‘Schwat’s up’ with short vowels in Gitksan pre-verbs?*

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Abstract: This paper investigates the distribution of the surface forms of short vowels in pre-verbs in Gitksan. The goal of this investigation is to determine what features are underlyingly present for these vowels. I propose that almost all of the data can be accounted for when taking the perspective that the underlying vowel is the featureless vowel segment, schwa. This proposal is only preliminary and is intended to set the stage for additional investigation.

Keywords: Phonology, schwa, underlying phonemes, Gitksan, pre-verbs

1 Introduction

The goal of this paper is to present a distributional account and proposal concerning the short vowels in Gitksan pre-verbs. I address this goal by asking the following: *What evidence is there that schwa (an abstract, featureless vowel segment) is underlyingly present in Gitksan pre-verbs, and how is its surface form derived?* Early grammars analysed the final vowel in Gitksan pre-verbs as underlying schwa (Rigsby, 1986). More recent work has analysed the final vowel in a pre-verb before it attaches to a verb root as epenthetic (Brown, Davis, Schwan, & Sennott, 2016). I propose that the majority of the short vowels in the data, including but not limited to the final vowel, are underlyingly schwa /ə/. This paper also provides a description of a subset of Gitksan pre-verbs whose vowels may be underlyingly specified for some feature, and cannot be accounted for with the current proposal. The purpose of this work is to serve as a basis for future analysis of the underlying phonemic inventory of Gitksan, which has implications for the historical reconstruction of proto-Tsimshianic.

Section 2 gives a literature review of themes relevant to this paper. 2.1 gives a description of Gitksan and its vowel inventory. 2.2 discusses how this paper is situated within phonological theory and acknowledges relevant theoretical assumptions. Section 2 concludes by situating my proposal within the context of the literature, and how it addresses the goal stated above. Section 3 describes the

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data used to motivate my proposal. Section 4 outlines my proposal that attempts to account for the data from section 3, provides observations supporting this proposal, and explains why alternative proposals do not account for the data to the same extent that my proposal is able. The proposal is that schwa, an abstract, featureless segment, is underlyingly present where short vowels surface in Gitksan pre-verbs. This paper concludes with section 5, which discusses the implications of this paper, and summarizes the key points that have been outlined.

2 Literature Review

2.1 Language Context

Gitksan is a Tsimshianic language spoken by communities in Northern British Columbia, along the upriver areas of the Skeena River. There are ~300 fluent speakers of Gitksan, many more semi-proficient speakers, and ~600 community members actively engaged in learning the language (Gessner, Herbert, Parker, Thorburn, & Wadsworth, 2014). The Gitksan community has been engaged in the documentation of their language for many years, with the first grammar of Gitksan being published in 1986 (Rigsby, 1986). This grammar uses primarily source data from the Eastern Anspayaxw dialect (Kispiox area), which is thus the focus of this paper.

Gitksan's **vowel inventory** has been documented as having 5 full vowels /a, i, e, o, u/, and sometimes includes the featureless vowel segment, /ə/ (schwa) (Yamane-Tanaka, 2006). A discussion of schwa follows in section 2.2. The full vowels have a length contrast, surfacing as either short (e.g. /a/), or long (e.g. /aa/) (Brown et al., 2016; Rigsby, 1986). The Eastern dialect, which this paper considers, does not have the short vowel /e/ (but retains the long variant) (Brown et al., 2016). Where short /e/ surfaces in other dialects, the Eastern variety has /a/. The data and proposal presented in this paper will deal with short vowels exclusively.

Table 1: Eastern Gitksan short vowel inventory feature chart.

	[-back]	[+back]
[+high]	i, i:	**u, u**:
[-high], [-low]	e:	**o, o**:
[+low]		a, a:

Segments in **bold** are rounded. Schwa not represented because it is *featureless* (see 2.2).

