Class 4: Structure above the segment IV

To do
☐ Talk to me by the end of this week about your project topic

Overview
More about feet. Then, the next level up: the PWord. We’ll see how far we get and save the rest for next time.

1 Fijian assignment: any post-mortem you’d like?

2 Arguments for feet, continued
- Trochaic languages are far more common than iambic
  - With feet, we can characterize one parameter setting as more common
  - But with just the grid, we have to describe certain combinations of parameter settings as common
    - which ones?
- Various consonantal rules apply to the “strong” or “weak” syllable of a foot, even if the foot is not supposed to have any stress (i.e., in languages reported to have no secondary stress).
  - See González 2002, González 2005 for cases of this and a case of something even more complicated.
  - Her simplest example: Capanahua (Panoan, Peru) deletes /ʔ/ in even-numbered syllables

/ʔotʃiti-raʔ-taʔ-ki/ → [ˈʔotʃi(tira)(taʔki)] ‘it’s probably a dog’
/ʔotʃiti-ma-raʔ-taʔ-ki/ → [ˈʔotʃi(tima)(raʔta)ki] ‘it’s probably not a dog’
  - Only one stress per word is reported, suggesting it really is about feet
  - but this could possibly be because researchers don’t realize that the cues to secondary stress are more subtle
  - Another feet argument: unfooted unstressed syllable doesn’t undergo rule

/ʔiʔsap/ → [ʔiʔ(ˈsa)] ‘bird’

- Expletive infixation in English (McCarthy 1982):
  Mo(nònga)-(fucking)-(héla)
  (Òs)-(fucking)-(wégo)
  (Àpa)-(fucking)-(làchi)(cóla), (Àpa)(làchi)-(fucking)-(cóla)
  (Tàta)ma-(fucking)-(góuchí) ~ (Tàta)-(fucking)-ma(góuchi) ← this one is crucial
• **Latin enclitic stress** (Steriade 1988; Jacobs 1997):
  - Latin stresses the penult if it’s heavy, otherwise the antepenult (data from Jacobs/Hayes).
  - Basic analysis:
    - final syllable doesn’t want to be in a foot
    - heavy syllable must be stressed (unless final: \textsc{NonFinality}>>\textsc{WeightToStress})
    - trochaic feet

\begin{align*}
\text{(câ.me)ram} & \quad \text{(ár.bo)rem} & \quad \text{pe(dés)trem} & \quad \text{vo(lup)(tá)tem} \\
\text{(sí.mu)la} & \quad \text{do(més.ti)cus} & \quad \text{a(mí)cus} & \quad \text{(li.be)(ra:ti)(ó):nem}
\end{align*}

❓ Can you tell from this what counts as a heavy syllable in Latin?
- But, it’s different when you add an enclitic (\textasciimacron = boundary):

\begin{align*}
\text{(í):ta} & \quad \text{‘so’} & \quad \text{(i)(tá)=que} & \quad \text{‘and so’} & \quad \text{*(*í:ta)=que} \\
\text{(mú):sa} & \quad \text{‘Muse’} & \quad \text{(mu)(sá)=que} & \quad \text{‘and the Muse’} & \quad \text{*(*mú:sa)=que} \\
\text{(lí:mi)na} & \quad \text{‘thresholds’} & \quad \text{(li:mi)(ná)=que} & \quad \text{‘and the thresholds’} & \quad \text{*(*li:mi:na)=que} \\
\text{(nó):bis} & \quad \text{‘us’} & \quad \text{(no)(bís)=cum} & \quad \text{‘with us’} & \quad \text{‘and with us’}
\end{align*}

- Steriade’s cyclic solution: when a clitic is attached, only still-unfooted material can be footed: old feet can’t be readjusted (let’s step through a couple of these)

- To deal with the following data, Jacobs proposes that not only final syllables, but also final enclitics resist footing (are “extrametrical”):

\begin{align*}
\text{(íd)} & \quad \text{‘this’} & \quad \text{(íd)=circo:} & \quad \text{‘therefore’} & \quad \text{*(*íd)=(cír)co} \\
\text{(quá):} & \quad \text{‘which’} & \quad \text{(qua):=propter} & \quad \text{‘therefore’} & \quad \text{*(*qua:)=(pró)p{ter}} \\
\text{(é):a:} & \quad \text{‘there’} & \quad \text{(e)(á):=propter} & \quad \text{‘therefore’} & \quad \text{*(*e:á):=(pró:p)ter} \\
\text{(ú)<bi>} & \quad \text{‘where’} & \quad \text{(u)(bí)=li:bet} & \quad \text{‘wherever’}
\end{align*}

