Onset weight in Arabela and Bella Coola
Nina Topintzi i.topintzi@ucl.ac.uk
University College London
13th Manchester Phonology Meeting - 27 May 2005

Introduction:

Standard phonological models ban any contribution to weight coming from onsets (Hyman 1985, Hayes 1989, 1995, Morén 1999). Still there are languages with onset effects on stress, e.g. Pirahã (Everett and Everett 1984, Everett 1988, Topintzi in prep., Gordon to appear). These have been analysed by means of some notion of prominence (e.g. Hayes 1995, Smith 2005 among others).

Aims of the paper:

- Moraic onsets exist, but only used in extremis
  - Introduce stress shift data from Arabela, which show similar to Pirahã effects. Proposal: Obstruent onsets - but not the sonorant ones - are moraic. Interaction of WSP and All-Ft-R causes stress shift in a particular environment only. In all other cases no trigger exists for stress shift. As a result All-Ft-R violations are too numerous to be compensated for so that the optimal candidates present the normal rhythmic pattern.
  - Show that even if stress systems such as Arabela or Pirahã can be re-analysed in terms of prominence, there are other clearly weight-based phenomena, such as Word Minimality in Bella Coola. Proposal: This requires an approach permitting onset moraicity, but only to satisfy top-ranked WDMIN. When WDMIN is not at stake, no moraic onsets, as confirmed by RtMax facts.

(I) ARABELA [Zaparoan, Peru; all data from Rich 1963 and Payne and Rich 1988]

1. Background on the language

(1) Phonemic inventory
   vowels: i, e, a, o, u
   consonants: stops p, t, k, fricatives s, f, h, nasals m, n, liquid r and glides w, y

   No voicing contrast in obstruents underlingly. Various variants on the surface.

(2) k ~ x ~ g
   /ke/ [kiʔ] “father”
   /nake/ [nãxiʔ] “his father”
   /kanaake/ [kanããgiʔ] “our (excl.) father”

2. Stress facts

Stress is rhythmic. Syllabic trochees L-R and the rightmost stress is the primary one.

(3) a. tênakári ‘afternoon’
   b. sâmarú ‘spirit’
   c. hûwahâniyá ‘peaceful’
Exceptional pattern: according to Payne and Rich (1988), “if a word-final syllable that would have received stress has a voiced onset, and the immediately preceding syllable has a voiceless onset, then the syllable with the voiceless onset is stressed”:

(4) a. nòwañfíano *nòwañfanó ‘brightened’
   b. sápoñhosáno *sápoñhösáno ‘deceived’
   c. mwèratìtyénu *mwèratìtyenú ‘cause to be seen’

3. Sensitivity to onset

Pirahã weight scale:

(5) PVV > BVV > VV > PV > BV [P=voiceless stop, B=voiced stop]

In Pirahã, the rightmost heaviest syllable within a trisyllabic window at the right edge of the word receives stress (Everett and Everett 1984, Everett 1988).

Arabela:

Similar to Pirahã, but contra Payne and Rich, propose that the contrast involved is one between sonorants and obstruents.

(6) ×: non stress-shifting, ✓: stress-shifting
sonorants voiced obstruents voiceless obstruents
Payne and Rich (1988)  ✓  ×  ✓
current proposal  ✓  ✓  ✓

- So: Obstruent onsets attract stress more than sonorants

Incorporate into a larger schema: *moraic markedness constraints* and use a general constraint that assigns moraicity (cf. WBYP) namely *MORAIC* [cf. Morén 1999].

(7) *Moraic markedness constraints* - general schema
*µ/x/y*: No moras in a syllable constituent of the type x that includes a segment of the type y.

*where*: x = Onset, Coda or Nucleus
          y = Son, [+voi], [-voi]

(8) Moraic markedness in margins:
   i) Onsets:
   *µ/ONS/sonorous >> *µ/ONS/non-sonorous
   ii) Codas:
   *µ/Coda/non-sonorous >> *µ/Coda/sonorous

Q: But isn’t sonority related to moraicity, i.e. the more sonorous, the more likely to be moraic?

Proposal: *Moraic markedness is related to sonority via syllable well-formedness.*
Well-formed codas and nuclei: more sonorous → moraic codas and nuclei: more sonorous
Well-formed onsets: less sonorous → moraic onsets: less sonorous

(9) Codas
Kwakwala (Zec 1988, 1995): more sonorous codas are moraic, less sonorous ones are not:
*μ/Coda/non-sonorant >> MORAIC >> *μ/Coda/sonorant

(10) Onsets
i) Pirahã - only voiceless onsets are moraic
*μ/ONS/Son >> *μ/ONS/ [+voi] >> MORAIC >> *μ/ONS/ [-voi]
ii) Arabela - only obstruent onsets are moraic
*μ/ONS/Son >> MORAIC >> *μ/ONS/ [+voi] >> *μ/ONS/ [-voi]

Arabela distribution of moraic onsets:
(11) *μ/ONS/Son >> MORAIC >> *μ/ONS/Obstr

<table>
<thead>
<tr>
<th>pohonu</th>
<th>*μ/ONS/Son</th>
<th>MORAIC</th>
<th>*μ/ONS/Obstr</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. p°oh°on°u</td>
<td>*!</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>b. pohonu</td>
<td></td>
<td>***!</td>
<td></td>
</tr>
<tr>
<td>c. poh°onu</td>
<td></td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>d. p°oh°onu</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footing of this example:
(12) *μ/ONS/Son >> MORAIC >> *μ/ONS/Obstr

<table>
<thead>
<tr>
<th>pohonu</th>
<th>*μ/ONS/Son</th>
<th>MORAIC</th>
<th>*μ/ONS/Obstr</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (p°oh°(nu)</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>b. (p°(ho)(nu)</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
</tbody>
</table>

- Two footings subject to elaboration later on. All candidates henceforth considered will include onsets with moraic obstruents and with non-moraic sonorants.