I will also briefly describe the consonant inventory in Gitksan, as is relevant to the current investigation. The language has a full set of labial, coronal and velar stops and fricatives, which are differentiated from the uvular, and glottal consonants by the feature [+PHAR] (Yamane-Tanaka, 2006). As such, the uvular, and glottal segments have been shown to pattern as a phonologically

significant natural class in Gitksan. These consonants have been shown to have co-articulatory effects to adjacent vowels. In particular, uvular consonants lower preceding vowels (Brown et al., 2016; Fortier, 2016).

Lastly, it is important to describe the nature of pre-verbs. These are bound prefixes that appear to be unique to Gitksan in some respects (Rigsby, 1986). Like English adverbs, Gitksan pre-verbs modify the meaning of the lexical root in some way. Rigsby (1986) made the claim that the final vowel in any pre-verb is underlyingly schwa, observing that the vowel's surface features could be derived in a predictable way from its phonological environment. My proposal differs in that I extend this observation to all short vowels in pre-verbs.

2.2 Phonological Context

To provide the basis for a preliminary phonological proposal, this paper will address the following questions in phonological theory: what does it mean to be underlying, and what features are assumed to be represented at the underlying phonological level? What is schwa, and what does it mean to be featureless?

What does it mean to be underlyingly present? This paper assumes that underlyingly, vowel segments have the features [± high], [±low] and [± back]. This is consistent with proposals from generative phonology in a broad context (Kenstowicz & Kisseberth, 2014), and can clearly be used to distinguish the vowel that are assumed by Rigsby (1986) to be underlyingly present: /i, a, u/. When a vowel's surface form is not predictable based on the quality of adjacent consonants (due to feature sharing/spreading), the features that are present on the surface can be presumed to be specified in the underlying form. Furthermore, if the features of a surface vowel segment are entirely predictable based on their phonological environment, it can be posited that the underlying vowel segment is not inherently specified for any feature. In summary: vowels that *are predictable* at the surface level are unspecified at the underlying level, and vowels that *lack predictability* at the surface level are likely specified for some or all of their features at the underlying level. I will use the following two aspects of surface distribution to investigate the predictability of short vowels: (i) the distribution of vowels between two consonants that would otherwise be a legal consonant cluster without an intervening vowel, (ii) the quality of the surface vowel and its features, as compared with the features of adjacent consonants.

What is schwa? At the underlying level, schwa is described as a **featureless** (placeless) vowel segment, or 'placeholder' (Blake, 2000; Blake & Shahin, 2008; Krämer, 2012; Parker, 2011). Its surface form is therefore *predictable* based on its linguistic environment. Segments that are underlyingly schwa get their vowel features at the surface level by undergoing abstract phonological processes (such as feature spreading from adjacent consonants), and surface as allophones/variants of the underlying segment (schwa). Indeed, surface vowels in Gitksan are highly variable in their quality (Fortier, 2016). This distinction between underlying forms and surface allophones was crucial to

Odden's analysis of abstractness, where he asserted that "underlying forms do not contain allophonic variants of phonemes" (Odden, 2005).

In addition to the perspective that schwa is underlyingly present, epenthetic analyses of schwa are also prominent in the literature. This account posits that schwa is essentially a repair strategy inserted at some stage between the underlying form and the surface representation to satisfy some constraint on syllable structure (Ito, 1989). For example, languages that don't allow complex onsets can either reduce a word-initial consonant cluster, or insert schwa and re-syllabify:

(i) CCVC → CVC

(ii) CCVC → Cə.CVC → CV^1.CVC
(where V^1 derives its surface features from the surrounding consonants)

Schwa is still featureless when introduced at the intermediate stage of insertion ((ii) above). Schwa remains an abstract placeholder before undergoing some phonological process in order to obtain features from adjacent segments.

2.3 Gitksan Literature Context:

How does the discussion of abstractness and schwa relate to the literature on Gitksan? Gitksan schwa has been analysed as both underlying (Rigsby, 1986), and epenthetic (Brown et al., 2016) in specific morphophonemic contexts. In Rigsby's 1986 grammar of Gitksan, he makes a statement that any final vowel of a Gitksan pre-verb (bound affixes that act semantically similar to English adverbs) is underlyingly schwa. This statement makes the following prediction:

(1) ma
/mə/
[ma]
'like (similar to)'[1]

The phonological form is not specified for the surface features of the vowel /a/. This form is derived through intermediary phonological processes unspecified by Rigsby's account.

