STRESS IN INTERIOR SALISH
William J. Idsardi
Massachusetts Institute of Technology

Introduction
Over 30 years ago, Gladys Reichard (1958-60) remarked that “[a] major
Salish problem is stress and its relation to strong and weakened vowels”. This
statement remains valid today. This paper examines the stress systems of
several Interior Salish (IS) languages using the “bracketed grid” metrical
theory (Halle & Vergnaud 1987). The languages examined are: Columbian
(Cm, Czaykowska-Higgins 1990), Colville (Cv, Mattina 1973), Okanagan (Ok,
Watkins 1970), Shuswap (Sh, Kuipers 1974), and Spokane (Sp, Carlson 1976,
1989, Carlson & Bates 1990). This paper will offer support for the Halle &
Vergnaud system and its more recent developments (Halle 1990, Halle &
Kenstowicz 1991) regarding the placement of boundaries, concluding that in
these languages the boundary placement account of stress placement is
superior to accounts employing cyclicity and stress erasure.
The Salish languages have a rich array of consonants but few vowels:

(1) CONSONANTS

<table>
<thead>
<tr>
<th>[-SON]</th>
<th>[+SON]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-CONT]</td>
<td>[+CONT]</td>
</tr>
<tr>
<td>vl gl vd</td>
<td>gl</td>
</tr>
</tbody>
</table>

LABIAL

<table>
<thead>
<tr>
<th></th>
<th>[-CONT]</th>
<th>[+CONT]</th>
<th>[-NASAL]</th>
<th>[+NASAL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>p</td>
<td>m</td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>b</td>
<td>ñ</td>
<td>ñ</td>
<td></td>
</tr>
</tbody>
</table>

CORONAL

<table>
<thead>
<tr>
<th></th>
<th>[-CONT]</th>
<th>[+CONT]</th>
<th>[-NASAL]</th>
<th>[+NASAL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>alveolar</td>
<td>t</td>
<td>t</td>
<td>s</td>
<td>n ñ</td>
</tr>
<tr>
<td>dental</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
</tr>
<tr>
<td>lateral</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
</tr>
<tr>
<td>distributed</td>
<td>c</td>
<td>c</td>
<td>r</td>
<td>r</td>
</tr>
<tr>
<td>palatal</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
<td>ð</td>
</tr>
</tbody>
</table>

DORSAL

<table>
<thead>
<tr>
<th></th>
<th>[-CONT]</th>
<th>[+CONT]</th>
<th>[-NASAL]</th>
<th>[+NASAL]</th>
</tr>
</thead>
<tbody>
<tr>
<td>velar</td>
<td>k</td>
<td>k</td>
<td>g</td>
<td>x</td>
</tr>
<tr>
<td>uvular</td>
<td>q</td>
<td>q</td>
<td>ñ</td>
<td>ñ</td>
</tr>
<tr>
<td>labio-velar</td>
<td>kʰ</td>
<td>kʰ</td>
<td>gʰ</td>
<td>xʰ</td>
</tr>
<tr>
<td>labio-uvular</td>
<td>qʰ</td>
<td>qʰ</td>
<td>sʰ</td>
<td>sʰ tʰ</td>
</tr>
</tbody>
</table>

LARYNGEAL

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
</tr>
</tbody>
</table>

No Salish language makes use of all of the consonants shown in (1). In fact,
some of these sounds are not attested in Interior Salish, but are present in
other (Coast) Salish languages. The vowel inventories are more similar but
the sound correspondences are complex (see Reichard 1958-60).
(2) **VOWELS**

<table>
<thead>
<tr>
<th>[-BACK]</th>
<th>[+BACK]</th>
<th>[-ROUND]</th>
<th>[+ROUND]</th>
<th>[-LOW]</th>
<th>[+LOW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[HIGH]</td>
<td>i</td>
<td>u</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[LOW]</td>
<td>e</td>
<td>o</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stress in Salish is largely determined morphologically. Descriptively, roots are divided into strong and weak types, and suffixes into strong, variable and weak (vowellness). Stress placement is often described as a hierarchy with the highest member in a word receiving the stress:

(3) **STRESS HIERARCHY**

strong suffix > strong root > variable suffix > weak root (> weak suffix)