❓ Bring on the dissent and counter-analysis for all of these...
3  **Asymmetric inventory: another argument for feet**

- Different languages require different types of feet:

<table>
<thead>
<tr>
<th></th>
<th>trochees</th>
<th>iamb</th>
<th>quantity-insensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>attested</td>
<td></td>
<td></td>
<td>Maybe unattested?</td>
</tr>
<tr>
<td>quantity-sensitive</td>
<td>attested: moraic (LL), (H)</td>
<td></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 iamb.
  - Altshuler 2006 proposes a counterexample—Osage (mostly iambic, quantity-insensitive)
  - So this is controversial! But certainly there seems to be a tendency…

3.1  **Why the asymmetry?**

- Rice 1992, ch. 5 Reviews and replicates Woodrow 1909, 1911, 1951b. Schematically,

- Grouping preference is stronger for duration-varying stimuli than for amplitude-varying stimuli.

- Subjects were played various binary, 7-repetition sequences of tones varying in tone duration, intertone pause duration, and tone pitch (Rice didn’t test intensity; Woodrow did) and had to say whether each was weak-strong or strong-weak.

**Percent trochaic (strong-weak) response**  (Rice p. 195)

<table>
<thead>
<tr>
<th></th>
<th>Stimulus 1</th>
<th>Stimulus 2</th>
<th>Stimulus 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>59.62</td>
<td>67.31</td>
<td>71.15</td>
</tr>
<tr>
<td>Group 2</td>
<td>46.15</td>
<td>38.46</td>
<td>32.69</td>
</tr>
<tr>
<td>Group 3</td>
<td>57.69</td>
<td>50.00</td>
<td>59.62</td>
</tr>
<tr>
<td>Group 4</td>
<td>51.92</td>
<td>57.69</td>
<td>44.23</td>
</tr>
</tbody>
</table>

The table shows that the percentage of trochaic responses increases as the difference in duration, pitch, and pause increases. The table indicates the following:

- Group 1: equal duration, equal pitch, equal pause
- Group 2: alternating duration, equal pitch, equal pause
- Group 3: equal duration, equal pitch, alternating pause
- Group 4: equal duration, alternating pitch, equal pause

Difference increases: (except Group 1, where duration changes)

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1 Apparently Fraisse 1963 is a good source on classic time-perception research too, if you’re interested.
The duration-alternating stimuli (Group 2) produce the most “iambic” responses, more strongly so as the duration difference increases.

Hayes 1995 cites also

- similar evidence from musicians’ judgments (Cooper & Meyer 1960):
  - “Durational differences...tend to produce end-accented groupings; intensity differentiation tends to produce beginning-accented groupings” (p. 10; as quoted by Hayes p. 80)
- a study of Swedish poetry (Fant, Kruckenberg & Nord 1991) in which...
  - reciters produced greater durational contrasts in iambic verse than in trochaic
  - musicians transcribing verse into musical notation “likewise reflected the pattern of the law in their choice of note values”
  - poets use greater contrast in number of phonemes (for accented vs. unaccented syllables) in iambic verse than in trochaic
    (see also Newton 1975 for English verse)

“Iambic/Trochaic Law” (Hayes 1995, p. 80)
  a. Elements contrasting in intensity naturally form groupings with initial prominence.
  b. Elements contrasting in duration naturally form groupings with final prominence.”

3.2 A consequence of the asymmetry: trochaic shortening

Middle English. This is apparently a bit controversial, but here’s the standard story (Mellander 2004):

- Assume footing as shown—I’m leaving as open/unsolved why these footings (issues: don’t-foot-the-end or don’t-stress-the-end? which consonants are moraic?)

How can we analyze these?

- (súːð) ‘south’
- di(víːn) ‘divine’

I couldn’t get clear Middle English data easily, so here are some Modern English examples that reflect the same phenomenon (whether or not it’s now synchronically real), from Prince 1990, pp. 13-14, with a couple of substitutions:

Analysis from above should extend straightforwardly:

- (óːmən) ‘omen’
- (séːn) ‘sane’

How do these work? (These examples show that the term “trisyllabic shortening”, if you’ve run into it, is a bit of a misnomer) [Prince, following Myers 1987, says that the suffix –ic is, exceptionally, not extrametrical.]
Can we explain the different pronunciations of the prefix? (Never mind why the final syllable is now getting footed—probably something to do with the = boundary that separates unproductive prefixes from their stems)

