same root, and on this basis it is possible to identify distribution of classes of sounds which tend to coincide with phonetic classes (Greenberg 1950)." Doak (1992) suggests that the uvulars *(Q)* and *r* act as members of a class in Cr (at least as it relates to retracting preceding vowels). PS **r* at one stage would have been an *r* with retracted tongue root (i.e., velarized *ɾ*), which would put it in the same class as *Q*. The lack of reflexes for PS **Qvr* roots with C_2 *r* would be dissimilatory, similar to the phenomenon in Semitic.

There apparently were PS roots **rvQ* or **rvʕ*, which would suggest that **r* in C_1 position would have lost retraction as dissimilation with a following uvular or pharyngeal. See section 4.2 above (**raχ*, **riχ*, **raʕ*, **rʕəc'*).

Dissimilation might explain the following apparent cognates for 'stomach': Li *ʕʷəlín*, Th *nʕʷyán*, Fl *ʔolín*, Sp *ʔurín*. The PIS form would be **ʕʷ(ə)lán*. An early dissimilation of PS **r* > Th *l* would have allowed the subsequent change of PS **l* > Th *y* to occur.

10. Syllable position as conditioning environment. Syllable position--C_1 initial versus C_2 postvocalic--can itself be a conditioning environment for allophonic differences and eventual sound change. For example, Kiowa *l* does not occur word-initially; *l* otherwise is realized as [l] in syllable-initial position, [^{d}l] in syllable-final position, and slightly devoiced [^{d}l] in utterance-final position (Watkins 1984:8). In RP English *l* in syllable initial position differs from *ɬ* in syllable final position. C_1 *l* has developed differently from C_2 *ɬ*. American English shows such a change can then generalize to the other syllable position (i.e., velarization from C_1 to C_2).[48] Clear *l* in American English now occurs only in syllable initial position before high (and possibly mid) front vowels. Velarized *ɬ* has generalized to C_1 position except before high (and possibly mid) vowels. That would be analogous to the developments of PS **r*, **y* in Salish: syllable position was a conditioning factor for sound change, and loss of velarization is generalizing from C_1 to C_2.

Compare the situation with PS **r* (Interior Salish) and PS **y* (in Li, Th), as they developed in initial and postvocalic position in those respective languages:

	initial	postvocalic	
PS **r*	*l*	*ɾ, r, ɻ, l*	[ɾ ɾ r ɾ ɬ ɬʲ l]
PS **y*	*z*	*Th ʒ* (*z*); Li z, *l*, y	

That *r* only occurs in C_2 position should not be considered a significant obstacle to reconstructing PS **r*. In Walapai, all consonants except *r* occur initially (Redden 1966:6). In Yana, "[a]ny consonant except /r/ may occur as an initial of a word" (Sapir and Swadesh 1960:4). In Karok, *r* does not occur in initial position, except in loanwords (Bright 1957:18). The same is true for Acoma *r* (Miller 1965:12). Wiyot *r* likewise is "rather uncommon initially" (Teeter 1964:15). In addition, Warao *r* has as allophones [d r l̆], with [l̆] described as a 'lateral flap'; the distribution for Warao *r* is: [d] initially, [r] medially / *i*__*a*, *a*__*a*, and [l̆] elsewhere. Finally, Wichita *r̃* is nasalized [n] in initial position, in gemination, and before homorganic stops or affricates; non-nasal [r] elsewhere, but voiceless and frictionalized [r̆] in final position (Garvin 1950:181). Those examples suggest a tendency in western America for *r* not to occur in initial position or have a non-rhotic allophone in initial position.

11. Th l-words as borrowings. Another issue we treat only briefly concerns Th words with *l* (not *ɻ* from PS **r*), but borrowings. Th has a number of such loanwords with *l*, many of which are fauna and flora terms. They were borrowed from the *l* languages that surround Th and perhaps from Nicola Athabaskan (once within Th territory). (Th *petáleʔ* 'blood' apparently is a borrowing from Athabaskan, perhaps through Li [ptálɛʔ].[49]) For example, Th fauna words containing *l* of Ok, Li, and Sh origin can be

identified; e.g., Th *kəl'x^{w}éw'sxn* 'lizard,' Cm *k'əl'kil'xáw's* Ok *klklxíw's* id.; Th *lhéc'* 'otter,' Li Sh *lhéc' id.*; Th *slax^{w}éyexkən* 'moose,' Sh *slx^{w}éyxn* 'caribou,' Li [slɛx^{w}éwzɛʔcn] 'caribou'; Th *q^{w}úlqən* 'wolverine,' Sh Li *q^{w}úlqən* id.; Th *spɻánt* 'skunk' Li, Sh *spɻánt* id.; Th *kəkl'éx^{w}eʔ* 'muskrat,' Li [kəkl'éx^{w}] id.; Th sƛ'úleʔ 'deer,' Li [sƛ'úlɛʔ] id.; Th *ʂoʕʷláps* 'bighorn sheep,' Li [swəlaps] ? id.; Th *c'əɬlécn* 'mink,' Sh *c'əɬlécn* id. Another Th fauna word with *l* of likely Sh Li or Ok origin is *sq'əɬlékeʔ* 'badger.' Still other Th fauna words with *l* might reflect PS or PIS **n*, **n'* > Th *l*, *l'*; e.g., Th *sk'íl'* 'rock rabbit' (cf. Fl *sč'ín'* id.).