Examples of the various combinations in the different languages are given in (4)-(7). Strong suffixes attract stress, even when occurring with a strong root:

(4) **STRONG ROOT + STRONG SUFFIX**

- **Cm:** [k_im^x_ik] k-\_\_im^x_ikn  
  loc-move-back  
- **Cv:** [x^k_nx^t] n-\_\_k-n-t-ix°  
  pull out-success  
- **Sp:** [k^x_1n^x]  
  make-trans-refl

(5) **WEAK ROOT + STRONG SUFFIX**

- **Cv:** [stwilx]  
  kas-t-wlx  
  good  
- **Cm:** [nkckqinn]  
  n-\_\_kq-k-qin-n-t-\_\_n  
  loc-hit rep-top-ctrl-tr-3so-1ss

With only variable suffixes, strong roots will retain stress:

(6) **STRONG ROOT + VARIABLE SUFFIX**

- **Cm:** [sa^x^m^x] n-\_\_x-mix  
  impf-move-impf  
- **Cv:** [x^k_nxt] n-\_\_k-n-t-ix°  
  pull out  
- **Ok:** [nkkcn]  
  n-k-n-ce-n  
  see-compl-2so-1ss  
- **Sp:** [k^x_1nt^x]  
  make-trans-2s

However, weak roots lose stress to a following variable suffix:

(7) **WEAK ROOT + VARIABLE SUFFIX**

- **Cm:** [ckncs]  
  \_\_k-n-t-sa-s  
  hit-ctrl-tr-3so-3s  
- **Cv:** [k^x^p_\_n]  
  \_\_x-p-n-t-in  
  hang  
- **Ok:** [ca^c\_n\_n]  
  ca\_n-ce-n  
  punch-compl-2so-1ss  
- **Sp:** [\_\_\_nt^x]  
  \_\_il-nt-ex°  
  chop-trans-2s

The hierarchy in (3) suffices to describe all the IS languages when there is a unique strongest item in a word. Interestingly, when a word consists of a root and more than one suffix of a given type, the languages differ in the stress
placement. Words containing more than one strong suffix show different stress patterns in the different languages:

(8) **STRONG ROOT + ... STRONG SUFFIX + ... STRONG SUFFIX**
   Cm: [kaspiqcncutxʷ] k̕as-ⱛpiq-cin-cut-mix
   irr-cook-food-refl-impf
   Cv: [kšӲIkstmistaxʷ] k̕š-ⱛšul-ikst-m-i-sut-x-a-x
   irr-abs-make-hand-mid-sec-refl-inc
   Sp: [ʔamšʷsncutnəyeʔy] νlǎmšʷ-us-nt-sut-tn-yeʔ-y
   shave-face-trans-refl-inst-seem-cont

As we have also seen, weak roots lose stress to variable suffixes; words having more than one variable suffix (and no strong suffixes) following a weak root are also stressed differently in different languages:

(9) **WEAK ROOT + ... VARIABLE SUFFIX + ... VARIABLE SUFFIX**
   Cm: [c̕শtaws] v̕čk-n-stu-wa-s hit-ctnvl-caus-JO-3ss
   Cv: [nšq̕asenx̕] n-ⱛšas-aqṣt-xan loc-good-rear-legs
   Sp: [šlncín] v̕šil-n-ti-en chop-trans-2obj-1subj

The location of the suffix with stress in such words in the various languages is summarized in (10):

(10) **SUFFIXAL STRESS PLACEMENT WITH MORPHEMES OF LIKE “STRENGTH”**
    Word Form         Cm   Cv   Ok   Sh   Sp
    root + strong suffix* last  first last  last  last suffix
    weak root + variable suffix* last  first last  first  first suffix

This table does not capture all the vagaries of Salish stress; there seems also to be interaction between the type of suffix (somatic versus grammatical) and stress. Even without such eventual elaborations, the patterning of stresses is theoretically intriguing.

