Week 9: Stress

1. Stress: Increased prominence (e.g. higher pitch, increased duration, increased loudness) associated with certain syllables (different languages have different cues to stress)

   - Strongest stress is primary stress: IPA ‘ e.g. ‘about’ [əˈbaʊt]
   - Weaker stress(es) is secondary stress: IPA , e.g. ‘manifestation’ [mænəˈfæsteɪʃən]

2. Stress is a property of syllables and not of sounds within a syllable

   - languages typically do not have stress contrasts between two halves of a diphthong
     pa.t'ai.ma vs. pa.ta'i.ma or between vowel and coda consonant pa.t'an.ta vs. pa.ta'n.ta

   - languages spread phonetic properties associated with stress throughout syllable
     --consonants in onset of stressed syllables lengthen in Estonian
     --open syllables become closed by geminating onset of following syllable in Munsee

3. Stress is usually culminative: every word has one main stress, stressless words do not occur

4. Grammatical words such as articles, pronouns, prepositions, auxiliary verbs may be stressless, since they are clitics which latch onto a full-fledged content word to form a phonological word

5. Types of stress systems

   - Phonemic stress: Words have different meanings depending on stress
     e.g. German unter'stellen ‘to insinuate’
     ‘unterstellen ‘to store’

   *Even in languages with “phonemic” stress, there are usually limitations on stress options*

     e.g. phonemic stress in Spanish ‘saβana ‘sheet’ vs. saβana ‘savannah’

     *But*, stress limited to one of final three syllables in Spanish

   - Phonologically predictable stress: Stress is predictable based on phonological properties

     --Fixed stress: always falls on same syllable of word (e.g. initial, penultimate (second-to-last), antepultimate (third-to-last), peninitial (second), final)

     --Weight-sensitive stress: “heavy” syllables attract stress (more later)
     e.g. Khalkha Mongolian (Heavy = syllables with a long vowel)
     'aːrui ‘dry cheese curds’
     do'loduγaɣ ‘seventh’
     uļamˈbaːtəːrəs ‘Ulaanbaatar (ablat.)’
Writing stress rules in languages with fixed stress

Polish stress

tele\'vizor ‘TV’
tele\'vizorek ‘little TV’
tele\'vizorek\'ek ‘tiny little TV’

Generalization: stress falls on penultimate syllable

\[ \sigma \rightarrow [+\text{stress}] / \_ \_ \_ \sigma \]_\text{word}

This way of writing rule is better than other way which does not refer to syllables

\[ V \rightarrow [+\text{stress}] / \_ \_ \_ C_0 \_ V \_ C_0 \]_\text{word}

- Syllables attract stress, and not individual vowels
- Environment is simplified by referring to syllables

\[ [+\text{str}] \]
\[ \sigma \ 
\sigma \ 
\sigma \ 
\sigma \ 
\text{tele\'vizer} \]

But, monosyllabic words have stress too: ‘sep ‘dream’, ‘staxname

Modified rule: \[ \sigma \rightarrow [+\text{stress}] / \_ \_ (\sigma) \]_\text{word}

Conventions for rules with parentheses

- Apply longer version of rule including material in parentheses
- If longer version applies, then shorter version(s) skipped; otherwise apply shorter version

Macedonian: antepenultimate stress

‘vozduxot ‘the air’
‘vozduxot\’a ‘the air’
‘vozdux ‘air’
‘silo ‘village’
‘silo ‘village’
‘slo ‘village’
‘grov ‘grave’
‘grov ‘grave’

Rule: \[ \sigma \rightarrow [+\text{stress}] / \_ \_ (\sigma)(\sigma) \]_\text{word}
13. Alternating stress

14. Maranungku (Australia)

Primary stress on initial syllable, secondary stress on odd-numbered syllables after the first


15. Rules

- Primary stress: $\sigma \rightarrow [1\text{stress}] / \text{word} [\_]
- Secondary stress: $\sigma \rightarrow [2\text{stress}] / \left[ \begin{array}{c} \sigma \\ +\text{stress} \end{array} \right] \sigma [\_ \text{iterative}]