12. PS *r and the issue of retraction more generally. Retracted vowels, retracting roots, and the PS **r* issue should be treated separately. The surface vowels that result may overlap, but they reflect different processes. It is beyond the scope of this paper to develop that issue, however, beyond a few brief remarks.

There apparently were (at least) two different kinds of PS roots relevant to the PS **r* issue, a root containing PS **r* (**C_1rC_2*) and a root containing a retracting pharyngeal (perhaps **C_1ʕC_2*, which Ok still reflects in certain forms, or **C_1rʕC_2*, **C_1rC_2ʕ*,). Cr *k^{w}ar* 'yellow' and Sh *k^{w}al* id. are cognate retracting roots, with retracted vowel *a*. Sh *k^{w}al* 'yellow' is a retracting root showing C_2 *l*, probably *ɻ*; e.g., *tk^{w}lóseʔ* 'chokecherry' (from *t-k^{w}al=úseʔ* qualitative?-yellow=berry). Cr *k^{w}ar* 'yellow' also is a retracting root showing C_2 ≠ (Doak 1992:19; Doak 1990:99; Reichard 1938:566). Doak (1989:93) recognizes that Cr *k^{w}ar* is a problem for an autosegmental analysis of C_2 *r* ~ *l*. Those roots can be explained as reflecting a hybrid of the two types of PS roots presented above: a root containing PS **r and* a retracting feature **ʕ*: **C_1ʕvl* (or **C_1vʕl* or **C_1vlʕ*). Kuipers and Doak attempt to merge the two types of roots, **C_1vr* with **C_1ʕvl* (or **C_1vʕl* or **C_1vlʕ*). That results in their inability to account for the phonological behavior of roots such as Cr *k^{w}ar*.

Cr also has such roots as *χal* 'redhot' and *χal* 'spy'; both show retracted *a* and following *l*. Compare those forms with Cr *χel* 'lay evenly (as lumber),' Fl *χaɻ* 'lay flooring or planks,' and Th *(ʔes)χál* 'cribbed.' Those forms show an unretracted vowel for Cr and Th, but a retracted vowel for Fl. Consider also Cr *χel* 'be clear, bright, light' (Cr *χal* 'redhot') and Sp Fl *χal* id. Cr *χel* shows unretracted *e* before *l*, but Fl *χaɻ* shows retracted *a* before *ɻ*. Such inconsistencies make it difficult to treat retracting roots, PS **r*, and retracted vowels as a single, related phenomenon. A PS root **Cʕəl* might account for those roots; cf. Ok *χʕal* 'crystal, glittering, light, bright in color'; Cm *sχálptən* 'east' (presumably *s-χál-p-tən*: nominalizer-light-inchoative-instrumental). The retracting feature **ʕ* would have been lost in Cr *χel* allowing for PS **a* > *e*. The retracting feature **ʕ* would have been reflected indirectly in the related Cr *χál*, and in Sp Fl *χal*. Similar developments may explain Cr *q^{w}élu?* 'gall,' Cm *q^{w}ə́li?* id.; cf. Ok *q^{w}l'ʕál'* 'gall bladder.' A retracting feature ʕ is evident in Ok, retracted **əl* > *əɻ* in Cm, and was lost in Cr.

Sp *mált*, Fl *mált* 'dirt' both show a retracted vowel before *l* and retracting root. Those cognates are problematic for Kuipers (1981, 1982) and Doak (1989). Their approaches both would predict *ar*, not *al* for the *r* language Sp. The root is retracting in Sp, Fl, Sh, Ok, and Cr (examples above). The PIS root likely contained a pharyngeal element, which retracted the vowel and accounted for the retractive effect of the root; the exact position of the pharyngeal is unclear. Mattina (1979) would suggest **mʕəl*, but **məʕl*

or even **məlʕ* might be PIS alternatives. Cf. Ok retracting root *mʕl* 'smear' (e.g., *mlʕá-m* 'smear').

Cognates for 'lukewarm' present similar problems for Kuipers's approach. The roots show a retracted vowel before *l* in Fl *nmáɬ* 'lukewarm liquid,' and Cm *nm'm'ə̓ɬ'*. Kuipers's and Doak's approach would require the *l* in the Cm form to retract to *r*. Explaining such forms as a secondary development avoids a real problem for Kuipers's 'darkening feature' or retracting vowel approach, instead of addressing it. Again, the PIS root likely contained a pharyngeal element that retracted the vowel, perhaps **mʕəl*, **məʕl*, or **məlʕ*. Cf. Ok *nmʕál* 'lukewarm.'

Several Sh roots with *l* (< PS **r*) are retracting roots. That cooccurrence can be explained as a secondary development of retraction harmony, probably analogical to retraction caused by **ʕ*. That is, PS **r* > Sh *l*, which in turn retracted the preceding vowel and otherwise caused retractive harmony of subsequent vowels. Fl *suyápi* 'white man' presents an interesting example of retraction harmony developing secondarily. Fl *suyápi* likely is a borrowing, perhaps through Nez Perce (cf. Aoki 1975:194-95); Nez Perce *so·yá·po·*, Sahaptin *šuyápo*. (A form of that word occurs widely on the Plateau.) Fl *suyápi*, however, can be a retracting root: *swipscó* [ɔ] 'he assumes white man's ways,' from /swyapi-s-t-súɬ/ (white.man-causative-transitive-reflexive).[50] Elsewhere, however, that root does not retract following vowels: *suyapstés* 'he caused it to be like the whiteman's,' from /swyapi-s-t-és/ (white.man-causative-transitive-third.subject). The expected retracted surface vowel would be *á*. Retraction in forms with /swyapi/ must have developed after PS or PIS.