Brown et al. 2016 provide an example of epenthetic schwa, seen below in (2) and (3). When the suffix *–m* is added to *gipaykw*, a vowel segment is inserted to resolve the illegal consonant cluster /k^wm/.

[1] Examples are formatted such that line 1 gives the orthography based on Rigsby (1986), line 2 gives a phonemic transcription, line 3 (where given) is a phonetic transcription, and line 4 is the English translation.

(2) gipaykw
/kʲəphajkʷ/
[kipaʸkʷ]
‘to fly’

(3) gipaygwum
/kʲəphajkʷ-m/
[kipaʸkʷum]
‘airplane’, see (2) ‘to fly’

For the above examples, note that voiced stops are analysed as underlyingly voiceless ([g] is underlyingly /k/). Furthermore, sequences like /gw/ are assumed to underlyingly be [kʷ]. Also note that there is no underlying voicing contrast in the stops, which is reflected in the phonemic transcription. Rounding is underlyingly present and a feature of some velar stops.

Some of the literature on Gitksan has documented specific abstract phonological processes that are known to colour (give features to) the surface representation of schwa. Yamane-Tanaka (2006) documents vowel harmony, which can occur across some classes of intervening consonants, matching the quality of schwa to an adjacent vowel. For example, vowel harmony occurs across the intervening glottal fricative in the following, spoken by a Western Gitksen speaking consultant:

(4) behe’y
/pexəʔy/
[pehe’y]
‘my lungs’

Note that this speaker pronounced the underlying /x/ as [h]. Brown et al. (2016) assert that rounding also colours schwa. For example:

(5) gipaygwum
/kʲəphajkʷ-m/
[kipaʸkʷum]
‘airplane’, see (2) ‘to fly’

In (5), schwa is inserted before the /m/. Due to the labial consonant immediately following the epenthesized schwa, it surfaces phonetically as /u/. This is feature spreading, the labial consonant gives the schwa the feature [+round], which surfaces as [u].

Given this body of literature on Gitksan schwa, I developed the following research question to address the goal of this paper: *What evidence is there that schwa (an abstract, featureless vowel segment) is underlyingly present in Gitksan pre-verbs, and how is its surface form derived?*

3 Description of the Data

The data I use in this paper are sourced directly from Hindle & Rigsby (1973). My goal is to look at short vowels in pre-verbs, so I adapted the data set along the following parameters:

(i) **Part of speech:** I considered only entries labeled as 'pre-verbs' (lexically-bound prefixes that function similar to English adverbs)
(ii) **Number of morphemes:** I considered only entries with a single morpheme, as multi-morphemic entries did not allow me to control for part of speech (some pre-verbs are bound to particular verb roots, and this creates a confound)
(iii) **Vowel length:** I considered only short vowels, excluding entries with long vowels.
(iv) **Variants:** I excluded entries that included multiple pronunciation variants, as the variants are not labeled for origin.

These variables left me with 58 entries that were appropriate to include in my data set.

The surface vowels in the data set are /a, i, o, u/. Note that /e/ is not present (predicted by the restriction to Eastern dialect data). /o/ and /u/ are both infrequent, with /o/ only observed twice in the data (within one prosodic word – see example (6)) and /u/ surfacing in seven environments. I am using the term 'environments' to refer to the preceding and following consonants that surround the vowel.

(6) sog̲om
/soqom/
'from the water onto land'

/a/ and /i/ are both much more frequent, surfacing in 31 and 29 environments, respectively. The distributions of /a, i, o, u/ are nearly complementary, with some exceptions, which are presented in the following examples. Observe example (7), where /a/ occurs in a similar environment as /o/ in (6):

(7) sag̲ayt
/saqa^{y}t/
'together'

Additionally, the following examples show that both /i/ and /u/ can occur in the environment g__n.

(8) gun
/kun/
'to cause to'

(9) hagun
/hakun/
‘near, toward’

(10) gina
/kina/
‘behind’

Lastly, both /a/ and /i/ can occur in the environment b__l.

