Class 13, 5/16/2018: Weight I

1. Assignments
   - Homework #5 (Indonesian stress) is in your hands; due in two weeks (Wednesday 5/30).

2. Announcement
   - Bruce away most of next week.
   - Kie Zuraw will take one of the classes (TBA) and I will cover the other in finals week at a time we can all come.

3. Go over the Ukrainian homework
   - See separate handout

4. Homework prep
   - Let us get on the same page with analysis of Indonesian stress by doing the monomorpheme forms together.

   1 syllable  [ cát ]  ‘print’
   2 syllables [ cári ]  ‘search’
   3 syllables  [ bicára ]  ‘speak’
   4 syllables  [ bijaksána ]  ‘wise’
   5 syllables  [ kóntinuási ]  ‘continuation’
   6 syllables  [ òtobiógráfi ]  ‘autobiography’
   7 syllables  [ àmerikánisási ]  ‘Americanization’

5. A tiny bit of history of syllables
   - There was strong pre-generative work, of which my favorite is W. S. Allen (1973) *Accent and Rhythm*, an extensive study of Latin and Greek, with syllables and proto-feet.
   - SPE was, notoriously, syllable-less, a matter that gave rise to an entertaining sequence of increasingly-perturbed footnotes.
   - Early generative syllable theorists: Joan Hooper, Dan Kahn, Lisa Selkirk
   - Weight became prominent with John McCarthy’s (1979) dissertation, which cites Allen.
6. What is weight good for? Clearer cases

- Heavy syllables attract stress in many languages.
  - More subtly: they attract foot-headedness: the amazing case of ‘CVCVCV vs. CVC’CVCV in Cairene Arabic.
- Heavy syllables are the equivalent of light - light in many systems of quantitative meter, e.g. the following Hausa example (catalectic mutadaarik):

\[
\begin{array}{cccc}
\circ & \circ & \circ & \circ \\
\_ & \_ & \_ & \\
\_ & \_ & \_ & \\
\_ & \_ & \_ & \\
\end{array}
\]

Nairàà dà kwabọ̀o saabo-n kudii¹
naira and kobo new-LINKER money
‘Naira and kobo, the new money’

- The prosodic templates of the world are definable by syllable weight.
  - Ilokano (Austronesian, Hayes and Abad 1989) has contrasting heavy and light reduplication patterns, with the heavy manifested as CVC- in some cases, CV:\- in others.
  - trab-trabaho, da:-da?t ‘is working, sewing’
  - ?agin-tra-trabaho, ?agin-da-da? it ‘pretends to be working/sewing’
- In many languages, English included, a monosyllable can be a word only if it is heavy.

\[\begin{array}{l}
\text{bay } [\text{'b}e\text{i}] \\
\text{bet } [\text{'b}e\text{t}] \\
\text{*beh } [\text{'b}e\text{s}]
\end{array}\]

- Various phonological processes get rationalized by referring to weight.
  - Open-syllable tonic lengthening; post-tonic gemination
  - Closed-syllable shortening
  - Trochaic and iambic shortening

7. What is it good for: less clear cases

- Heavy syllables often can host contour tones.
  - Caveat: often this involves a special definition of heavy, as in Lithuanian: only sonorant codas are tone-hosting, and obstruent codas are not.
  - See below on process-specific weight.

¹“Naira da kwabo,” a song by Haruna Oji promulgating the 1973 change to decimalized currency in Nigeria; recorded off the air by Russell Schuh.
8. This and that: Paul Newman on syllable weight in Chadic

- Reference:

SYLLABLE WEIGHT AS A PHONOLOGICAL VARIABLE
The Nature and Function of the Contrast Between "Heavy" and "Light" Syllables
Studies in African Linguistics
Volume 3, Number 3, December 1972

- Predictable tone in Bolanci verbs is based on whether the first syllable is heavy or not:

```
<table>
<thead>
<tr>
<th>Heavy</th>
<th>Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>ràamù 'to repair'</td>
<td>tònù 'to sharpen'</td>
</tr>
<tr>
<td>sóorù 'to fall'</td>
<td>shìrù 'to steal'</td>
</tr>
<tr>
<td>mòyyù 'to wait for'</td>
<td>mòyyù 'to see'</td>
</tr>
</tbody>
</table>
| lëmdù 'to lick'    | ñgàdù 'to eat (meat)'
| wùndù 'to call'
```