4. Analysis

4.1. Stress retraction

General rhythmic pattern
Constraints required:
(13) Undominated constraints:
TROCHEE: Feet have initial prominence
ALIGN-Hd-R: Align-R (HdFt, PrWd)
    The head foot is rightmost in the prosodic word

Other prosodic constraints:
(14) PARSE-σ: Syllables are parsed by feet
     FtBin(MAX): Feet are maximally bisyllabic
     ALL-Ft-R: Align-R (Ft, PrWd)

1 For ease of exposition and to avoid more complicated tableaux, I unify *μ/ONS/ [+voi] and *μ/ONS/ [-voi] under the tag *μ/ONS/Obstr.
Align the right edge of a foot with the right edge of the PrWd
ALL-Ft-L: Align-L (Ft, PrWd)
Align the left edge of a foot with the left edge of the PrWd

- No syllables are left unparsed, provided they are parsed in monosyllabic or bisyllabic feet → PARSE-σ, FTBIN(MAX)
- Since all syllables are parsed into feet → PARSE-σ >> ALL-Ft-R
- ALL-Ft-R >> ALL-Ft-L since foot alignment is rightwards and not leftwards
- But FTBIN(MAX) >> ALL-Ft-R must also hold, otherwise we could get ternary or even larger feet as shown below.

(15) FTBIN(MAX) >> ALL-Ft-R

<table>
<thead>
<tr>
<th>σσσσσ</th>
<th>FTBIN(MAX)</th>
<th>ALL-Ft-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (σσσσσ)</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. (σσσ)σσ</td>
<td>*!</td>
<td>**</td>
</tr>
<tr>
<td>c. (σσσσ)σσ</td>
<td>*!</td>
<td>***</td>
</tr>
<tr>
<td>d. (σσσ)σσσσ</td>
<td></td>
<td>****</td>
</tr>
</tbody>
</table>

Rankings achieved so far:

(16) a. *μ/ONS/Son >> MORAIC >> *μ/ONS/Obstr
    b. PARSE-σ, FTBIN(MAX) >> ALL-Ft-R >> ALL-Ft-L

- (16a) tells us which onsets may surface with moras in the output, (16b) illustrates the general stress pattern of the language. These rankings appear unrelated making statements for different aspects of the language. What is the link between them?

(17) WSP (Weight-to-Stress Principle): Heavy syllables must be stressed

N.B: Note that Arabela ignores codas for stress purposes e.g. (moko) (tyaka) ‘palm fruit’.
(18) *μ/CODA/y: Codas of no type are moraic
    [y used as a variable to indicate any type of codas]
(19) *μ/CODA/y, *μ/ONS/Son >> MORAIC >> *μ/ONS/Obstr

The inclusion of WSP is important so that we are able to account for stress shift.

a) WSP within the moraic markedness hierarchy (16a):
(20) *μ/ONS/Son >> MORAIC >> WSP >> *μ/ONS/Obstr

<table>
<thead>
<tr>
<th>pohonu</th>
<th>*μ/ONS/Son</th>
<th>MORAIC</th>
<th>WSP</th>
<th>*μ/ONS/Obstr</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (p mighty oh h o) (nu)</td>
<td></td>
<td>*</td>
<td>*!</td>
<td>*</td>
</tr>
</tbody>
</table>

With this ranking, for (12) [now (20)] a single ranking is chosen.

b) WSP within the prosodic hierarchy (16b):
(21) ALL-Ft-R, WSP >> ALL-Ft-L

<table>
<thead>
<tr>
<th>(nòwa)(j'ìj'ì'a)(nò)</th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (nòwa)(j'ìj'ì'a)(nò)</td>
<td>**** (4)</td>
<td>*</td>
<td>******! (6)</td>
</tr>
<tr>
<td>b. (nò)(wàj'ì)(j'ì'àno)</td>
<td>******! (6)</td>
<td>*</td>
<td>***** (4)</td>
</tr>
<tr>
<td>c. (nòwa)(j'ìj'ì)j'ì'àno</td>
<td>****** (5)</td>
<td>****** (5)</td>
<td></td>
</tr>
</tbody>
</table>
Foot alignment on its own cannot choose (c). The addition of WSP keeps both (a) and (c) in the evaluation and lets ALL-Ft-L decide.

Brief summary of the proposed analysis:
WSP must be added to the pros. hierarchy and be ranked at least next to MORAIC so that it takes into account the weight contributed by onsets. WSP must also be ranked along ALL-Ft-R (in fact they have to be equally ranked cf. Crowhurst and Michael 2005. On the importance of equal ranking see Appendix I) so that it balances the violations of the regularly stressed form and these of the stress-shifted form.

