

# **It's that schwa again! Towards a typology of Salish schwa**

**Aliana Parker**  
University of Victoria

The purpose of this paper is twofold: first, to provide a brief review and comparison of the patterns of inserted schwa across multiple Salish languages; and second, to make the initial move towards applying Gestural Phonology to Salish languages. The intent is to begin to develop a typology of schwa in Salish. The first part of this paper reviews the literature on patterns of inserted schwa in ten Salish languages and the second part attempts to unite the observed patterns by proposing an analysis within the framework of Gestural Phonology. In this analysis, both epenthetic and excrescent schwas are proposed to come from an underlying gap between consonant gestures which results from a consonantal coordination constraint that is active in all Salish languages.

## **1 Introduction**

A key component of phonological research in Salish languages regards the occurrence of schwa, which appears throughout Salish and has thus far proved enigmatic. Though much debate remains, the general consensus in the literature is that Salish schwa is weightless, featureless and absent from underlying representations. Its occurrence is most often attributed to insertion, via epenthesis or excrescence, or to full vowel reduction. However, while many researchers have examined schwa as a necessary element of their work on prosodic phenomena such as stress systems and syllable structure, as yet few have focused exclusively on schwa across the Salish family. The purpose of this paper is to both follow and build upon Kinkade (1993 & 1998) by providing a more comprehensive review and comparison of schwa patterns across multiple Salish languages. To that end I review the current research on schwa from ten languages representing each branch of the Salish language family. The languages reviewed are Bella Coola, (an isolate); Sliammon, SENĆOŦEN, Cowichan, hənqəmínəm, Squamish and Lushootseed, from the Central Salish branch; Upper Chehalis, from the Tsamosan branch; and St'at'imcets and Nxaʔamxcín from the Interior Salish branch. The hope is that this research will provide for a better understanding of Salish schwa and will in turn allow for further advances in the research of Salish prosody. As Bianco notes, "the assignment of stress, structural

constraints on syllables, and even certain morphosyntactic enigmas are motivated according to the researcher's primary assumptions about schwa" (1994:9). Thus an enhanced understanding of this issue will be of great benefit to all future research.

The organization of this paper is as follows: Section 2 introduces the different types of schwas in Salish; Sections 3 and 4 summarize the various analyses of epenthetic and excrescent schwa in the languages reviewed; Section 5 offers a discussion of these summaries and raises some questions regarding the current status quo of schwa analyses in Salish; and Section 6 presents a preliminary analysis of schwa in the Gestural Phonology approach.

## 2 The Status of Schwa

Many Salishanists have accepted Kinkade's (1993, 1998) seminal proposals regarding schwa across Salish. He suggests that all schwas in Salish are weightless (non-moraic), featureless and absent from underlying representations. The implication is that all schwas appearing in surface representations are the result of some phonetic or phonological process of vowel change or vowel insertion. Kinkade (1993) proposes that schwa in Salish surfaces from one of four processes: epenthesis, excrescence, vowel reduction or segment derivation. (The final process appears to be limited in range, occurring only in Interior Salish.) A complete review of all four of these processes is beyond the scope of this paper, and thus the former two sources of schwa, epenthesis and excrescence, will comprise the discussion to follow.

The widely accepted distinction of epenthetic and excrescent schwa in Salish is based on the proposals of Levin (1987), who argues that excrescent vowels do not interact with the phonology, are the result of transitional or coarticulation effects and are not triggered by stray consonants. This contrasts with epenthetic vowels which are inserted by phonological rule and may be of fixed quality. Within Salish, an epenthetic schwa is most often inserted for the purposes of stress assignment or syllabification and thus interacts with the prosodic rules of the language (e.g. Bianco, 1994; Blake, 2000; Czaykowska-Higgins & Willett, 1997; Matthewson, 1994 a & b; Shaw, 2002). An excrescent schwa is usually defined as being optional in occurrence, of variable phonetic quality and invisible to the prosodic rules of the language, (it will not carry stress nor will it affect syllabification). It is therefore considered to be solely an articulatory or perceptual transitional element within certain consonant clusters (Bagemihl, 1991; Dyck, 2004; Leonard, 2007; and Rowicka, 2002, among others).