16. An iterative rule applies repeatedly until it can apply no more

17. Derivation

/ŋaltiritiri/ Underlying

ŋaltiritiri Syllabification

1

ŋaltiritiri Primary stress

1 2

ŋaltiritiri Secondary stress

1 2 2

ŋaltiritiri Secondary stress

----- Secondary stress

[ŋalti,riti,ri] Phonetic

18. Syllable weight

19. In many languages, location of stress is dependent on weight of syllables

20. Heavy syllables attract stress over light syllables
21. What counts as heavy varies from language

- Khalkha Mongolian, Yupik: CVV heavy
- Arabic, Latin: CVV, CVC heavy
- Indonesian: Non-schwa vowels heavy

22. Evidence for weight from Classical Persian quantitative meter

dʒæhan, ej bæraːdær, næmaːnæd be kæs
world O brother waits for no one
“The world, O brother, waits for no one”

del ændær dʒæhan æfærin bænd o bæs
heart to world- creator tie and enough
“Set thy heart on the creator of the world and it is enough”

This poem follows a rhythmic pattern in terms of heavy and light syllables (assuming syllables can span word boundaries, cf. Spanish)

- indicates light syllable (=CV)
- indicates heavy syllable (=CVV, CVC)

\[
\begin{align*}
\text{d} & \text{ʒ} & \text{æ} & \text{h} & \text{aː} & \text{n} & \text{e} & \text{j} & \text{b} & \text{æ} & \text{r} & \text{aː} & \text{d} & \text{æ} & \text{r} & \text{n} & \text{æ} & \text{m} & \text{aː} & \text{n} & \text{æ} & \text{d} & \text{b} & \text{e} & \text{k} & \text{æ} & \text{s} \\
\text{d} & \text{el} & \text{æ} & \text{n} & \text{d} & \text{æ} & \text{r} & \text{d} & \text{ʒ} & \text{æ} & \text{h} & \text{aː} & \text{n} & \text{æ} & \text{f} & \text{ær} & \text{iː} & \text{n} & \text{b} & \text{æ} & \text{n} & \text{d} & \text{o} & \text{b} & \text{æ} & \text{s}
\end{align*}
\]

- - - pattern repeats

23. Weight-sensitive stress

24. Classical Arabic stress

25. Preliminary facts:
- VCCV syllabified as VC.CV
- CVV, CVC are heavy

26. Data

<table>
<thead>
<tr>
<th>Word</th>
<th>gloss</th>
<th>syllable weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>'malikun</td>
<td>‘a king’</td>
<td>⋈ ⋈ ⋈</td>
</tr>
<tr>
<td>ma'likatun</td>
<td>‘a queen’</td>
<td>⋇ ⋇ ⋇</td>
</tr>
</tbody>
</table>
mali'katuhu ‘his queen’
maktabatun ‘a library’
dījā’warahū ‘it bordered it’
‘kassarat ‘she smashed’
kas’sartuhu ‘I smashed it’
‘kaṭṭibun ‘a writer’
kīta:bun ‘a book’
kassa’ru:hu ‘they smashed it’
kasar’nahu ‘we broke it’
kattībīna ‘writers’
ka’sartu ‘I broke’
sa:fartu ‘I traveled’
‘faqat ‘only’
‘qabla ‘before’
‘lan ‘not’

27. Generalization: Stress the penultimate syllable if heavy; otherwise stress the antepenultimate syllable

\[ \sigma \rightarrow [+\text{stress}] / \_ (\_ \sigma) \]_{\text{word}}

28. Conclusion about weight in Arabic: Heavy syllables preferentially attract stress, but there are certain positions in which heavy syllables do not attract stress (final syllables, heavy syllables before the antepenult)

