Lillooet stress shift and its implications for syllable structure and prosody*

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1. Introduction

This paper examines the phenomenon of stress shift in Lillooet, a Northern Interior Salish language. Lillooet stress shift is best viewed not as a single process, but rather as a cluster of properties that conspire to shift stress as far to the right edge of a word as possible while still obeying unrelated constraints. It will be argued here that Lillooet in fact has two types of stress shift: one bounded, the other unbounded. Section 2 provides an account of bounded stress shift within the rule-based metrical stress theory of Hayes (1991). The stress shift data also have implications for an analysis of Lillooet syllable structure. Section 3 will show that although Lillooet permits surface consonant clusters in coda position, the stress facts suggest that final clusters are not integrated into the syllable, which is argued here to be maximally CCVC. Additional consonants are in fact prosodically licensed only by moras that are not integrated into syllabic structure, as has similarly been claimed by Bagemihl (1991) for Bella Coola, another Salish language. Section 4 presents data involving unbounded stress shift which do not have a ready analysis within Hayes' (1991) framework. It will also be seen that two otherwise general constraints on Lillooet stress may be violated, and this mystery will be considered from the perspective of Optimality Theory, which is designed to address the surface violation of phonological constraints (McCarthy and Prince (1993), Prince and Smolensky (1993)).

There are other aspects of stress shift that will not be addressed here. One, for example, is the behaviour of so-called strong suffixes, which invariably attract stress. As this is partly an idiosyncratic morphological property, it will not be addressed here. Rather, this paper seeks to explain the purely phonological properties of Lillooet stress shift. A more inclusive description of stress shift that outlines the stress-related properties of specific affixes may be found in van Eijk (1981b, 1984: 20-24).1

All of the data in this paper are from van Eijk (1981a, 1981b, 1984), although some data have been re-checked with informants. For additional data consult van Eijk (1983).

2. Bounded stress shift

Lillooet has the following inventory of vowel phonemes according to Remnant (1990: 57):

(1) i u a

Van Eijk (1984: 2) includes the retracted counterparts of each of these phonemes in his inventory; the discrepancy is ignored in this paper as it is not particularly relevant to stress. For discussion consult van Eijk (1984) and Remnant (1990), especially the former for a general sketch of the language, which is not given here.

Some aspects of Lillooet stress are predictable (such as the process of stress shift examined here), while others are not. For example, stress can be seen to be unpredictable and contrastive in the following minimal pairs:

(2)

a. maq̓aʔ 'snow'
maq̓?it 'poison onion'
b. Ṙ̌am̓in 'fur'
祐m̓iʔ 'axe'

The simplest case of stress shift is illustrated in (3). To use van Eijk's (1984: 20-24) neutral terminology: in root-suffix combinations, stress moves rightward two vowels at a time from the underlyingly stressed vowel of the root—as far as possible—as long as it does not fall on the last vowel of the word. Hyphens represent morpheme divisions:

(3)

a. cūn 'to order'
cūn-iłkʷaxʷ 'you ordered him'
cūn-tumùkw 'order us'

b. cūn-ùm̓ 'to point at'
cūn-ùm̓-iłkʷaxʷ 'you pointed at him'
cūn-ùm̓-tumùkw 'point at us'

c. qam̓-'ím 'to hear'
qam̓-ím-iłkʷáp 'you folks hear'
qam̓-ím-iłkʷáp ha 'do you folks hear?'

d. ?uxʷłam̓ 'Indian, person'
?uxʷłam̓-xʷ-kan 'I am an Indian'
?uxʷłam̓-xʷ-ám 'to do something the Indian way'

e. súwk̓ 'winter'
súwk̓-áka 'northern wind'

f. səxʷłam̓ 'to ask about'
səxʷłam̓-iłkʷán 'I asked about it'

g. pūn 'to find'
pūn-iłkʷán 'I found him'
pūn-ítx 'they found him'
pūn-c-ál-íx 'they found me'
pūn-ci-hástäw 'they found you'
pūn-tumùl-ítx 'they found us'
Note that in (3c) *qan'lm* 'to hear', the underlying stress is on the second syllable, and that as suffixes are added, the stress shifts rightward two vowels at a time, counting from the underlyingly stressed vowel. Hence, the form *qan'irimkal'ap ha* 'do you folks hear?' results, with stress shifted onto the fourth vowel from the left. This shows that the left edge of the metrical parsing domain of stress shift is not defined morphologically (e.g., a word edge) but rather is located at the underlyingly stressed syllable of the root. The edge of the metrical parsing domain is called the ‘counting base’ by van Eijk, since it is from this vowel that stress shifts rightward as suffixes are added.

