To do
- Fijian stress (last assignment) due Friday
- Be working on project. If you’ve gotten stuck in your analysis, come see me Thursday.
- You can do the course evaluation online, any time before Saturday

Overview: More about weight; arguments for feet that we didn’t get to.

1. What are moras again?
   • A mora is an abstract unit of duration\(^1\) that has been proposed for dealing with footing and stress assignment in so-called “quantity-sensitive” languages.
     - It’s the difference between a light syllable and a heavy syllable.

   • What gets a mora?
     - Onsets usually don’t get any (but see Topintzi 2006, Topintzi 2010, Ryan 2014)
     - A nucleus vowel almost always gets one (though in some languages, schwa gets no mora).
     - A long vowel or diphthong (2 vowels in the same nucleus) usually gets two.
     - A coda consonant may get one, depending on the language—and in some languages, only certain coda consonants get one

\[
\begin{align*}
\sigma & \quad \text{or} \quad \sigma \\
\mu & \quad \mu \\
\text{SUM} & \quad \text{SUM}
\end{align*}
\]

   • Syllable weight
     1 mora: light syllable
     2 moras: heavy syllable
     3 moras: superheavy syllable

---
\(^1\) or total acoustic energy, or total acoustic energy weighted with some frequencies counting more than others. See (Gordon 2002), (Gordon 2005).
2. **Reasons to add moras to the theory**

- **Syllables with more moras often attract stress**, leading to this constraint (Prince 1990):
  
  **WSP** ("weight-to-stress principle"): a heavy syllable must be stressed
  
  - Before moras you had rules like \( V \rightarrow [+\text{stress}] / \_ C\{\text{C,\#}\} \)
  - Doesn’t capture the typology (why not \( V \rightarrow [+\text{stress}] / \_ CV \) instead?)

- **Compensatory lengthening** (Hayes 1989)

  **Latin historical change**
  
  *kas.nus > ka:.nus* ‘gray’
  *kos.mis > ko:.mis* ‘courteous’
  *fi.des.li.a > fi.de:.li.a* ‘pot’

  **Turkish free variation**
  
  sav.mak \(\rightarrow\) optionally sa:.mak ‘to get rid of’
  
  da.vul \(\rightarrow\) optionally da.ul ‘drum’

- Draw the moras and syllable structure for [sav.mak] and [da.vul]. Let’s ponder why deletion leads to lengthening in one case but not the other.

**Greek (East Ionic)**

*woi.kos > oi.kos* ‘house’
*ne.wos > ne.os* ‘new’
*od.wos > o:.dos* ‘threshold’

- Draw the moras and syllable structure for [woi.kos], [ne.wos], [od.wos], and ponder.
Ling 200A, Phonological Theory I, Zuraw, Fall 2016

Middle English (originally from Minkova 1982) ta.Ł > ta:l ‘tale’

- We have to ignore several complications, but we can get the basic idea by drawing [ta.Ł]

**Unattested cases**

- sa → a:
- sla → sa:

- Why don’t these occur?

- **Asymmetric foot inventory**

  At least for trochaic languages, we want feet to be able to count moras

<table>
<thead>
<tr>
<th></th>
<th>trochees</th>
<th>iambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>quantity-insensitive</td>
<td>attested</td>
<td>maybe unattested?</td>
</tr>
<tr>
<td>quantity-sensitive</td>
<td>attested: moraic (LL), (H)</td>
<td>attested: “uneven” (LH), (H), (LL)</td>
</tr>
</tbody>
</table>

- Hayes (1995) argues, through an extensive typological survey, that these 3 are the only foot types. There are claimed to be no languages with syllabic iambs.
  - Altshuler 2006 proposes a counterexample—Osage (mostly iambic, quantity-insensitive).
3. Reining in our optimism about moras
Ryan 2011a; Ryan 2011b shows that language can make many more than 2 or 3 weight distinctions

- Tamil: using sophisticated statistical measures over a huge verse corpus, Ryan finds 5 partly-overlapping weight classes

Then, he finds more and more categories (in Tamil and for other languages)
- The categories often don’t behave as though evenly spaced
  - Weight is not just a hierarchy, but maybe a numerical scale

In versification and lexically-variable stress (English real and fake words), it seems more like you can attach a real number to each syllable, like “0.81”.

