A Fricative-First Path from Proto-Salish *c to /s/ and /θ/ in Central Salish[*]

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Abstract: Proto-Salish (PS) *c has developed into /θ/ and /s/ in certain dialects of Central Salish languages. This paper proposes a fricative-first trajectory of change from PS *c to /θ/ and /s/ in Pentlatch, Comox-Sliammon, Northern Straits, and Halkomelem. The fricative-first path is motivated by impressionistic descriptions of ambiguity and variation in the pronunciation and distribution of the reflexes of PS *c. The fricative-first trajectory is better able to account for the patterns in Central Salish as a whole than the fronting-first one Thompson, Thompson, and Efrat (1974) propose for Saanich.

Keywords: fricatives, sound change, Pentlatch, Comox-Sliammon, Halkomelem, Northern Straits

1 Introduction

The interdental fricative /θ/ is not only cross-linguistically rare (Maddieson 1984:45), but is also a shared innovation across several Coast Salish languages. Kuipers (2002) proposes that Proto-Salish (PS) *c developed into either /s/ or /θ/ across Central Salish languages, while PS *s remained /s/ (Kuipers 2002). The progression of this change from alveolar affricate to (alveolar or interdental) fricative, as well as the factors mediating its actuation, have not been explored in detail.

Impressionistic descriptions of these languages suggest articulatory similarity and perceptual ambiguity between /θ/ and /s/. This is documented for Halkomelem (Suttles 2004), Northern Straits (Thompson, Thompson, & Efrat 1974), and Comox-Sliammon (Blake 2000). Reports of ambiguity and similarity, coupled with the fact that a phonemic contrast has been lost between PS *c and *s in a handful of the dialects, suggest that synchronic and diachronic instability surround reflexes of PS *c. This instability, along with the variation that arises from it, is crucial to understanding the developmental trajectory of PS *c across different languages.

This brief paper proposes a FRICATIVE-FIRST trajectory from PS *c > /s/ and /θ/ in Central Salish, drawing upon previous documentation and description. In Section 2, I provide an overview of the distribution of PS *c reflexes in the languages that have undergone the sound change. This includes the impressionistic descriptions of the sounds and variation in their pronunciation across the languages. Section 3 outlines the proposed FRICATIVE-FIRST trajectory, explicating where each of the described Central Salish dialects fits. Acoustic motivation and phonetic bias underlying the actuation of changes from PS *c are detailed in Section 4. Section 5 concludes the paper with a brief summary of an alternate (FRONTING-FIRST) path of change and its disadvantages when compared to the FRICATIVE-FIRST trajectory proposed in this paper.

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2 Distribution and Description of PS *c Reflexes

Galloway (1988) and Kuipers (2002) propose that PS *c became /s/ or /θ/ in some dialects of the Central Salish languages, while PS *s is realized as /s/ across all these languages.[1] The languages shown in Table 1 are the ones that have developed /θ/ or /s/ from PS *c. PS *c became /θ/ and *s remained /s/ in Mainland Comox, Pentlatch, and Halkomelem, while PS *s and *c merged in the Island dialect of Comox and the Lummi, Songish, Samish, and Sooke dialects of Northern Straits. The situation is more complicated in Saanich, where PS *c split into /θ/ and /s/.

Table 1: Reflexes of Proto-Salish *s and *c in (some) Central Salish languages

Language	Dialect	Proto-Salish *s	Proto-Salish *c
Pentlatch	–	s	θ
Halkomelem	Musqueam	s	θ
	Island Halkomelem	s	θ
	Upriver Halkomelem	s	θ
Comox-Sliammon	Mainland Comox	s	θ
	Island Comox	s	s
Northern Straits	Saanich	s	s, θ
	Samish	s	s
	Songish	s	s
	Sooke	s	s

Taken together, Table 1 suggests that PS *c developed from an affricate into either an alveolar or an interdental fricative in each of the languages, with synchronic variation between the two documented in the Saanich dialect of Northern Straits.

Halkomelem (and Straits) differ from Comox-Sliammon and Pentlatch in having a more complicated set of interacting sound changes that have resulted in the /s/ and /θ/ in their present-day phonemic inventories. In Halkomelem, PS *k and *k' have become /c/ and /c̓/, while they have become /s/ and /c̓/ across dialects of Northern Straits, with the exception of Saanich, where PS *k has developed into /s/ and /θ/, and *k̓ has become /t̓ᶿ/. These additional changes, though relevant to the overall picture, are set aside at present. I focus predominantly on reflexes of PS *c.