(22) **Schema that generates the stress-shifted candidate [after mark cancellation]**

<table>
<thead>
<tr>
<th>Schema</th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>regular stress (cf. 21a)</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>stress shift (cf. 21c)</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

(23) Mini-grammar of Arabela

*µ/Coda/y, *µ/ONS/Son >> MORAIC, >> *µ/ONS/[Obstr]

WSP,

PARSE-σ, FTBIN(MAX) >> ALL-Ft-R >> ALL-Ft-L

4.2. Obstruent-sonorant combinations and non-shift of stress in other positions

Issues we need to explore:
- do we make the correct predictions for all possible combinations of sonorants and obstruents in the two last syllables of the word?
- does the appearance of an obstruent in a position other than the final two disrupt the normal algorithm?

I) Possible son-obstr combinations:

(24)

<table>
<thead>
<tr>
<th>Penult</th>
<th>Ultima</th>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Sonorant</td>
<td>Sonorant</td>
<td>hûwahâniyá</td>
</tr>
<tr>
<td>b.</td>
<td>Sonorant</td>
<td>Obstruent</td>
<td>šâkamânahá</td>
</tr>
<tr>
<td>c.</td>
<td>Obstruent</td>
<td>Obstruent</td>
<td>kôkotâka</td>
</tr>
<tr>
<td>d.</td>
<td>Obstruent</td>
<td>Sonorant</td>
<td>nòwajîfâno</td>
</tr>
</tbody>
</table>

N.B: In the examples that follow, it is assumed that output obstruent onsets contain a mora, whereas the sonorant ones do not.

(25) sonorant - sonorant --- no shift

ALL-Ft-R, WSP >> ALL-Ft-L

<table>
<thead>
<tr>
<th>Penult</th>
<th>Ultima</th>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(hùwa)(hûni)(yá)</td>
<td>**** (4)</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>(hùwa)(hâ)(niya)</td>
<td>****! (5)</td>
<td>**** (5)</td>
</tr>
</tbody>
</table>

No obstruent onsets in the final two syllables to cause stress shift.
(26) sonorant - obstruent --- no shift

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(sàka)(màna)(hà)</td>
<td>**** (4)</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>(sàka)(mà)(nàha)</td>
<td>**** (5)</td>
<td>*!</td>
</tr>
</tbody>
</table>

No trigger for stress shift, since the ultima with an obstruent already receives primary stress due to rhythmic stress.

(27) obstruent - obstruent --- no shift

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(kòko)(tàka)</td>
<td>** (2)</td>
<td>**</td>
</tr>
<tr>
<td>b.</td>
<td>(kò)(kò)(tà)(kà)</td>
<td>*****<em>!</em> (6)</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>(kò)(kà)(kà)</td>
<td>*** (3)</td>
<td>*</td>
</tr>
</tbody>
</table>

II) No stress shift earlier or later in the word

(28) sonorant - obstruent --- no leftward shift early in the word

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(sàka)(màna)(hà)</td>
<td>**** (4)</td>
<td>*</td>
</tr>
<tr>
<td>b.</td>
<td>(sà)(kà)(màna)(hà)</td>
<td>***<em><strong>!</strong></em> (8)</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>(sà)(kàma)(nàha)</td>
<td>*****<em>!</em> (6)</td>
<td>*</td>
</tr>
<tr>
<td>d.</td>
<td>(sà)(kàma)(nà)(hà)</td>
<td>*****<em>!</em> (7)</td>
<td></td>
</tr>
</tbody>
</table>

Massive violations of ALL-Ft-R cannot be compensated for by better satisfaction of WSP.

(29) sonorant - obstruent ---- no rightward stress shift [hypothetical: kokonaka]

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>(kòko)(nàka)</td>
<td>** (2)</td>
<td>**</td>
</tr>
<tr>
<td>b.</td>
<td>(kò)(kò)(nà)(kà)</td>
<td>**** (4)</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>(kò)(nà)(kà)</td>
<td>*** (3)</td>
<td>*</td>
</tr>
</tbody>
</table>

4.3. Summary

- The Arabela stress system is generally rhythmic
- ALL-Ft-R is quite high ranked and violated whenever stress shift occurs
- High-ranked MORAIC and WSP require that obstruent onsets are not only moraic, but also receive stress
- Thus in odd-syllable words containing a sequence of obstruent-sonorant in the penult and ultima respectively, stress shift to the obstruent causes one extra violation of ALL-Ft-R, but one less of WSP when compared to the rhythmic candidate
- The important candidates tie, so the evaluation carries on
- Low-ranked ALL-Ft-L picks the candidate with stress shift
- Remaining issues are considered in Appendix II
Why doesn’t stress shift occur in other cases?

Because in words without the obstruent-sonorant sequence, such stress shift is gratuitous. No trigger exists for stress shift and as a result ALL-Ft-R violations are so many that the optimal candidates present the normal rhythmic pattern.

(II) AGAINST A PROMINENCE ACCOUNT

But isn’t it possible to account for the Arabela facts with a prominence account? Yes, but there are numerous disadvantages of prominence which favour a weight-based proposal, as it is more restrictive and has a broader coverage of phenomena.

Prominence:

- unclear what prominence is supposed to stand for. Hayes (1995: 271) talks about perceptual salience. This definition is undermined though almost immediately afterwards: “The proposal here is to formalize this distinction”, accounting for weight with a theory of quantity, based on moraic structure; and a theory of prominence, based on a different representation, which encompasses the whole set of phonetic properties (weight included) that make syllables sound louder” (Hayes 1995: 271-272).