### 3 Epenthetic Schwa

This section summarizes the analyses of epenthetic schwa in the literature across ten languages. The goal of this section is to highlight the differing patterns of schwa that may be seen across Salish, as well as to establish the commonalities among all. As will be seen, the general pattern is that epenthetic schwa occurs to satisfy prosodic rules of syllabification or stress assignment.

Let us begin the review with Bella Coola, which Bagemihl (1991) has argued contains only excrescent schwa and no epenthetic schwas. He proposes that the maximal syllable structure is CRVC<sup>1</sup>, where a resonant may optionally function as a syllable nucleus. While all Salish languages are known for their long strings of consonant clusters, Bella Coola demonstrates the strongest version of this characteristic and may contain words entirely made up of voiceless obstruents, for example: q'psttx̣ "Taste it!" (Bagemihl, 1991:627). This has posed an obstacle to researchers, who have alternately proposed that Bella Coola has no syllables at all, or that every single segment is syllabic, (see Bagemihl, 1991 for a review of this research). Bagemihl, on the other hand, proposes that all unsyllabified consonants are moraic and thereby prosodically licensed by grace of their moraic weight. Thus, no insertion is required to syllabify illicit clusters because no clusters are illicit. Moreover, Bagemihl also suggests that schwa insertion is not required for stress purposes. His analysis thereby avoids any need for epenthetic schwa. Bella Coola is the only language notable for this analysis; all other Salish languages evidence an epenthetic schwa of some kind.

Blake's (2000) dissertation on the distribution of schwa in Sliammon involves an in-depth review of the syllable structure and stress system in the language. In essence, Blake (2000) argues that schwa epenthesis occurs to satisfy the Optimality Theoretic constraint of ProperHeadedness, which requires that the syllable head of a foot have a nucleus. Epenthesis in Sliammon also occurs as the result of a constraint against stem initial consonant clusters, for example t<sup>h</sup>k<sup>w</sup>a → t<sup>h</sup>ək<sup>w</sup>a "edible root" (Blake, 2000:5). In this way schwa can occur stressed and unstressed in closed syllables, as in pəq<sup>h</sup>pəq<sup>h</sup> "all white" and t'énʔəm "barbeque (salmon)", or stressed in open syllables as in ʔəʔəp<sup>w</sup>x̣ "become broken" (Blake, 2000:5). However, Blake also argues that there is a strong dispreference for schwa in open stressed syllables. This is the result of a constraint \*ə]σ, which disallows stressed schwa in open syllables. It is ranked lower than the constraint which demands the left-alignment of prosodic-word heads. Thus, for example, /θət<sup>h</sup>əm/ will be realized as [θət<sup>h</sup>əm] "jig for cod" (Blake, 2000:6) in order to avoid a stressed schwa in an open syllable. Note, however, that the constraint

---

1 Within this paper, C=consonant, O=obstruent, R=resonant, V=full vowel only, ə=schwa. Differing notations from the works reviewed have been adapted to fit this format.

against root-initial consonant clusters is ranked higher than the constraint \*ǎ]σ, allowing forms like t<sup>h</sup>ǎk<sup>w</sup>a to appear.

Bianco's (1994) thesis provides a comprehensive discussion of schwa insertion in Cowichan, a dialect of Halkomelem. She argues that, at least within un-affixed roots, schwa epenthesis occurs to carry stress in the absence of a full vowel and in order to satisfy the sonority constraints on syllable structure. Regarding the latter, Bianco (1994) proposes that epenthetic schwa occurs to prevent onset consonant clusters, as in *clɛl* → *cəlél* "deep" (Bianco 1994:121), and to divide overly-sonorous codas into multiple syllables that are legal according to the sonority constraints in the language, as in *ɸisç* → *ɸisəç* "pine cone" (Bianco 1994:121). The maximal syllable shape in Cowichan is CVCC, with strict limitations on allowable codas.