The pre-tonic vowels that serve as the counting bases in the assignment of stress receive secondary stress. This is illustrated in (4):

(4)

a. *ʔUXʷ'almixʷ*  
   'Indian, person'

b. *cųl-un'kan*  
   'to point at'

c. *cųl-un'-tůmūl-kal'ap*  
   'you folks pointed at us'

Because this secondary stress is entirely predictable, van Eijk does not mark it in his transcriptions. Questions about secondary stress will be raised upon inspecting some more complicated data below, and these will be addressed accordingly. 2

Consonant clusters (either root-final or arising from concatenation of lexical suffixes or enclitics) count like vowels with regard to the distribution of stress:

(5)

a. *ʔsw't*  
   'late'

b. *χʷʔucin*  
   'four'

c. *ʔUXʷ'almixʷ*  
   'Indian'

d. *ʔw'uy't*  
   'to sleep'

e. *χʷsw'as*  
   'low'

f. *pān'-c*  
   'to help'

g. *pan'-c-kal'ap*  
   'you folks share somebody’s meal'

h. *cųl-un'-ikan*  
   'I will point at it'

i. *p'an't*  
   'to return'

j. *qʷ'ezlhx*  
   'to dance'

In (5a) *ʔsw't-kal'ap* 'you folks are late', it can be seen that stress shifts only one syllable, not two. Of course, if stress were to shift two syllables to the right, it would have to fall on the final syllable—a possibility that is generally excluded. In this case, then, stress would be expected to remain in its underlying position in the root: *ʔsw't-kal'ap*. Instead, the *w't* consonant cluster seems to behave as if it were a vowel with regard to the calculation of stress shift, forcing stress onto the adjacent syllable. The same observation extends to the other data in (5), and it suggests that root-final and word-final consonant clusters are moraic, i.e., weight-bearing. The prosodic unit relevant to stress shift is therefore the mora, not the syllable.

Consonants may not bear stress, and so if a consonant cluster is in a position to which stress would be assigned, the cluster is ignored:

(6)

a. *cųl-kʷ'al'-c*  
   'to finish eating'

b. *cųl-kʷ'al'-c-kan*  
   'I am finished eating'

c. *cųl-kʷ'al'-c-kal'ap*  
   'you folks are finished eating'

Consonant clusters of (5) have significant implications for syllable structure, which will be discussed in section 3. The data are listed above only to show that moras (not syllables) are relevant for stress shift. The data presented so far represent the core case of stress shift. Hayes’ (1991) metrical stress theory is adequate to characterize it, since the stress generally moves rightward in a binary fashion from the stressed vowel of the root. A prerequisite to this analysis, though, is to consider how best to represent the underlying primary stress, since it was seen from the minimal pairs in (2) to be distinctive, and moreover it locates the edge of the metrical parsing domain. Because underlying stress will have to be stated with a word’s lexical entry, it will simply be stipulated that underlyingly stressed syllables are assigned prominence on line 1 (the mora row) of the metrical grid. The contrast between the words in (2a) will therefore be represented as follows: 3, 4
The stress rule is stated formally in (8), followed by general comments on each part of the rule. Derivations will then be given to illustrate each aspect of this rule:

(8)  

a. Final moras are extrametrical.

b. Parse the word (beginning with the underlying grid mark) from left to right into moraic trochees, i.e., feet containing two light syllables (the first being more prominent than the second) or a single heavy syllable.

c. End Rule Right (at word level).

Final moras are extrametrical (8a) because stress generally does not shift onto the final syllable. Stress may shift onto the final syllable, however, if that syllable is bimoraic, i.e., contains a consonant cluster in addition to a vowel, as was seen in (5b,c). This is permitted by final-mora extrametricality, but would not be permitted by final-syllable extrametricality. The word is parsed left to right (8b) because the target of stress shift is determined by counting in a binary fashion from the left, starting at the stressed vowel of the root. The word is parsed into moraic trochees because consonant clusters behave like vowels with regard to the calculation of stress shift (recall the data from (5); see also section 3 below). This fact could not be accommodated by parsing instead into syllabic trochees, for example, since the consonant clusters do not form syllables themselves. End Rule Right (8c) places a grid mark on line 2 (word level) at the right edge, making that syllable the most prominent in the word. This accounts for the fact that the rightmost strong syllable always receives primary stress.