(11) balgi
/palki/
‘sudden, spontaneously, uncausedly’

(12) χbil
/x̲pil/
‘partly’

In conclusion, examples (8–12) show that the distribution of the short vowels is not entirely complementary. There are some few environments in which the surface distribution overlaps. Section 4 will outline a preliminary proposal, of which the central claim is that the underlying vowel for all short vowels in Gitksan pre-verbs is schwa. My proposal attempts to account for the surface distribution of the vowels, including positing possible explanations for the overlapping distributions in (8–12).

4 Proposal

Despite working with a small data set for this paper, I am able to show that the distribution of the short vowel is almost always predictable based on the environment. To this end, section 4.1 will show how these surface forms might be derived based on the features of adjacent consonants. I propose that the underlying vowel is therefore featureless – schwa. Alternate accounts of the data and why I think an underlying analysis is preferable will be discussed in 4.2.

4.1 Observations

4.1.1 Conditions for /a/

/a/ occurs only preceding uvular consonants (k̲, g̲ , x̲), glottalized and glottal consonants (k’, ‘m, ‘w, ‘y, ‘t, h), and morpheme-initially and -finally. Glottal stops are often phonetically inserted at morpheme boundaries (Rigsby, 1986), so this would satisfy the glottal condition (see (16)). Therefore, the conditions for /a/ are that it surfaces adjacent to a uvular or a glottal/glottalized segment. Glottalized consonants are similar to ejectives, in that they combine glottal constriction with another consonant segment which is fully realized (Brown et

al., 2016). These conditions form the natural class [+PHAR], which is motivated in Gitksan by Yamane-Tanaka (2006). Uvular and glottal articulations involve retraction of the tongue root towards the back of the oral cavity, which articulatorily conditions /a/, because it is a low back vowel (refer to Table 1). Co-articulation effects resulting from uvular and glottal articulations are known to produce /a/ in Gitksan surface forms, both proceeding and following the vowel (Fortier, 2016; Yamane-Tanaka, 2006). Observe:

Uvular:
(13) bag̲ayt
/paqaʸt/
'in the middle'

Glottalized consonant:
(14) 'masim
/ṁasim/
'separately, apart'

Glottal /h/:
(15) hagul
/hakul/
'slowly'

Glottal stop (inserted word-initially):
(16) ahlax̲
/ʔałaχ/
'in bad health'

The only exceptions to these conditions are as follows:

(17) balim
/palim/
'to act like one is X' (where X is the verb root)

(18) balgi
/palki/
'sudden, spontaneously, uncausedly'.

There is nothing about b__l known to condition /a/ in Gitksan. There are two possible analyses for this: (i) the features [+back, -high] are underlying in the initial vowel in 'balim' and 'balgi', (ii) some unknown phonetic feature in the environment b__l is conditioning /a/ to surface. (ii) might be the favourable proposal. Further investigation is needed to determine the exact quality if /l/ and whether it is articulatorily motivated to suggest that /l/ can condition an adjacent schwa to surface as /a/. If /l/ is produced with a retracted tongue position, for example, this might explain the retracted quality of the vowel. However,

examples (21) and (22) in the next section show that /i/ can surface adjacent to /l/, so this requires further phonological investigation as well.

4.1.2 Conditions for /i/

/i/ occurs only adjacent to labial (m, p, b), alveolar (t, d, s, n), lateral (l, hl) and velar consonants (k, g, x). These consonant sets are representative of the full consonant inventory in Gitksan, excluding those that are [+PHAR]. Given that these do not form a natural class, the simpler analysis is to say that when the [+PHAR] condition is not triggered, the default surface form is /i/. Observe:

Labial:
(19) ‘masim
/ṁasim/
‘separately, apart’

Alveolar:
(20) ‘wahlin
/ẇałin/
‘former, old-fashioned’

Lateral:
(21) gyuwil
/kʸuwil/
‘past, beyond’

Velar:
(22) lixs
/lixs/
‘strange, by itself, different’

The exceptions to these conditions are as follows:

(23) x̲ts’i
/χṫsi/
‘in the middle of a long object’

(24) hi’la
/hiʔla/
‘close, nearby’

In both cases, there is a glottal stop that we would expect to reinforce the [+PHAR] feature condition. Therefore, I have two possible analyses of these exceptions: (1) the features [+high, -back] are underlying in ‘hi’la’ and ‘xts’i’, or (2) some unknown feature is present at the intermediate stage of representation,

such that the [+PHAR] condition is blocked, and /a/ does not surface, resulting in the surface form /i/.