Regarding stress, Bianco (1994) proposes a leftward directionality. Stress is assigned to the leftmost full vowel, skipping schwa if a full vowel is present, or to the leftmost schwa if no full vowel is present. In certain instances, stress may appear to select one full vowel over another, regardless of schwa. Compare for example the forms *θéθiʔən* "blood" and *ʔiléʔəq* "in the back of a vehicle" (Bianco, 1994:50). Bianco's explanation is that vowels in Cowichan are ranked according to sonority, with /a/ being the most sonorous, /e, o/ less so, /i, u/ even less sonorant and /ə/ being the least sonorant vowel of all. Thus stress will be attracted to the most sonorous vowel in the root and will only appear on schwa when no other vowel is present.

Shaw (2002, 2004) and Shaw, Blake Campbell and Shepard (1999) in their review of *həŋqəmiŋəm* (another dialect of Halkomelem) also posit that schwa appears to provide an obligatory syllable nucleus for stress and to break up illicit consonant clusters, as in *ts* → *tás* (perfective), *ts-ət* (t-transitive) "approach" (Shaw et al. 1999:15). Shaw (2002) argues that schwa epenthesis serves to fulfil ProperHeadedness requirements in that it provides a nucleus for stress. Moreover, Shaw et al. (1999) propose that stress is sensitive to the weight distinction between full vowel and epenthetic schwa. In this case, the Weight-To-Stress Principle is ranked higher than the alignment constraint on trochaic feet, ALIGN-FOOT-LEFT. Thus, for example, *smətəlí*, "beaver-tooth dice game" shows a foot template ə(ǎ́) despite a usual pattern of left-alignment (Shaw et al. 1999:13). In addition, Shaw et al. propose a constraint \*ǎʔ]σ which disallows a /ǎʔ/ sequence syllable-finally, for example *nəçəʔ* → *nəçǎʔ* (1999:11).

Within SENĆOŦEN, Leonard (2007) demonstrates that schwa may be epenthesized to prevent illicit consonant clusters. She argues that the only clusters which appear word-initially, (OO clusters) are not tautosyllabic and therefore are allowed to occur. Compare for example *tqép* "saltwater fish trap" with *qəlǎx* "salmon eggs" (Leonard, 2007:14-16). Of the OO clusters that do surface with epenthetic schwa, this schwa serves to break up a cluster that matches in both place and laryngeal features, for example *qəqǎλ* "shadow"

(Leonard, 2007:15). In contrast, resonants are not allowed to cluster root initially. Schwa epenthesis will always occur in RR, RO and OR root-initial clusters. Schwa epenthesis also occurs in codas due to Sonority Sequencing constraints. Thus, apart from a few exceptions, schwa will appear in a coda cluster that rises in sonority, as in  $\text{tek}^w\text{əl}$  "cross over the water" (Leonard, 2007:18).

Similar to other Salish languages, stress in SENĆOŦEN is sensitive to a moraic weight distinction between full vowels and schwa (Leonard 2007). Following the analysis proposed by Dyck (2004), Leonard adopts a modified version of the Weight-To-Stress principle in that stress will be attracted to any syllable with weight over a weightless one. However, a schwa-resonant sequence may pattern as a full-vowel nucleus. The suggestion is that the schwa+syllabic resonant functions as a syllable nucleus, with the resonant providing moraic weight to equal that of a full vowel. A similar pattern is found in Squamish (Dyck, 2004) and Upper Chehalis (Kinkade, 1998).

Epenthetic schwa in Squamish also occurs to prevent consonant clusters and to satisfy requirements for stress (Dyck, 2004). While Dyck does not provide specific examples of schwa insertion in consonant clusters *per se*, it can be concluded from her analysis that Squamish has a preference for simple onsets and codas and therefore schwa insertion will occur to break up illicit clusters. Notably, only OO clusters are allowed as onsets and RO and OO clusters are allowed as codas within Squamish. Dyck (2004) notes that when RR and OR coda clusters occur, the second R is either syllabic or the cluster is realized as  $\text{R}\text{ə}\text{R}$  or  $\text{O}\text{ə}\text{R}$ , (which may indicate excrescence in this case).

