**Class 17: Structure above the segment, part I**

To do
- Holoholo HW due tomorrow (Friday).
- Last study questions due Tuesday—Hayes 1995.
- No assignment posted tonight—last one will be posted Tuesday night, due Friday, Dec. 5.
- Draft project abstract due Tuesday.

Overview In a lot of ways, stress doesn't look like a feature. Accordingly, a type of representation called a *grid* has been proposed, to which stress rules apply.

1. A little background on syllables
- Segments seem to be grouped into syllables, which themselves show evidence (that we won't discuss) of internal structure:
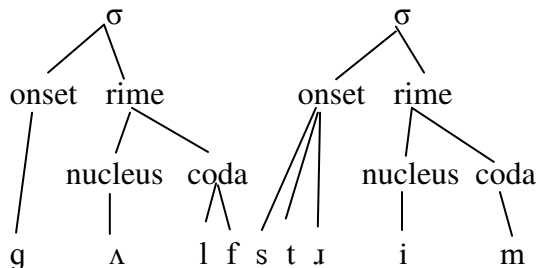
- Although SPE eschewed syllables, they were quickly readopted because they allow simplification of lots of rules and constraints (e.g., all "/__{C,#}" rules)
- It's not always clear where the boundaries between syllables are (gi.ven? giv.en? giv.ven?)
- Be skeptical of sources that claim a syllabification as though it were observable data—syllabification is always part of a phonological analysis.
  - E.g. Spanish[kó.pja] 'copy'
    - explains why the /j/ has its non-syllable-initial allophone ([j] rather than [ɟ])
    - consistent with claim that Spanish forbids [p] in coda (since we don't observe them word-finally or before non-glide/liquid Cs)
    - consistent with claim that Spanish allows [pj] onset, since words can begin [pj]
  - vs. Tagalog [kóp.ja] 'copy' (loan from Spanish)
    - explains why suffixed form is [kópja-hin] ~ [kòpja-hín] (only roots with stressed, closed penult show this pattern)
    - consistent with observing lots of words that end in [p]
- Stress seems to be a property of syllables, not segments
  - You can't have a syllable where the onset C is [+stress] and the nucleus V is [–stress], for example.

2.   What is stress?

- Not all languages have it.
- Among those that do, stress doesn't have a fixed phonetic realization. Stressed syllables tend to…
    - have longer duration
    - be louder
    - support a larger set of vowel contrasts (see Crosswhite 2001; Barnes 2006 for surveys)
    - have longer VOT, more fortition on their consonants (see Lavoie 2001; González 2002 for surveys)
    - attract glottalization and aspiration away from unstressed
    - be associated with pitch excursions (high or low, depending on utterance melody)[1]
- This means stress isn't something you can hear, see in a spectrogram, or ask a speaker to intuit—it's the result of a phonological analysis to explain traits like those listed above.
    - That's why phonologists can disagree about a word's stress pattern, or even about whether a certain language has stress (French, Korean...)

- It's better to define stress as an abstract prominence relation:
    - Some syllables are more prominent (stressed) than others, and this has phonetic and phonological consequences, depending on the grammar, such as those listed above.

3.   Stress as a feature? (see Hayes reading for more)

- Other features don't (usually) shift from segment to segment based on distance from a word edge:

    órigin   o**rí**ginal   orìgi**ná**lity
    phótogràph   pho**tó**grapher   phòto**grá**phic

- Other features don't (usually) act at long distances across other instances of that feature:

    Mìssi**ssí**ppi   vs. **Mí**ssissìppi **lé**gislàtors

- Languages don't require every content word to have at least one + value of other features (except maybe [syllabic], which not all theories have).
- For just about every other feature, there is some language where it assimilates—but I know of no rules of stress assimilation, only stress dissimilation.

---

[1] This is what makes stress different from pitch accent. A pitch-accented syllable always gets the <u>same</u> tone or tone contour. So what makes pitch accent different from tone? Maybe nothing really: see Hyman 2009.