2.1 Pentlatch

Very little has been said about Pentlatch in the literature, including description of its phonemic inventory. Boas (1890) transcribes *ç* ([θ]) in places that correspond to a [θ] in Mainland Comox and a [c] in Sechelt, suggesting that PS *c became /θ/ in Pentlatch. An *s* ([s]) is found in places where Mainland Comox and Sechelt each have [s], suggesting that PS *s remained /s/ in Pentlatch. As shown in (1), this is true of initial, final, and medial segments.[2] Galloway (1988)

[1] In addition to Galloway (1988) and Kuipers (2002), the correspondences in Table 1 are informed by my own work with archival materials (Island Comox and Pentlatch), fieldwork (Mainland Comox), and Galloway's (1986) description of Samish.

[2] The first column of the transcriptions (in italics) is the one given by Boas (1890). The phonemic representation of the Pentlatch is my own. The Mainland Comox data come from fieldwork I conducted,

reaches a similar conclusion in his summary of sound correspondences in Proto-Salish, connecting PS *c to /θ/ and PS *s to /s/ for Pentlatch.

(1)	Boas	Phonemic	Translation	Mainland Comox	Sechelt
a.	*sisā'e*	/səysáy/	'to be afraid'	sáysay	–
b.	*kō'poçĕn*	/qʷúpuθin/	'beard'	qʷúpuθin	sqʷúpúcín
c.	*hē'wos*	/híwus/	'chief'	hígus	híwus
d.	*ço*	/θu/	'go'	θu/hu	cu
e.	*ē'maç*	/ʔímaθ/	'grandchild'	ʔímaθ	ʔimac
f.	*koā'san*	/qʷásan/	'flower'	qʷásəm	sqʷásam
g.	*çō'man*	/θúman/	'eyebrow'	θúmin	cácúmin
h.	*mĕ'qsĕn*	/məqsən/	'nose'	məqsən	məqsán
i.	*çō'çin*	/θúθin/	'mouth'	θúθin	cúcin

The *ç* ([θ]) is reliably found in lexical items expected to have had PS *c, suggesting that the shift from PS *c to /θ/ was relatively complete at the time of documentation. Though little can be conclusively concluded about the acoustic or articulatory properties of the Pentlatch /θ/, it is worth noting that it is transcribed fairly reliably as *ç* in the Boas materials, which cannot be said of other sounds that reflect, minimally, some amount of variability from either difficulty in discrimination or the result of language change. For example, the uvular and velar contrast in place of articulation and the difference between ejective and plain segments are more difficult for L2 speakers to reliably perceive. Impressionistically, this difficulty is reflected to a certain extent in early transcription, including the Boas (1890) archival materials. In contrast, the Pentlatch fricatives /θ/ and /s/ appear to be relatively stable in their distribution across lexical items and are consistent with what would be anticipated for words which had PS *c or *s originally.[3]

2.2 Comox-Sliammon

2.2.1 Mainland Comox

While the diachronic development results in a one-to-one mapping between PS *c and *s and Mainland Comox /θ/ and /s/, respectively, there is variation in synchronic data in the articulation of /θ/. A single speaker of Mainland Comox will variably produce something like [θayəɬ] or [sayəɬ] for 'lake', as shown in (2). This is only true of words that have an underlying /θ/ (from PS *c). Words with an underlying /s/ (from PS *s) are unambiguously realized with [s]. This pattern holds across the lexicon and is not restricted to any lexicalized subset of words and is only moderately influenced by other phonological factors; a more dental [s] pronunciation of /θ/ is recorded adjacent to back vowels (Blake 2000).

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and the Sechelt examples come from Beaumont (2011) and are translated from the orthography for comparison.

[3] It is worth pointing out that little is known about dialect variation that may have existed in Pentlatch previously, or whether neighbouring dialects would have influenced the distribution of fricatives in the language.

(2)	a.	Initial, word with reflex of PS *c	[θayəɬ ~ sayəɬ]	‘lake’
	b.	Medial, word with reflex of PS *c	[θuθin ~ susin ~ θusin ~ suθin]	‘mouth’
	c.	Final, word with reflex of PS *c	[gaqəθ ~ gaqəs]	‘husband’
	d.	Initial, word with reflex of PS *s	[sayǰa] (*[θayǰa])	‘leaf’
	e.	Medial, word with reflex of PS *s	[qʷasəm] (*[qʷaθəm])	‘flower’
	f.	Final, word with reflex of PS *s	[χawgus] (*[χawguθ])	‘grizzly’

Blake (2000) stated that /θ/ may easily be misperceived as /s/ and speculated that [θ] may have a grooved tongue shape, which makes it sound more similar to [s]. Taken together, an [s]-like tongue shape and phonological conditioning related to whether a vowel is specified as [+/- back] suggest that one of the main distinctions between /s/ and /θ/ is the frontness of the constriction.