Regarding stress assignment, Dyck (2004) argues that stress is penultimate and sensitive to weight distinctions. As mentioned earlier, Dyck proposes a modified version of the Weight-to-Stress principle, saying that if the syllable has weight, it will be stressed. Thus in the case of multiple weighted syllables, stress will be penultimate, but in the case of a weighted and weightless syllable pair, the weighted syllable will receive stress regardless of location. Thus schwa will only be stressed when no other full vowel is present. The one exception to this is in a  $\text{ə}\text{R}$  sequence. Dyck (2004) argues that a schwa-resonant sequence has equal weight to a full vowel, and therefore will accept penultimate stress over a full vowel. Examples are: ( $\text{ə}\acute{\text{V}}$ ) as in  $\text{sy}\text{ə}\acute{\text{x}}\text{ás}$  "large rock" (86); ( $\acute{\text{ə}}\text{ə}$ ) as in  $\text{w}\acute{\text{ə}}\acute{\text{x}}\text{əs}$  "frog" (97); and ( $\acute{\text{ə}}\text{RV}$ ) as in  $\text{h}\acute{\text{ə}}\text{wan}$  "dog" (90). Note that this last example only occurs when the resonant is plain. In the case of a glottalized resonant, the stress will move to the full vowel, as in  $\text{h}\text{əw}\text{ʔit}$  "rat", (Dyck, 2004:86). This is due to glottal restructuring, in which an underlying  $/\text{R}\text{ʔ}/$  becomes  $[\text{ʔ}\text{R}]$  in the surface form. Thus, the preceding schwa can no longer be licensed by the moraic weight of the resonant.

Urbanczyk's (2001) analysis of schwa in Lushootseed again shows similarity to other Salish languages in that it occurs to prevent complex obstruent clusters and to carry stress when no full vowel is present. Lushootseed follows

the common Salish pattern wherein stress is trochaic and is sensitive to vowel quality, and initial obstruent aspiration within OO clusters serves to break up the cluster. Compare for example  $təs=əd \rightarrow t́səd$  "Punch someone!" and  $təs=us-əd \rightarrow t́sósəd$  "punch someone in the face" (Urbanczyk, 2001:79). Thus Urbanczyk (2001) proposes that the maximal syllable shape in Lushootseed is CVC or CəC. However, this brief summary does not do appropriate justice to Urbanczyk's analysis, which is significant for understanding schwa in all Salish languages. A more complete discussion will follow in Section 5.

Within Upper Chehalis, Kinkade (1998) argues that schwa occurs solely to bear stress when no full vowel is present. The stress system of Upper Chehalis shows a preference for full vowels over schwa. Moreover, all unstressed vowels in closed syllables are deleted, and there is a strong dispreference for unstressed schwa in open syllables. For example,  $c'əx^w-mł$  "wash for others" shows a stressed schwa in a closed syllable. This schwa is deleted when stress falls on a different syllable, as in  $c'əx^w-š́n-m$  "wash one's feet" (Rowicka, 2001:109). The language also shows a pattern of changing unstressed schwa in open syllables to the least marked full vowel depending on the location. In this case schwa may surface as stressed in a root, but may change to another full vowel from certain morphological interactions. Thus it is apparent that epenthetic schwa only surfaces as stressed, as in  $támš$  "earth, ground" (Rowicka, 2001:109). Consequently, any unstressed schwa which occurs in Upper Chehalis can be concluded to be the result of excrescence, as in  $q'wóləwe?$  "maple" (Rowicka, 2001:109).

Schwa epenthesis in St'át'imcets, (Lillooet), also occurs for one of two reasons; either to prevent an illicit consonant cluster based on sonority sequencing rules, or to provide the obligatory syllable nucleus to carry stress. Regarding syllable structure, St'át'imcets follows sonority sequencing rules within tautomorphemic onset clusters and all coda clusters. For example, schwa epenthesis will occur to break up an RR-coda cluster as in  $ká.nəm$  "why" but is not required in the heterosyllabic cluster in  $ł-kán.m-aš$  "why (subjunctive)" (Matthewson, 1994a: 6). Therefore, tautomorphemic onset sequences of RO and RR are disallowed and instigate schwa epenthesis, and any CRC coda cluster will also cause epenthesis. However, Matthewson (1994a) notes that a sequence of ROOR would be allowed as it may be syllabified as RO.OR which follows sonority sequencing rules.