13. Other linguistic considerations for PS *r. Treating *r* as a retention of PS **r* instead of an innovation from a retracted PS **l* implies that *r* languages (Cm, Cr, Sp, Ok) are more conservative than *l* languages (Salish generally), at least concerning PS **r*. If the *r* languages are, in fact, more conservative generally than other Salishan languages, then that would support *r* being a retention.

We assume a correlation between greater extralinguistic contact and greater language change; e.g., Icelandic versus English, Lithuanian versus Latvian, or Shoshone versus Comanche. More contact, more change; less contact, less change. Interior Salish has had less *pervasive* contact than Coast Salish, Tsamosan Salish, Tillamook, or Bella Coola. The Northwest Coast area had great linguistic diversity, exogamous marriage and extensive trade prevailed, and there was extensive multilingualism. Compared to the Northwest Coast Sprachbund, the northern and eastern Plateau where the Interior Salish settled was *relatively* insulated.[51] One therefore could hypothesize that the Interior Salish, who migrated to the Interior from the Coast (Kinkade 1990b), would be more conservative linguistically than Salishan groups elsewhere.

The data support the hypothesis that the Interior Salishan languages were conservative compared to the other Salishan languages. Interior Salishan languages have retained the PS phoneme inventory to a much greater extent than the non-Interior Salish languages, whether one accepts Kuipers's (1970, 1973, 1976, 1981, 1982) or Thompson's (1979) PS system. All Interior languages have retained PS pharyngeals

**ʕ*, **ʕ'*, **ʕʷ*, **ʕʷ'*,[52] apparently lost elsewhere in Salish. Most Interior languages (except Cr, Ka, Sp) have retained PS **k*, **k'*, **x*, instead of innovative *č*, *č'*, *š* found generally outside of Interior Salish, with a few exceptions such as Bella Coola and within Tsamosan (e.g., Cowlitz; see Kinkade 1973). The northern Interior languages (and the northern Ok dialects) have retained PS **γ*, **γ'*; the southern Interior reflects PS **γ* as *y* (Cm, Sp, Ka) or *j* (Cr). PS **γ*, **γ'* apparently has been lost elsewhere in Salish. Most of the Interior Salish languages reflect transparently the full complement of PS transitive and related suffixes: pretransitives **-mi* relational, **-ɬ* (?) replacive, **-xi* indirective, **-nəw* noncontrol, **-n* direct; transitives **-t* transitive, **-stəw* causative; posttransitives **-səwt* reflexive, **-wax*^{w} reciprocal. Th and Sh have retained a PS subordinator **wə*, with Tillamook and some Coast Salish languages (Thompson 1979:727; Newman 1980:163). The Interior languages transparently reflect additional PS morphemes: PS **ʔac-* 'stative,' PIS **(ʔ)ac-* id. (e.g., Cm *ʔac-*, Th *ʔes-*); PS **-almn* desiderative, PIS **-amn* desiderative, habitual (e.g., Cm *-amn*, Th (-m)-emn); PS **-ilix* autonomous, PIS **-ilx* id. (e.g., Cm *-ilx*, Th *-iyx*).[53]

Within the Interior itself, Cm and Ok probably are the most conservative. Only Cm, Ok, and Sp have retained PS **t'* and **ƛ'*, while Li, Sh, and Th have merged **t'* and **ƛ'* as *ƛ'*; Cr has merged **t'* and **ƛ'* as *t'*. Cm and Ok (with Cr, Sp, and Ka) also have retained the pretransitive suffix *-ɬ* replacive, lost or unproductive in the northern Interior, with reflexes in southern Lushootseed dialects (Thompson and Thompson 1980:28-30; Thompson 1979:741-43; Kinkade 1980).

Cm has the most conservative Salish vowel system, reflecting most closely the PIS vowel system (Kinkade and Sloat 1972). For instance, only Cm (and perhaps a dialect of Sh) did not front and/or raise PS **a*; PS **a* > Sp *æ* > Li Ka Th Sh *ɛ* > Cr Ok *i*.[54] Cm likely reflects the PS vowel system (**i*, **u*, **ə*, **a*) most closely. Concerning PS consonants, Cm shows only two significant innovations: PS **γ* > *y*, and PS **ʕ* > *ɦ*, *ʕ*. Cm otherwise has been most conservative regarding PS **l*, which has devoiced to *ɬ* in many Salishan languages (Thompson 1979:719).

Cm also has been very conservative in retaining the original PS pronominal system, which had a neutral object paradigm and causative object paradigm (Newman 1979b:300-301). Compare Newman's PS reconstructions with the Cm reflexes: neutral paradigm 1s **-c* Cm *-ca*, 2s **-ci* Cm *-ci*, 3s Ø, Cm Ø, 1p **-al* Cm *-al*, 2p **-ulm* Cm *-uləm*; causative paradigm 1s **-mx* Cm *-m*, 2s **-mi* Cm *-m*, 3s **-Ø* Cm *-Ø*, 1p **-muɬ* Cm *-al*, 2p **-muɬ* Cm *-məl*.[55] More generally, Newman's (1977, 1979a, 1979b, 1980) or Hoard's (1971) reconstructions for the PS pronominal system (possessive, transitive subject, independent) indicate that Cm has one of the most conservative pronominal systems. Cm also has a reflex (*-wa*, *-u*) of PS topical object **-wali*, which otherwise occurs only in Tsamosan Salish, Lushootseed, and Tillamook (Kinkade 1990a). Cm is overall one of the most conservative Salishan languages, and it is an *r* language.