2.2.2 Island Comox

One of the characteristics of the Island dialect of Comox that sets it apart from the Mainland dialect is that it does not have /θ/. Instead, PS *c corresponds to /s/. As PS *s has remained /s/, this indicates that the contrast between words with PS *c and *s is no longer maintained and that a merger between the two took place at some point in the history of the language. Given that a contrast is maintained in the Mainland dialect, the merger between PS *c and *s likely reflects a relatively recent change that came after the two dialects split.

In an overview of previous work on Comox, Harris (1981) found that the distribution of [θ] and [s] was hard to reconcile. There was no neat separation between a θ-dialect and s-dialect. As shown in Table 2, Boas (as cited in Harris 1981) reported [θ] in words where modern Mainland Comox consultants (and Harris’ Island consultant) use [s], and [s] in words where Mainland Comox consultants use [θ].[4] Harris (1981:24) speculated that Boas transcribed forms incorrectly, arguing against bidirectional dialect borrowing. Even if Boas (1890) did make some errors, Harris (1981) also describes differences in the distributions reported by Sapir (1914), Gibbs (1877), and Barnett (1955). Given the relative consistency across the documented words in Pentlatch and that synchronic ambiguity is reported for the Mainland dialect between /θ/ and /s/, the “inconsistency” in Boas might actually reflect phonetic variation or similarity between the sounds, rather than mistakes in transcription.

Table 2: s/θ distribution in Boas (1890) and Harris (1981), compared to modern Mainland Comox

English	Boas	Harris	Modern Mainland Comox
‘head (suffix)’	-oːs	-os	-os
‘head’	moʔoθ	moʔos	moʔos
‘go’	θoː	so	θo/ho
‘husband’	gʸaːqas	gʸaːqas	gaqəθ

[4] Interestingly, Harris (1981) reports [θ] for ‘go’ in Boas’ transcription. In the Pentlatch materials (Boas 1890), there is a single page of Comox sentences where one of the words is *hōstōmut*, built with the root *ho* ‘go’, suggesting that an alternation between [h] and [θ] in this word is not just a modern idiosyncrasy.

2.3 Halkomelem

2.3.1 Upriver Halkomelem

The /θ/ in Upriver Halkomelem is described as interdental, such that "the air is released in the spaces between the upper teeth [and] the tongue rests on the back of the upper teeth, not between the upper and lower teeth" (Galloway 1977:5). This suggests a slightly more retracted articulation than would be the case for an English [θ]. While the tongue would be between the top and bottom teeth in the production of English [θ], the pronunciation associated with the Upriver Halkomelem /θ/ is described in a manner that suggests it is produced with the tongue slightly higher and further back than an English [θ].

Galloway (1977) does not suggest that the further back articulation of /θ/ results in any ambiguity or confusion with /s/, as has been documented for other languages with /θ/. In fact, he states that /s/ in Upriver Halkomelem may be realized as [š] in certain environments, rather than [s]. However, Elmendorf and Suttles (1960) describe [s] as a back allophone of /θ/ in this dialect, suggesting that some confusion may be possible in this environment.

2.3.2 Island Halkomelem

Not much has been said about the reflex of PS *c in Island Halkomelem. As in the other dialects of the language, PS *c developed into /θ/. Elmendorf and Suttles (1960) describe /θ/ across Halkomelem dialects, including Island Halkomelem, as interdental, while Kava (1969) labels it as a "voiceless dental slit fricative". However, despite Kava's (1969:27) description suggesting a less anterior constriction for /θ/, the contrast between /s/ and /θ/ is retained.

2.3.3 Musqueam

Articulatory similarity between /θ/ and /s/ is reported in the Musqueam dialect of Halkomelem, as in the Mainland dialect of Comox-Sliammon. /θ/ is described as "usually a dental or interdental spirant somewhat like English 'th' in thin" (Suttles 2004:4).

Suttles (2004:4) reports difficulty transcribing the sonorants, where [s] was transcribed instead of /θ/, suggesting perceptual ambiguity between the two. He further indicates that "some speakers … articulate /θ/ further back, reducing the difference" from /s/ (Suttles 2004:4). In addition to this, Suttles (2004:4) notes that in earlier spellings of names, *s* is used for /θ/, suggesting that the tongue was further back when producing the sound at this earlier point. Suttles (2004) speculates that the development of /θ/ in Musqueam might be a more recent, and unstable, innovation.