In addition, schwa epenthesis also occurs to provide a syllable nucleus to carry stress in morphemes lacking a full vowel, such as  $káxkəx$  "older sister" (Matthewson, 1994a:3). However, "...schwa is the least preferred foot head, and may not head a foot which also contains a full vowel" (Matthewson, 1994b:7). St'át'imcets shows a similar pattern to Upper Chehalis in that there is a dispreference for unstressed schwa in open syllables. However, schwa may occur freely as stressed or unstressed in closed syllables.

Finally, in Nxaʔamxcín (or Moses-Columbian Salish) schwa epenthesis is conditioned by constraints on syllable structure due to sonority sequencing principles and by stress requirements. It may occur to fulfil the required nucleus for stress in CC or CCC roots that are not followed by a suffix with a full vowel, as in the form cákək "get hit" (Czaykowska-Higgins & Willett, 1997:395). Czaykowska-Higgins and Willett (1997) argue for a maximally simple syllable structure in Nxaʔamxcín: CVC. Onset clusters are prohibited and therefore realized with inserted schwa, except for OO clusters. As seen before, initial obstruent aspiration is nucleic and therefore onset OO clusters are not tautosyllabic. For example, ptíxʷ → pʰtíxʷ "spit" (Czaykowska-Higgins & Willett, 1997:392). All other onset clusters are disallowed, regardless of sonority sequencing principles. The patterning of epenthetic and excrescent schwa in coda clusters provides additional evidence for maximally simple codas. It appears that schwa epenthesis occurs in coda clusters of RR and OR sequences, and schwa excrescence occurs in RO coda clusters. In OO coda clusters, the aspiration of the initial stop is again analysed as nucleic. Urbanczyk (2001) first proposed the analysis of obstruent aspiration as syllabic. Such an analysis has some interesting implications, a few of which will be discussed in Section 5.

#### 4 Excrescent Schwa

A review of excrescent schwa also reveals similar patterns across Salish. Of the works reviewed, almost all suggest that excrescent schwa occurs in clusters involving resonants. Indeed, Kinkade proposes that this is a pan-Salish rule and may be a trace from Proto-Salish (1998:198). In Bella Coola, Upper Chehalis, Sliammon and SENĆOŦEN, excrescent schwa occurs in CR clusters, or more specifically OR clusters (Bagemihl, 1991; Rowicka, 2002; Kinkade, 1998; and Leonard, 2007). Returning to Bagemihl (1991), excrescent schwa is the only inserted schwa that surfaces in Bella Coola. It follows a similar pattern to that found in all the other languages in that it is an optional transition within an OR cluster, regardless of syllabicity. It is invisible to reduplication rules, is not triggered by "stray" consonants, (of which there are none in Bella Coola according to Bagemihl's analysis), and thus simply mediates an articulatory transition. Thus schwas in examples such as mənłkʷa "bear berry" and təlkw "swallow" (Bagemihl, 1991:599) may be understood as purely excrescent.

This analysis can be taken as representative of all other Salish languages. In Sliammon, excrescent schwa occurs in OR and RO clusters (Blake, 2000); in SENĆOŦEN it occurs in OR clusters (Leonard, 2007); in Upper Chehalis it occurs in any CR cluster (Kinkade, 1993); finally, in Nxaʔamxcín excrescent schwa occurs as a transition between two heterosyllabic resonants as well as in RO clusters (Czaykowska-Higgins & Willett, 1997). The argument here is that the transitional vowel is actually the voiced form of the resonant release, and

similar to the 'nucleic' aspiration of the first obstruent in an OO cluster, can vary in quality from almost imperceptibly short to something characteristic of a full schwa.

## 5 Discussion

From these reviews, it appears that schwa epenthesis in Salish occurs as a result of prosodic constraints: a constraint against certain consonant clusters and a constraint which requires that stressed syllables have vocalic nuclei. In many ways it would be easy to confuse these two constraints as they both involve epenthesizing schwa to function as a syllable nucleus. And, in fact, as both elements are closely related (syllables forming the prosodic feet on which stress falls), it may be that both are interacting in every language to determine schwa epenthesis.