**Stress Parameters & Rules**

The Halle & Vergnaud system of stress assignment is based on the construction of a metrical grid above the organizing tier. The possible stress systems of language are not atomic, but consist of a conjunction of units of minimal contrast, the parameters. As an example of a minimal contrast, consider the difference between the stress patterns of Latvian and French (taken from Halle & Vergnaud):

(11) Latvian: word initial stress  (e.g. Lātvija)
    French: word final stress  (e.g. originalité)

This shows a minimal contrast in the location of stress Stress is assigned to an extreme in both cases, in Latvian to the first stressable element and in French to the last. Thus, these languages are similar in some respects (one stress per word) and different in others (which end receives stress). The
parameter describing this difference is the headedness of the constituent, Latvian is left-headed; French right-headed.

Another minimal contrast is the size of the constituents. This contrast is described by the enumeration of the types of constituents available. The types of feet include (maximally) binary (i.e., at most two elements) and unbounded. Halle & Vergnaud use the following parameter set:

\[
\begin{align*}
\text{Stress Parameters} & \\
[\leq \text{BND}] & \text{constituents are (not) bounded} \\
[\leq \text{HT}] & \text{heads are (not) constituent terminal} \\
[\text{R/L}] & \text{constituents are right (left) headed} \\
[\text{L} \rightarrow \text{R}, \text{R} \rightarrow \text{L}] & \text{construct constituents from left (right) edge} \\
[\leq \text{CONFLATE}] & \text{lines 1 and 2 are (not) conflated}
\end{align*}
\]

Thus, Latvian and French share constituent-final heads and unbounded constituents [+HT -BND]. However, they differ on which end the head appears on, Latvian placing it on the left, French on the right:

\[
\begin{align*}
\text{Latvian} & \quad \text{French} \\
* \times \times & \quad * \times \times \times \times \times \times \text{ line 1} \\
\text{Latvija} & \quad \text{originalité} \\
[+\text{HT}-\text{BND} \text{L}] & \quad [+\text{HT}-\text{BND} \text{R}]
\end{align*}
\]

Along with the stress parameters there are rules of grid construction, identifying elements with special properties. One such property is being capable of bearing stress; the line 0 grid marks are introduced by a rule, of the form:

\[
\text{(14) Line 0 Projection} \\
\text{Project a line 0 mark for each vowel (nuclear element, rimal element ...)}
\]

and in some "quantity sensitive" systems, where heavy syllables are treated differently from light ones, some line 1 marks are introduced by rule:

\[
\text{(15) Line 1 Realization of Quantity Sensitivity} \\
\text{Project a line 1 mark for each heavy syllable}
\]

One of the major concerns is the proper balance between rules and parameters, for in many cases the examples of attested rules are not numerous, allowing for a characterization into parameters (Dresher 1990 offers extrametricality and foot construction as examples). One possible difference between rules and parameters could be lexical exceptionality. That is we might expect lexical exceptions to rules, but not to parameter settings (or vice versa). Further, we could expect differences due to rule orderings. As an example, consider the application of two rules, one as in (15) and a rule of extrametricality. Would heavy edge syllables be marked extrametrical? The answer to this question would depend on the ordering of the rules. If
extrametricality applies first, then final heavy syllables would be extrametrical. If, however, line 1 marks are placed first, this would preclude final heavy syllables from being marked extrametrical.

**Cyclicity**

The interaction between stress and morphology has been commented on extensively. In English, for example, there are two types of suffixes: stress-shifting (párent, parént-a1) and stress-neutral (párent, parént-hood). This distinction is captured by Halle & Vergnaud as a consequence of the cyclic application of rules. The stress-shifting affixes are cyclic, requiring the erasure and reconstruction of the stress plane. Stress-neutral affixes are non-cyclic, respecting the cyclically assigned metrical structure. Non-cyclic affixes augment the already constructed grid, cyclic affixes replace it. Thus, the metrical structure of the sub-components can remain visible through non-cyclic affixation, but not through cyclic affixation.