It is worth noting that PS *s corresponds to /s/ in Musqueam and the articulation of /s/ is described as being "somewhat more retracted than /t/ or /t̓/" (Suttles 2004:5). This suggests that /s/ in Musqueam may be produced with the tongue further back than the alveolar ridge.

2.4 Northern Straits

2.4.1 Saanich

In the Saanich dialect of Northern Straits, PS *c split into /θ/ and /s/. Thompson et al. (1974:185–187) suggest that the irregular distribution of /s/ and /θ/ forms results from contact with Halkomelem and describe a subset of lexical items where /θ/ alternates with /s/, such as the word for 'mouth' (θaθən ~ sasən) or 'sockeye salmon' (θəqiʔ ~ səqiʔ).

Unlike in Mainland Comox, where variation is observed across the lexicon and is heightened in certain phonological environments (adjacent to a back vowel), this variation is reported to be restricted to a subset of lexical items that would have had PS *c. Though influence with Halkomelem has been suggested as a source of the [θ] ~ [s] alternation, it is not clear whether this distribution could also reflect a change in progress, where some words have undergone a shift and others have not followed yet. Within the set of words where [θ] ~ [s] may alternate, there is little evidence for any kind of conditioning. This suggests that the alternation might be a case of free variation, where these segments vary in their pronunciation between [θ] and [s], which differ only minimally depending on how front the tongue (and resultant constriction) is at the time of articulation.

Montler (1986) describes /θ/ as dental, rather than interdental. He reports that this sound is unlike English /θ/ and difficult for L2 speakers to discriminate, partially due to it having a grooved (not slit) tongue shape.

2.4.2 Samish

Thompson, Thompson, and Efrat (1974) speculate that the PS *c > s change had not reached Samish, suggesting that Samish retained the affricate /c/ from PS *c, resembling Klallam in that respect. They recognize limited available data as a challenge in discussing Samish and set it aside in their comparison of phonological developments in Straits. Accordingly, Kuipers (2002:5) does not include a PS *c change for Samish in his summary of sound changes across the language family.

In contrast to this, Galloway (1986) states that PS *c is most often /s/ in Samish, but speakers will occasionally produce a [θ]-like sound. The speech of one speaker revealed a dental [s] in places where speakers of Saanich and Island Halkomelem would have /θ/, while another consistently used an alveolar [s] (Galloway 1990). These descriptions suggest that PS *c had undergone a shift in Samish, though this may have been far from complete. In general, Galloway's (1986) description suggests that the Samish system resembles the Sooke, Lummi, and Songish ones, where PS *c had become a fricative /s/.[5] The actual articulation of this sound may have varied with respect to frontness of constriction, such that it was more retracted (alveolar) or anterior (dental) in certain productions.

Montler (1999) lays out sound correspondences between different dialects of Straits Salishan, noting that all of the Northern Straits dialects have at least partially undergone the shift from PS *c to /s/, with the possible exception of Samish.

2.4.3 Lummi, Sooke, and Songish

The reflex of PS *c in the Lummi, Sooke, and Songish dialects is /s/. Raffo (1972:29) describes /s/ in Songish as an alveolar fricative that is pronounced as [s] across all environments, though it is realized with some palatalization when before a velar consonant. The merger between PS *c and the /s/ from *s is not quite complete in Lummi; in positions where PS *c would be a coda following a stressed vowel, it is realized as [ʔs]. Though it is no longer a homorganic affricate, there is still stop occlusion before the frication (Thompson, Thompson, & Efrat 1974:185). This is shown in (3), where Klallam, with /c/, is compared to Lummi.

[5] Undoubtably, there would have been language contact between different dialects, which would account for some of the alternation.

(3)	Klallam	Lummi	Translation	
	ʔə́ŋac	ʔə́ŋəʔs	‘give it to me’	
	stácᵂɬ	stéʔskᵂɬ	‘back’	(Thompson, Thompson, & Efrat 1974:185)

This pattern is reported across Northern Straits dialects, but is only consistent in Lummi (Thompson, Thompson, & Efrat 1974). The retention of a phonologically-conditioned alternation between [s] and [ʔs] suggests that PS *c has not completely merged with the /s/ from PS *s in Lummi.