Thus far the general consensus is that the distinction between the different types of inserted schwas is one of epenthesis versus excrescence. However, some issues begin to indicate that this distinction might not be so simple. Levin (1987) argues that epenthetic vowels are inserted early enough to interact with phonological rules such as stress assignment, whereas excrescent vowels result from late insertion rules and therefore are ignored by prosodic processes. However, Rowicka (2001) argues that such a distinction would predict that the epenthetic vowel would be the result of redundancy rules and therefore mimic the phonetic qualities of an underlying vowel in the language's inventory. However, if you accept that schwa is not present in the underlying representation, then its surface appearance - which does not mimic a phonemic vowel - is unexplained. Moreover, it is widely attested that schwa is variable in quality and is highly prone to coarticulation effects (see for example Blake, 2000). This contradicts the fixed quality that one might expect from a relatively stable epenthetic element. For these and other reasons, Rowicka (2001) proposes the distinction being one of prosodic visibility versus invisibility. The epenthetic vowel would be considered prosodically visible in that it does interact with certain phonological rules such as stress assignment, whereas the excrescent schwa is prosodically invisible as it is completely ignored by prosodic rules.

In contrast, Kinkade (1998) suggests that excrescent schwa might indeed be prosodically visible. While Levin states that "there are no phonological rules which refer to excrescent vowels" (1987:192), Kinkade notes that excrescent vowels in Upper Chehalis require the application of at least two phonological rules: one is the shift of stress from an underlyingly stressed resonant to the nucleic schwa, as in čnq → čánq-ł "make a mistake, get lost" (Kinkade, 1998:202); and the other is a change of quality in an open syllable, as in s-čánq-w-n → s-tx<sup>w</sup>-čánáq-stw-n "make a mistake, get lost" (Kinkade, 1998:210), which he argues is different from the changes outlined for epenthetic schwas (please

refer to Kinkade, 1998 for further explanation). Thus excrescent schwa in Upper Chehalis is apparently visible to prosodic rules. The significance of the proposals by Rowicka (2001) and Kinkade (1998) is that the commonly understood distinctions of epenthesis and excrescence are inadequate to fully explain inserted schwa in Salish.

Urbanczyk's (2001) analysis of schwa adds further interest to the discussion of epenthetic schwa. She argues that no CC clusters are tautosyllabic. Rather, the initial C of any CC cluster will always be produced with some form of release which functions as a syllable nucleus. Thus, every single consonant in Lushootseed is licensed by syllabification, unlike Bagemihl's (1991) proposal of Bella Coola that consonants are prosodically licensed by their moraic weight. Moreover, Urbanczyk argues that obstruent release, or aspiration, is in complementary distribution with schwa: aspiration will occur before a voiceless consonant but not before a vowel, and schwa will occur before a voiced consonant and when needed for stress. Thus aspiration will become schwa when the following segment is voiced or when that syllable is required to carry stress. Otherwise it will surface as aspiration, or will be subsumed by the following vowel. These competing analyses of epenthesis and excrescence raise many questions about our current understanding of this distinction. In the following section, I offer a preliminary explanation which might account for the rather blurred boundary between epenthetic and excrescent schwa.

## 6 A Gestural Analysis

In considering all of these facts, it may be possible to examine inserted schwas in Salish by means of Gestural Phonology, as first described by Browman and Goldstein (1986). To date, no one has applied the gestural approach to Salish phonology, yet it may be that this framework can assist and develop our understanding of Salish schwa. What follows is a preliminary proposal that represents an initial step towards using Gestural Phonology for the analysis of Salish. In this analysis, I follow the lead of Kinkade (1993, 1998), among others, and adopt three crucial assumptions regarding the nature of schwa: that all schwas in Salish are weightless, featureless and absent from underlying representations. While many of the works reviewed earlier do adopt these assumptions, they are still entirely debatable.

As a brief introduction, gestural phonology, a type of articulatory phonology, describes segments in terms of their spatio-temporal relations. Segments are seen as bundles of articulatory gestures and are described by their interaction with one another along a temporal scale. Each segment is schematically represented as a single gesture which is defined by its temporal landmarks: the Onset of the gesture; the Target, when the ideal constriction is reached; the C-Centre, which marks the centre of the gestural plateau (the phase

during which the target constriction is held); the Offset when the articulators begin to move away from the target position; and the Release-Offset, signaling the end of the gesture.

