

Salish consonant clusters: phonetic evidence for syllabic parsing?

Sonya Bird and Ewa Czaykowska-Higgins
University of Victoria

Salish languages are characterized by complex sound systems, with large consonantal inventories and long, complex consonant clusters (Czaykowska-Higgins & Kinkade 1998), as in the Nxaʔamxcín word *snkɫx^wpáw'stn* 'clothesline' (Czaykowska-Higgins & Willett [CHW] 1997). A relatively consistent finding across Salish is that, stem-initially, Obstruent-Obstruent (OO) clusters are allowed but Obstruent-Resonant (OR) clusters are not, which seems to contradict predictions made by the Sonority Sequencing Principle (SSP). As a result, the question of how these types of clusters are syllabified has generated much scholarly work, and various phonologically-motivated analyses (e.g., Bagemihl, 1991; CHW, 1997; Shaw, 2008; Urbanczyk, 2001) which have addressed the "special" properties of OO clusters. Apart from Shahin (2007) and Flemming, Ladefoged, & Thomason (2008), however, there has been no instrumental analysis of complex Salish clusters, and there is thus little indication of what such analysis might reveal about Obstruent/Resonant distinctions, about SSP, and/or about Salish syllabification.

In response to this gap, this paper systematically examines acoustic properties of consonant clusters in one Salish language, Nxaʔamxcín Salish, to consider the extent to which they contribute evidence pertinent to understanding Salish syllabification. We address two questions: 1) can we confirm instrumentally auditory impressions that led CHW (1997) to claim the occurrence of OO to the exclusion of other clusters in Nxaʔamxcín (as has been claimed for other Salish languages); and, 2) what, if anything, does instrumental analysis tell us about the role played by the Obstruent/Resonant sonority distinction in cluster syllabification?

Our acoustic analysis examines 217 surface forms of underlying CC clusters in root-initial, -medial, and -final position (token counts in parentheses), and considers the **distribution and duration of schwa** vowels relative to clusters containing different combinations of Os and Rs:

	Root Initial (69)	Root Medial (32)	Root Final (116)
OO	/ptɪx ^w / 'spit'	/pckl /'leaf'	/taxs/ 'start hauling'
OR	/cnuk ^w / 'syphilis'	/q ^w utlʔ/ '	/sapn/ 'daughter-in-law'
RR	/mra/ 'gather (plants)'	/ʔinwil/ 'yours'	/tánn/ 'mortar'
RO	/lk ^w ut/ 'far, long way'	/yamx ^w ʔ/ 'basket'	/na-√ʔawt/ 'behind'

In terms of schwa **distribution**, we find OO clusters are indeed unique: contrary to SSP predictions, they are the only cluster type in which schwas almost never occur. Root-initial OR and root-final RO clusters, which conform to SSP, behave differently: schwa tends to occur in root-initial OR clusters, but not in root-final RO clusters, although when it does occur in either, its duration is approximately the same. More generally, schwas occur preceding Rs much more frequently than preceding Os: in 59% of clusters with R as their second member vs. 13% of clusters with O as their second member (cf. Flemming et al. 2008). In terms of **duration**, despite small and uneven token counts across positions, there is a relatively clear split between schwas in final OR and RR clusters (average 53ms) vs. in clusters appearing elsewhere (average 37ms), likely corresponding to an epenthetic vs. excrescent schwa split (cf. Shahin & Blake 2004).

Placed in the context of research on cluster typologies (e.g., Morelli 1999; Kreitman, 2006), cue perceptibility (e.g., Fleischhacker, 2001; Fullwood, 2014; Steriade, 2009; Yun, 2014), and gestural (mis)timing (e.g., Gick & Wilson, 2006), these findings confirm that sonority distinctions play a major role in parsing Nxaʔamxcín clusters, but that, rather than Os in OO clusters being special, it is Rs that are special, because only Rs consistently require preceding (epenthetic) schwas. Our findings also suggest that Nxaʔamxcín may allow complex OR and OO onsets and RO and OO codas, contrary to previous analyses. Finally, our findings suggest cluster parsing is due to complex constraint interactions on syllable structure, perceptibility and timing.

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