Though Kuipers (2002) indicates that PS *c has developed into /s/ in the Lummi, Sooke, and Songish dialects, there is virtually no description of this specific to Sooke. Further, Montler’s (1999) description of the reflex of PS *c in Songish includes both [s] and [θ]. As his interest is primarily in sketching out dialectal differences, he focuses on “narrow phonetic differences” (Montler 1999:471). It may be that this reflects a more anterior or dental [s] that could occasionally be mistaken for a [θ]. This is speculative, though, as there is not much description of the pronunciation of /s/ in Songish aside from Raffo’s (1972) description of phonemes in the language. She notes that Songish /s/ corresponds to /c/, /θ/, /s/, and /xʸ/ in Musqueam and Island Halkomelem and characterizes /s/ as being pronounced as an alveolar fricative that is realized as [s] generally, with a slightly more palatalized variant when adjacent to a velar consonant. There is no mention of a [θ] allophone. Similarly, Thompson, Thompson, and Efrat (1974:40) report /s/ as the reflex of PS *c (and PS *k, *x, and *s) in Songish and only record variation between /s/ and /θ/ in the Saanich dialect. It is possible to conclude that PS *c became /s/ in Songish, but there may be some synchronic acoustic variation in the realization of /s/ that leads to a more front pronunciation that could be associated with a more dental or interdental point of constriction.

3 FRICATIVE-FIRST Trajectory

The historical trajectory proposed in this paper is a FRICATIVE-FIRST path from PS *c to Central Salish /s/ and /θ/. This establishes a two-step process in the development of /θ/ from PS *c. PS *c first underwent spirantization (or, more accurately, the loss of the stop component of the affricate), resulting in a fricative. This fricative would be produced at a similar (alveolar) place of articulation as *c, meaning that the resulting intermediate fricative would bear articulatory and acoustic similarity to /s/, which exists in the system already from PS *s (and other sources). This is exemplified in (4).

(4)	Stage I – /c/	>	Stage II – /~s/	>	Stage IIIa – /θ/
				>	Stage IIIb – /s/

The /c/ at Stage I corresponds to the original phoneme in PS, as well as the sound found in languages that did not undergo the changes described in this paper. This includes languages like Sechelt and Squamish, where PS *c has remained /c/ (Kuipers 2002).

Languages that have not retained PS *c have either /s/ or /θ/, suggesting a common development from affricate to fricative. This is Stage II in (4). The FRICATIVE-FIRST analysis provides an explanation for the development of /θ/ in some dialects and /s/ in others. For each language and dialect where PS *c corresponds to /θ/ or /s/, I propose that there was a shared intermediate stage (Stage II) where PS *c had shifted to a fricative that is similar in place to [s]. This [s]-like form may have been slightly more dental or forward than the pronunciation associated with /s/. This is consistent with descriptions of /s/ and /θ/ in present languages, such as

the more retracted /s/ in Musqueam (Suttles 2004), or the more dental pronunciation of /th/ in Upriver Halkomelem and the Mainland dialect of Comox-Sliammon (Galloway 1977; Blake 2000).

The proposed Stage II marks a point between *c and either /θ/ or /s/ where the sound was realized as a [s]-like form. Given that /s/ would also be present in the phonemic inventory from PS *s, the Stage II realization is likely to have been ambiguous. Subsequent fronting of this ambiguous form to /θ/ would preserve the contrast between PS *s and *c, reaching Stage IIIa. A failure to front this [s]-like form could result in a merger between PS *s and *c, resulting in the Stage IIIb pattern.

The divergent outcome between the dialects in Comox-Sliammon exemplifies how the ambiguity in Stage II could be resolved to result in /θ/ (Stage IIIa) or /s/ (Stage IIIb). The two dialects must have diverged at a point of instability where PS *c had already begun to spirantize (Stage II), but each dialect reconciled the instability in a different way. If Mainland Comox /θ/ developed from an intermediate [s]-like form, we may expect greater variability in words with an underlying /θ/, rather than /s/, reflecting a period of uncertainty where its status was unclear. Blake (2000) describes ambiguity between /θ/ and /s/ in words with /θ/, not /s/, consistent with this hypothesis. If fronting occurred to prevent a merger between PS *s and an intermediate (Stage II) Proto-Comox [s]-like form, derived from *c, /θ/ and /s/ should differ most on acoustic measures correlated with front cavity size or frontness. This is supported by the impressionistic description given in Blake (2000), which suggests that /θ/ and /s/ have a similar tongue shape that contributes to their perceptual ambiguity. Further, it is hardest to differentiate the two in the environment of a back vowel. A similar tongue shape and phonological conditioning related to the frontness of adjacent segments suggests that frontness of the constriction is one of the main differences between /θ/ and /s/ in the Mainland dialect of Comox-Sliammon.