Other southern Interior languages are likewise conservative phonologically and morphologically. Ok, for instance, retains the PS consonant system, except for shifting PS *ʕʷ to ʕ and shifting PS *γ to *y* in southern dialects (e.g., Colville). Ok apparently reflects a retracting feature ʕ (Mattina 1979), which has been lost as as segment elsewhere in the Interior.[56] The existence of *ʕ remains, however, in morphophonemically conditioned retraction of vowels in other Interior languages. Ok is an *r* language.

Those data indicate that the Interior Salishan languages are more conservative generally than other Salishan languages, and that the southern Interior languages are the most conservative overall. Importantly, the southern Interior Salish also retained much of the original Salish kinship system (Elmendorf 1961), while it was changed largely elsewhere in Salish. Such conservatism would be consistent with *r* being a retention in the southern Interior languages (Cm, Cr, Ok, Sp), not an innovation.

14. Conclusion. Kuipers (1973:11) posits a PS feature !, "reconstructed *in abstracto*," to account for the reflexes *l*, *r*. Kuipers (1976:2) later offers an abstract feature "darkened ˆ " to account for *l*, *r*. Kuipers (1981:324) then posits a 'darkening feature' / . / to account for *l*, *r*, referring back to Kuipers (1973). Kuipers (1982:72) finally gives phonetic shape to the retracting feature in the form of PS "darkened (retracted, pharyngealized) vowels *ɑ, *ə, *ʊ," to account for *l*, *r*. Kuipers's approach starts with an abstraction, which then moves toward and eventually finds some phonetic reification. Doak (1989) similarly starts with an abstraction, the theoretical construct of nonlinear or autosegmental phonology, and then integrates phonetic data into it.

The known facts of languages generally and Salish specifically must be the basis for careful reconstruction of PS sounds. Resorting to abstract notions such as a 'darkening feature,' 'darkened' vowels, default consonants, linking and delinking of autosegments, blocking retraction harmony, and so on, diverts from that salutory principle. Our analysis starts with the known as the basis from which to speculate as to the unknown. We start with the concrete--phonetics--and move toward the abstract. Kuipers (1973, 1976, 1981, 1982) and Doak (1989) assume the reverse order.

Proto-languages are languages, and they should act as such. The best way to see what may have happened in a proto-language phonologically is to look at what does happen in its descendant languages. In the above analysis, we look at the present, concrete phonetics of two northern Interior languages (Li, Th) to reconstruct what may have happened with the phonetics of Proto-Salish. We have attempted to show that the development of PS *y > Th, Li *z* explains the development of PS *r > ɬ, r, l, l. We conclude that reconstructing PS *r is better motivated than reconstructing PS *l plus an abstract retracting feature such as Kuipers and Doak propose.

Finally, the comparative method generally treats the *phonemes* of descendant languages to reconstruct the *phonemes* of their parent language. The phonetic nature of those phonemes often is considered secondarily, if at all. For PS *r, Kuipers, Doak, and Kinkade and Thompson consider primarily the phonemes *r* and *l* in the descendant languages. We considered as primary the phonetic nature of those phonemes in different environments. In C_1 position, PS *r > *l*. In C_2 position, the reflexes of PS *r have the following shapes: / ɬ r ɭ l / = [ɬ ɾ/ɾ ɬ/ɬˠ l].

Cm, Cr, Ok, Sp

[ɬˡ]
PS *r > > ɬ > r
Cr Cr ?
Cm
Ok
Sp

Ka, Li, Sh, Th

[ɬˡ]
PS *r > lˠ > l > l
Ka Ka Sh
Th Th Th
Li

Considering retraction, retroflexion, and varying degrees of lateral effect associated with those features allowed us to see parallels with PS *y > Li, Th *z*. Those parallels, in turn, helped us to unravel the development of PS *r.

1. Hereafter, **r *r'* will be represented collectively as **r*, unless otherwise indicated. We abbreviate the Interior Salish languages as: Cm Columbian, Cr Coeur d'Alene, Fl Flathead, Ka Kalispel, Li Lillooet, Ok Okanagan (includes Colville), Sh Shuswap, Sp Spokane, Th Thompson. Unless otherwise indicated, the Interior Salishan data are from: Cm Kinkade (1981a), Cr Reichard (1939), Ka Vogt (1940a), Li van Eijk (1985 or personal communication), Ok Mattina (1987), Sh Kuipers (1974), Sp Carlson and Flett (1989), Th Thompson and Thompson (forthcoming). Fl, Ka, and Sp are members of a dialect continuum, all mutually intelligible. Fl and Ka are virtually the same dialect. Ka may be interpreted as the inclusive term for Ka and Fl. As a practical matter, however, data marked Fl are from Egesdal's fieldnotes on that dialect proper, while data marked Ka are from Vogt (1940a).

2. The correspondence of *r* with *l* in Li, Sh, Th, and Ka is exemplified below. See also Doak (1989:84), Thompson (1979:707,711), Kinkade and Thompson (1974:23). For correspondences with *l* in Tsamosan Salish, consider, Cr *par'kʷ* 'pierce,' Chehalis *pálow-* 'pierce, go through,' Cowlitz *pal'ák*ʷ 'pierce' (Kinkade and Sloat 1972:42, item 728); PIS **xar*, 'hang' (Fl *šal* id., Sh *xal* 'partition off by hanging mat or curtain,', Cr *šar* 'one hangs'), Seshelt *šál(-at)* 'hang transitive' (Kuipers 1982:85).

