The Architecture of Derivational OT: Evidence from Icelandic Syncope

Mark Norris
University of California, Santa Cruz
mnorris@ucsc.edu

NELS 41, 22 Oct. 2010

Two questions:
• THEORETICAL: What should derivational theories of phonology be used to do, and (how) do we pick from among the various alternatives?
• EMPIRICAL: How can we use a derivational model of phonology to account for (Icelandic) syncope (IS)?

Outline of the talk:
1. Description of the data
2. Stress and vowel length
3. Analysis (in Stratal OT)
5. Conclusions

Preview
• In IS, the syncopating vowel is realized iff it is in a heavy syllable.
• We can account for IS in a derivational framework like Stratal OT, because it allows constraints to be re-ranked between steps.
• A theory without constraint re-ranking, like HS, overpredicts deletion in a key set of forms.

*Many thanks to the participants in the winter 2010 Research Seminar at UCSC, Ryan Bennett, Emily Elfner, Eric Baković, Melissa Frazier, Jaye Padgett, and Junko Itô for reading drafts and/or listening to me present the data and problems. Even more thanks are due to my advisor, Armin Mester, whose support and suggestions from the project’s first draft to its current state have been invaluable. All errors are mine alone.
1 Description of the Data

- In Icelandic, there are words that alternate between a form with a vowel and a form with no vowel. Some examples are given below:

<table>
<thead>
<tr>
<th>No suffix</th>
<th>V-initial suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. [a:.kYr] ‘field’ noun</td>
<td>[ak.rar] nom. pl.</td>
</tr>
<tr>
<td>d. [sEn.dIn] ‘sandy’ adjective</td>
<td>[sEnd.na] acc. m. pl.</td>
</tr>
</tbody>
</table>

- The alternating vowel may be either [a], [i], or [y], but the choice is not predictable from the surrounding environment. ⇒ This is not epenthesis.

  - IS is a lexically-specific process—some words simply do not undergo syncope, despite phonological similarity to words that do (Stong-Jensen, 1993).
  - Furthermore, there are recent loans that show syncope (e.g., [bi:.til] ∼ [bit.lar] ‘Beatle(s)’), suggesting the process still has a synchronic status.

- As we saw in (1), the syncopating vowel is realized in forms where it is followed by no suffix and deleted in forms where it is followed by a V-initial suffix.

- The syncopating vowel is also realized when it is followed by a C-initial suffix, as seen below:

<table>
<thead>
<tr>
<th>C-initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [srœnd.m] ‘sandy’ acc. m. sg.</td>
</tr>
<tr>
<td>b. [i:.mIs] ‘diverse’ nom. f. sg.</td>
</tr>
<tr>
<td>c. [trœ:.km] ‘taken’ acc. m. sg.</td>
</tr>
</tbody>
</table>

- The lack of deletion in (2) could be explained by appealing to phonotactics or constraints on consonant clusters, as deletion in those cases leads to outputs that cannot be (easily) syllabified. I will show later that this account does not work for all forms in the language.

- Instead, I argue that syncope is conditioned by syllabification: the alternating vowel is realized iff it is in a heavy syllable.

1 I will use IPA to represent examples with the exception of the oral stops. Icelandic does not have the voiced stops [b], [d], or [g], but contrasts voiceless unaspirated stops (orthographically b, d, and g) with something like voiceless aspirated or pre-aspirated stops. The phonetic identity of the stops will not affect our analysis here.
2 Stress and Vowel Length

2.1 Stress

- Primary stress in Icelandic is always on the first syllable (Árnason, 1985; Hayes, 1995; Árnason, 1996). At the very least, Icelandic must have one left-aligned trochaic foot.

- Secondary stress in Icelandic is less clear.

2.1.1 *CLASH

- In non-compound words, there are never sequences of two stressed syllables (Árnason, 1985; Hayes, 1995).

- In compound words, the stresses of the individual members of the compound can be deleted (4a) or shifted (4b) to avoid having adjacent stressed syllables (Árnason, 1985; Hayes, 1995).

\[(4)\]
\[a. \quad (\text{'þing})(\text{húss})(\text{hurð})(\text{parliament})(\text{house})(\text{door}) \quad \text{‘parliament door’} \]
\[b. \quad (\text{'ung})(\text{barni})(\text{dh})(\text{young})(\text{child.the}) \quad \text{‘the infant’} \]

- I take this as evidence that Icelandic does not tolerate stress clash, meaning *CLASH is operative in the language.