29. A similar stress system: Main Stress in English

30. Generalizations

- If penult is light, antepenult is stressed

- If penult is heavy, it takes stress
  CVC penult: appenlix, dialecxtal, Columbus, consonantalt, ejective, suspension
  CVV penult: Oklahomta, Argenntina, assimilation, opponent, Alttooana

- Disyllables have initial stress

- Monosyllables have stress
  ‘bad, ‘sack, ‘moat, ‘spot

31. But, there are a lot of exceptional words which don’t obey these generalizations
  antetenna, Alabama, ba’nana, va’nilla
  ‘character
  police, giraffe, guitar
32. Hayes’ estimate: 87% of English vocabulary has stress which is predictable based on pattern described here

33. Tendency to regularize “exceptional” words: ‘police, ‘guitar


- ‘napna ‘shirt’
- ki’japi ‘dipper’
- mi’rikho ‘hunting stick’
- ‘mo’ki ‘to die’
- ko’jo’no ‘turkey’
- ‘na’ti:hta ‘to hurt oneself’
- qo’tosompi ‘headband’

35. Inga Quechua stress (Levinsohn 1976)

- ‘nespa ‘then, saying’
- ‘ña:m’b’ag ‘path’
- ya’war ‘blood’
- ‘pala’kuna ‘upper backs’
- kiv’nako ‘he is vomiting’
- apa’maj ‘to bring’

36. Apalai stress (Koehn and Koehn 1986)

- pa’uru ‘banana’
- kô’fi:tapâ:nô:ko ‘becoming chilly’
- firiko’zuru ‘grass’
- isapo’kara ‘jakuruaru lizard’
- kumû:kuru ‘our son’
- inikah’poino ‘from upriver’
- o’rihtopô:piri ‘death (past, poss.)’

37. Syllable weight for other phenomena

38. Weight not limited to stress and quantitative meter; other phenomena involving syllable weight

39. Minimal Word Requirements

Smallest content word is a heavy syllable

English: Minimal Word = CVC

Words may consist of a long vowel (usually but not always [+tense]) or diphthong: say, see, cow
Words may consist of a closed syllable: cat, lip, put
Words may consist of two syllables: Minna, Emma
But, no monosyllabic words consisting of a short vowel in an open syllable: *kæ, *li, *po
40. Tone

Contour tones limited to heavy syllables

Kiowa: Heavy = CVV, CVR (Watkins 1984)
  kʰʊːl ‘pull off’
  hā: ‘arise’ refl.
  kʰʊltː ‘pull off’ future
  kʰút ‘pull off’ perfective (=underlying kʰʊː-t)

41. Reduplication

Reduplicant = heavy syllable

Mokilese (Harrison 1976)

<table>
<thead>
<tr>
<th>Kasá</th>
<th>kas-kasá</th>
<th>‘throw’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poki</td>
<td>pok-poki</td>
<td>‘beat’</td>
</tr>
<tr>
<td>Wadék</td>
<td>wad-wadék</td>
<td>‘read’</td>
</tr>
<tr>
<td>Pa</td>
<td>paa-pa</td>
<td>‘weave’</td>
</tr>
<tr>
<td>Di.ar</td>
<td>dii-di.ar</td>
<td>‘find’</td>
</tr>
</tbody>
</table>

42. Representations of weight: Moraic theory (Hyman 1985, Hayes 1989)

- Heavy syllables have two moras
- Short sounds have one mora, geminates have two moras
- Onsets are moraless
- Coda weight differs depending on language

<table>
<thead>
<tr>
<th>/ta:/</th>
<th>/tap/</th>
<th>/ta/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khalkha</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

43. Compensatory Lengthening as preservation of mora count (Hayes 1989)

Latin: /kasnus/ → [kaːnus] ‘gray’
/kosmis/ → [koːmis] ‘courteous’
But:

/smereo:/ → [mereo:] ‘deserve 1sg. pres’
/snurus/ → [nurus] ‘daughter-in-law’

/kasnus/ → [kaːnus]

/smereo:/ → [mereːo]

/kasnus/ → [kaːnus]