Consider now some derivations illustrating rule (8). First, some examples without stress shift are (3b) cuí-un’ ‘to point at’ and cuí-un’-tum‘ak µ ‘you pointed at him’, which have the following underlying representations:

(9)  

'point at' (3b)  

'you pointed at him' (3b)  

x  

x
µ µ
µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

The words are then parsed left to right into moraic trochees. The first example has a single mora, hence can form only a degenerate foot:

(10)  

X
µ µ
µ µ
X
µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

to point at’ (3b)  

'you pointed at him' (3b)  

X
µ µ
µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

Next, End Rule Right puts a grid mark atop the rightmost prominent mora. Because there is only one such element in each word, the effect is essentially vacuous and stress is correctly placed on the initial syllable. In neither example has stress shifted from its underlying position in the root, since each word contains only a single foot:

(11)  

(X)  

(X )
µ µ
µ µ
µ µ
µ µ

<=<un’>  

cuí-un’-tum<ub cui-un’-tumui-kal’ap

Consider now some longer forms of these words, in which stress shift does occur. The underlying forms of (3b) cuí-un’-tum‘ak µ ‘point at us!’ and cuí-un’-tum‘ak µ ‘you folks pointed at us’ are shown in (12):

(12)  

X
µ µ µ µ µ µ µ µ
µ µ µ µ µ µ µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

cuí-un’-tum<ub cui-un’-tumui-kal’ap

to point at’ (3b)  

'you pointed at him' (3b)  

X
µ µ µ µ µ µ µ µ
µ µ µ µ µ µ µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

In each case, the final mora forms a degenerate foot. When End Rule Right applies, primary stress is correctly placed on this rightmost foot:

(13)  

(X )  

(X )
µ µ µ µ µ µ µ µ
µ µ µ µ µ µ µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

cuí-un’-tum<ub cui-un’-tumui-kal’ap

Note again that each word starts with an underlyingly prominent mora and final-mora extrametricality. The words are parsed into moraic trochees as follows:

(14)  

(X )  

(X )
µ µ µ µ µ µ µ µ
µ µ µ µ µ µ µ µ

mu maqa? maqa?‘snow’ ‘poison onion’

cuí-un’-tum<ub cui-un’-tumui-kal’ap

In each case, the final mora forms a degenerate foot. When End Rule Right applies, primary stress is correctly placed on this rightmost foot:

(15)  

a. fâp-an  

fâp-an-ikal’ap

'you folks forgot it'  

Some exceptions to the general process of stress shift are now detailed. First, the mid central vowels a and a (so-called 'weak vowels,' often referred to collectively as 'schwa') may not be the targets of stress shift, although they otherwise behave like full vowels. Note, for example, that where a weak vowel is not in a position to receive the stress, it nevertheless counts for the assignment of stress, just like a full vowel:

(16)  

µ µ µ µ µ µ µ µ  

mu maqa? maqa?‘snow’ ‘poison onion’

'to forget'  

'you folks forgot it'
b. k"ozsämt-kax’ ‘you worked’
k"ozsämt-ikan ‘I worked’
k"ozsumtkäx’ ha ‘did you work?’
k"ozsum-ikan k’ ‘I will work’
c. ?iih’om ‘to sing’
?iih’om-ikäl’ap ‘you folks sing’
?iih’om-käx’ ha ‘do you sing?’
d. sawmämin ‘to ask about’
sawmämin-ikan ‘I asked about it’
e. täl-bx-wi ‘stand up, you folks!’
täl-bx-wi mat ‘stand up then, you folks!’

The underlying forms of (15d) sawmämin ‘to ask about’ and sawmämin-ikan ‘I asked about him’ are given below:

(16) sawmämin sawmämin-ikan

When the word is parsed into moraic trochees, schwa in each example is the weak element of the moraic trochee:

(17) sawmämin sawmämin-ikan

Finally, End Rule Right applies, shifting stress in the longer word but not in the shorter one:

(18) sawmämin sawmämin-ikan

In cases where stress is expected to fall on a weak vowel, however, it skips instead to the next vowel—if that vowel is non-final—otherwise stress does not shift at all. This is illustrated in (19).