My proposal for /a/ and /i/ cannot at this time predict why /a/ surfaces over /i/ in certain environments. This is a job for future analysis, possibly within an Optimality Theory framework such as was offered by Blake (2000). The possible conditions I have proposed are useful building blocks for such an analysis.

4.1.3 Conditions for /o/ and /u/

As described in section 3, /o/ and /u/ are relatively infrequent in the data. I propose that /o/ and /u/ correlate to /a/ and /i/, respectively, with the addition of the rounding feature. This is to say that they are conditioned similarly. This is articulatorily motivated as /u/ and /i/ are both [+high] and /o/ and /a/ are both [-high]. While /u/ surfaces in a variety of environments, /o/ appears to only surface in the [+PHAR] condition:

(25) sogom
/soqom/
'from the water onto land'

(26) gun
/kun/
'cause to'

(27) gyuwil
/kʸuwil/
'past, beyond'

(28) hagul
/hakul/
'slowly'

(29) hagun
/hakun/
'near, toward'

(30) k̓utk̓u
/kutku/
'around, turn, spin'

(31) tuxs
/tuxs/
'out of a portable of movable object'

(32) uxs
/ʔuxs/
‘from the land into the water, toward the water’

My proposal is that /o/ and /u/ are both triggered by a rounding condition, which has been neutralized at an intermediate stage of the phonological derivation. Where the [+PHAR] condition is triggered, /o/ will surface, and /u/ will surface elsewhere. Davis (1970) makes similar observations about the surface distribution of schwa in Mainland Comox. Davis observes that /u/ surfaces between two ‘high consonants’ if at least one is round. /o/ is not observed.

/xw/, /xs/, or /xws/, and /gw/ are all frequent consonant clusters in Gitksan. I propose that (26, 28–9, 31–2) are examples where the /w/ has triggered rounding of the vowel, and has then been deleted (neutralized) before the final surface form is derived. Indeed, (28) varies dialectally as ‘hagwil’ (Rigsby, 1986). This predicts the following derivation:

UR:	/hgʷl/
Schwa-insertion:	/həgʷəl/
[+PHAR] condition:	/hagʷil/
Vowel rounding:	/hagʷul/
Rounding-deletion:	/hagul/
SR:	[hagul]

That leaves (25, 27, 30) to be accounted for. I propose the following two possible analyses: (1) a consonant adjacent to /o/ or /u/ in these segments is underlyingly rounded, which spreads to the vowel, and is neutralized at some intermediate phonological process, or (2) the vowel is underlyingly rounded. Further data is needed to make additional observations or claims.

I cannot yet account for how the phonology selects either /a/ or /i/ when either could be derived from the adjacent consonants. For example, (11) /kina/ and (12) /palki/. In both of these examples, the final vowel could be conditioned /a/ because it is morpheme-final, or /i/ because the preceding consonant is not [+PHAR]. I suggest that future analysis take an Optimality Theory approach, to investigate how the phonology selects one form over another in examples such as this.

4.2 Why not epenthesis?

Previous works have given evidence for schwa-epenthesis in Gitksan, such as (5). (Brown et al., 2016). Why haven’t I argued for an analysis that relies on **epenthesis,** such as I discussed in 2.2? Gitksan allows complex onsets, and a variety of consonant clusters (Brown, 2010; Rigsby, 1986). Consider the following examples:

(33) sg̲a
/sqa/
‘across the way’

(34) sag̲ayt
/saqaʸt/
‘together’

(33) shows that Gitksan allows the complex onset /sg̲/. Therefore, the first /a/ in ‘sag̲ayt’ must be underlyingly present. However, the quality of this /a/ is predictable based on the [+PHAR] condition. Therefore, this evidence supports my proposal that schwa is underlyingly present in examples like (33) (and not specified for any set of features). An epenthetic analysis would fail to account for this pattern.