In a subset of lexical items in Saanich, there is an alternation between /s/ and /θ/. Where variation in Mainland Comox and Musqueam was not reported to be lexically restricted, Thompson, Thompson, and Efrat (1974) argue that the alternation in Saanich is limited to a subset of lexical items. This places Saanich in the middle of the Stage II /s/ and the Stage III /θ/, such that the alternation between the two reflects an incomplete sound change. Unlike languages that have progressed to Stage III, the fricative is not yet fully fronted to /θ/ or merged with /s/.

If the Saanich pattern is somewhere between Stage II and Stage III, the Lummi pattern may be between Stage I and Stage II. In Section 2, it was shown that the /s/ from PS *c in Lummi had not completely merged with PS *s because there was a [ʔs] pronunciation when in a coda position and following a stressed vowel. This represents an intermediate point between affricate and fricative, where an occlusion is retained in a certain environment. This conditioned [ʔs] sequence makes sense in a FRICATIVE-FIRST trajectory.

One concern is that there is no clear evidence of a language in Stage II of the proposed trajectory. While languages are found at each of the end points, and some fall in the middle, there are no clear examples of the proposed intermediate Stage II form. While I leave this question open for future exploration, it is also worth highlighting that there are several reasons that this situation could arise. First, it is possible that gaps in documentation obscure the existence of a Stage II language. There is little description of Samish, which may have had /c/ or /s/, depending on the description. Montler (1999) summarizes this as "s/θ" for three speakers (from Galloway 1986) and "c" in one description with unspecified speaker(s) (from Thompson, Thompson, & Efrat 1974). This inconsistency may be the influence of nearby dialects, or may represent a highly unstable stage between PS *c and /θ/, potentially the missing Stage II. Another potential explanation for the absence of the proposed [s]-like form is speaker variation. The Lummi data illustrates this, but this is even clearer in considering Galloway's (1982) description of speaker

variation in Nooksack. It is possible that this [s]-like form might resemble idiolect variation he reported, where one speaker realized /s/ and /c/ closer to [θ] and [θs], respectively. In fact, the Nooksack pronunciation [θs] might be roughly equivalent to the intermediate s-like form (from *c) proposed for Stage II. Table 3 shows the distribution of Central Salish languages across the proposed stages, with Nooksack tentatively placed under Stage II.

Table 3: Distribution of Central Salish languages across proposed stages

Stage I – /c/	>	Stage II – /~s/	>	Stage IIIa – /θ/
Sechelt	Lummi	Nooksack (?)	Saanich	Mainland Comox
Twana				Pentlatch
Lushootseed				Halkomelem (all dialects)
Klallam				
Squamish				
				Stage IIIb – /s/
				Island Comox
				Sooke
				Songish

While gaps in documentation and speaker variation are potential reasons for the absence of a Stage II state in any language, another possibility is that this intermediate stage is highly unstable and thus does not persist very long as learners regularize and shift toward Stage III (either /s/ or /θ/) and that the languages that have retained PS *c may have been moving toward Stage II if transmission had not been interrupted, but did not fully reach it, while other languages accelerated quicker toward Stage III given the language situation (see Davis & Huijsmans 2017 for discussion of accelerated change in the syntax of Comox-Sliammon).

4 Phonetic Motivation for Changes from PS *c

4.1 Phonetic In/stability and Ambiguity

The documentation suggests ambiguity and variation that is unidirectional: though [s] and [θ] are both implicated, it is lexical items with /θ/ (from PS *c) that are highly confusable, rather than those with /s/. This suggests that /s/ is the more stable of the two sounds. On the one hand, this is not surprising because /θ/ is cross-linguistically unstable (McGuire & Babel 2012). On the other hand, this is predicted under the fricative-first trajectory: if PS *c became a fricative before fronting, the fronting would be a way to maintain contrast with the pre-existing phoneme /s/ (from PS *s and other sources).

Gick, Stavness, Chiu, and Fels (2011) found that speech production favours quantal regions, which are stable states that tolerate variability in muscle activation while requiring little active control. The consistency of PS *s across the Central Salish languages suggests that /s/ is relatively stable, while the realizations of /θ/ are highly variable. The stability of /s/ across most of the Central Salish languages seems to suggest it involves a quantal region, such that there would be less motivation for it to shift. In contrast, /θ/ is variable across each of the languages that have it, suggesting that it is less stable in production. With this in mind, it is unsurprising that it (and the precursor PS *c) would be susceptible to change, particularly where it might cause ambiguity with the existing /s/ from PS *s.