4. The grid

- The prominence relation is often represented as a *grid* (Liberman 1975).
  - ▪ Rows (a.k.a. 'layers') represent degrees of stress;
  - ▪ columns are associated with stress-bearing units (syllables, typically).

```
                    x
x                   x               Example from Hayes
x         x         x
x    x    x    x    x    x
re   con  ci   li   a    tion
```

- Grids are assumed to be subject to the (inviolable) Continuous Column Constraint
  - ▪ For every grid mark (except on the bottom layer) there must be a grid mark in the same column on the layer below.

5. Payoff I: Locality

- English <u>phrasal stress rule</u> (a.k.a. <u>nuclear stress rule</u>)
  - ▪ Place main stress on the last word of a phrase,[2] even though this is sometimes several syllables from the end of the phrase
  - ▪ Example from Hayes: *hypothètical ímitators*, which could also perhaps be *hỳpothetical ímitators*.
- The grid allows us to state the rule very locally.
  - ▪ Any amount of white space is allowed between and on either side of *x*s on the same layer when matching representations up to the structural description
  - ▪ The structural description could match any (adjacent) rows of the grid:

$$\begin{bmatrix} \\ x\ x \end{bmatrix} \rightarrow \begin{bmatrix} \quad x \\ x\ x \end{bmatrix}$$
= "if the top layer of the grid has exactly two marks, add another mark to the second one"

- o Draw grids for *hypothetical* and *imitators* in isolation, then put them together and apply this rule.

---

[2] This can be overridden by focus. Also, watch out for compounds.

- The optional English <u>rhythm rule</u> (Prince 1983): really an interaction between a constraint NOCLASH and a rule Move-X.

    NOCLASH: * x x   (if two grid marks are adjacent on their layer, the grid marks under
                              x x   them can't also be adjacent on their layer)

    Move-X: Move one grid mark along its layer (triggered by NO-CLASH)

    ▪ English-specific detail: only leftward movement is allowed here.

o Draw the grids for *Mississippi* and *legislators*. If you put them together, is NO-CLASH violated?

o Apply Move-X if necessary—where can X move to without violating the Continuous Column Constraint?

o In what way might this operation appear non-local? In what way is it local?

6. Payoff II: Consequences of the Continuous Column Constraint

- <u>The rich get richer</u>: in the rhythm rule, Prince notes that the stress retracts onto the strongest preceding syllable. Here are some of Hayes's examples.

o Draw grids for *Sunset Park* and *Zoo*, and then put them together and apply Move-x to resolve/alleviate the clash. What would be the permissible landing sites for the moved *x* if the Continuous Column Constraint didn't exist?

o Let's use the rhythm rule to figure out grids for *totalitarian tendencies* (more than one possible outcome?) and *Constantinople trains*

- <u>And the poor get poorer</u> (Hayes): Consider the derivation of *paréntal* from *párent*.
    - ▪ When –*al* is added, assume that, rather than recalculating stress entirely, the Level 2 stress rules merely add stress to the penult (*páréntal*).
    - ▪ Then assume that main stress is assigned to *rent* (*pàréntal*).

o Draw the grid for *pàréntal*. What constraint is now violated? Can Move-X help?

o Assume a rule 'Delete (one) *x*' that can be triggered by constraint violation (though not by NOCLASH, apparently). What options do we have for applying that rule?