Weight:

- under the above, subtype of prominence. Thus more restrictive than prominence
  - it does not distinguish these data from other effects of syllable weight
  - more specific predictions: prominence allows syllables starting with e.g. onset s to attract stress more than others as a result of s’s loudness.
  - weight can maximally reach two or three moras; no similar upper bound for prominence → considerable overgeneration of patterns
- prominence cannot account for onset effects in clearly weight-based phenomena such as Bella Coola word minimality (see III), Samothraki Greek compensatory lengthening (Hayes 1989, Katsanis 1996, Kavitskaya 2002) or possibly some effects of onsets in metrics, e.g. Luganda (Katamba and Cooke 1987, Fabb 1997) or in initial geminates, e.g. Trukese (Curtis 2003), Pattani Malay (Hajek and Goedemans 2003).

(III) BELLA COOLA [Salish, Canada; Bagemihl 1991 and Bagemihl 1998 (B91 and B98 respectively)]

5. The problem

Bella Coola Word Minimality:

2 i.e. between weight and prominence.
3 Emphasis added is mine.
• Violated by C and V. Satisfied by VV, VC, CC (unsyllabified consonants) and surprisingly CV.

6. Data and issue under examination

6.1. Basic Facts

• Syllables in Bella Coola = maximally TRV:C, e.g. c’wiiχʷ “having grey hair” (B91: 619), where T=obstruent, R=sonorant.
• Nuclei = vowels e.g. kʷit “to pry loose” (B98: 75) and syllabic sonorants e.g. tlqʷ “to swallow something” (B98: 79)
• Singleton obstruents syllabify either as onsets or codas depending on the environment. Codas are moraic.
• Obstruent clusters (TT) stay unsyllabified (for evidence, see Bagemihl 1991)

(30) Sequences with unsyllabified consonants [unsyllabified consonants indicated in bold]
a.  stn  “tree”     (B91: 609) 
b.  sqʷcit “ventral posterior fin”     (B91: 609) 
c.  c’klakt “ten”     (B98: 78) 
d.  cipx “fisher”     (B98: 80)

Implication: obstruent-only words consist of no syllables at all violating the Strict Layer Hypothesis (SLH), e.g. txʷ “to wake somebody up”, c’kt “to arrive”, stxʷc’ “cottonwood buds” (B98: 78).

How are obstruents licensed? They contribute moras to the word (see below) so they are moraically licensed.

6.2. Word Minimality

Minimal word facts (B98: 87-89):

(31) Word Shape  Examples
a. V    * 
b. VV  ya  “good” 
c. VC  nλ’ “dark, night” 
d. C    * 
e. CV / CR λ’i “fast” /  c’m “index finger” (B98: 79) 
f. CC  tk’ “sticky” 
g. CCC  sχp “to tie a knot” 
h. CCCC  p’χʷt “bunchberries”

Two approaches: i) WdMin = 2 segments, ii) WdMin = 2 moras

• Word Minimality = 2 segments. Advantage: accounts for CV straightforwardly

Arguments against it:
• Reduplication V, CV, CVC can be expressed as one or two moras, but unaccounted for in a segment-based approach
• Root maximality is stated in moras (see below). Desirable if WdMin and RtMax are both accounted for by the same means.
o No other languages with such WdMin segmental restrictions. Possible exception is Yakima Sahaptin: CCV or CVC (Curtis 2003: 193-207), but given that all initial clusters are invariably released (Curtis 2003: 196), that codas are released (but not obligatorily, Curtis 2003: 199) and that some illicit clusters are split by epenthetic or excrescent [i] (2003: 195), perhaps C'CV and CVC respectively (Moira Yip, p.c). Then WdMin=disyllabic.

Segment-based approach has to be discarded.

Bagemihl and current proposal: Word Minimality = 2

Bagemihl (1998): all segments underlyingly moraic. WdMin - an input condition - is satisfied by VV, VC, CC and CV (all bimoraic). C and V violate it (monomoraic). In the output C in [CV] loses its mora, by being an onset.

Current proposal: no underlying moraicity needs to be imposed (consistent with ROTB). WdMin is an output constraint. Moraic onsets are marginally admitted.

Advantages over Bagemihl:
- WdMin restrictions hold true in the output, not the input
- No need for constraining inputs by imposing moras
- Violability of constraints allows for the possibility of having moraic onsets in CV-only words, but not anywhere else

The assumed representations are below:

<table>
<thead>
<tr>
<th>(32)</th>
<th>Word Shape</th>
<th>Respects WdMin?</th>
<th>Prosodic Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Underlying</td>
<td>After Syllabification</td>
</tr>
<tr>
<td>a.</td>
<td>C</td>
<td>No</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(μ)</td>
<td>μ</td>
</tr>
<tr>
<td>b.</td>
<td>CC</td>
<td>Yes</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(μ)</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C τ μ</td>
<td>C τ μ</td>
</tr>
<tr>
<td>c.</td>
<td>V</td>
<td>No</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>μ</td>
<td>μ μ</td>
</tr>
<tr>
<td>d.</td>
<td>CV</td>
<td>Yes</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(μ)</td>
<td>μ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C τ μ</td>
<td>C τ μ</td>
</tr>
</tbody>
</table>

7. WdMin and /CV/ words - the core

Analysis works irrespective of presence of underlying moraicity. Due to phonemic vowel length, V=μ, VV=μμ. SonSeq >> *Complex Onset holds for TR onsets.
Constraints needed

(33) \( \text{WdMin}: \) Words are minimally bimoraic
*\text{Moraic Onset}: \) Moraic onsets are banned
\text{Dep-\( \mu \)}: \) No moras are inserted in the output
\text{MParse}: \) Morphemes are parsed into morphophonological constituents [Prince and Smolensky 1993]

\( \Rightarrow \) WdMin and core ranking for /CV/

(34) \( \text{WdMin} \gg \text{Dep-\( \mu \)}, \text{*Moraic Onset} \)

\( \Rightarrow \) Moraic onsets only emerge so that WdMin, a top priority in the language, is satisfied.