3. We hereafter will cite Kuipers, van Eijk, and Timmers (1973) as "Kuipers (1973)," following Kuipers (1981).

4. It is an orthographic convention among Interior Salishanists to indicate retraction with a subdot under the character: *l̠* = [ɬ], a velarized lateral approximant; Cm Li Th *s̠* = [s], versus the blade articulation *s* that sounds similar to English *š* [ʃ]; Cm Li Th *ç* = [c], versus the blade articulation *c* that which sounds similar to English *č* [tʃ]. *r̠* is not used, nor is *z̠*. Where relevant, retracted *r* and *z* are represented with the superimposed tilde ~ .

5. van Eijk (1985:7-8) provides the examples in this paragraph, among numerous other examples. The basic phonetic values for Th vowels are: *i* [i] generally, [e] after uvulars or pharyngeals; *e* [ɛ]; *u* [u] generally, [o] after uvulars and pharyngeals; *o* [ɔ]; *a* [ɑ]; *ə* [ï], *ə̓* [ʌ], *i̓* [ë]. Thompson and Thompson (1992:11-21) fully describes Th vowels. van Eijk (1985:3) uses differing symbols for Li vowels: "*a i u ə* are broadly [ɛ e o ə], while *ą i̓ ų ə̓* are [a ė/ɛ ɔ ʌ]." van Eijk's *ė* may be IPA [ë], i.e., a centralized, high, close-mid front unrounded vowel (as for Th *i̓*). There is some confusion in comparing the Th and Li material, as van Eijk writes *a* for [ɛ]; Li *a* [ɛ] = Th *e* [ɛ] for the material below.

6. One's first transcriptions of a language often reflect subtle phonetic detail later overlooked when one has phonemicized the sounds. On Egesdal's first day of Th fieldwork (June 1981), he transcribed the word for 'gill net' as *nxalkʷútn*, later corrected to *nxazkʷútn*. He noted that the perceived *l* was "very dental." He was confused about the fricative effect of that perceived *l*, and he noted that "z in initial position is easy to discern." Those first impressions remain accurate descriptions of Th z in those positions.

7. Notes from the Th field methods class at University of British Columbia (1987-88, 1989-90, 1990-91), taught by M. Dale Kinkade, include helpful phonetic comments on Th *z*. The speakers are Dorothy Ursaki, (Spences Bridge dialect) and Mandy Jimmie (Merritt dialect). Th *z* is transcribed generally as dental [z̪]. Specific comments are: 10/11/89 (Book 1, p. 29, item 126) *x̌ʷəz̪cún* 'I love you,' with comment (p. 28) "z̪ has much lateral quality here." 2/21/90 (Book 1, p. 117, item 507) *q̓ʷəz̪xána* 'I use it,' with

comment (p. 116) "z̪ very *ð*-like." Mandy Jimmie pronounces 'grandmother' as *kʰəðǽʰ* (Book 1, p. 29, item 124). (I have heard 'grandmother' only as *kz̪'é* [kz̪ˈɛ́] in the Lytton dialect.) 1/25/88 (Book 1, p. 77, item 367): kéz̪æ? 'he is lying,' with comment (p. 76) "once with ð" (p.76). 10/10/90 (Book 1, 1990-91, p. 25, item 92): Mrs. Ursaki has *mʌ́z̪aʰ*, where Mandy Jimmie has *mʌ́ða* (p. 24).

8. Concerning the feature laterality, Ladefoged (1971:56) states: "It is difficult to conceive what might be meant by in-between values for this feature. At the systematic phonemic level sounds are either lateral or they are not (in which case they are central); and the same seems to be true at the phonetic level." Th *z*, however, apparently shows varying degrees of laterality. Laterality of Th *z* increases from (1) no laterality to (4) almost fully lateral: (1) initial (#__), (2) simple postvocalic (V__#), (3) postvocalic before a consonant (V__C), and (4) when laryngealized.

9. Kuipers (1976:3) also suggests Th *y* is phonetically *ð*: "In northwestern I[nterior]S[alish] *y* > *ð* . . . ." Bracketed material is added.

10. van Eijk (1985) uses *x̌* to represent the uvular, voiceless fricative (IPA *χ*). We use the Americanist *x̣* elsewhere in this paper (for IPA *χ*).

11. Th, Li *z* functions as a resonant (not obstruent), as do Th Li *γ*, *ʕ*, *ʕʷ* and their laryngealized counterparts (*γ'*, *ʕ'*, *ʕʷ'*). In the IPA framework, conversely, *z*, *γ*, *ʕ* are placed as obstruent fricatives. The change of PS **y* > *z* > Li (M) *l*, then, is a change occurring within that class of resonants. The change of PS **l* > Th *y* also is a change within that class of resonants. A change of PS **r* > Th *l* would complete that almost circular shift of PS resonants: **y* > Th *z* (which can be retroflexed and lateral), **l* > Th *y*, and **r* > Th *l*.

12. The change of palatal *l̠* [lʲ] > the palatal sibilant *ʒ* in Castilian Spanish would represent almost a reverse shift from a lateral to a *z*-like sound; e.g., *lenteḷa* > *lenteja*; *oḷo* > *ojo*; *foḷa* > *foja*; *meḷore* > *mejor* (Lloyd 1987:254).