Phonologists are making increasing use of Gestural phonology to analyze inserted elements. Nancy Hall's (2006) key work on the distinction between epenthetic and excrescent vowels argues that epenthetic elements are the result of an inserted vowel gesture whereas excrescent elements are the result of a 'gestural mistiming', or a gap between two 'misaligned' consonant gestures. Gafos (2002) on the other hand, examines inserted schwas in Moroccan Colloquial Arabic and proposes that they result from this very "mistiming". He develops a set of OT alignment constraints which can be used to predict the appearance of epenthetic schwa.

In this analysis, I adopt the proposals of Gafos (2002) and suggest that Salish languages have a coordination constraint on consonant clusters which aligns the centre of the first gesture with the onset of the second, as in figure 1. This is expressed in the OT constraint ALIGN(C<sup>1</sup>, C-CENTER, C<sup>2</sup>, ONSET):

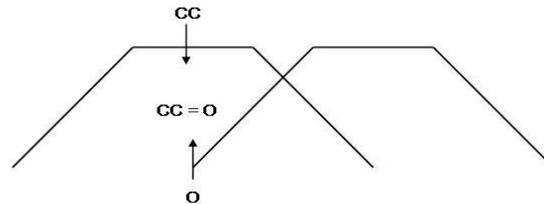


Figure 1. CC Coordination ALIGN (C<sup>1</sup>, C-CENTER, C<sup>2</sup>, ONSET)

As figure 1 shows, the C-Centre of the first consonant gesture is aligned with the Onset of the second gesture, leaving a small gap between the Offset and Target points. This gap may be voiced, depending on the coordination of the respective vowel gestures, in which case it would have a vowel-like quality. According to Gafos (2002), this gap is the source of some inserted schwas in Moroccan Colloquial Arabic, and thus a similar analysis will be applied to Salish. However, while Gafos requires multiple alignment constraints to explain the different patterns, I opt in favour of simplicity, based on the principle of Ockham's Razor, and propose that this gap is the source of both epenthetic and excrescent schwas in Salish. When a vocoid is required by certain phonological rules, such as stress assignment or syllable formation, the gap in the consonant gestures will surface as a voiced schwa and thereby appear to be epenthetic. However, when no vocoid is required by the phonology, this gap may optionally surface as voiced or voiceless depending on the underlying voicing gestures and thus appear as excrescent. Moreover, in the latter case, the schwa-like percept would disappear

in fast speech as the gestures would "stiffen" and close the gap between them. In this way, we can understand epenthetic and excrescent schwa, and obstruent aspiration, as resulting from the same source: not a gestural "mistiming", as Hall (2006) says, but rather a functional and intentional gap between consonant gestures. The distinction between them depends on phonological rule, much like Rowicka's (2001) distinction of prosodic (in)visibility.

This preliminary analysis has some weaknesses, yet it also offers certain advantages for the study of Salish schwa. There are some phenomena which it cannot explain, such as the optional appearance of schwa between two voiceless obstruents, as in the alternation observed in Lushootseed of  $q^h si? \sim q\text{ə} si?$  "uncle" (Urbanczyk, 2001: 76). While the consonantal gap may easily be the source of aspiration in this case, it is more difficult to explain why a voicing gesture would be randomly activated in the gap between two voiceless segments. However, while more fine-tuning is necessary, the initial proposal offers several advantages for understanding the observed qualities of inserted schwa. First, it may reconcile Rowicka's (2001) and Kinkade's (1998) varying analyses of excrescent schwa, as discussed earlier. It also fits well within the Proper Government approach, in which all consonants are headed by a syllable nucleus (this being the gestural gap), and therefore may align to a certain extent with Urbanczyk's (2001) proposals. Finally, it provides additional evidence for the theory that schwa, regardless of type, is weightless, featureless and absent from underlying representations.