N.B: In the tableaux henceforth, the brackets surrounding an asterisk indicate that that a violation is incurred if the input is assumed to include a mora (again in brackets). The remaining violations are shared in both moraic and non-moraic inputs. This practice will be repeated again whenever it does not overburden the tableaux.

- **[CV] satisfies WdMin**

(35) \( /C_{\mu}V_{\mu}/ \rightarrow [\left[C_{\mu}V_{\mu}\right]_{\sigma}]_{\text{PrWd}} \)

\( \text{WdMin} \gg \text{Dep-\( \mu \)}, \text{*Moraic Onset} \)

<table>
<thead>
<tr>
<th></th>
<th>WdMin</th>
<th>Dep-( \mu )</th>
<th>*Moraic Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( [\left[C_{\mu}V_{\mu}\right]<em>{\sigma}]</em>{\text{Wd}} )</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Rightarrow ) b. ( [\left[C_{\mu}V_{\mu}\right]<em>{\sigma}]</em>{\text{Wd}} )</td>
<td>*</td>
<td>( (\star) )</td>
<td>*</td>
</tr>
</tbody>
</table>

Extra Dep-\( \mu \) violation when input is /CV_{\mu}/. No change since WdMin \( \gg \) Dep-\( \mu \).

8. Larger roots

WdMin can be satisfied by other means, so although low-ranked *Moraic Onset favours candidates without moraic onsets due to *Moraic Onset \( \gg \) Max-\( \mu \)

(36) \( /C_{\mu}V_{\mu}C_{\mu}/ \rightarrow [\left[C_{\mu}V_{\mu}C_{\mu}\right]_{\sigma}]_{\text{PrWd}} \)

\( \text{WdMin} \gg \text{*Moraic Onset} \gg \text{Max-\( \mu \)} \)

<table>
<thead>
<tr>
<th></th>
<th>WdMin</th>
<th>*Moraic Onset</th>
<th>Max-( \mu )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( [\left[C_{\mu}V_{\mu}C_{\mu}\right]<em>{\sigma}]</em>{\text{Wd}} )</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>( \Rightarrow ) b. ( [\left[C_{\mu}V_{\mu}C_{\mu}\right]<em>{\sigma}]</em>{\text{Wd}} )</td>
<td></td>
<td>( (\star) )</td>
<td>*</td>
</tr>
</tbody>
</table>

\( \Rightarrow \) **Q: But how exactly can we tell that the winning candidate has no moraic onset, since empirically (a) and (b) are the same?**

**A: Root Maximalty facts**

9. Root Maximalty

- Bella Coola roots consist of maximally 4 moras [i.e. two bimoraic feet], cf. Yoruba, Ponapean (Ola 1995). This restriction does not hold on the word level, e.g. polymorphemic words such as \( x \text{\( \ddot{a} \)p} \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p} \) “he had had in his possession a bunchberry plant” (B98: 74) [\( \text{\( x \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p}/ \text{\( \ddot{a} \)p} \) “tree, plant”; -\( \text{\( \ddot{a} \)p} \) PLUPERFECT; -\( \text{s} \) POSSESSIVE).
Rt = monomorphemic base to which affixes are added (B98: 91, note 8). Roots may occur as independent words without any affixes (B98: 93, note 18).

Establishing that the maximality criterion is based on mora count:

- Consideration of alternative counting criteria shows that only mora-counting works (37) Possible counting criteria

<table>
<thead>
<tr>
<th></th>
<th>C-counting</th>
<th>V-counting</th>
<th>Seg-counting</th>
<th>μ-counting</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. c’klakt</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>b. p’χ’it</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>c. ptkn</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>d. λ’q’lkŋ</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>e. k’anawi</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>f. λ’aq’akila</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>g. miank</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

N.B: Glosses for newly introduced words: ptkn “bark of bitter-cherry tree” (B98: 79), λ’q’lkŋ “(low) dwarf blueberry” (B98: 79), k’anawi “bow of boat” (B98: 81), λ’aq’akila “a man’s name” (B98: 78), miank “wide canoe” (B91: 616).

Although the roots below conform to the maxima above and thus should be attested, they are not. This is explained only if mora counting is considered, i.e. all of them exceed four moras.

(38) Unattested roots based on C-, V- or Seg- maxima

<table>
<thead>
<tr>
<th></th>
<th>C-counting</th>
<th>V-counting</th>
<th>Seg-counting</th>
<th>μ-counting</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. CVCCCV (B98: 75)</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>b. CCC (B98: 75)</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>c. CCCVCVC (B98: 81)</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>d. CVCCCV (B98: 80)</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

(39) Root Maximality and moraic onsets

i) Roots such as CVCC CVCCCV “ashes” [B98: 76] or CVCCC μux’”lt “to cry huyp (a dance cry)” [B98: 75] or CVCCCV μux’”ski “soapberries” [B98: 75] among others are admitted, because all are maximally quadrimoraic. Had the onsets counted moraically, all these forms would either include 5 or 6 moras. Given maximality, they should thus fail to surface. The fact that they surface, clearly suggests that onsets are not moraic with the exception of CV words.

ii) Alternatively: onsets are consistently moraic, so need to revise mora maximum to 5 or 6 moras to accommodate moraic onsets. However, this is incorrect. To illustrate, suppose we modified the limit to six moras, so that roots like CVCCCV above are admitted [i.e. with all segments moraic]. The question would then be why roots such as CCCCV or CVCCCV or CCCCCC [B98: 79-80] etc are not well-formed, although these comprise six moras too.