(19) a. zäx-al’q’am’ ‘tall’
b. zäx-al’q’am’-ikan (*zäx-al’q’am’-ikan) ‘I am tall’
c. zäx-al’q’am’-ikäl’ap (*zäx-al’q’am’-ikäl’ap) ‘you folks are tall’

The underlying metrical representations of (19b) zäx-al’q’am’-ikan ‘I am tall’ and (19c) zäx-al’q’am’-ikäl’ap ‘you folks are tall’ are as follows:

(20) zäx-al’q’am’-ikan zäx-al’q’am’-ikäl’ap

In parsing the shorter word (19b) zäx-al’q’am’-ikan, schwa must form a degenerate foot because it is the final metrical mora. The schwa in (19c) zäx-al’q’am’-ikäl’ap, on the other hand, is able to head a moraic trochee:

(21) zäx-al’q’am’-ikan zäx-al’q’am’-ikäl’ap

When End Rule Right applies, stress is shifted onto schwa in each example, incorrectly deriving *zäx-al’q’am’-ikan and *zäx-al’q’am’-ikäl’ap:

(22) zäx-al’q’am’-ikan zäx-al’q’am’-ikäl’ap

It seems that in order to prevent stress from shifting onto schwa, schwa must be explicitly excluded from being able to head a moraic trochee. This is stated in (23), which also excludes consonants from the same position (since consonants may not bear stress), though presumably this would otherwise be required by sonority constraints:

(23) Only syllables with full vowels are stress-bearing. Neither schwa nor a moraic consonant may head a bimoraic foot, i.e., they must occupy the weak, second element of the moraic trochee.

An obvious question concerns how to represent this property of schwa in the metrical grid. L. Downing (p.c.) suggests that schwa simply not be parsed if it is not able to occupy the weak, second element of the bimoraic foot. Under this analysis, then, the representations of (22) above would instead appear as in (24) below:

(24) zäx-al’q’am’-ikan zäx-al’q’am’-ikäl’ap
3. Implications for syllable structure

Recall the rather interesting behaviour of consonant clusters as outlined above in (5). Only root-final and word-final consonant clusters behave as if they are heavy, i.e., bimoraic (e.g., (5a) ‘law’-’kal’ap cf. ‘law’-’kal’ap you folks are late’), while medial clusters do not (e.g., (3g) piln-o-al-fl-as cf. *piln-o-al-fl-as ‘they found me’; (3c) qan-im-kal’ap cf. *qan-im-kal’ap ‘you folks hear’). This suggests that coda consonants are not invariably moraic, and hence that weight is not assigned to consonants only by virtue of their position. This is especially evident from a form like (3g) piln-o-al-fl-as ‘they found me’, which would be syllabified as indicated by the periods. If the n in the coda of the first syllable (pun) were moraic, we would expect stress to shift only as far as the next syllable, yet this does not occur, as indicated above.

Similarly in (3c), qan-im-kal’ap ‘you folks hear’, stress shift does not occur, yet the final consonant m of the root qan’im must form a coda according to the sonority hierarchy. Although it forms a coda, then, it does not seem to be moraic, since it does not count for the assignment of stress. The other striking point to note about this word is the medial cluster _mkl_; if only final clusters behave as if they are heavy, the syllable division of this word must be qan-im-kal’ap, with the _tk_ cluster forming a complex onset. The maximal syllable structure, then appears to be CCVCC. But because the coda behaves as if it is heavy only when it contains two consonants, the moraic representation of a root like (5a) ‘law’-’late’ would appear rather oddly as in (26):

(26) *aw’-t’kal’ap ‘you folks are late’

This representation is unusual in that it suggests that syllabification allows only a single consonant to be adjoined to the vowel’s mora, whereas additional consonants are assigned weight by position. In order to maintain a more consistent statement of weight and syllable structure in Lillooet, perhaps Bagemihl’s (1991: 596) Simple Syllable Hypothesis (SSH) may be adopted here, permitting extrasyllabic consonants to be licensed solely by moras. Under this account, the maximal syllable in Lillooet would be CCVC (identical to the syllable size that Bagemihl (1991) proposes for Bella Coola, except that Bella Coola also has long vowels), with only vowels being linked to moras. The single permissible coda consonant, if present, is not linked to its own mora (since it does not bear weight), but instead adjoins to the vowel’s mora. Consonants that cannot be integrated into this CCVC syllable are instead moraically licensed, and are not attached to the syllable. Under this account, (5a) ‘law’-’late’ would instead have the following representation:

(27) *aw’-t’kal’ap

(27) differs from (26) in that it respects the maximal CCVC syllable size, since the final _t_ is not part of the syllable.