(33) and (34) also show why Rigsby’s 1986 analysis fails to capture the observable patterning of underlying schwa in Gitksan pre-verbs. Rigsby proposed that only the final vowel of Gitksan pre-verbs was underlyingly schwa, and assumed that any preceding vowels were underlying specified for their features. Yet, my proposal of (34) shows that it is the initial vowel which is underlyingly present, and featureless.

5 Conclusion

5.1 Implications

The data and discussion presented in this paper have both practical and theoretical implications. Firstly, there is growing interest in the reconstruction of proto-Tsimshian. Investigations such as the one undertaken in this paper contribute to the reconstruction of the underlying phonemic inventory of proto-Tsimshian. If we can determine what features are underlyingly present in modern Tsimshianic languages, then we can identify what the related languages have in common and begin to develop a proposal concerning what the features of the common root language were. Secondly, this data and the proposal I have put forward have implications for the continuing discussion of abstractness and the underlying features of vowels. The predictable nature of the surface realization of schwa as I have demonstrated in this paper contributes to broader phonological debates on what it means to be underlying, what it means to have features, and what ‘schwa’ is (see Barthmaier, 1998; Blake, 2000; Blake & Shahin, 2008; Leonard, 2007; Parker, 2011). Further investigation into how these patterns emerge in the associated dialects of Gitksan may help to shed light on the surface differences in vowel quality, how they are conditioned, and how they can be accounted for in dialect-specific and dialect-inclusive language materials.

Future research should attempt to develop a more complete phonological analysis of the patterns observed in this paper. Working within the Optimality Theory framework, one could investigate how the phonology selects one form

over another, when the linguistic environment is such that either /a/ or /i/ could be conditioned, based on the observation presented in this paper. For inspiration, see Blake (2000). Such an analysis should take care to expand the current data set.

5.2 Summary

Section 1.1 introduced the goal of this paper: to present a distributional account and preliminary proposal to account for the phonological distribution of short vowels in Gitksan pre-verbs . Section 2.1 introduced the language context for this paper: Gitksan, an understudied language. I began the theoretical discussion in this paper in 2.2 by reviewing the relevant phonological theory for this paper, including vowel features, and the notion of underlying features. My proposal supports the assertion that schwa is an underlying vowel segment that is unspecified for any features. Therefore, schwa only exists as a phonological unit at the level of underlying representation (or the intermediate level, in the case of epenthesis) and has no independent phonetic consequence. Schwa is only phonetically real when given its features by surrounding segments. Rather, schwa surfaces predictably based on its phonological environments.

In section 3 I presented data from Gitksan pre-verbs, and described the distribution of short vowels /a, i, o, u/ within them. It was also noted that /a/ and /i/ were the most frequent surface forms, and that their distribution was nearly complimentary. Section 4 accounted for this distribution, and proposed that the underlying vowel of the full range of short vowels in Gitksan pre-verbs is the featureless vowel segment, schwa (4.1). In 4.2 I proposed that /a/ is motivated by the condition [+PHAR], and that /i/ surfaces when this condition is not triggered. I was not able to account for when this condition is triggered, only to motivate it as a possible approach. I proposed that /o/ and /u/ arose in the data as a result of underlying rounding in the surrounding consonants, giving the vowel rounding features. I suggested that an epenthetic analysis would not account for the data that my proposal has captured, and that Rigsby's 1986 assertion that schwa was the underlying vowel of only the final vowel in a pre-verb (not extending to other vowels in polysyllabic pre-verbs) was too limited in scope (4.3).

This is a preliminary account of the surface distribution and possible underlying representations of short vowels in the Eastern dialect of Gitksan. This proposal should be further investigated using data not limited to pre-verbs, and from other dialects.

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