The hallmark case of cyclicity and stress assignment is Vedic Sanskrit stress (Kiparsky 1982), which displays the Basic Accentuation Principle (BAP) of Indo-European (Kiparsky & Halle 1977):

(16) **BASIC ACCENTUATION PRINCIPLE**
Stress the leftmost accented vowel, or, in the absence of accented vowels, the leftmost vowel

The Vedic stress system is further complicated by the existence of two types of suffixes, "dominant" and "recessive". Dominant suffixes serve to wipe out any previously assigned stresses, receiving stress if they are accented, otherwise placing stress on the first syllable of the word. Recessive suffixes, too, can be accented, receiving stress only when there is no preceding stressed element. Various patterns of underlying and surface forms are shown in (17), adapted from Cole (1990):

(17) **VEDIC STRESS PATTERNS**
| UR: | SDÓ | SDÓ | SDÓ | SDD | SÓÓ | SÓR | SRR | SDR | SDDR |
| SR: | SDD | SDD | SDD | SDD | SDR | SDR | SDR | SDR | SDD |

Halle & Vergnaud re-analyze the difference as one of cyclicity, dominant suffixes being cyclic and recessive suffixes non-cyclic, and introduce the Stress Erasure Convention (SEC):

(18) **STRESS ERASURE CONVENTION**
At the beginning of each pass through the cyclic phonology erase all metrical structure and stresses assigned on previous cycles
Halle & Kenstowicz (1991); Halle, Harris & Vergnaud (1991)

The derivation of a word with two dominant suffixes, one accented, one not is shown in (19). Accented vowels have a lexical line 1 asterisk, and the Vedic stress system is LINE 0: [+HT -BND R], LINE 1: [+HT -BND L].
(19) Vedic /ci+kar+ay+isa#ti/ → [cikarayisati]*

          *
        (*)
     (*)(*)
Cycle 1:  ci+kar+ay  
     *
   (. . . . .)
     * * * * *
Cycle 2:  ci+kar+ay+isa  
     *
    (*)(*)
   (*)(*)
post-cyclic:  ci+kar+ay+isa+ta

Czaykowska-Higgins emphasizes the similarity between Cm stress and the BAP, using cyclicity to characterize the types of suffixes:³

(20) CHARACTERIZATION BY CYCLICITY AND LEXICAL ACCENT

<table>
<thead>
<tr>
<th>SUFFIXES</th>
<th>VEDIC</th>
<th>SALISH</th>
<th>REPRESENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>dominant</td>
<td>cyclic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>recessive</td>
<td>variable</td>
<td>non-cyclic</td>
<td></td>
</tr>
<tr>
<td>acoustics</td>
<td>strong</td>
<td>lexically accented</td>
<td></td>
</tr>
<tr>
<td>unacoustics</td>
<td>weak</td>
<td>lexically unaccented</td>
<td></td>
</tr>
</tbody>
</table>

Czaykowska-Higgins then builds unbounded right-headed feet and a left-strong word tree, that is, grids are built with the following parameters:

(21) CZAYKOWSKA-HIGGINS COLUMBIAN STRESS PARAMETERS
LINE 0: [-BND, +HT, R]   LINE 1: [-BND, +HT, L]
Thus, the Stress Erasure Convention (SEC) will shift stress when strong (cyclic) affixes are encountered by erasing the grid:⁴

(22) Columbian s+s+s+v /kas+piq+cin+cut+mix/

          *
        (*)
Cycle 1:  kas+piq *
           (*)
Cycle 2:  kas+piq+cin *
           (*)(*)
Cycle 3:  kas+piq+cin+cut *
           (*)(*)
non-cyclic:  kas+piq+cin+cut+mix
            [kaspiqoncut+mx⁵]

Czaykowska-Higgins splits the stressing into two components: line 0 construction is both cyclic and non-cyclic, while line 1 construction is non-cyclic only.
Domains and Cyclicity

As argued by Watanabe (1991) for Tokyo Japanese and Jones (1991) for German, we can extend the cyclic/non-cyclic distinction to also classify roots. Cyclic roots will be subject to the stress rules, while non-cyclic ones will not, providing the effect of lexical accent. Watanabe argues that cyclicity is a property of domains rather than morphemes per se, and that the stem and the affix can both contribute to the specification of the cyclicity of the domain they constitute. Tokyo Japanese has suffixes which when attached to cyclic stems create a cyclic domain, and when attached to non-cyclic stems create a non-cyclic domain. It also has suffixes that "flip" the cyclicity of the stem, creating a cyclic domain when attached to non-cyclic stems and a non-cyclic domain when attached to cyclic stems. Employing this idea, the strong/variable/weak distinctions in Interior Salish can be cast uniformly as a cyclicity distinction:

(23) CHARACTERIZATION BY CYCLICITY
strong suffixes, strong roots = cyclic
variable suffixes, weak roots = non-cyclic

Obviously, to extrapolate this analysis to the other languages some distinctions need to be added. In order to account for the stresses with multiple variable suffixes, we can use lexical accent (line 1 marks):

(24)

<table>
<thead>
<tr>
<th>Cm</th>
<th>Cv</th>
<th>Ok</th>
<th>Sh</th>
<th>Sp</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

When the word consists of a weak root and variable suffixes, in languages where variable suffixes have line 1 grid marks the first suffix will receive the word stress.