13. Gregerson (1984) also discusses sound symbolism involving retracted versus unretracted vowels in Rengao (Mon-Khmer).

14. One might expect intermediate stages from PS **y* to Th *z*. Fagan (1989:224) discusses frication and fronting of *y* (IPA [j]) in Andalusian Spanish, giving as variants of *y*: "[y] vd. frictionless palatal continuant, [y̆] vd. prepalatal, slight friction, [ʝ̌] voiced prepalatal, medium friction, [z̆] vd. prepalatal, full friction, [z̪̆] vd. dento-alveolar, full friction." Compare also Proto-Romance **y* > Portuguese *j* [ʒ]; e.g., Latin *iustum*, Port. *justo*. In northern Japan [ʒ] is common for *y*; the Fukushima dialect has [z] for *y* in certain words (Martin 1987:19). It is questionable whether PS **y* > Th *z* included an intermediate postalveolar consonant [ʒ], with later velarization (and retroflexion) resulting in [ʒ̴]. (Russian *ʒ* is velarized, showing the possibility of a velarized postalveolar.) The primary allophone of Th *s* is postalveolar [ʃ], and the primary allophone of *c* is postalveolar [tʃ]. They occur in all but retracting environments. The voiceless counterpart of Th *z*, Th *s*, is [ʃ]; if Th *z* was earlier **ʒ*, it is unclear why such intermediate *ʒ* would have moved to *z*. Moreover, PS **y'* > Th *c'* [ts'], a non-palatalized affricate, where Th *c* conversely is postalveolar [tʃ]. Perhaps PS **y'* became Th intermediate *d̪ᶻ*, which as a marginal sound merged with the

nearest sound *c'* (perceptually and in terms of the phoneme inventory); i.e., intermediate *c̲ᶻ* ([dz'] ?) merged with *c'* [ts'] not *c* [tʃ]. In comparison, PS **y'* > Li *z'*.

15. That a position before coronals would impede PS **y* > Li *z* makes sense, considering that retraction is the source of the change. PS **y* before Li non-coronals (velars, uvulars) would be consistent with retraction, while PS **y* before Li coronals would not be. Compare the velarization of *l* across English dialects; in American English the change is generalizing from syllable final to syllable initial position, impeded by front high (and perhaps) mid vowels; in British RP *l* is still unvelarized in syllable initial position.

16. The Sh cognate is *skʷúye* 'child.' Consider also Th *skʷóz* [ɔ] 'aunt,' *skʷúkʷz'* 'auntie,' *kʷúy* 'aunt (vocative)'; Sh *skʷúy* id., Fl *skʷúy* 'man's mother.'

17. In Fl Ka, PS **i* did not retract before uvulars, but **u* is neutralized with *o* [ɔ], and *e* [ɛ] is neutralized with *a* [ɑ] before uvulars or *l* (< PS **r*). That pattern parallels the retraction of vowels before Th, Li *z*.

18. Ladefoged (1993:168) distinguishes between a flap [ɽ] and a tap [ɾ] . "In a tap, the tip of the tongue simply moves up to contact the roof of the mouth in the dental or alveolar region, and then moves back to the floor of the mouth along the same path. In a flap, the tip of the tongue is first curled up and back in a retroflex gesture, and then strikes the roof of the mouth in the post-alveolar region as it returns to its position behind the lower front teeth."

19. Mithun (1979:162) reconstructs Proto-Iroquoian **r*, which has reflexes *r*, *l* in the descendant languages. She comments that "*r may have been a lateral" (1979:163). Perhaps Proto-Iroquoian **r* was phonetically [ɾˡ], which might account for the reflexes *r*, *l*.

20. Some additional reflexes for the PS roots in Kinkade and Thompson (1974) are: Fl *líš* 'fishy smell/taste'; Ok *líwkstm* 'ring a bell,' Fl *líwu* 'bell rings (by itself).'

21. Old English *r* has been characterized as back (uvular) based on its effect on preceding vowels (Lass and Anderson 1975). Danish uvular *r* [ʁ] also retracts preceding vowels.

22. Nicodemus (1975:75) describes Cr *o* as the sound in English *or*. Reichard (1938:529) had described Cr *o* as the sound of English *law* ("but with the tongue farther back"). Nicodemus's description may suggest something about the phonetic nature of Cr *r*, as well; i.e., Cr *r* is still retroflex as with American English *r* [ɻ].

23. Krueger (1967:9) has *swaráq'xən* 'young frog.' Krueger (1967) often mistakenly writes uvular *q*, *q'* for the respective velar counterparts *k*, *k'*. Krueger's form very likely represents *swarák'xən*, transparently cognate with Ok *swarák'xn*.

24. Th also has *wərə́k'* 'sound frog makes' (Egesdal 1992:19 & n.20). That form may be a borrowing from southern Interior Salish (perhaps Ok). It might instead reflect archaic speech (Egesdal 1992, ch. 5).

25. Krueger (1967:9) gives Cm *arašíqʷ* (see note 24). Krueger also writes Cm blade articulation *s* as *š*.

26. Cf. also Upper Chehalis *ʔalašík* 'turtle' (Kinkade 1991:310). PIS apparently had two words for 'turtle.' The other word was **sp'arqʷalqs*; Sp *sp'rqʷáqs*, Fl *sp'ɻqʷáqs*, Cr *sp'ár'kʷalqs*, Sh *splqʷéqs*. Reichard (1938:544) mentions that velars and their correlate uvulars vary in certain words. Cr 'turtle' probably was historically **sp'ar'qʷa(l)qs*.

27. Interior Salish cognates for Methow 'cricket' are: Cm *sár'sar'*, Cm *šəšáršar* (Krueger 1967:11; see note 25), Fl *sáɻsɻ*, Ok *sársr*, Sh *sál* (certain kind of cricket), Sp *sérsr*, Th *ṣə́ɻsəɻ*.