4.2 Evidence for Fronting from Debuccalization and Phonetic Biases

The presence of a glottal stop before the [s] in coda position in Lummi serves as further evidence for *c becoming a fricative before fronting, and presents the possibility that the affricate-to fricative-change was multi-faceted. The decomposition of the affricate (from *c to /t+s/) may have occurred prior to debuccalization, where the stop portion lost its specification for place and became a glottal stop in coda positions before being lost.

There is good evidence for positing debuccalization in a coda position: for example, the Liverpool dialect of English has debuccalization of /t/ and /k/ to glottal segments following a stressed vowel (Harris 1990:266), obstruent segments in Spanish are often realized as [ʔ] and [h] in coda positions (Hall & Żygis 2010), Icelandic has processes of "half-debuccalization" and stops are realized as [hp] in similar environments (Kirchner 1998:143).[6,7] Further, Hayes (1986) describes a similar process of debuccalization in Toba Batak, where a stop is realized as a [ʔ] before another consonant, including as a sandhi process across word boundaries. This is parallel to the position of the [ʔs] in Lummi, as codas will proceed other consonants (as well as word boundaries).

These patterns suggest that perhaps an additional stage should be posited in the development of /θ/, where the affricate was first decomposed into a stop-fricative sequence and then the stop underwent debuccalization, as shown in (5).

(5)

Stage I		Stage II		Stage III		Stage IV		Stage V
Affricate	>	Decomposition	>	Debuccalization	>	Deletion	>	Fronting
/c/		/t+s/		/ʔs/		/s/		/θ/

Garrett and Johnson (2013:22) argue that phonetic bias, "the phonetic force that introduces variability and determines the direction of the change", is implicated in debuccalization changes, such that they result from gestural overlap which contributes to hypocorrection, in the sense of Ohala (1989).[8] This could account for the actuation of this change in Northern Straits, and potentially other Central Salish languages.

Phonetic bias and motivation for change can also be inferred from descriptions of the Musqueam dialect of Halkomelem. The pronunciation of /s/ in Musqueam is reported to be a retracted variant of [s] (Suttles 2004), suggesting that the tongue is further back in articulation than usual for an alveolar consonant. Assuming that the place of articulation for /s/ was further back, the change from affricate to fricative at an alveolar place of articulation would result in a slightly more anterior version of /s/. This could act as a precursor to fronting, providing the articulatory motivation for why change might occur (see discussion of /s/-retraction and actuation in Baker, Archangeli, & Mielke 2011). This leads to a testable prediction: the articulation of /s/ in dialects of Central Salish languages with a merger between PS *c and *s may be more anterior, or closer to the alveolar ridge, than that of dialects without the merger.[9]

[6] Kirchner (1998) also describes half-spirantization as a possible process cross-linguistically.

[7] The Icelandic "half-debuccalization" process is more commonly labeled "preaspiration"; however, there is reason to treat these as proper clusters instead of complex segments (see Árnason 2011).

[8] Garrett and Johnson (2013) clarify that hypocorrection itself is not rooted in any specific phonetic bias, and that debuccalizaton in a coda position has gestural motivation.

[9] A preliminary examination of spectral moments in Mainland (fieldwork) and Island (recordings made by

5 Why FRICATIVE-FIRST? (And not FRONTING-FIRST?)

A counterargument to the FRICATIVE-FIRST analysis is that the PS *c > /θ/ change underwent a shift that was in parallel with *c̓ > /t̓θ/, such that there would have been an intermediate affricate *tθ between PS *c and /θ/ in the present-day phonemic inventories. This is the trajectory that Thompson, Thompson, and Efrat (1974) describe for /θ/ in Saanich. They suggest that it developed in a two-stage process; PS *c first fronted to *tθ before becoming a fricative. The FRONTING-FIRST analysis presented by Thompson et al. (1974) for Saanich is attractive to account for the changes across the Central Salish languages because it provides a parallel to a PS *c̓ → /t̓θ/ change that occurs in most of the languages with /θ/.

While both *c and *c̓ could have been targeted by the same fronting process, and then the plain affricate later evolved into /θ/, it is not necessary to treat these changes in parallel. Elmendorf and Suttles (1960) describe the development of /θ/ across Halkomelem dialects as part of the general fronting that occurred from Proto-Salish, which also includes shifts affecting PS *k, *k̓, and *x.