## 7 Conclusion

It is clear that there are many factors involved in the appearance of schwa in Salish languages. The interaction between stress systems and syllable structure is a central issue and this paper suggests that gestural coordinations may be yet another defining factor. General patterns that are seen across Salish languages are that stress shows a preference for full vowels over schwa, indicating that schwa may be weightless and non-moraic. Moreover, it is possible that all inserted schwas in Salish, epenthetic and excrescent, result from the same underlying construct and may be understood as the result of a constraint on consonant gesture coordination. This review has provided a brief glance at the patterns of inserted schwa in some Salish languages. More research is needed to develop a complete understanding inserted schwa in Salish, but it is clear that the Gestural Phonology approach may offer new and valuable insights into the phenomenon of Salish schwa.

### Acknowledgments

I am very grateful to the various experts in this field who provided invaluable feedback regarding this research: Patricia A. Shaw, Ewa Czaykowska-Higgins, Janet Leonard, and Suzanne Urbanczyk. All errors and omissions are my own.

### References

- Bagemihl, B. (1991). Syllable structure in Bella Coola. *Linguistic Inquiry*, 22(4), 589-646.
- Bianco, V. M. (1994). The role of sonority in the prosody of Cowichan. (MA Thesis). University of Victoria, Victoria.
- Blake, S. J. (2000). On the distribution and representation of schwa in Sliammon (Salish) (Doctoral dissertation). University of British Columbia, Vancouver.
- Browman, C.P & Goldstein L.M. (1986). Towards an articulatory phonology. *Phonology Yearbook* 3, 219-252.
- Czaykowska-Higgins, E. & Willett, M. (1997). Simple syllables in Nxaʔamxcín. *International Journal of American Linguistics*, 63(3), 385–411.
- Dyck, R. A. (2004). Prosodic and morphological factors in Squamish (Skwxwú7mesh) stress assignment (Doctoral dissertation). University of Victoria, Victoria.
- Gafos, A. (2002). A grammar of gestural coordination. *Natural Language & Linguistic Theory* 20, 269–337.
- Hall, N. (2006). Cross-linguistic patterns of vowel intrusion. *Phonology* 23, 387-429.
- Kinkade, D. M. (1993). The chimerical schwas of Salish. *Paper read at 92 Annual Meeting of the American Anthropological Association/ 32nd Conference on American Indian Languages, Washington, D.C., November 21, 1993.*
- Kinkade, D. M. (1998). How much does a schwa weigh? In E. Czaykowska-Higgins & M. D. Kinkade (Eds.), *Salish languages and linguistics: theoretical and descriptive perspectives* (197–216). New York: Mouton de Gruyter.
- Leonard, J. (2007). A preliminary account of stress in SENĆOŦEN (Saanich/North Straits Salish). *Northwest Journal of Linguistics* 1(4), 1–59.
- Levin, J. (1987). Between epenthetic and excrescent vowels (or what happens after redundancy rules). *WCCFL* 6, 187-201.
- Matthewson, L. (1994a). Syllable structure in St'át'imcets. In *Toronto Working Papers in Linguistics: Proceedings of the Canadian Linguistics Association* (Koskinen, P., ed.)

- Matthewson, L. (1994b). Optimality and syllable structure in St'át'imcets. UBC Generals paper.
- Rowicka, G. J. (2002). Lateral deletion and more or less excrescent schwa in Upper Chehalis. *Linguistics in the Netherlands*, 139-149.
- Rowicka, G. J. (2001). Epenthesis and prosodic (in)visibility in Mohawk and Upper Chehalis. *Proceedings of WSCLA 5*, 107-118.
- Shaw, P. A. (2004). Reduplicant order and identity: Never trust a Salish CVC either? In D. Gerdts & L. Matthewson (Eds.), *Studies in Salish linguistics in honor of M. Dale Kinkade*. University of Montana Occasional Papers in Linguistics (Vol. 17). Missoula, MT: University of Montana.
- Shaw, P. A. (2002). On the edge: obstruent clusters in Salish. *Proceedings of WSCLA 7. UBCWPL 10:119-136*.
- Shaw, P. A., Blake, S. J., Campbell, J. & Shepard, C. (1999) Stress in həŋqəminəŋ (Musqueam) Salish. In *Proceedings of the Workshop on Structure and Constituency in the Languages of the Americas*, UBC Working Papers in Linguistics, vol. 2. Pp. 131-163.
- Urbanczyk, S. (2001). *Patterns of reduplication in Lushootseed*. London: Garland Pub.