(5) *CLASH: Stressed syllables must not be adjacent to other stressed syllables. Assign one violation mark for every pair of adjacent stressed syllables.

2.1.2 NON-FINALITY

- Given the effects of *CLASH we just discussed, the only location we might expect a secondary stress for trisyllabic inputs would be on the final syllable.

- There is some disagreement about this: Árnason (1985) says these syllables are stressed, Gussman (1985) says they sound completely stressless, and Hayes (1995) says they sound slightly prominent, especially phrase-finally.

- Noting that these final syllables are often reduced to having a schwa-like vowel or sound completely stressless in connected speech, Hayes (1995) attributes their prominence to phrase-final lengthening, not stress.

- Reduction would be unexpected if the final syllable were indeed stressed.

- I take this as evidence that NON-FINALITY, or NON-FIN, is active in Icelandic.

(6) NON-FIN: The final syllable of a word must not be footed. Assign one violation mark for any final syllable that is footed.
2.2 Vowel Length

- In Icelandic, vowels are long in stressed, open syllables, and short otherwise (Kiparsky, 1984; Pind, 1993).²

\[
\begin{array}{llllll}
\text{a.} & [\text{ha:.mar}] & \text{‘hammer’} & \text{noun} & \text{acc. sg.} & [\text{ham.rI}] & \text{dat. sg.} \\
\text{b.} & [\text{a:.kYr}] & \text{‘field’} & \text{noun} & \text{acc. sg.} & [\text{ak.rar}] & \text{nom. pl.} \\
\text{c.} & [\text{I:.kI]} & \text{‘key’} & \text{noun} & \text{acc. sg.} & [\text{lik.lar}] & \text{nom.pl.} \\
\text{d.} & [\text{sen.dm}] & \text{‘sandy’} & \text{adjective} & \text{acc. m. sg.} & [\text{send.na}] & \text{acc. m. pl.} \\
\text{e.} & [\text{hœ:.vYð}] & \text{‘head’} & \text{noun} & \text{acc. sg.} & [\text{hœv.ðI}] & \text{dat. sg.} \\
\text{f.} & [\text{i:.mIs}] & \text{‘diverse’} & \text{adjective} & \text{nom. f. sg.} & [\text{im.sa}] & \text{acc. f. sg.} \\
\end{array}
\]

- I treat this as a reflex of the STRESS-TO-WEIGHT PRINCIPLE, or SWP:

\[
(7) \quad \text{SWP: If a syllable is stressed, then it is heavy. Assign one violation mark for any stressed syllable that is not bimoraic.}
\]

- If we rank SWP above a markedness constraint against long vowels, which I call *V:, we can predict the proper distribution of long vowels in Icelandic regardless of the input:

\[
\begin{array}{c|c|c}
\text{/hamar/} & \text{SWP} & *V:\ \\
\hline
\text{a. } & \text{☞ ha:.mar} & * \\
\text{b. } & \text{ha.mar} & *!
\end{array}
\]

\[
\begin{array}{c|c|c}
\text{/ha:mar/} & \text{SWP} & *V:\ \\
\hline
\text{a. } & \text{☞ ha:.mar} & * \\
\text{b. } & \text{ha:.ma:r} & **!
\end{array}
\]

\[
\begin{array}{c|c|c}
\text{/hamar/} & \text{SWP} & *V:\ \\
\hline
\text{a. } & \text{☞ ha:.mar} & * \\
\text{b. } & \text{ha.mar} & *!
\end{array}
\]

\[
\begin{array}{c|c|c}
\text{/ha:.mar/} & \text{SWP} & *V:\ \\
\hline
\text{a. } & \text{☞ ha:.mar} & * \\
\text{b. } & \text{ha:.ma:r} & **!
\end{array}
\]

- Notice, syncope could also satisfy SWP, as it turns what was once an onset into a coda for the initial syllable (e.g., /tęk-m-a/ → *ték.kI.na → [ték.na]).