Figure 14: Figure 13 filtered into five phonological classes. (Ryan 2011a p. 21)
Here’s Ryan’s English real-word data:

(Ryan 2011a, p. 179)

4. **Long exercise: Manam**


- Develop an OT analysis of Manam stress using feet. I’ve given syllabifications you can assume.

1. ú ‘kind of fish trap’
2. gá ‘Morinda citrifolia’
3. máŋ ‘bird’
4. pá.tu ‘stone’
5. dá.m[w]a ‘forehead’
6. tá.go ‘not’
7. zé.re ‘sorcery’
8. bá.zi ‘wing’
9. si.ná.ba ‘bush’
10. ta.né.p[w]a ‘chief’
11. ga.rí.b[w]a ‘flower sheath of palm tree’
12. i-.mo.ná.qo ‘3sg.rl-eat’
13. ta.né.p[w]a-.tí.na ‘chief-int’
14. bò.ta.zí.ga ‘hole’

Size of font indicates frequency.
Notice that more-complex onset leads to more stress.

**try drawing feet first**
- trochaic or iambic?
- right- or left-aligned?
- what happens to leftovers: unfooted, or subminimal foot?
- which foot gets primary stress?
15. mó.a ‘penis’
16. sá.i ‘spoon’
17. ró.a ‘spouse’
18. á.e ‘leg’
19. so.ʔá.i ‘tobacco’
20. ?e.té.a ‘side of canoe opposite outrigger’
21. ī-.bo.ʔá.u ‘3sg.rl-be.bent’
22. ?ò.a.ʔá.?a ‘then’
23. bò.a.ʔí.ʔa ‘hole’
24. i-.mò.a.ʔú.ʔu ‘3sg-be.heavy’

25. lún.ta ‘moss’
26. móm.bʷa ‘victory leaf’
27. u.ʔán ‘1sg.rl-cry’
28. ém.ʔé.?i ‘sacred flute’
29. ún.ʔú.ʔa ‘person from a village other than one’s own’
30. ém.ʔé.?i-.tí.?a ‘sacred.flute-int’
31. i-.dán-.dán-.la-.lá.ʔo ‘3sg.rl-crawl-rpl-lim-thither’
32. móm.bʷa-.tá.?u ‘victory.leaf-int’
33. mà.la.ʔó ‘flying fox’

34. ná.i.ʔa ‘who?’
35. mó.a.ʔi ‘song’
36. ?á.o.ʔa ‘two pieces of wood rubbed against each other to produce fire’
37. bó.e.ʔa ‘Boesa Island’
38. gó.ʔi ‘star’
39. tá.u.ʔa ‘trading partner’
40. ta.mó.a.ʔa ‘man’
41. i-.pó.ʔa.ʔa.ʔí.ʔa ‘3sg.rl-be.tired’
42. gó.ʔí.ʔí.ʔa ‘start-int’
43. ró.a.ʔá.?a ‘her real husband’
44. já.ʔa.ʔí.ʔa ‘good-int’
45. j-u.ʔa.ʔú.ʔa ‘he hit me a lot’
46. wà.u.ʔú.ʔa ‘new’
47. di.ʔó.a.ʔi.ʔó.ʔa ‘they sat down first’
48. bi.éŋ ‘Bieng (place)’

these shouldn’t present any problems for a preliminary analysis based on 1-14. But once you’re done, check that these still work.

explain why these are different

note: not *[èm.bé.ʔí]

not *[i-dan-dán-la-lá?o]

explain why these are different

• why do these candidates win, instead of the candidate you would have expected based on the analysis up until now?
• you’ll have to invent a constraint here

I could only find one like this but don’t ignore it!
5. If we still have some time: phonological words

- We keep referring to the word, as in ALIGN(Word, Left; Foot, Left), or \*_{+\text{son}}\#_{-\text{voice}}
  - So what counts as a word, anyway?