(25)

<table>
<thead>
<tr>
<th>Cm/Ok</th>
<th>Cv/Sh/Sp</th>
</tr>
</thead>
<tbody>
<tr>
<td>(s + v + v)</td>
<td>(*) (\times)</td>
</tr>
<tr>
<td>cyclic:</td>
<td>(s + v + v) (s + v + v)</td>
</tr>
<tr>
<td>(*) (\times) (\times) (\times)</td>
<td>(*) (\times) (\times) (\times)</td>
</tr>
<tr>
<td>post-cyclic: (s + v + v) (s + v + v)</td>
<td></td>
</tr>
<tr>
<td>(w + v + v)</td>
<td>(*) (\times)</td>
</tr>
<tr>
<td>post-cyclic: (w + v + v) (w + v + v)</td>
<td></td>
</tr>
</tbody>
</table>

The case with strong suffixes appears similar, with stress falling on either the first or last strong suffix. However, given the SEC and the cyclic characterization of strong suffixes, it is difficult to keep stress from shifting all the way to the right, as Cv requires. What is required is some sort of persistent mark on the Cv strong suffixes, one which will not be erased by the
SEC. Following Halle (1990) who distinguishes between placing line 1 marks and placing boundaries, we might encode the distinction as:

\[(26) \text{ STRONG SUFFIX ACCENT TYPES} \]

\[
\begin{array}{c|c|c}
\text{Cv} & \text{Cm/Ok/Sh/Sp} & \text{S} \\
\hline
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\end{array}
\]

This would require the following elaboration of the SEC. The SEC would erase (lexical) line 1 marks but not (lexical) boundaries. This would distinguish between two types of lexical accent: persistent (boundaries) and transient (line 1 marks).

\[(27) \]

\[
\begin{array}{c|c|c}
\text{Cm/Ok/Sh/Sp} & \text{Cv} & \text{S} \\
\hline
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\text{S} & \ast & \ast \\
\end{array}
\]

Such a solution is intriguing, but other factors, notably syncope, make it untenable. However, the lexical placement of boundaries is an idea worth pursuing, and it will be explored below.

**Reduced Cyclicity**

There are still some issues to be dealt with in the recasting of cyclicity as a property of domains. Foremost among these is the operation of cyclic and non-cyclic rules. Cyclic rules can apply in each cyclic domain, but the non-cyclic rules are only applied once, at the end. This suggests that cyclic and non-cyclic domains cannot be inter-twined. Further, when an outermost affix defines a cyclic domain, this does not preclude the application of non-cyclic rules over that domain. Thus, inner non-cyclic domains are not domains for the application of non-cyclic rules, and the final domain must be non-cyclic, though it can also be cyclic. The final domain can thus have two specifications and non-cyclic rules only apply on the final domain. Thus, a better characterization of the situation is to eliminate the characterization of each domain as cyclic or non-cyclic and replace this with only cyclic domains, understanding that the non-cyclic rules will apply to the output (plus any
leftover material). Thus, there are no non-cyclic domains, only the absence of cyclic domains:

(28) not: \( \text{non-cyclic (cyclic (non-cyclic cyclic))} \)
rather: \( \text{post-cyclic (cyclic ... (cyclic))} \)

Such a view encodes the domains for the application of rules correctly, but makes Watanabe’s “flipping” of domains more difficult to state, for cyclicity is now a privative feature. In essence, it serves to trade bushiness for depth of embedding, in the most extreme case converting a binary tree of depth \( n \) into an \( n \)-ary branching tree of depth one.