3 Analysis: IS in Stratal OT

- Stratal OT (Kiparsky, 2000) is a derivational variant of OT where there is a fixed number of steps, but constraints can be re-ranked at each step.

- The multiple levels of Stratal OT are sometimes correlated with certain morphological levels, and while there is evidence for some kind of leveling in Icelandic, fitting the data into morphological levels unfortunately runs into problems.³

---

²In monosyllabic words, there is a slight addendum to this generalization: single (orthographic) consonants are treated as extra-metrical for the purposes of this rule. I do not address this distinction here, as all words we will look at are at least two syllables long.

³For example, one proposal would force us to say that syncope is a “post-lexical” process, which is strange given the extensive lexical exceptions to it.
What I propose instead is an analysis of IS split up over two levels, where foot structure is assigned on the first level, and syncope happens on the second level.

Borrowing from McCarthy’s (2008) account of syncope in HS, I assume the constraint driving syncope is is \( *V\text{-PLACE}_{\text{weak(-in-foot)}} \), or simply \( *V\text{-wk} \):

(12) \( *V\text{-wk} \): Vowels with place features in the non-head position of a disyllabic foot are prohibited. Assign one violation mark for each vowel with place features in the non-head position of a disyllabic foot.

### 3.1 Level One: Metrical Structure

Since syncope only deletes vowels in medial syllables that are light, those should ideally be the only cases where we have a violation of \( *V\text{-wk} \).

We can do this if we build (HL) but prevent building (HH) feet.

This is Quantity Sensitivity (Hayes, 1985), which I cash out using Bennett’s (2009) WSP\(_{ft}\):

(13) WSP\(_{ft}\): If a footed syllable is heavy, then it is stressed. Assign one violation mark for every heavy syllable that is in the non-head position of a disyllabic foot.

Following McCarthy (2008), I assume building a foot is motivated by WD\( CON \) (Selkirk, 1996) and EXHAUSTIVITY\( (wd) \) (EXH\( (wd) \), Itô and Mester (1992); Selkirk (1996).

(14) WD\( CON \): Lexical words must correspond to prosodic words and vice versa. Assign a violation for outputs lacking a prosodic word node.

(15) EXH\( (wd) \): Assign one violation mark for every syllable node that is immediately dominated by a prosodic word node.

In order to prevent deletion in Level One, I assume MAX\(-V\) is undominated.

Some representative tableaux are given below:

(16) \( \text{ým\(sa\)} \) ‘diverse’ (acc. m. pl.)

<table>
<thead>
<tr>
<th>/im(\text{Is-a})/</th>
<th>WD(CON)</th>
<th>NON-FIN</th>
<th>*CLASH</th>
<th>WSP(\text{ft})</th>
<th>EXH(\text{(wd)})</th>
<th>( *V\text{-wk} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. i:m(\text{I}.\text{sa})</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [i:m(\text{I}.\text{mI}.\text{sa})]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. [i:(\text{mI}.\text{mI}.\text{sa})]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**!</td>
<td></td>
</tr>
<tr>
<td>d. [i:(\text{mI}.\text{mI}.\text{sa})]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
Norris 2010: Icelandic Syncope

(17) ýmissa ‘diverse’ (gen. pl.)

<table>
<thead>
<tr>
<th></th>
<th>WdCON</th>
<th>NON-FIN</th>
<th>*CLASH</th>
<th>WSPft</th>
<th>EXH(wd)</th>
<th>*V-wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. i.mIs.sa</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [i:i)mis(sa)]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. [i:i)(ms)sa]</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d. [i:i:ms)sa]</td>
<td></td>
<td></td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>e. ☞ [i:i)mIs.sa]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>

- In (16), the candidate that minimizes EXH(wd) violations is preferred, but the similar candidate in (17) violates WSPft, so candidate (e) is chosen instead.

3.2 Level Two: Deletion

- To allow deletion, *V-wk must rank over MAX-V.

  New ranking: *V-wk ≫ MAX-V

- This will result in deletion as a means to “repair” (or avoid) violations of *V-wk.