It is beyond the scope of this paper to give a complete justification of the representation proposed in (27). Recall that it is the number of moras rather than syllables that is implicated in stress shift. In order to formulate the rule of stress shift (as in (8) above), either representation (26) or (27) will suffice, though the former is perhaps an unprecedented representation and hence would have to be defended just as (27) would.
A proper defence of the SSH (27) probably would require lengthy discussion and proposals about Lillooet prosodic morphology, and it is not obvious that Lillooet can offer the same evidence from reduplication that Bagemihl (1991) is able to find in Bella Coola to justify his proposal. However, perhaps independent evidence for the SSH in Lillooet may be adduced from a process of retraction harmony discussed by Remnant (1990: 86-94). Remnant proposes a floating adversative morpheme (comprising a floating tongue root node) which spreads bidirectionally through a word, including prefixes and suffixes, retracting all vowels and alveopalatal consonants. There are several exceptional forms, though, in which retraction does not spread onto affixes, but is confined to the root. Interestingly, many of these exceptional forms have consonant clusters similar to the root-final clusters that count as moraic in calculating the target of stress shift. If the analogy is correct, the SSH as in (27) could account for the blocking of retraction in such forms if retraction harmony were regarded not as a long-distance process, (28) (SH), but instead as a more local process, e.g., restricted to syllabically licensed segments. The idea is worth pursuing, since Remnant (1990: 95) speculates only that retraction harmony is blocked in the exceptional forms because of level ordering within the lexical phonology, though she does not attempt an analysis.

To conclude this section, derivations of words having consonant clusters are now given. (5b) $x^{"\text{\textsc{ucin-\textsc{dl}}}'}$‘four sticks’ has a final cluster in its lexical suffix -\textsc{dl}$'$, and so the final, moraic consonant $q$ is extrametrical. In (5j) $q^{"\text{\textsc{zilx-kal}'ap}}$‘you folks danced’ there is a medial consonant cluster $\text{\textsc{lx}}$, the second consonant of which is moraic as per the discussion above. The underlying forms are therefore as follows:

(28) $x^{\text{\textsc{ucin-\textsc{dl}}}q}$

When these words are parsed into moraic trochees, the initial mora of (5j) $q^{"\text{\textsc{zilx-kal}'ap}}$ must form a degenerate foot, because the second syllable is underlyingly stressed. After parsing, the representations are:

(29) $x^{\text{\textsc{ucin-\textsc{dl}}}q}$

Finally, End Rule Right derives the output, with stress having shifted in each word:

(30) $x^{\text{\textsc{ucin-\textsc{dl}}}q}$

The interesting point to note concerning (5b) $x^{"\text{\textsc{ucin-\textsc{dl}}}'}$ is that stress may fall on the final syllable because only the final consonant (which is moraic) is extrametrical. This illustrates that the final extrametrical constituent is indeed a mora, not a syllable.

Finally, the metrical grid derived for (5j) $q^{"\text{\textsc{zilx-kal}'ap}}$ predicts that the initial two syllables bear secondary stress. In fact, according to a transcription from recent fieldwork, secondary stress surfaces only on the second syllable: $q^{"\text{\textsc{zilx-kal}'ap}}$. This constitutes evidence for D. Pulleyblank’s (p.c.) suggestion (see n. 4) that words having non-initial phonemic stress be represented underlyingly by initial invisibility. Under this approach, both the initial and final moras of (5j) $q^{"\text{\textsc{zilx-kal}'ap}}$ will be extrametrical and the output will be as in (31) rather than as in (30):

(31) $x^{\text{\textsc{ucin-\textsc{dl}}}q}$

In this representation, the initial syllable is correctly predicted not to bear secondary stress.