Two further amendments to the theory of cyclicity are possible, arising out of Cole (1990), who gives a non-cyclic analysis of Vedic stress. She formulates a rule deleting stress marks, triggered by dominant morphemes. The same could be done for the Salish strong suffixes, in all languages but Cv all lexical stress but the final would survive:

(29) **Stress by explicit deletion**
LINE 1: \* \rightarrow \sigma / \_ \_ \*

In Cv, the rule would need to be restricted so that only a stem accent could be deleted. Or, all following accents could be deleted, with the stems characterized along another dimension. This approach offers a number of alternatives for the treatment of sequences of strong suffixes, but offers no insight into the characterization of sequences of weak ones. Further, it eliminates the SEC in name only, allowing equivalent rules to remain within the grammar. Finally, though it has the form of a clash resolution rule, the line 1 accents needn’t be on consecutive syllables to trigger it.

A major point of Cole’s paper is that there are few cases of multiple application of cyclic processes. For example, with the SEC, one only needs to calculate the stress on the last cycle and the non-cyclic stress. Therefore, it would be sufficient to partition the word tree into two domains, the cyclic and the post-cyclic. If we see the SEC as a principle of mapping (the cyclic domain corresponds to the domain encompassed by the last cyclic suffix) then we can imagine a parameterization of this mapping:

(30) **Parameterized reduced cyclicity interpretation of SEC**
The cyclic domain corresponds to the domain of the [FIRST/LAST] cyclic suffix

This will enable us to get the difference in the stress placement in forms with more than one strong suffix. Cv will be marked [FIRST] and all the other languages will be marked [LAST].
This approach does not directly address the placement of stress in forms with weak roots and only variable suffixes. To get these cases we would need to retain some other mechanism, such as lexical accent. The common thread shared by all the cyclicity based approaches is that cyclic affixes erase (or prevent the building of) foot structure on inner cycles. However, there is a class of stress theories that do not have this property, instead employing boundary placement.

**Boundary Placement**

Metrical theory provides another alternative. Halle (1990) shows there are three types of quantity systems: two line 0 marks (MORAS), line 1 mark placement and line 0 boundary placement. Halle & Kenstowicz (1991), employing evidence from Turkish and Diyari, further show that there are two types of idiosyncratic stress, line 1 marks and line 0 boundaries. The introduction of boundaries can, like the SEC, serve to move stress along in a word. Thus, in languages with unbounded feet there are two ways to move stress in a morphologically complex word: wipe out previous stress structure (the cyclic approach) or mark some morphemes as starting (or ending) feet (the boundary approach). Thus, a non-cyclic account for Salish stress becomes possible with the advent of lexical boundary placement. If stress is placed on the last foot, adding new feet to the end of the word will cause stress to shift to the right. The morphemes and stress parameters in the various languages can then be characterized as:

<table>
<thead>
<tr>
<th>ROOTS</th>
<th>Cv</th>
<th>Cm</th>
<th>Ok</th>
<th>Sh</th>
<th>Sp</th>
</tr>
</thead>
<tbody>
<tr>
<td>strong</td>
<td>(...</td>
<td>...</td>
<td>(...</td>
<td>(...</td>
<td>(...</td>
</tr>
<tr>
<td>weak</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>SUFFIXES</td>
<td>(...</td>
<td>...</td>
<td>(...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>strong</td>
<td>(...</td>
<td>...</td>
<td>(...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>variable</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>LINE 0</td>
<td>BND</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HEADED</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>LINE 1</td>
<td>BND</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HEADED</td>
<td>1</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>XPOS</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

Parametric differences among the languages yield the three language types. Lexically, morphemes are marked for idiosyncratic foot boundaries, indicated by "("; those morphemes noted "..." impose no foot requirements. Each
language builds left-headed feet (LINE 0: [-BND, L]) and the word stress falls on the last foot (LINE 1: [-BND R]) in all the IS languages except for Cv, where it falls on the second foot. In Sh and Sp weak roots require any subsequent material (even variable suffixes) to be separately footed and thus capable of bearing word stress.

Weak roots with variable suffixes in Cm, Ok and Cv contain no lexical boundaries. Thus, when a weak root is followed by variable suffixes in Cm and Ok no lexical boundaries will occur in the word. The stress on such a word ends up on the last vowel, indicating that the line 1 parameter is determining stress placement. Therefore, line 0 is parsed only where lexical boundaries exist, that is the feet are inferred, not constructed. When no feet are induced by lexical boundaries, line 1 parameters are applied directly to line 0 (yielding in Cm and Ok a “reverse” foot).