✦ Evidently onsets are moraic only in CV roots and the moraic limit should not be amended.

(40) RțMăx: No root may exceed four moras [B98: 77]
Empirical evidence: Unattested roots - null parse wins because they exceed 4 moras

\[ /C_{\mu}C_{\mu}C_{\mu}V_{\mu}C_{\mu}C_{\mu}/ \quad \text{---} \quad \emptyset \]

\( \text{RtMax} >> \text{MParse} \)

<table>
<thead>
<tr>
<th></th>
<th>RtMax</th>
<th>MParse</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Wd</td>
<td>*!</td>
</tr>
<tr>
<td>( \emptyset )</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Empirical evidence: Roots up to 4\( \mu \) survive because they have no moraic onsets

\[ /C_{\mu}C_{\mu}V_{\mu}C_{\mu}/ \quad \text{---} \quad [C_{\mu}C_{\mu}V_{\mu}C_{\mu}]_{\mu}W_{\mu}W_{\mu} \]

\( \text{RtMax, *Moraic Onset} \)

<table>
<thead>
<tr>
<th></th>
<th>RtMax</th>
<th>*Moraic Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Wd</td>
<td>*!</td>
</tr>
<tr>
<td>b.</td>
<td>Wd</td>
<td>*</td>
</tr>
</tbody>
</table>

N.B: It will become evident below that in fact \( \text{RtMax} >> \text{*Moraic Onset} \) by implication since \( \text{RtMax} >> \text{MParse} \) (41), \( \text{MParse} >> \text{SLH} \) (55), SLH >> *Moraic Onset (60).

✦ **Summary:** CV-only words are the only ones with a moraic onset. In larger roots, onsets in CV syllables are not moraic. RtMax confirms this empirically.

✦ **WdMin - the remaining cases**
Word Minimality has to be satisfied as much as possible, so moraic onsets can be admitted in CV words even at the expense of mora insertion. Such insertion can be obstructed if it creates new branching structures (cf. V or C words), in which case the null parse is preferred [For full analysis see Appendix III and Topintzi 2005b].

10. Conclusion

✦ Bella Coola onsets are moraic only in CV-words. On all other occasions, they are not. RtMax considerations confirm this fact
No need to posit underlying moraicity or require that WdMin is an input condition. WdMin is a constraint satisfied in the output. It forces moraic onsets in CV words, but not anywhere else where WdMin is satisfied by other means and *MORAIC ONSET’s violations become superfluous.

Core ranking for WdMin: WdMin >> DEP-µ, *MORAIC ONSET

(IV) FINAL REMARKS

Some stress systems (Arabela) can either be analysed by means of moraic onsets or prominence.

However, Bella Coola Word Minimality cannot be handled by prominence.

A range of other weight-based phenomena have received onset-moraicity accounts, e.g. geminates (Pattani Malay), compensatory lengthening (Samothraki Greek), metrics.

Onset moraicity exists!

References

Crowhurst, Megan and Lev Michael (2005) Iterative footing and prominence driven stress in Nanti (Kampa). Language 81: 47-95
Gordon, Matthew (to appear) A perceptually-driven account of onset-sensitive stress. ms, University of California, Santa Barbara


Katamba, Francis and Peter Cooke (1987) Ssematimba ne Kikwabanga: the music and poetry of a Ganda historical song

336. *World of Music* 29(2): 49-68

Katsanis, Nikolaos [Κατσανίς Νικόλαος] (1996) *The dialect of Samothraki Greek [Το γλωσσικό ιδίωμα της Σαμοθράκης]*. Municipality of Samothraki [Δήμος Σαμοθράκης]


McCarthy, John (2003b) OT constraints are categorical. *Phonology* 20: 75-138


Topintzi, Nina (in prep.) Onset, stress and weight interactions [provisional title]. Doctoral Dissertation, UCL


Appendix I: On the importance of equal ranking

Locating ALL-Ft-R and WSP in the same position does not imply an undetermined ranking. Instead, it is crucial that these constraints are *equally* ranked.

**Problem:** Undetermined ranking implies that any of ALL-Ft-R >> WSP or WSP >> ALL-Ft-R should produce the right result.

Examining (21) [repeated here in (43)] and (29) [repeated in (44)] shows that only equal ranking can work.