An alternative to deletion

- We can also repair violations of *V-wk by unfooting the second syllable.
  Deletion: (i:mi)sa → (im)sa (violates MAX-V)
  Unfooting: (i:mi)sa → (i)mi.sa (violates EXH(wd))

- One apparent solution is to rank EXH(wd) above MAX-V, making deletion the preferred repair mechanism.

- This also means that deletion could be used as a means to reduce violations of EXH(wd) (i.e., by deleting vowels in unfooted syllables, thereby destroying the syllable).

- The only cases where this kind of deletion could occur are forms where the second syllable is heavy and thus unfooted: by and large, deletion there would lead to outputs that cannot be syllabified:

  a. [sɛn.dm] ‘sandy’ acc. m. sg. [sɛnd.m.na] gen. pl. *[sɛnd.na]
  b. [i:mi:s] ‘diverse’ nom. f. sg. [i:mi:s.si] dat. f. sg. *[imi.si]
  c. [tɛ:km] ‘taken’ acc. m. sg. [tɛ:km.nar] gen. f. sg. *[tɛkn.nar]

- However, there are forms in the language where deletion of the vowel in an unfooted second syllable does not lead to outputs that cannot be syllabified.
The Critical Data

- For the forms below, syncope does not lead to outputs that cannot be syllabified:

(18)

a. [nau:.In] ‘near’ acc. m. sg. [nau:.na] acc. m. pl. [nau:.m.na] gen. pl. *[naut.na]
b. [lu:.In] ‘tired, weary’ acc. m. sg. [lu:.na] acc. m. pl. [lu:.m.na] gen. pl. *[lut.na]
c. [bu:.In] ‘lived, done’ acc. m. sg. [bu:.nIr] nom. m. pl. [bu:.m.nar] gen. f. sg. *[but.nar]

- There is nothing wrong phonologically with something like [butnar] or [nautna]: there are unrelated words of this shape in Icelandic (e.g., [rutna] ‘to round (something) off’, [spautn] ‘Spain’).

- Since we cannot block syncope by appealing to syllabification for the forms in (18), we cannot simply rank EXH(wd) above MAX-V to prevent unfooting:

(19)

<table>
<thead>
<tr>
<th>(bu:.I)na</th>
<th>*V-wk</th>
<th>MAX-V</th>
<th>SWP</th>
<th>*V:</th>
<th>EXH(wd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. =&gt; (bu:)na</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>b. (bu:.I.na)</td>
<td>0 L</td>
<td>1</td>
<td>2 W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(20)

<table>
<thead>
<tr>
<th>(bu:.I.na)</th>
<th>*V-wk</th>
<th>MAX-V</th>
<th>SWP</th>
<th>*V:</th>
<th>EXH(wd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. =&gt; (bu:.I.na)</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>b. (but)na</td>
<td>1 W</td>
<td></td>
<td>0 L</td>
<td>1 L</td>
<td></td>
</tr>
</tbody>
</table>

- In order to get the proper winner in (19), we must rank EXH(wd) above MAX-V.

- In order to get the proper winner in (20), we must rank MAX-V above EXH(wd).

⇒ NB: candidate (b) shows deletion to avoid violations of EXH(wd) (not *V-wk).

- Ranking EXH(wd) above MAX-V overpredicts deletion for IS.

Proposal

- I propose that unfooting is prevented by a prosodic faithfulness constraint, which I call IDENT(foot-role), or ID(ft).

(21) ID(ft): A substring in the input and its correspondent in the output must have the same foot role (i.e., head or nonhead). Assign one violation mark for any substring that is present in both the input and output but whose foot role is not the same in the input and output.

---

4Two notes about the forms below: First, Icelandic has both short and long diphthongs (Orešnik and Pétursson, 1977), and second, after diphthongs, [i], and [u], geminate [nn] is realized as something like [tn]. While these facts are certainly interesting, they are beyond the scope of the work here.
• Crucially, only segments that are present in both the input and output can result in violations of ID(ft): the constraint penalizes input-output pairs.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>ID(ft) segments</th>
<th>change</th>
</tr>
</thead>
<tbody>
<tr>
<td>(’ta.pi)na</td>
<td>(’tap)na</td>
<td>*</td>
<td>deletion</td>
</tr>
<tr>
<td>(’ta.pi)na</td>
<td>(’ta)pi.na</td>
<td>** p, 1</td>
<td>unfooting</td>
</tr>
<tr>
<td>(tap)na</td>
<td>(ta.pi)na</td>
<td>*</td>
<td>epenthesis</td>
</tr>
</tbody>
</table>

• ID(ft) has the effect of “freezing” metrical structure.