4. Unbounded stress shift

The data presented so far have been given a fairly simple treatment within the metrical stress theory of Hayes’ (1991). The facts presented next are more problematic for Hayes’ theory, and these will be shown to be better accommodated by the Optimality Theory (OT) of McCarthy and Prince (1993) and Prince and Smolensky (1993). First, note that roots with a weak vowel retain stress when combined with a suffix containing another weak vowel:

(32) a. m$\text{\textsc{dc}}$ ‘to write’
   m$\text{\textsc{dc}}$ ‘to write it’
   m$\text{\textsc{dc}}$ ‘to write (int.)’

However, when combined with a suffix having a full vowel, stress shifts to the first full vowel, as shown in (33):

(33) a. m$\text{\textsc{dc}}$ ‘to write’
   m$\text{\textsc{dc}}$ ‘to write (int.)’
   m$\text{\textsc{dc}}$ ‘to write it’
   m$\text{\textsc{dc}}$ ‘to write (int.)’
   m$\text{\textsc{dc}}$ ‘to write (int.)’
   m$\text{\textsc{dc}}$ ‘to write (int.)’
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   m$\text{\textsc{dc}}$ ‘to write (int.)’
   m$\text{\textsc{dc}}$ ‘to write (int.)’

As more suffixes are added, the first full vowel serves as the counting base and the stress moves rightward according to the usual binary pattern: 12
The reversed ranking in this case would be *FINAL μ STRESS > > *STRESSED a, which is perhaps more plausible than even the actual Lillooet ranking (36). Final extrametricality is extremely common in languages (Hayes 1991: 45-49), whereas stress prohibitions on specific vowels are rare and controversial (see n. 6, n. 7, above). Moreover, there is evidence that even Lillooet permits schwa to bear stress via regular, bounded stress shift (see n. 5). If there is indeed dialectal variation, it might be possible that rankings such as (36) and its reversed counterpart are what characterize the variation. There has not been any research in this area, but it is worth pursuing.

Before concluding this section, consider a final set of data exhibiting unbounded stress shift. Full vowels followed by a glottal stop behave like weak vowels in that they do not retain stress if there is a full vowel following. In the following examples, stress shifts onto the full vowel of the suffix rather than be retained by the root, which has a full vowel followed by a glottal stop:

\[
\begin{align*}
\text{(37)} & \\
\text{a.} & \quad \text{q'aʔ-ikan} & \quad \text{'I eat'} \\
\text{b.} & \quad \text{caʔxʷ-kan} & \quad \text{'I am glad'}
\end{align*}
\]

These data may be collapsed immediately with those containing schwa in (33). L. Downing (p.c.) has suggested that perhaps sequences of full vowels followed by glottal stop are in fact derived from underlying /sw/. There is good evidence for this. First, van Eijk (1984: 35 n. 14) notes that no Lillooet words have the surface sequence /ət/. Second, Remnant (1990: 12 n. 5, citing M. D. Kinkade (p.c.)) attributes this absence to a rule that regularly lowers /sw/ to /ət/ in Interior Salish. Because (37) contains all of the examples cited by van Eijk and none have full vowels other than [a] preceding the glottal stop [ʔ], it seems likely that these forms in fact contain underlying weak vowels rather than full vowels. The data in (37) are therefore to be included with those in (33)—clearly a desirable result, since it circumvents having to allow stress rules to look below the root node for laryngeal features, which would otherwise be necessary.

More could be said about Optimality Theory. For example, if extended more fully as conceived by McCarthy and Prince (1993) and Prince and Smolensky (1993), it would employ the ranking of constraints to choose the correct output from an infinite set of candidates—a procedure that differs considerably from a rule-based, derivational approach to phonology as exemplified by the application of Hayes’ (1991) metrical stress theory in section 2. See also McCarthy (to appear: 18-21) for some discussion. In its simplistic presentation here, though, OT can be seen to adequately characterize the otherwise problematic data in (32)-(33).

5. Conclusion

This paper represents a tentative theoretical examination of Lillooet stress shift, and as such it has not offered a single, coherent explanation. Stress shift has been shown to comprise at least two phonologically distinct parts. Bounded stress shift was characterized by Hayes’ (1991) metrical stress theory (section 2), while unbounded stress shift was given an interpretation within Optimality Theory (section 4). Stress shift was also shown have implications for Lillooet syllable structure (section 3).