I) Choosing ALL-Ft-R >> WSP produces the wrong winner

(43) i)  & ALL-Ft-R >> WSP >> ALL-Ft-L ---- wrong winner 

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>⚫</td>
<td>**</td>
<td>*****</td>
</tr>
<tr>
<td>b.</td>
<td>⚫</td>
<td>*</td>
<td>*****</td>
</tr>
</tbody>
</table>

ii) *equal ranking:* ALL-Ft-R, WSP >> ALL-Ft-L ---- correct winner

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>⚫</td>
<td>**</td>
<td>*****</td>
</tr>
<tr>
<td>b.</td>
<td>⚫</td>
<td>*</td>
<td>*****</td>
</tr>
</tbody>
</table>

II) Choosing WSP >> ALL-Ft-R produces the wrong winner

(44) i) WSP >> ALL-Ft-R >> ALL-Ft-L ---- wrong winner

<table>
<thead>
<tr>
<th></th>
<th>WSP</th>
<th>ALL-Ft-R</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>⚫</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>b.</td>
<td>⚫</td>
<td>****</td>
<td>****</td>
</tr>
</tbody>
</table>

ii) *equal ranking:* ALL-Ft-R, WSP >> ALL-Ft-L ---- correct winner

<table>
<thead>
<tr>
<th></th>
<th>ALL-Ft-R</th>
<th>WSP</th>
<th>ALL-Ft-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>⚫</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>b.</td>
<td>⚫</td>
<td>****</td>
<td>****</td>
</tr>
</tbody>
</table>

I conclude that this property of rankings must be recognized (cf. Crowhurst and Michael 2005 on Nanti) and depicted differently from the comma used for cases of undetermined ranking. I will be using the symbol of equality “=” and the wavy line to indicate this in tableaux. Thus, the ranking of WSP, ALL-Ft-R is now updated to:

(45) **EQUAL RANKING:** WSP = ALL-Ft-R >> ALL-Ft-L

Appendix II: Outstanding issues

*An alternative: stress shift directly related with primary stress*

The stress shift effect only arises in the obstruent-sonorant sequences of *primary stress.* Mc Garrity (2003) presents numerous cases where primary stress is assigned differently from secondary stress. Could Arabella be re-analysed along these lines?

1st alternative: In accordance with Mc Garrity, we could invoke the familiar WSP and its primary stress variant WSP₆.

(46) WSP₆: Heavy syllables must have primary stress

---

4 The symbol ⚫ indicates a wrongly selected winner.
Problem: \( \text{WSP}_{\text{wd}} \) does not really do much. It may yield the right results, but all the constraints previously used also need to be invoked. So why add a superfluous constraint?

2\textsuperscript{nd} alternative: Make use of general \(*\mu/\text{ONs}/y\) and the more specific \(*\mu/\text{ONs}/y_{\text{wd}}\) or similarly \textsc{Moraic} and \textsc{Moraic}_{\text{wd}} to differentiate between primary and secondary stressed syllables. Problem: addition of unnecessary complexity and duplication to the system

\textit{On the peculiarity of the Arabela stress system}

Is Arabela odd? Yes, in terms of presenting onset effects, but no in terms of its stress shift pattern.

Goroa and coda weight (47) (Rosenthal and van der Hulst 1999): Stress in Goroa either falls on the leftmost long vowel (a-b) or on the penult (e-f). Closed syllables are generally light (b, f) except word-finally (c-d) where they are heavy and can receive stress to satisfy higher ranking metrical constraints, i.e. \textsc{Edgemost-R}.

(47)  
\begin{align*}  
a. & \quad \text{dú:gnuno:} \quad \text{“thumb”} \\
b. & \quad \text{girambó:da} \quad \text{“short”} \\
c. & \quad \text{adúx} \quad \text{“heavy”} \\
d. & \quad \text{axemís} \quad \text{“hear”} \\
e. & \quad \text{oromílá} \quad \text{“because”} \\
f. & \quad \text{idirdána} \quad \text{“sweet”} \\
\end{align*}

Stress shift to the right occurs due to the presence of a coda whose heaviness can satisfy \textsc{Edgemost-R}. Other languages presenting contextual heaviness - but less reminiscent of Arabela - include Eastern Ojibwa, Khalkha Mongolian and Kashmiri (Morén 2000).

\textit{Ranking \textsc{Moraic} and \textsc{WSP} with accuracy}

(48)  
\textsc{Moraic} = \textsc{Wsp} = \textsc{All-Ft-R} >> \textsc{All-Ft-L} >> \*\mu/\text{Ons/Obstr}
Only obstruent onsets in stressed syllables have moras

(49)  
\textsc{Moraic} >> \textsc{Wsp} = \textsc{All-Ft-R} >> \textsc{All-Ft-L}, \*\mu/\text{Ons/Obstr}
All obstruent onsets have moras

(49) is simpler in that all obstruent onsets are uniformly treated as moraic and that might be a property more easily acquired by the language learner, rather than being based on stress cues to decide which obstruent onset moras survive in the output.

(48) is consistent with other approaches (cf. Morén 2000, Rosenthal and van der Hulst 1999) which suggest that certain (coda) consonants are variably moraic.

Thus the system proposed for Arabela is one of the following:

(50)  
\text{Mini-grammar of Arabela - Final attempt}

I)  
\begin{align*}  
& \*\mu/\text{Coda}/y, \*\mu/\text{Ons/Son} & \text{\scriptsize PARSE-\sigma, FtBin(MAX)} \\
& \text{\scriptsize Moraic} = \text{\scriptsize Wsp} = \text{\scriptsize All-Ft-R} \\
& \text{\scriptsize All-Ft-L} \\
& \*\mu/\text{Ons}/[\text{Obstr}] \\
\end{align*}
Appendix III - WdMin: The remaining cases

Some additional constraints needed:

(51) \textit{DEP-SEG}: No segment insertion
*\textit{BANCHING}: Introducing new branching structures in the output is banned [cf. McCarthy 2003]