7. The perfect grid—describing four basic stress systems
- Prince proposes that the four basic stress types of Hayes 1980 can be achieved through setting two parameters for lining up syllables with a *perfect grid*:

```
      x     x     x
 … x  x  x  x  x  x  x …
```

(a) where to start on the grid: peak or trough
(b) where to start in the word: beginning or end
o What are the parameter settings for each of the following four languages (don't worry about primary vs. secondary stress)? [taken from Hayes]

Maranungku (aka Maranunggu, Australian lang. from Australia, highly endangered; data orig. from Tryon 1970)

tí.ralk	'saliva'
mé.re.pèt	'beard'
yán.gar.mà.ta	'the Pleiades'
láng.ka.rà.te.tì	'prawn'
wé.le.pè.ne.màn.ta	'kind of duck'

Weri (Trans-New Guinea, PNG, 4,000 speakers; data orig. H. Boxwell & M. Boxwell 1966)

ŋin.típ	'bee'
kù.li.pú	'hair of arm'
u.lù.a.mít	'mist'
à.ku.nè.te.pál	'times'

Warao (Language isolate, Venezuela, 28,000 speakers; data orig. from Osborn 1966)

yi.wà.ra.ná.e	'he finished it'
yà.pu.rù.ki.tà.ne.há.se	'verily to climb'
e.nà.ho.rò.a.hà.ku.tá.i	'the one who caused him to eat'

Araucanian (data originally from Echeverria & Contreras 1965)
Family consisting of Mapudungun (Chile & Argentina, 300,000 speakers) & Huilliche (Chile, 2000 speakers).

wu.lé	'tomorrow'
ṭi.pán.to	'year'
e.lú.mu.yù	'give us'
e.lú.a.è.new	'he will give me'
ki.mú.ba.lù.wu.lày	'he pretended not to know'

- Additional parameter: add a grid mark on the top level at either the beginning or the end of the word.

o Which setting does each of the four languages above have?

o Consider Araucanian *elúmuyù*: how does the extra grid mark end up in the right place?

Next time: Adding feet to the grid; ALIGN constraints.

Now we'll look at some abstracts I brought

References

Barnes, Jonathan. 2006. *Strength and Weakness at the Interface: Positional Neutralization in Phonetics and Phonology*. Mouton de Gruyter.

Boxwell, H. & M. Boxwell. 1966. Weri phonemes. In S. A Wurm & S. A Wurm (eds.), *Papers in New Guinea Linguistics*, vol. 5, . Canberra: Australian National University.

Crosswhite, Katherine. 2001. *Vowel Reduction in Optimality Theory*. Routledge.

Echeverria, Max S & Heles Contreras. 1965. Araucanian phonemics. *International Journal of American Linguistics* 31. 132–135.

González, Carolina. 2002. The effect of prosodic structure in consonantal processes. University of Southern California dissertation.

Hale, Kenneth & Josie White Eagle. 1980. A preliminary metrical account of Winnebago accent. *International Journal of American Linguistics* 46. 117–132.

Hayes, Bruce. 1980. A Metrical Theory of Stress Rules. MIT.

Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies*. Chicago: The University of Chicago Press.

Hint, M. 1974. *Eesti Keele Sonafonoloogia I*. Tallinn: Keele ja Kirjanduse Instituut.

Hyman, Larry M. 2009. How (not) to do phonological typology: the case of pitch-accent. *Language Sciences* 31(2-3). 213-238. doi:10.1016/j.langsci.2008.12.007.

Lavoie, Lisa M. 2001. *Consonant Strength: Phonological Patterns and Phonetic Manifestations*. Routledge.

Liberman, Mark. 1975. The Intonational System of English. MIT.

Lunden, S.L. Anya. 2006. Weight, final lengthening and stress: a phonetic and phonological case study of Norwegian. University of California, Santa Cruz dissertation.

Miner, Kenneth. 1979. Dorsey's Law in Winnebago-Chiwere and Winnebago Accent. *International Journal of American Linguistics* 45. 25-33.

Osborn, Henry A. 1966. Warao I: Phonology and Morphophonemics. *International Journal of American Linguistics* 32(2). 108–123.

Prince, Alan. 1983. Relating to the grid. *Linguistic Inquiry* 14. 19–100.

Topintzi, Nina. 2008. On the existence of moraic onset geminates. *Natural Language and Linguistic Theory* 26(1). 147-184.

Tryon, D. T. 1970. *An Introduction to Maranungku (Northern Australia)*. Canberra: Australian National University.