(ɹɛ́.bəl)  ‘rebel’  (ɹíː)(bɛ́t)  ‘rebate’
(ɹɛ́.kəd)  ‘record’ (noun)  (ɹiː)(fɛ́ks)  ‘reflex’
(ɹɛ́.zi)(dɛ́nˌjɔl)  ‘residential’  (ɹiː)(lɛ̝k)(sɛ́)ʃən  ‘relaxation’
(ɹɛ́.fəs)  ‘preface’  (ɹiː)(fɛ́kt)  ‘prefect’
(ɹɛ́.lət)  ‘prelate’  (ɹiː)(lɛ́t)  ? “not late yet”??
(ɹɛ́.məs)  ‘premise’  (ɹiː)(fiks)  ‘prefix’
(ɹɛ́.zon)(tɛː.ʃən)  ‘presentation’  (ɹiː)(mɛ́.ɾɪ)(tɛː)ʃən  ‘premeditation’

### 4 Phonological word

- We keep referring to the **word**, as in ALIGN(Word, Left; Foot, Left), or #\[–son \+voice\]#.  
  - 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).
  - ALIGN(LexicalWord, L; PWord, L)
  - And there can be conflicting constraints that disturb the relationship
5 What counts as a word? Descriptive example from Samoan

- The domain of footing in Samoan is a lexical root (Noun, Verb, Adj), plus any associated bound morphemes after it (Zuraw, Yu & Orfitelli 2014):
  
  - **Primary stress is trochee at right edge:**

    la(váː) ‘energized’ le(léi) ‘good’ (mánu) ‘bird’ ma(nóŋi) ‘smell good’
    (sámi) ‘sea’ pu(líŋi) ‘pudding’
    (áta) ‘picture’ i(ŋóa) ‘name’

    (ŋífo) ‘tooth’ ŋi(fó-a) ‘having teeth’

    sa(váli) ‘walk’ (sáva)(Í-ŋa) ‘parade’

    (máfa)(tí) ‘stress out’ (máfa)ti(a-ŋa) ‘distress’

  - **In a compound, each root starts its own stress domain:**

    a(lòfi)-(váe) ‘sole of foot’ (assembly+foot) *(àlófi)-(váe)
    (àŋa)-le(áŋa) ‘bad behavior’ (bad+behavior) *(a(ŋàle)(áŋa)

  - *(HL) Foot not tolerated ⇒ “trochaic shortening”—domain again includes suffixes*

    (fúsi) ‘hug’ fu(sí-a) ‘hug-ERG’ /fusi/
    vs. (tísi) ‘write’ (tíː)(sí-a) ‘write-ERG’ /tíːsi/


  - **Certain vowels have to foot together, e.g. /ai/, /au/:**

    (mái)le ‘dog’ cf. ma(éla) ‘hollow’
    (máu)ŋa ‘mountain’ cf. ma(óta) ‘pastors house’

  - **...but not across a boundary that includes the beginning of a root:**

    (fàʔa)-(úlu)-(úlu) ‘be subject to’ (ulu ‘head’) *faʔa(u)-ulu
    (fàna)-(iʔa) ‘dynamite for fishing’ (shoot + fish)
    (pòná)-(uá) ‘Adam’s apple’ (knot + neck)

  - In summary, if p-word is domain of footing,
    - [root]p-wd
    - [root-suffix]p-wd
    - prefix-[root]p-word
    - [root]p-word-[root]p-word

    → every root initiates a new p-word.

  - This is a very common pattern cross-linguistically (see Peperkamp 1997 for a review and some in-depth case studies).
6 How can an analysis capture what counts as a word?

- Following Peperkamp 1997, we can do it with ALIGN constraints (McCarthy & Prince 1993), such as ALIGN(LexWord, L; PWord, L).

Let’s try some tableaux for Samoan.

7 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>fəu</td>
<td>fə</td>
</tr>
<tr>
<td>a</td>
<td>æt</td>
<td>œ</td>
</tr>
<tr>
<td>and</td>
<td>ænd</td>
<td>ŋ</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. What’s the winner?

<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 BE-dominated BYPWd</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>[ tʰu London ]PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>[ tʰə London ]PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>tʰu [ London ]PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>tʰə [ London ]PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>[ tʰu ]PWd [ London ]PWd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>[ tʰə ]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 “[ə]t” is footed, “[ə]” isn’t. What’s the winner?

<table>
<thead>
<tr>
<th></th>
<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 BE-dominated BYPWd</th>
<th>PWordMUST CONTAIN FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>[looking ət]PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>[looking ət]PWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>[looking]PWd ətPWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>[looking]PWd ətPWd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>[looking]PWd ət</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>[looking]PWd ət</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

⇒ looking needs to end a p-word, but phrase also wants to end w/ a p-word, so at must end its own p-word.
8 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.