• In their analysis of a particular Japanese language game, Itô et al. (1996) propose constraints similar to ID(ft), but of the MAX and DEP families (e.g., MaxFtTail, DepFtHead).

(23) MaxFtTail: Substrings of I(nput) that are foottails (= nonheads of feet) correspond to substrings of O(utput) that are foottails.

• MaxFtTail treats deletion and unfooting equally: both involve material that was in a foot tail in the input that is no longer in a foottail in the output.

• What we need is a constraint that treats deletion and unfooting differently. ⇒ This is ID(ft).

• Ranking ID(ft) above MAX-V prevents unfooting, as seen in the tableaux below.

(24) buna ‘lived, done’ (acc. m. pl.), Level One

<table>
<thead>
<tr>
<th>/bu-in-a/</th>
<th>WDCON</th>
<th>NON-FIN</th>
<th>*CLASH</th>
<th>WSPft</th>
<th>EXH(wd)</th>
<th>*V-wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bu.I.na</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [’bu:1]’na]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. [’bu:1]’na]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**!</td>
<td></td>
</tr>
<tr>
<td>d. ₯ [’bu:1]’na]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level Two

<table>
<thead>
<tr>
<th>[’bu:1]na</th>
<th>*V-wk</th>
<th>ID(ft)</th>
<th>MAX-V</th>
<th>EXH(wd)</th>
<th>SWP</th>
<th>*V:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [’bu:1]na]</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [’bu:1]’na]</td>
<td>*!</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ₯ [’bu:1]’na]</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Since ID(ft) ≫ MAX-V, deletion is preferred to unfooting (see (b) and (c) in Level Two).
(25) *bùína ‘lived, done’ (gen. pl.), Level One

<table>
<thead>
<tr>
<th></th>
<th>/bù-m-na/</th>
<th>WDCON</th>
<th>Non-Fin</th>
<th>*Clash</th>
<th>WSPf</th>
<th>ExH(wd)</th>
<th>*V-wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bù.m-na</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ([‘bù:m(‘ná)]</td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ([‘bù:’mna)]</td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. ([‘bù:’mna)]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>e. [‘bù:’m.na]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level Two

<table>
<thead>
<tr>
<th></th>
<th>[‘bù:m.na]</th>
<th>*V-wk</th>
<th>Id(ft)</th>
<th>MAX-V</th>
<th>ExH(wd)</th>
<th>SWP</th>
<th>*V:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [‘bû:m.na]</td>
<td></td>
<td></td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. [‘bù:’m.na]</td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Since ExH(wd) remains ranked below MAX-V, deletion to avoid violations of ExH(wd) is prevented.

(26) Level One constraint ranking:

\[
\text{MAX-V} \quad \text{WDCON} \\
\quad \text{*Clash} \quad \text{Non-Fin} \quad \text{WSPf} \\
\quad \text{ExH(wd)} \\
\quad \text{*V-wk}
\]

(27) Level Two constraint ranking:

\[
\text{*V-wk} \\
\quad \text{Id(ft)} \\
\quad \text{MAX-V} \quad \text{WDCON} \\
\quad \text{*Clash} \quad \text{Non-Fin} \quad \text{WSPf} \\
\quad \text{ExH(wd)}
\]

3.3 Summary and Segue

- In Level One, ExH(wd) must be ranked above *V-wk in order to produce proper footing, as building a disyllabic foot entails a violation of *V-wk.

- In Level Two, we must rank MAX-V below *V-wk to allow deletion, and we must rank ExH(wd) below MAX-V to avoid spurious deletion in forms like (‘bù:)m.na.