- Look at these plurals in Hausa:

(18) káskóo kásàakèe 'bowl'
(19) jìrìfì jìràagèe 'train'
(28) káfàa ---→ káfàafèe 'hole'
(29) würìi ---→ wuràarèe 'place'
(30) dámòo ---→ dämàamèe 'monitor'
(31) zùgùù ---→ zùgàagèe 'roll of cloth'
(32) k%fìi ---→ k%fìèayèe 'fish'
(33) gàulàa ---→ gàulàayèe 'idiot'
(34) zòomóo ---→ zòomàayèe 'hare'
(35) sùunàa ---→ sùunàayèe 'name'

9. Different criteria for weight

- Some languages make the heavy-light divides at CVV/CVC, CV
- Others at CVV, CVC/ CV

10. The era of explanatory glory in syllable weight: the consistent-in-language hypothesis

- It’s a structural principle, set once, obeyed thereafter.
  - Sort of like a parameter setting.
A case that makes you think this is true: Latin, with CVV, CVC/ CV

- Phenomena: stress, iambic Shortening (ˈputo: → ˈputo ‘I believe’), word minimum (/da/ → [da:]), the theme vowel case below; various others

11. Data for the i/i; theme vowel in Latin verbs

<table>
<thead>
<tr>
<th>-i-</th>
<th>-i-</th>
<th>-i-</th>
</tr>
</thead>
<tbody>
<tr>
<td>audĭmus</td>
<td>‘hear’</td>
<td>capĭmus</td>
</tr>
<tr>
<td>prūĭmus</td>
<td>‘itch’</td>
<td>operĭmus</td>
</tr>
<tr>
<td>seapĭmus</td>
<td>‘enclose’</td>
<td>sepelĭmus</td>
</tr>
<tr>
<td>sāgĭmus</td>
<td>‘scent’</td>
<td>amicĭmus</td>
</tr>
<tr>
<td>haurĭmus</td>
<td>‘draw’</td>
<td>reperĭmus</td>
</tr>
<tr>
<td>farcĭmus</td>
<td>‘plug’</td>
<td>resipĭmus</td>
</tr>
<tr>
<td>senĭmus</td>
<td>‘feel’</td>
<td>fodiĭmus</td>
</tr>
<tr>
<td>dormĭmus</td>
<td>‘sleep’</td>
<td>rapiĭmus</td>
</tr>
<tr>
<td>sanctĭmus</td>
<td>‘consecrate’</td>
<td>parĭmus</td>
</tr>
<tr>
<td>vincĭmus</td>
<td>‘fetter’</td>
<td></td>
</tr>
</tbody>
</table>

- Or even with the very same stem:

<table>
<thead>
<tr>
<th>-i-</th>
<th>-i-</th>
</tr>
</thead>
<tbody>
<tr>
<td>parĭmus</td>
<td>‘bring forth’</td>
</tr>
<tr>
<td>sapĭmus</td>
<td>‘taste’</td>
</tr>
<tr>
<td>re-perĭmus</td>
<td>‘find’</td>
</tr>
<tr>
<td>re-sipĭmus</td>
<td>‘taste of’</td>
</tr>
</tbody>
</table>

- What’s up here?

12. The party ended soon

- This didn’t last; people found inconsistencies, or indeed triple distinctions: CVV/CVC/CV

13. An example of a triple distinction²

- Finnish stress is left-to-right syllabic trochees.

ú.jos.tè.le.màt.to.mùu.des.tàn.sa ‘from his lack of shyness’

- But you skip a syllable medial, if this will let you form better feet.
  - ‘CV CVC, ‘CV CVV are bad, producing the skip.

---

² source: talk handout by Anttila, “Word stress in Finnish”, on line; cites others
There is a much better basis for assigning weight: process specificity

- He checks in huge detail/scope with a 400-language database.
- Statistical testing.
- There is no evidence to support language-internal consistency.
- But processes strongly prefer particular weight criteria:
  - Tone: CVV, sometimes CVR (sonorant coda) are heavy.
  - Meter: CVV, CVC are heavy
  - Stress: a mix of criteria, affiliated (Gordon claims) with the phonetics of the language in question.