- This was already an issue in SPE. Take a rule like...
  \( \{u, i\} \rightarrow \emptyset / +\_\# \) (Chomsky & Halle 1968, p. 129, 239)
  accounts for alternations in bile, bil+i#ous and reptile, reptil+i#an, because their underlying forms are argued to be /bIl+i/, /reptIl+i/

- What determines whether there’s a #? In SPE...
  - some #s are generated by syntactic brackets
  - some affixes have a # in their lexical entry (/#iv/)
  - #s can also be deleted, inserted, or changed by phonological rules

- In OT, one popular way to do it is with ALIGN constraints that turn certain syntactic boundaries into phonological word boundaries (e.g. Peperkamp 1997).
  - And there can be conflicting constraints that disturb the relationship

6. English example

- Many English function words (i.e., not Nouns, Verbs, or Adjectives) have weak and strong forms.

<table>
<thead>
<tr>
<th></th>
<th>strong</th>
<th>weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>to</td>
<td>tʰu</td>
<td>tʰə</td>
</tr>
<tr>
<td>at</td>
<td>æt</td>
<td>æt</td>
</tr>
<tr>
<td>for</td>
<td>foɹ</td>
<td>foɹ</td>
</tr>
<tr>
<td>a</td>
<td>æɪ</td>
<td>æ</td>
</tr>
<tr>
<td>and</td>
<td>ænd</td>
<td>ə</td>
</tr>
</tbody>
</table>

- I’m going __ London next summer. Where are you going __?
- I’m looking __ Campbell Hall. What are you looking __?

- Selkirk 1995 proposes two possible structures:
To avoid cluttering the tableau, assume that the “t[u]”s form a foot with stress; “t[ə]”s are unfooted.

○ Fill in the tableau. Winner is A, B, C, or D?

<table>
<thead>
<tr>
<th></th>
<th>to London</th>
<th>ALIGN (LexWd,L,PWd,L)</th>
<th>ALIGN (PWd,R,LexWd,R)</th>
<th>FOOTMUST BEDOMINATED BYPWORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>t[u] London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>tə London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>t[u] London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>tə London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>t[u] PWd London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>tə PWd London PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Focus changes things: *I need a flight TO London, not FROM London.*)

○ *looking at*: draw a phonological tree that causes *at* to be pronounced in its full form

○ Fill in the tableau (we needed to add some constraints). Assume “[æ]t” is footed, “[ə]” isn’t. Winner is A, B, C, or D?

<table>
<thead>
<tr>
<th>looking at</th>
<th>ALIGN (LexWd,R, PWord,R)</th>
<th>ALIGN (PPhrase,R, Pwd,R)</th>
<th>ALIGN (PWd,R, LexWd,R)</th>
<th>FOOTMUST BEDOMINATED BYPWORD</th>
<th>PWORDMUST CONTAIN FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>looking æt PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>looking æt PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>looking PWd æt PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>looking PWd æt PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>looking PWd æt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>looking PWd æt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

⇒ *looking* needs to end a p-word, but phrase wants to end w/ a p-word, so *at* must end its own p-word.
7. Dutch example (Gussenhoven & Jacobs 1998, p. 250)
   - In Dutch, resyllabification applies across some morpheme boundaries but not others.
     - I’m including an inserted glottal stop since I think that’s what’s intended as the evidence for syllabification.

   \[
   \text{[ont.[\text{?ei.\text{\v{c}on}]v]v ‘dispossess’} \quad \text{[k\text{\text{\v{e}rk}]N.[\text{?\v{o}y}l]N]N ‘barn owl’} \quad \text{[te.:\text{k\v{a}.\text{n}}v \text{n}]}N \text{ ‘drawing’} \\
   \text{[\text{\v{e}n.}[\text{?\v{e}n}]}A \text{ ‘uneven’} \quad \text{[\text{\v{r}ein}]N.[\text{?\v{a}.\v{k}]}N]N \text{ ‘Rhine barge’} \quad \text{[\text{\v{c}an.d\v{a}.l}]v a.r]}N \text{ ‘walker’}
   \]

   - G&J propose that resyllabification is blocked across a p-word boundary (parentheses below mark p-words).