<table>
<thead>
<tr>
<th>(33)</th>
<th>Cm/Ok</th>
<th>Sh/Sp</th>
<th>Cv</th>
</tr>
</thead>
<tbody>
<tr>
<td>s + s + s</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>s + (s + s)</td>
<td>s + s</td>
<td>s + (s + s)</td>
<td>s + s</td>
</tr>
<tr>
<td>w + s + s</td>
<td>w + (s + s)</td>
<td>w + (s + s)</td>
<td>w + (s + s)</td>
</tr>
<tr>
<td>s + v + v</td>
<td>s + v + v</td>
<td>s + v + v</td>
<td>s + v + v</td>
</tr>
</tbody>
</table>

Extraposition and extrametricality are impossible when there is only one mark in the domain, yielding for Cv the equivalency of “second” stress and “last” stress when only one line 1 mark projects. When only two line 1 marks project, we again have equivalence of “second” and “last” stress. In the case when no line 1 marks project, the line 1 parameters are applied to line 0 (indicated here with periods in place of asterisks on line 1).

This analysis offers an alternative to a cyclic account of stress placement in IS, allowing certain types of morphological juncture to persist as metrical boundaries. Thus a “richer” structure is available, allowing for a simplified formulation of metrically sensitive rules. This theory also allows stress to be “read off” the morphological representation, without the obfuscating effects of the SEC. Since the lexical stresses have some degree of permanence, the stress patterns are more nearly surface-transparent, presumably easing the task of the language learner (cf. Dresher & Kaye 1990).
Evidence for feet

Some evidence for the existence of feet in Sh is available from other sources, morphological processes that are sensitive to metrical structure and syncope. Sonorant glottalization and reduplication are two prevalent morphological processes in Salish, and each displays dependence on metrical structure. Vowel deletion runs rampant in these languages, leaving the enormous consonant clusters for which these languages are renowned.

Sonorant glottalization

Morphological glottalization in Sh is stress-dependent; falling only on the stressed vowel or post-stress vowels or resonants

(34) **Shuswap Glottalized Sonorants**

post-tonic rimal sonorant  s-t-qéy-qn  shed
x-siq-n-s  he ladies it over
post-tonic vowel        1-kapépyó  small dishpan
stressed vowel         t-x'1-x'1-lib  gooseberry bush

To restrict the placement of glottalization, we can circumscribe the word (McCarthy & Prince 1990). But such circumscription entails that the stressed vowel forms a foot with the following material, not with the preceding material. Thus, the feet should be left-strong (line 0: [-BND, +HI, L])... For further details see Ldsardi (1991).

Syncope

But, the best evidence for boundary placement is syncope. Czaykowska-Higgins is forced to formulate a trans-derivation constraint on syncope in Cm: vowels can be deleted only when they do not receive stress on ANY cycle:

(35) **CM Vowel Deletion/Secondary Stress Generalizations**

A. A vowel situated to the left of primary stress
   1. is always deleted if it was never assigned stress on any cycle
   2. is not deleted if it was assigned stress on an earlier cycle
B. Secondary stress appears only if the vowel on which it occurs was stressed on an earlier cycle. (Czaykowska-Higgins 1991 p27)

Under the account employing lexical boundaries, the generalizations concerning secondary stress and syncope can be captured by deleting all vowels that do not head feet:

(36) **Columbian Syncope**

\[
v \rightarrow \emptyset / _\star
\]

The boundary placement analysis preserves the information encoded by Czaykowska-Higgins on previous cycles, vastly simplifying the statement of
syncope. There is, however, a case where syncope applies to delete the vowel that is the head of a foot: in clash.

\[
(37) \quad s+s \quad s+s+s
\]

indicating that Columbian has a rule of clash resolution:

\[
(38) \quad \text{COLUMBIAN CLASH RESOLUTION}
\]

\[
* \rightarrow \emptyset / \quad * \quad \star \quad * \quad \text{line 1}
\]

\[
* \quad \text{line 0}
\]