28. Egesdal discussed those forms with Sp speakers Robert Sherwood and Ewa Boyd at Elder's Week, Two Eagle River School, Pablo, Montana, May 11, 1993.

29. Kuipers (1982:85) reconstructs *PIS *xəl* 'steep.' That etymon does not work well, given the Cm doublet. The Cm doublet apparently shows secondary glottalization of the resonants *r'*, *l'* (< PS **r*).

30. Importantly, there is no retracted vowel in either form; i.e., no evidence of Kuipers's darkening feature or darkened vowel.

31. The vowel correspondence of Cr *o* [ɔ] to Cm *ə* [ʌ] could be explained in two ways. First, it might reflect velarization of a central vowel in Cr (PS **ə* > Cr ɔ) and retractive lowering of that vowel in Cm (PS **ə* > Cm ʌ). The velarization would parallel the velarization of short vowels in Latin, discussed in note 44 below; the lowering would parallel the lowering of Old English ǣ > ā before *r* (and *l*); e.g., Old English *steora*, English *star*, German *Stern*, Latin *stella*, Greek *aster*. Second, the correspondence of Cr [ɔ] to Cm [ʌ] might reflect the lowering of a high back rounded vowel in Cr (PS **u* > ɔ) and the centralization of that vowel in Cm (PS **u* > Cm ʌ). The lowering in Cr would follow a regular Cr phonological rule (Doak 1992), while the centralization in Cm would parallel centralization of Th *u* (< PS **u*) before retractive *z*; e.g., *skʷúze?* [ú] ~ *skʷóze?* [ɔ́] ~ *skʷə́ze?* [ʌ́].

32. Doak (1983:108) shows *t'rq* 'kick,' apparently a typographical error. Mattina (1987:206,321) gives *tr'q* 'kick.'

33. Krueger did his Fl fieldwork in the 1950s. Copies of his tape recordings we have heard are of poor quality. We therefore cannot confirm his perception of Fl *l* as ɻ . Today no such *r*-coloring of Fl *l* is evident, although *l* is retroflex in certain forms (with *oɻ*). That may reflect almost 40 years of further interference from the dominant language English. Schütz (1981:27-33) discusses how English as a dominant language effected a change in Hawaiian phonetics: the alternation of a fricated [ʍ] ~ [w] was reinterpreted as [v] ~ [w].

34. Mattina (1979:24 n.8), Kinkade and Sloat (1972:44), and Kuipers (1970:52) discuss ablaut for Interior Salish.

35. PS **a* > Sh *e* [ɛ], at least in the dialect Kuipers (1974) covers. See Kuipers (1974:26). The *l* in the Sh form therefore has retained its retractive effect on the preceding vowel.

36. Egesdal was able to check retroflexion of these and other forms containing *ɻ* with Th speakers Mabel Joe and Mandy Jimmie at the NALI Conference in Hilo, Hawaii, May 19-23, 1993.

37. Anttila (1989:197-98) similarly describes historical change as a process where sounds are not shifted directly on an articulatory scale, but where the child reinterprets the acoustic signal. He concludes that while a fair amount of articulatory justification for sound change exists, an auditory justification is more powerful.

38. Fl Ka likely neighbored Sh earlier. Both Fl Ka and Sh show *ɻ* [ɬ] as a reflex for PS **r*, and they show deglottalization of the first of neighboring ejective obstruents (T'). With Sh the phenomenon is more pervasive, occurring across vowels; e.g., T'VT' > TVT'. With Fl Ka, deglottalization only occurs with contiguous ejective obstruents; e.g., T'T' > TT'. (Sp has *r* and no such deglottalization.) Neighboring Kootenai has no *r*, only lateral *ɬ*. Nez Perce also has no *r*, only *l*.

39. Nicodemus (1975:3) describes Cr *r*: "The *r* is slightly trilled, like the *-tt-* of *Betty* when it is rapidly spoken." That description sounds like English intervocalic tap [ɾ]. (Reichard's descriptions above, however, suggest a velarized flap.) Vogt (1940b:10) describes Sp *r* as "heavily trilled." Egesdal has heard no such heavy trill for Sp *r*, even where *r* is reduplicated as *rr* (e.g., *šérr* 'bored'). Some speakers have a slight trill (probably vibration in articulating a flap or tap, not a true trill). Vogt would have known a trilled *r* well, given that Norwegian generally has a trilled *r*, and the Olso dialect has a tapped *r* except where geminated (Haugen 1965:42). The difference between Vogt's (1940b) account of Sp *r* and modern Sp *r* might suggest the quality of Sp *r*, and perhaps *r* more generally in Interior Salish, has changed due to interference from English. (Vogt may have misheard Sp *r*, too.)

40. A similar confusion of *l* and *n* exists in Chinese. Dow (1972:32-33) describes Chinese *l* as articulated slightly further back than English *l*, resembling a prepalatal instead of an alveolar; people throughout the Yangtze Valley and some speakers of Cantonese often confuse *l* with *n*. (Dow 1972:32-33). Perhaps the backing of the *l* results in that confusion with *n*, similar to the PS **n* > Eastern Halkomelem *l* or sporadic Salishan *l* ~ *n* correspondence.

41. Cr shows *u* [u] retracted to *o* [ɔ] in the lexical suffix for 'ground, earth' *=uləm'x*^{w}. Sh does the same for cognate *=úle?x*^{w}. Ok similarly shows retracted *á* for *ú* of cognate *=úla?x*^{w}.