Epenthesis and consonant retraction are processes that potentially bear on an analysis of stress shift. A better grasp of the former will surely yield results in understanding stress shift. Despite van Eijk’s excellent data, the close analysis presented here has revealed several areas in which more detailed descriptions of Lillooet are necessary, particularly with regard to secondary stress and possible dialectal variation in stress assignment.
Notes

*Thanks to the following persons for helpful discussion and suggestions concerning several parts of this paper: Henry Davis, Laura Downing, M. Dale Kinkade, Lisa Matthewson, Doug Pulleyblank, and Pat Shaw. Henry Davis and Lisa Matthewson also elicited some data for me from their Lillooet informants under the auspices of Social Sciences and Humanities Research Council of Canada grant 410-92-1629 awarded to Patricia A. Shaw.

1 The neighboring Thompson language likewise has particular morphemes with stress-related properties (Thompson and Thompson 1992: 22-24, 27-30), but it does not also have a binary stress system like Lillooet. In this regard, Lillooet is apparently unique within Salish.

2 An immediate question, however, concerns whether words that have not undergone stress shift also have secondary stress. Although this is beyond the scope of this paper (which is concerned only with secondary stresses resulting from stress shift), there may be predictable, post-tonic (binary) secondary stress. This is not mentioned by van Eijk, and the question is left open here.

3 For typographical convenience, prosodic prominence and constituency are depicted in grid notation rather than with metrical trees whose nodes are labeled (S)trong and (W)eak. The representations in (i)-(ii) are therefore notational variants of the pattern vvvv:

(i)  
\[
\begin{align*}
\text{Word} & \quad \text{(X .)} \\
\text{W} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)}
\end{align*}
\]

(ii)  
\[
\begin{align*}
\text{Word} & \quad \text{(X .)} \\
\text{W} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)} \\
\text{S} & \quad \text{(X .)}
\end{align*}
\]

4 D. Pulleyblank (p.c.) suggests that underlying stress contrasts be represented instead by initial invisibility of the first syllable of words having primary stress on the second syllable. This would circumvent having to stipulate an underlying grid mark for all words, since words could simply be parsed into moraic trochees or degenerate feet if necessary, and the correct result would be obtained. Under this proposal, (7a-b) would differ instead as follows:

(i)  
\[
\begin{align*}
\text{a.} & \quad \mu \mu \\
\text{b.} & \quad \mu \mu \\
\text{máqαʔ} & \quad <\text{ma}>qαʔ \\
\text{'snow'} & \quad 'poison onion'
\end{align*}
\]

In such cases, the first two or more syllables would have to be marked as invisible. Assuming that these syllables could be treated as a phonological constituent, as is preferred by Hayes' (1991: 47) theory of extrametricity, the constituent would clearly have to be larger than the invisible mora in (ii(b)), and so there would be some inconsistency with regard to what initial constituents could be marked as invisible.

For the purposes of this paper, the underlying representations will be given as in (7). The more important facet of the analysis will be the rules deriving metrical stress shift, which simply build feet on whatever underlying representation is supplied by the lexicon. Because either form of underlying representation can be adopted without any particular consequences for the stress rule, then, the first proposal is adopted here only for the sake of concreteness. There are consequences for secondary stress, though, and at the end of section 3 it will be seen that an example like (5j) favours Pulleyblank's proposal despite the potential problems noted above.
counting base. To settle this issue would require words with several schwas following the root, which unfortunately do not exist according to van Eijk (1984: 24 n. 2). His claim is therefore based solely on stress.

As we shall see in section 4.

The explanation of epenthesis in Lillooet data like (i), in which weak vowels do indeed seem to be inserted, sometimes elided. Van Eijk cites the following data to show that stressed weak vowels contrast, and hence must be present underlyingly:

(i)

a. ka-lb~ a 'to deflate, go down (like dough)'
   ka-lb~ a 'to get very tired, to conk out'
b. ps-k-on 'to cover'
   ka-pst a 'to get squished'

Because van Eijk presents schwa as underlying in the stress-shift data he cites (and van Eijk is the major source of data), this paper will retain van Eijk's assumption in this regard, for two reasons. First, there is no indication from his examples containing schwa whether it might be epenthetic or underlying, or even whether it might be elided; to indiscriminately omit schwa from underlying forms would surely result in errors for data like (i), in which weak vowels do indeed seem to be underlyingly present. Second, a consistent explanation of epenthesis in Lillooet has not yet been proposed; see Matthewson (in preparation) for discussion in this regard. But if Kinkade is correct, and if a full account of schwa epenthesis can be formulated, then the data in (19) will indeed fall together with the consonant cluster data in (5)-(6), allowing a simplification of the stress rule. Nevertheless, schwa will remain problematic in other areas of stress shift, as we shall see in section 4.