The fronting of PS *k and *k̓ provide an example of parallel fronting, when one is fronted in a language, the other generally is as well. For example, in Comox-Sliammon, PS *k corresponds to /č/ and *k̓ corresponds to /č̓/, while *k corresponds to /c/ and *k̓ to /c̓/ in Halkomelem (Kuipers 2002). Here, there is clear motivation for analysing the two as parallel as they share a place of articulation in each language. The same is not true for PS *c and *c̓. The patterns in Pentlatch show that the two changes are not necessarily occurring in tandem.[10] While the words documented in Boas (1890) suggest a relatively complete shift from PS *c to /θ/, the language still has /c̓/ in lexical items that would have had PS *c̓. This is illustrated in (6), where words that have /t̓θ/ in the Mainland dialect of Comox-Sliammon have a /c̓/ in Pentlatch. While changes from PS *c and *c̓ may be linked to a more general fronting process, the conclusion that may be drawn is that *k and *k̓ shift in parallel while *c and *c̓ do not necessarily show the same symmetry.

(6)		Boas	Phonemic	Translation	Mainland Comox
	a.	*ē'ts'amēn*	ʔíc̓amin	'blanket'	ʔit̓θəm
	b.	*ts'āmk̲l'*	c̓amqɬ	'cloud'	t̓θamqʷɬ

Kuipers (2002) notes that PS *c is occasionally realized as /s/ in Bella Coola, while there has been no documentation of /θ/. This occasional [c] ~ [s] alternation is consistent with the fricative-first analysis, rather than the fronting-first one, because it suggests synchronic alternation between the affricate /c/ and the fricative /s/. If the trajectory were fronting-first, the predicted variant would be a more front version of /c/, such as /tθ/. One thing that stands out in the comparison of reflexes of PS *c across the Central Salish languages is that they are uniformly either the affricate /c/, such as in Sechelt or Squamish (Kuipers 2002), or they are a fricative, as in

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Harris 1981) Comox suggests differences in the acoustic realization of [s] between the two dialects. This prediction will eventually be tested in a more systematic comparison to see if /s/ production is a predictor of how PS *c developed.

[10] Galloway (1986) gives /t̓θ/ in the Samish phonemic inventory, but does not give /θ/. This may be the opposite of Pentlatch, where the change affecting PS *c' occurred before the PS *c one. However, given the limited documentation of both languages and the fact that I am relying on descriptions of Samish rather than my own examination of the data, this is speculative.

the languages discussed in Section 2. If the trajectory of change was FRONTING-FIRST, as proposed by Thompson, Thompson, and Efrat (1974), alternations involving /tθ/ would be predicted in at least some languages.

The FRONTING-FIRST analysis reconstructs an intermediate *tθ between PS *c and /θ/ in the /θ/-languages. Despite this being a midpoint in the change, there is no language where PS *c is realized as /tθ/. With the broad range of languages at different stages in the changes involving PS *c, it would be reasonable to expect that /tθ/ might be recorded in at least one of the languages with /t̓θ/. However, the few places it occurs are said to be marginal and limited to particular grammatical morphemes, such as *tθ* for the first person possessive in Comox-Sliammon. It is relevant to note that this developed historically from a cluster (Davis 1978), rather than from a single affricate like in the PS *c > /θ/ shift. It is not necessarily an issue that this would have developed in a separate process at a different point, given that it comes from a distinct source and does not end up merged with PS *c. In addition, the recorded alternations are not between /tθ/ and /s/ or /tθ/ and /c/, which might be expected under the fronting-first analysis.

Further, it is not immediately clear why /tθ/ would undergo further change and become a plain fricative, while /t̓θ/ remains. Though it is possible that the difference in glottalization of the two segments is enough to result in markedly different perceptual salience or articulatory ease, motivating change at a different rate, this requires further argumentation. The fronting-first analysis does not straightforwardly connect the developments of /s/ and /θ/ from PS *c as cohesively as the FRICATIVE-FIRST analysis.

6 Conclusion

A cross-linguistic comparison of Central Salish languages provides support for a FRICATIVE-FIRST trajectory between PS *c and /θ/. This analysis accounts for the development of /θ/ in Comox-Sliammon, Northern Straits, and Halkomelem. The FRICATIVE-FIRST analysis is more consistent with the distributional patterns, ambiguity, and reported variation in pronunciations across realizations of /s/ and /θ/ in the Central Salish languages than a FRONTING-FIRST one, such as proposed by Thompson, Thompson, and Efrat (1974) for Saanich.

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