Ugly little things want to come in and participate in the same area as orthodox weight

- They aren’t as “powerful” in effect (readings)
  - Branching onsets make syllables a bit heavier
  - Onsets vs. no onsets make syllables a bit heavier.
  - Non-sonorous onsets make syllables a bit heavier.
  - Lower vowels make syllables a bit heavier

Another example from Finnish

- Genitive plural suffix has variants -ja, -ita.
- Anttila shows these are deployed to obtain optimal stress.
- This in turn shows that optimal stress is influenced by vowel height.

“/a, ä, o, ö/ are preferably stressed, /i, e, u, y/ preferably unstressed.”

<table>
<thead>
<tr>
<th>TYPE</th>
<th>BINARY</th>
<th>TERNARY</th>
<th>DEL%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAI</td>
<td>(fí.lo)(sò.fe)ja</td>
<td>(fí.lo.so)(fèi.ta)</td>
<td>90.7%</td>
</tr>
<tr>
<td>HAI</td>
<td>(prò.fès)(sò.re)ja</td>
<td>(prò.fès.so)(rèi.ta)</td>
<td>84.9%</td>
</tr>
<tr>
<td>LIA</td>
<td>(gál.le)(rì.o)ja</td>
<td>(gál.le.rì)(óì.ta)</td>
<td>1.0%</td>
</tr>
<tr>
<td>HIA</td>
<td>(ál.ler)(gi.o)ja</td>
<td>(ál.ler.gi)(óì.ta)</td>
<td>0.3%</td>
</tr>
</tbody>
</table>
17. What sort of theory do we want?

- We know what factors tend to make syllables prominent.
- We know what factors are stronger
  - We would be surprised to see a language in which CVV is light.
- We want to affiliate weight with processes, not languages.

18. Phonetics offers hope of bringing order to the mess

- We can develop a theory of phonetic properties lending auditory prominence, and roughly deduce the typology of what counts as heavy.
- Slogan: *syllables are heavy when they sound heavy*
- Then we need a formal theory that governs/deploy this phonetic influence as phonological grammar.

**ELEMENTS OF A PHONETICALLY-GROUNDED THEORY OF WEIGHT**

19. Source

- Gordon readings, also his book cited above.

20. Process specificity

- It stands to reason that vowel duration, or VR rhyme duration, would matter to tone.
- Indeed, in the three known languages where a coda obstruent makes a syllable heavy for purposes of tone, it seems to be due to vowellengthening in the non-contrastive environment of a closed syllable.

21. Elements that evidently make syllables sound more prominent for stress

- Duration
- Sonority (primarily V vs. C, but also differences among V’s and C’s)
- The “suddenly-loud” effect of auditory perception.
  - from Richard Wright (2004) Perceptual Cue Robustness and Phonotactic Constraints: Rethinking Sonority. In Hayes/Kirchner/Steriade, *Phonetically Based Phonology*
Gordon’s schematized version has a gentle downward slope during the main part of the vowel:

![Auditory nerve response to /da/ stimulus](image)

Either way, it implies the striking effect that less sonorous consonants imply greater weight than more sonorous ones.

Gordon measures perceptual salience of syllables by integrating over sonority, with a boost for post-quiet things — the quieter, the greater the boost.

- The unit of measure emerges as the **decibel-millisecond**.

### 22. Phonological changes that might be thought of as weight-enhancing

- Uncontroversial are the rhyme changes: lengthening of vowels, gemination of posttonic consonants.
- But also (Gordon): glottal stop insertion, which in some dialects of British English is only pretonic.

\[
\textit{Kafka} \quad [\text{ˈkæfkə}]
\]

\[
\textit{Kafka is ...} \quad [\text{ˈkæfkəɪz...}]
\]
23. The problem of quantitative variation and structure

- Actual energy-integral values form, presumably, a messy, overlapping distribution in reality.
- This is true for any appeal to phonetic principles in phonology.
- A repeatedly-adopted strategy is generalization from phonetic maps, which Gordon adopts.