5Interestingly, the bad example in (19b) has been collected in independent fieldwork, suggesting that schwa may indeed bear shifted stress. However, if this were generally possible, the starred example in (19c) should also be expected to be correct, yet some informants give zax-af'tan'-skal'ap, showing an inconsistency even with identical stems. The contradictions may be due to dialect differences between informants. This paper will assume the correctness of van Eijk's data since they are internally consistent, though a fuller account should attempt to explain the difference.

6Hayes (1991: 40 n. 2) cites Cohn's (1989: 175) analysis of Indonesian as a possible precedent for the same restriction that schwa may not bear stress. Kager (1990) handles the same restriction in Dutch by treating schwa as morationally weightless. This analysis would not work for Lillooet, however, since schwa does indeed count as a mora with regard to stress placement; it simply may not be able itself.

7M. D. Kinkade (p.c.) suggests that the data in (19)—which showed that schwa may not be the target of stress shift—are really just another instance of consonant clusters, analogous to (5)-(6), since the schwa in (19) might only be inserted late in the derivation. The main difficulty in such an analysis is the lack of a coherent account of epenthesis. This is discussed at length by van Eijk (1984: 25-35), who notes that the distribution of schwa is one of the most complex problems of Lillooet phonology, since schwa is sometimes inserted, sometimes elided. Van Eijk cites the following data to show that stressed weak vowels contrast, and hence must be present underlyingly:

(i)

a. 1uc 'tight'
   1uc'-aka?-am 'to hold on tightly (int.)'
   1uc'-aka?-min 'to hold on tightly (trans.)'

5Van Eijk (1984: 21) claims that there is another alternation involving vowels followed by glottal stop. Stress may fall on a full vowel followed by a glottal stop only when the following suffix contains a weak vowel:

(i)

a. 1uc 'tight'
   1uc'-aka?-am 'to hold on tightly (int.)'
   1uc'-aka?-min 'to hold on tightly (trans.)'

Given everything that has been seen to this point, stress is not expected to shift in any of the examples of (i). The condition that allows stress to shift onto an underlyingly weak vowel in (b) is very unusual, especially since the target is part of the same lexical suffix—aka? 'hand' in both (b) and (c). An analysis will not be given here as it is not clear even under Optimality Theory how to handle these data. Unfortunately, these are the only forms that van Eijk cites in support of his general claim, and they have not been re-checked with the Lillooet informants. More data should be gathered to support van Eijk's claim.

8Thanks to L. Matthewson for bringing to my attention the Remnant (1990) thesis and the possible relevance of Lillooet retraction harmony for syllable structure.

9Thanks to D. Pulleyblank for sharing these articles with me and noting their relevance for Lillooet stress.

10Although van Eijk (1984: 20) claims that the counting base for regular, binary stress shift is the first full vowel, L. Downing (p.c.) notes that the stem vowel a in the examples in (34) instead could be the counting base. To settle this issue would require words with several schwas following the root, which unfortunately do not exist according to van Eijk (1984: 24 n. 2). His claim is therefore based solely on analogy to the data in (33), in which a full vowel attracts stress from preceding syllables headed by schwa. Evidence for Downing's suggestion comes from a recent transcription of (34) which was given as (25), repeated below as (i):

(i)

1Van Eijk cites the following data to show that stressed weak vowels contrast, and hence must be present underlyingly:

(i)

a. 1uc 'tight'
   1uc'-aka?-am 'to hold on tightly (int.)'
   1uc'-aka?-min 'to hold on tightly (trans.)'

Given everything that has been seen to this point, stress is not expected to shift in any of the examples of (i). The condition that allows stress to shift onto an underlyingly weak vowel in (b) is very unusual, especially since the target is part of the same lexical suffix—aka? 'hand' in both (b) and (c). An analysis will not be given here as it is not clear even under Optimality Theory how to handle these data. Unfortunately, these are the only forms that van Eijk cites in support of his general claim, and they have not been re-checked with the Lillooet informants. More data should be gathered to support van Eijk's claim.
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