- We need to be able to re-rank constraints for IS, and the inability to do so is what causes the account of IS in Harmonic Serialism to fail.
4 Syncope in Harmonic Serialism

4.1 Architecture of Harmonic Serialism

• The main difference between HS and parallel OT is that forms effectively have the potential to be sent through the constraint ranking more than once, but GEN can only make one change at a time (this is referred to as \textit{gradualness}).

• Different from derivational accounts like Stratal OT, the constraint ranking must remain fixed throughout the derivation in HS.

• EVAL selects the optimal candidate from the restricted candidate set produced by GEN, and that candidate becomes a new input to GEN.

• Derivations proceed in this way, making one change at a time until the candidate selected by EVAL is identical to the input. The derivation is then said to converge (i.e., terminate).

4.2 Icelandic Syncope in HS

• Building a disyllabic foot entails a violation of \(^*\text{V-wk}\), so we must rank EXH(wd) above \(^*\text{V-wk}\) if we want to build disyllabic feet at all.

• In order to allow deletion, \(^*\text{V-wk}\) must rank above MAX-V. By transitivity, this means that EXH(wd) must also rank above MAX-V.

• Because we cannot re-rank EXH(wd) below MAX-V after footing is complete, deletion to reduce violations of EXH(wd) is predicted to occur when possible.

• In McCarthy’s (2008) analysis of Aguaruna, it never \textit{is} possible due to iterative footing: building a new foot reduces more violations of EXH(wd) than deletion does.

• As a result, deletion does not become the most harmonic option until all syllables have been footed.

• However, for the critical data in (18), ranking EXH(wd) above MAX-V leads to deletion across the board:

\textbf{(28) STEP ONE:}

<table>
<thead>
<tr>
<th></th>
<th>WDCON</th>
<th>FTCON</th>
<th>EXH(wd)</th>
<th>(^*\text{V-wk})</th>
<th>MAX-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. bu.m.na</td>
<td></td>
<td></td>
<td></td>
<td>(!)</td>
<td></td>
</tr>
<tr>
<td>b. [('bu)m.na]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. [('bu.m)na]</td>
<td></td>
<td></td>
<td>*WSPrt!</td>
<td>(!)</td>
<td></td>
</tr>
</tbody>
</table>
5 Conclusion

Analysis summary

• In order to account for IS, I showed that we need to be able to re-rank constraints, which is something that a Stratal OT account allows, but HS explicitly forbids.

• Specifically, EXH(wd) must dominate $^*V$-wk for the purposes of foot building, but $^*V$-wk must dominate EXH(wd) ($^*V$-wk $\gg$ MAX-V $\gg$ EXH(wd)) for the purposes of deletion.

• Since HS does not allow constraint re-ranking, it overpredicts deletion in a key set of forms.

Beyond

• One of the insights of McCarthy (2008) was that, if syncope is sensitive to metrical structure, then metrical structure should be built before deletion can occur.
  – The analysis here preserves that insight, albeit by stipulation (high-ranking MAX-V in level one).\(^6\)
  – It is certainly worth investigating whether we can impose a containment requirement (i.e., no deletion) in Level One in a model like the one sketched here.

• The analysis provided here provides support for a Quantity Sensitive analysis, contra Hayes (1995).

\(^5\)In this tableau, I am representing candidate (b) as [‘bun]na] instead of [‘but]na] (its ultimate pronunciation) due to the principal of gradualness: GEN will not produce a candidate that both deletes a vowel and changes the identity of a consonant in the same step.

\(^6\)Though not shown here, an account where deletion and footing happen simultaneously also overpredicts deletion.
• While this work does not claim that we do not need HS at all, it does suggest that HS alone is not enough to account for all kinds of derivational phonology, because we need to be able to re-rank constraints (see Thompson (2010) for another such argument).

• Beyond the theoretical machinery, the analysis presented here has led us to the following view of syncope: faithfulness to metrical structure, but lack of faithfulness to the segments that comprise it.

References


Bennett, Ryan. 2009. Irish plural allomorphy and output optimization. Qualifying paper, UCSC.


Itô, Junko, and Armin Mester. 1992. Weak layering and word binaarity. Ms., *University of California, Santa Cruz*.


Thompson, Anie. 2010. Interactions between footing, accent and length in Seneca. Qualifying paper, UCSC.