There are also some forms with weak roots that show loss of the root vowel, or failure to apply clash, while others do not:

\[
(39) \quad w+s*\text{WORDS}
\]

\[
\begin{align*}
n+cok+\text{VTG}-(qin-n-t-\emptyset-n) \quad [\text{nckckqinn}] \\
\text{V*k}^a?+/\text{akst+n+cut} \quad [\text{k*a?akstncut}] \\
k+yar+\text{VTG}+(qin+)(alq^*+(akst+n+t+\emptyset+n) \quad [\text{kyarqalqalq^*akstn}]
\end{align*}
\]

Notice also that in the w+s+s+s form there would be four feet in clash. Only the second vowel undergoes syncope, suggesting iterative L→R application of the syncope rule. There is one case where we predict syncope of the root vowel in Cm, in w+v* words:

\[
(40) \quad \text{REVERSE FOOT} (w+v^*) \text{WORDS}
\]

\[
\begin{align*}
\text{V*cok+n+t+sas+s} \quad \text{V*cok+n+stu+wa+s} \\
\text{V*cok+n+t+sas+s} \quad \text{V*cok+n+stu+wa+s}
\end{align*}
\]

and indeed in this case the vowels preceding the stress delete, indicating that the “reverse” foot interpretation of stress placement in words without lexical boundaries is correct.

Thus, retention of stress information calculated on sub-portions of the word is crucial, showing that the proper characterization of Salish stress will not delete previously assigned structure. The boundary placement account is the only theory currently meeting these criteria.

Notes

I would like to thank Ewa Czytkowska-Higgins, Tom Green, Morris Halle, Doug Jones, Michael Kenstowicz and Jay Keyser for discussions about the issues raised in this paper. The opinions expressed here should not be considered representative of
their views. This material is based on work supported under a National Science Foundation Graduate Fellowship.

1 In the phonemic transcriptions morpheme boundaries are indicated by hyphens (-), strong morphemes are indicated by an accented vowel, null morphemes are indicated by Ø and roots are preceded by √. Roots without vowels have not been found in stressed forms, so the vowels are as yet undetermined.

2 The foot typology is simplified here for clarity of presentation, the two interacting parameters of [ßND] and [ß11] yield three foot types: binary, ternary and unbounded. The specification [-ß11 -ßND] is ruled out because the position of the head of such a foot is not uniquely recoverable.

3 Czykowska-Higgins treats weak roots as vowelless, with a vowel epenthesis rule applying after the footing rule.

4 Since prefixes are devoid of effect on stress they do not project onto the grid.

5 This again raises the problem of the lexical encoding of accent. If another, diacritic feature is used to represent underlying accent, this diacritic would still be present following the application of the SE, and stress could be re-projected for these items. The transient nature of lexical accent in Vedic implies that lexical accent must be represented on the same grid.

References

Abbreviations:
CLA Proceedings of the Canadian Linguistics Association Meeting
FLSMA Proceedings of the Meeting of the Formal Linguistics Society of Mid America
ICSL Proceedings of the International Conference on Salish and Neighboring Languages
IJAL International Journal of American Linguistics
LI Linguistic Inquiry
NLLT Natural Language and Linguistic Theory
SCOPIL University of Southern California Occasional Papers in Linguistics
UHWPIL University of Hawaii Working Papers in Linguistics


Cole, Jennifer (1990) Arguing for the phonological cycle: a critical view FLSMA 1


Halle, Morris (1990) Respecting metrical structure NLLT 8:149-176
Jones, Douglas A (1991) The mapping of syllable quantity to stress in German ms MIT
Kiparsky, Paul & Morris Halle (1977) Towards a reconstruction of the Indo-European accent In L. Hyman (ed) Studies in Stress and Accent SCOPII 4
Mattina, Anthony (1973) Colville grammatical structure UHWPL 5:4
Watkins, Donald (1970) A Description of the Phonemes and Position Classes in the Morphology of Head of the Lake Okanagan (Salish) PhD thesis University of Alberta
Watanabe, Akira (1991) Some problems in Tokyo Japanese accentuation: a study of the notions of “Stem” and “Affix” ms MIT

MIT Room 20D-219
Cambridge MA 02139
idsardi@athena.mit.edu