42. Certain Cm data suggest that forms with a retracted C_2 derive from **C_1vlʕ*: *x*^{w}*áy'sn* 'I scolded him,' *x*^{w}*i?x*^{w}*áy'sn* 'I scolded them.' The first form (simplex) shows pharyngealization of the root *x*^{w}*ay'* 'scold.' The second form (reduplicated) show pharyngealization of the root but not of the copied augmentative prefix *x*^{w}*i?*. That difference in pharyngealization suggests that the root underlyingly is *x*^{w}*ay'*ʕ (a representation accepted by a literate Cm speaker). The augmentative prefix would copy only the C_1VC_2 of the root, not C_3 ʕ. That would explain the difference in pharyngealization in the forms. We thank M. Dale Kinkade for bringing these data to our attention.

43. Kuipers (1981:330) seems to leave open the question of "whether **ɻ* was opposed to **l* at least in a late stage of PS." He then discusses the Interior Salish reflexes as if **ɻ* was a protophoneme, although he never squarely states whether PS **ɻ* and **l* ever were opposed. Kuipers (1982:72) apparently abandons

PS **ɻ*, stating instead that "PS **r* is eliminated in favor of **l* (retracted to [l] in roots with darkened vowels ...)."

44. That development might parallel the development of short vowels before Latin velarized *l*. Latin had a 'dark' *l* [ɬ]; before such *l*, *ĕ* and unaccented *ă* became *ŏ*, and then *ŏ* > *ŭ* more generally, unless preceded by *u* or *v* (e.g., *facul*, *facultas*, but *facilis*; *molta* > *multa*); later the change of *ŏ* > *ŭ* in those environments as well *(volt* > *vult*, *volgus* > *vulgus*, *parvolus* > *parvulus*) (Sturtevant 1920:79). Compare also the change of Middle English *a* > Modern English *ɔː* before *ɬ*; e.g., ME *talke(n)* [tɑlkan], MnE *talk* [tɔːk] (Moore 1929:29). Consider the velarization effect of those dialects of English have a uvular trill *ʁ* (e.g., Northumbrian 'burr'); e.g., *here* as [hiɔᵚ] (Lass 1976:187). The German uvular trill *ʀ* may vocalize as [ʌ], described as high, back, unrounded but not as peripheral as [ɯ]; e.g., *besser* / 'besəʀ/ as ['bɛsʌ] (Griffen 1982:301).

45. In the Merritt dialect, one finds corresponding pairs Th *c'ə́ɬ-t* [ʌ́] 'sour' and its diminutive *c'ə́[·c']ɬ-t* [ï] 'a little sour.'

46. A truly retracted vowel, conversely, stays retracted in such diminutive formations; e.g., *mə́c*'e [ʌ́] 'fly,' *mə́m'c'e* [ʌ́] 'little fly.'

47. Other examples of PS **Qvr*: PS **q'vrax̣*: Th *q'lax̣* 'fill gap,' Cm *q'alá x̣* 'fence.'

48. Cf. also the velarization of German *l* / __# or / __C, in the North Saxon, Lower Elbe region; e.g., *Lief* [l] 'body,' *Pahl* [ɬ] 'pole' (Keller 1961:355). That development also shows syllable position itself can be a conditioning factor for consonantal change (as with Proto-Romance initial **l* > Catalan *l*^{j}).

49. The bracketed Li forms in this section are based on words in Williams (1979). We have attempted to convert to IPA the practical orthography used in Williams, consistent with the phonetic description in van Eijk (1985).

50. The *t* of the Fl reflexive suffix *-sút* is truncated as a frequent and regular Fl phonological rule: XV́Y > XV́.

51. We do not wish to imply that extensive language contact was absent on the Plateau. Aoki (1975) alone would dispel such a notion. We do suppose, however, that in *relative* terms the degree of language contact was significantly greater for Salish on the Northwest Coast than for Salish in the Interior. The greater similarity among Interior Salishan languages versus the greater diversity among Coast Salishan languages also may reflect a late separation of PIS from the larger body of Salish and slower divergence of the Interior Salishan languages thereafter.

52. Cm has developed PS **ʕ* to *ɦ* [ɦ], ʕ. Pharyngeals have been lost sporadically in some Interior languages; e.g., 'pray' Fl *č'aw*, Sp *č'a*ʕ^{w}, Cm *k'i*ʕ^{w}, Ok *k'*ʕ.

53. We thank M. Dale Kinkade for sharing his comparative Salishan materials with us, from which we have extracted the material presented in this sentence.

54. Egesdal hears Sp *e* lower than Fl *e*. Sp *e* is closer to [a$^+$] or [æ] (but not as open as English [æ]); Fl *e* is closer to [ɛ].

55. Newman's Cm object reflexes differ from those presented in Kinkade (1981b), the latter of which we assume to be correct. Kinkade (1981b:104) gives: non-causative (neutral) 1s *-sá/-s*, 2s *-sí/-s*, 3 *-Ø*, 1p *-ál/-l*, 2p *-úlm/-lm*; causative paradigm 1s *-m*, 2s *-m*, 3 *-Ø*, 1p *-ál/-l*, 2p *-úlm/-lm*.

56. Thompson (1979:728) reconstructs a retracting feature **ʕ*, which differs from the pharyngeal resonants reconstructed as **ẏ*, **ẏ'*, **ẏʷ*, **ẏʷ'*. That series is reflected in the Interior as ʕ, ʕ', ʕʷ, ʕʷ', respectively.

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