   \[
   (\text{\text{\v{e}n.})(\text{?ei.\text{\v{c}on})}) \quad (\text{\text{\v{e}rk.})(\text{?\v{o}y}l)} \quad (\text{te.:\text{k\v{a}.\text{n}}}])N
   \]

   o Let’s fill in the alignment constraints:

<table>
<thead>
<tr>
<th>/[\text{\v{e}.\text{\v{w}}}N])A/</th>
<th>/([\text{te.\v{a}.\text{n}])N} /</th>
<th>DEP-?</th>
<th>NoCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>( (\text{\v{e}n.})(\text{?\v{e}.\v{n}}) )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( (\text{\v{n}})(\text{\v{e}.\v{n}}) )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( (\text{\v{n}.\v{e}.\v{n}}) )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>/([\text{te.\v{a}.\text{n}}]v \text{n}]}N} /</th>
<th>DEP-?</th>
<th>NoCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>( (\text{te.:\text{k\v{a}.\text{n}}}])N )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( (\text{te.:\text{k\v{a}.\text{n.}}})(\text{n}]}N )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( (\text{te.:\text{k\v{a}.}})(\text{n}]}N )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   o What should happen to function words, like pronouns and determiners, assuming the same ranking? A or B?

<table>
<thead>
<tr>
<th>/[\text{ri}]v [\text{\v{a}n}]\text{det} [\text{kat}]N/ called a cat</th>
<th>DEP-?</th>
<th>NoCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>( (\text{ri.\v{p}.})(\text{\v{a}n.})(\text{kat}) )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( (\text{ri.\v{p}.\v{n}})(\text{kat}) )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. More evidence in Dutch: long-vowel diphthongization (p. 252)
   - /e/, \( \varphi \), o/ become [ɛ\text{\text{o}}, \varphi\text{\text{o}}, o\text{\text{o}}] before [r], regardless of syllabification:

   \[
   \text{[me\text{\text{o}}\text{\text{\v{e}}r}]N} \text{ ‘more’} \quad \text{[k\varphi\text{\text{o}}\text{\text{\v{e}}r}]}N \text{ ‘coral’} \\
   \text{[\v{c}h\varphi\text{\text{o}}\text{\text{\v{e}}r}]N} \text{ ‘smell’} \quad \text{[\text{\v{c}o\text{\text{\v{e}}r}]}N \text{ ‘test’}
   \]
Why doesn’t the alternation apply here:

\[ ([\text{me:}[\text{rei.z}]_V]_N, N) \quad \text{‘to accompany’} \quad ([k\text{ør}][\text{riŋ}]_N)_A \quad \text{‘cue ring’} \]
\[ ([\text{mil.jøø}[\text{ri.zi.kō}]_N)_N \quad \text{‘environmental hazard’} \quad [\text{ne:.of:}[\text{re:}][\text{v}]_N]_A \quad \text{‘neo-Revian’} \]

9. More evidence in Dutch: conjunction reduction (see also Booij 1985)

*just spelling here, not IPA*
\[ ([\text{land}[\text{bouw}]_N)_N \quad \text{agriculture} \quad \text{and} \quad \text{[tuin}[\text{bouw}]_N)_N \quad \text{optionally becomes} \quad \text{land-} \quad \text{en} \quad \text{tuinbouw} \quad \text{agri-} \quad \text{and} \quad \text{horticulture} \]

but: \[ ([\text{absurd}[\text{aiteit}]_N)_N \quad \text{absurdity} \quad \text{and} \quad \text{[banal}[\text{aiteit}]_N \quad \text{cannot become} \quad \ast \text{absurd-} \quad \text{en} \quad \text{banaliteit} \quad \ast \text{absurd-} \quad \text{and} \quad \text{banality} \]

Why not \[ \ast \text{absurd-} \quad \text{en} \quad \text{banaliteit}? \]

**Next time:** Course wrap-up and prospect; tips on next week’s presentations, incl. handouts

**References**

Altschuler, Daniel. 2006. Osage fills the gap: the quantity insensitive iamb and the typology of feet.