\* \textbf{[C] words are bad}
(52) /\textit{C}_i/ \rightarrow [\textit{C}_i]\textit{\textsc{d}} \rightarrow \textit{WdMin}, \textit{DEP-SEG} \gg \textit{MPARSE}

\begin{center}
\begin{tabular}{|c|c|c|}
\hline
 & \textit{WdMin} & \textit{DEP-SEG} & \textit{MPARSE} \\
\hline
a. & [\textit{C}_i]\textit{\textsc{d}} & *! &  \\
\hline
b. & [[\textit{C}_i\textit{V}_j]\textit{\textsc{d}}]\textit{\textsc{w}} & *! &  \\
\hline
c. & \emptyset &  & * \\
\hline
\end{tabular}
\end{center}

\* \textbf{[T] words, where T=obstruent, satisfy \textit{WdMin}}
(53) *\textit{NUC/OBSTR} \gg \textit{NUC} \gg *\textit{NUC/SON} \gg *\textit{NUC/VOWEL}

(54) \textit{SLH}: For every word, there is at least one mora dominated by a syllable

(55) /\textit{C}_i/\textit{C}_j/ \rightarrow [\textit{C}_i\textit{C}_j]\textit{\textsc{p}}\textit{\textsc{d}} \rightarrow \textit{WdMin, DEP-\textit{\textmu}}, \textit{SLH}

\* \textbf{[V] words are bad, [VV] are ok}
Monovocalic forms: slightly problematic: /\textit{N}/ \rightarrow *\textit{VV}, but instead \emptyset. One might make use of high-ranking DEP-\textit{\textmu}. Since we need the null parse to win, DEP-\textit{\textmu} \gg \textit{MPARSE} would work here, but would wrongly favour the null parse on other occasions as in (55). Hence MPARSE \gg DEP-\textit{\textmu} is retained.

\textbf{Solution}: old and new markedness (McCarthy 2003) \rightarrow *\textit{\textmu}\text{BANCHING} and *\textit{BANCHING}.

(56) *\textit{BANCHING} \gg \textit{MAX-\textit{\textmu}} \gg *\textit{\textmu} \text{BANCHING}
(57) \textit{V} inputs - monomoraic and bimoraic

\textbf{MAX-\textit{\textmu} \gg *\textit{\textmu} \text{BANCHING}}

\begin{center}
\begin{tabular}{|c|c|c|c|}
\hline
 & *\textit{BANCHING} & \textit{MAX-\textit{\textmu}} & *\textit{\textmu} \text{BANCHING} \\
\hline
\hline
a. & \textit{V}_i &  \\
\hline
b. & \textit{V}_{\textit{\textmu}} & *! &  \\
\hline
\end{tabular}
\end{center}
<table>
<thead>
<tr>
<th>V_{bb}</th>
<th>^nBRANCHING</th>
<th>MAX-\mu</th>
<th>^oBRANCHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>c, V_{b}</td>
<td>^!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d, V_{bb}</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(58) \^nBRANCHING >> MPARSE >> \^oBRANCHING
(59) V roots – monomoraic and bimoraic
\^nBRANCHING >> MPARSE >> DEP-\mu, \^oBRANCHING

<table>
<thead>
<tr>
<th>/V_{1}/</th>
<th>^nBRANCHING</th>
<th>MPARSE</th>
<th>DEP-\mu</th>
<th>^oBRANCHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>a, V_{bb}</td>
<td>^!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b, \emptyset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>/V_{bb}/</th>
<th>^nBRANCHING</th>
<th>MPARSE</th>
<th>DEP-\mu</th>
<th>^oBRANCHING</th>
</tr>
</thead>
<tbody>
<tr>
<td>c, V_{bb}</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d, \emptyset</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(59a) establishes the necessity of \^nBRANCHING; since MPARSE >> DEP-\mu alone favors the null parse (b) instead. In the case of an underlying bimoraic input though, the null output fails since the bimoraic winning candidate only violates the low-ranking \^oBRANCHING.

This grammar generates [VV] as minimal words. If one rejects the existence of true VV words (cf. (31b)), then this probably relates to the extreme rarity of long vowels in morpheme-final position (B98: fn. 20, p. 93).

- [CV] words revisited
Does SLH affect evaluation of /CV/? No provided SLH >> *MORAIC ONSET.

(60) /CV_{1}/, V_{b} / --- [/[C_{m}V_{b}]_{l}]_{m}w_{d}
DEP-\mu, SLH, ONSET >> *MORAIC ONSET

<table>
<thead>
<tr>
<th></th>
<th>DEP-\mu</th>
<th>SLH</th>
<th>ONSET</th>
<th>*MORAIC ONSET</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Wd</td>
<td>(*)</td>
<td>^!</td>
<td></td>
</tr>
<tr>
<td></td>
<td>\mu \mu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Wd</td>
<td>(*)</td>
<td>^!</td>
<td></td>
</tr>
<tr>
<td></td>
<td>\sigma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>\mu \mu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Wd</td>
<td>(*)</td>
<td></td>
<td>^</td>
</tr>
<tr>
<td></td>
<td>\sigma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>\mu \mu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C V</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- VC words satisfy WDMin
(61) PARSE-SEG >> NO CODA
(62) MORAIC CODA >> MPARSE >> DEP-\mu, SLH

\[ WDMin - core ranking \]

(63) WDMin, \^nBRANCHING >> MPARSE >> DEP-\mu, *MORAIC ONSET