24. Phonetic maps

- Articulation: Hayes on voicing difficulty:

  Landscape of Difficulty for Voiced Stops: Three Places, Four Environments

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>d</td>
<td>g</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>[-son]</td>
<td>43</td>
<td>50</td>
</tr>
<tr>
<td>#</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>[+son, -nas]</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>[+nas]</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>contour line: 25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Perception: Steriade on the P-map:

25. The two criteria languages use in “selecting” a weight criterion

- **Fit to map**
  - sample comparison:
- He finds an appropriate statistic to assess this degree of fit

- **Simplicity**

  - Book, p. 134: “A weight distinction is complex iff: it refers to more than one place predicate OR it makes reference to disjoint representations of the syllable.”
### Table 4.2. Weight distinctions and their phonological dimensions

<table>
<thead>
<tr>
<th>Predicates</th>
<th>Dimension</th>
<th>Non-place</th>
<th>Place</th>
</tr>
</thead>
</table>
| CVV(C) heavy                | \([X]_R\) [X]_R  \\
| +syllabic                   | 4         | 0        |
| CVV(C), CVC heavy           | \([X]_R\) [X]_R  \\
|                            | 2         | 0        |
| CVV(C), CVR heavy           | -const.gl. -const.gl.  \\
|                             | 6         | 0        |
| CVVC, CVCC heavy            | \([X]_R\) [X]_R [X]_R  \\
| +sonorant                   | 3         | 0        |
| Non-high V heavy            | -high     1  \\
|                             | 2         | 1        |
| Low V heavy                 | +low      1  \\
|                             | 2         | 1        |

26. **Allowed under the complexity criterion**

- vowel height cutoffs, alone
- branching rhyme
- [+syllabic] segments
- has onset, no onset

27. **Not allowed**

- E.g., blend of the above: “Stress the leftmost long low vowel of the word.”

28. **Success**

- The observed criteria do seem to single out what gets used; and both of them are needed.
- The theory has teeth: it is committed to some consistent relative patterns, which emerge from the map.
  - CVV is always heavier or equal to CVC
  - CVC always heavier or equal to CV
  - Onset-based distinctions will not trump rhyme ones
  - Vowel height distinctions will not trump rhyme-length distinctions
  - No reversed vowel height distinctions

29. **Gordon’s exterminationism with respect to moras, etc.**

- Moras provide little explanatory payoff if they are not a parameter set by language.
Indeed, they fail to cover compensatory lengthening under onset loss, which exists; work of Kavitskaya, Loporcaro, Topintzi

- So Gordon is an exterminationist regarding syllable structure and segmental slots:
  - Segment slots are X’s (one per “segment”)
  - Vowels bear the good-old feature [+syllabic]
  - All the work goes into the constraint system, which refers to the structural properties relevant to weight.

GRADIENCE AND RYAN’S LAW

30. Ryan’s Law

- Where syllable weight is treated gradiently/statistically, virtually all criteria get accessed.

31. An early study: Kelly on English

- Source
  - (See also his prescient work with Martin
- Basic generalization: the more consonants an English disyllable begins with, the more likely it will have initial stress.
- Corpus study (electronic lexicon):

<table>
<thead>
<tr>
<th>Number of onset consonants</th>
<th>Number trochaic</th>
<th>Number iambic</th>
<th>Proportion trochaic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>441</td>
<td>806</td>
<td>.35</td>
</tr>
<tr>
<td>1</td>
<td>2862</td>
<td>295</td>
<td>.69</td>
</tr>
<tr>
<td>2</td>
<td>783</td>
<td>158</td>
<td>.83</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>1</td>
<td>.98</td>
</tr>
</tbody>
</table>

- This is superposed on the well-known noun-verb difference (SPE); so there is ganging:
Wug test: “how would you stress this?” Pairs with C-, CC-, splitting subjects so no one sees both in the same pair.
- Result:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Onset structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
</tr>
<tr>
<td>Present</td>
<td>.67</td>
</tr>
<tr>
<td>Absent</td>
<td>.60</td>
</tr>
</tbody>
</table>

- Note the rather larger effect in non-prefixed forms.

### 32. Where we are headed with Ryan

- Quantity in classical metrics (Greek, Latin, Sanskrit) is not as clear as we thought: careful examination of *different kinds of heavy-requiring metrical position* diagnoses a stochastic criterion of weight that:
  - tends to combine in one system *all* known typological criteria for weight
  - but also includes a strict, categorical criterion, the topic of all previous research