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

(ʔɔnt.)-(ʔi.χən) (kɛrk.)-(ʔœyl) (te:.kə.ɪŋ)
(ʔɔn.)-(ʔe:.vən) (rɛin.)-(ʔa:k) (vʌn.də.ɪŋ)

? Let’s fill in the alignment constraints:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>DEP-?</th>
<th>NOCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>/[on [e:vən]A]A/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ʔɔn.) (ʔe:.vən)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ʔɔn.) (e:.vən)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ʔɔn.) (e:.vən)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>DEP-?</th>
<th>NOCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>/[te:kən]v ɪŋ]/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(te:.kə.nɪŋ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(te:.kən.) (ɪŋ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(te:.kə.ɪŋ)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>DEP-?</th>
<th>NOCODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>/rip]/v [ən]det [kæt]s/ called a cat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a (ri:p.) (ʔən.) (kæt)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b (ri:.pən) (kæt)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9 More evidence in Dutch

9.1 Long-vowel diphthongization (G & J p. 252)

- /eː/, øː, øː/ become [eə, øə, oə] before [r], regardless of syllabification:

<table>
<thead>
<tr>
<th>Word</th>
<th>phones</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>more</td>
<td>[meːr]N</td>
<td>‘more’</td>
</tr>
<tr>
<td>smell</td>
<td>[ɔːr]N</td>
<td>‘smell’</td>
</tr>
<tr>
<td>coral</td>
<td>[kɔːraːl]N</td>
<td>‘coral’</td>
</tr>
<tr>
<td>test</td>
<td>[kɔːrət]N</td>
<td></td>
</tr>
</tbody>
</table>

Why doesn’t the alternation apply here:


9.2 Conjunction reduction (see also Booij 1985)

just spelling, not IPA

<table>
<thead>
<tr>
<th>Word</th>
<th>phones</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>agriculture and horticulture</td>
<td>[[lɑnd][bəu]N en [[tœyn][bau]N N</td>
<td>optionally becomes land- en tœynbau agri- and horticulture</td>
</tr>
<tr>
<td>but: absurdity and banality</td>
<td>[[apsyrd][ɛt]N en [[bana][leɪt]N</td>
<td>cannot become *apsyrd- en banaːleɪt absurd- and banality</td>
</tr>
</tbody>
</table>

Why not * apsyrd- en banaːleɪt?

Check that it works for prefixed words too—data point from shopping bag from Record Mania in Amsterdam:

<table>
<thead>
<tr>
<th>Word</th>
<th>phones</th>
<th>Notes</th>
</tr>
</thead>
</table>

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2 Revian = akin to or evoking the style of Dutch writer Gerard Reve
10 The phonological word in some other languages

- Sanskrit, Turkish, Hungarian, Malagasy, Tagalog, Bengali, and Italian have pretty much the same p-word boundaries as Samoan or Dutch, with some slight wrinkles.

- In Italian, for example, only prefixes that are semantically transparent stand outside the stem’s p-word (Peperkamp 1997, van Oostendorp 1999):
  - (a)-(sociale) ‘associé’ but (re-sistenza) ‘resistance’

  - Provides a way to test Italian speakers’ morphological intuitions: see Baroni 2001 on N. Italian intervocalic voicing of /s/, which applies only if the surrounding vowels are in the same p-word.

- Yidin’ (Australian language, with very few remaining speakers. Nespor & Vogel 1986, data from Dixon 1977)
  - Penults of odd-syllabled p-words lengthen—no long vowels otherwise.

```
gu.da:ga ‘dog’
mu.ɖaːm ‘mother’
ma.ɖiːn.da-n ‘walk up-pres.’
ga.linha ‘go-pres.’
gu.maːri-dagːa-ŋ ‘red-inch.-past’
ma.ɖiːn.da-ŋ lin ‘walk up-pres’
```

- Based on the data above, are suffixes part of the p-word?

- So what should we make of examples like these, with longer suffixes:

```
gu.maːri-da-gaː-ŋ ‘red-inch.-past’
ma.ɖiːn.da-ŋ.lin ‘walk up-pres’
```

11 Do we need the p-word?

- In 2006, a group of us spent about 40 hours debating the issue (see www.linguistics.ucla.edu/people/zuraw/courses/prosword_2006.html for handouts). Results were inconclusive:
  - Often, interleaving phonology and morphology can do the job (add some affixes too late for certain processes to see them).
  - But there was a residue of cases where it seemed like we really might need the p-word. The last handout at the link above sums up the pro and con arguments.

To sum up
- We’ve seen more arguments for feet, and looked at the next level of structure up, the PWord

Next time
- Maybe some practice with p-words and footing (if time)
- Lower down in the representation: the CV skeleton
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