**Class 19: Stress III**

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

depending on the language
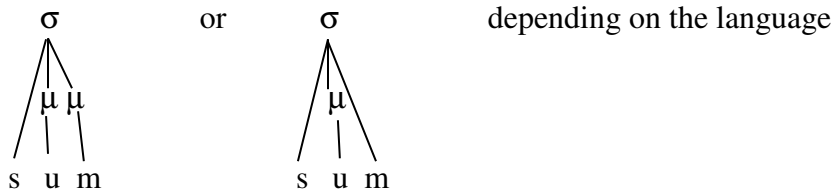
- Syllable weight
  1 mora: light syllable
  2 moras: heavy syllable
  3 moras: superheavy syllable

  o How could a syllable have 3 moras?

---

2.   Reasons to add moras to the theory

- <u>Syllables with more moras often attract stress,</u> leading to this constraint (Prince 1990):

  WSP ("weight-to-stress principle"): a heavy syllable must be stressed

  - Before moras you had rules like V → [+stress] / __ C{C,#}
  - Doesn't capture the typology (why not V → [+stress] / __ CV instead?)

- <u>Compensatory lengthening</u> (Hayes 1989)

Latin historical change	*kas.nus > kaː.nus	'gray'
	*kos.mis > koː.mis	'courteous'
	*fi.des.li.a > fi.deː.li.a	'pot'

Turkish free variation		sav.mak →optionally saː.mak	'to get rid of'
	but	da.vul →optionally da.ul	'drum'

o 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 > oː.dos	'threshold'

o Draw the moras and syllable structure for [woi.kos], [ne.wos], [od.wos], and ponder.

Middle English (originally from Minkova 1982) ta.lə > taːl 'tale'

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

Unattested cases sa → aː
sla → saː

o Why don't these occur?

- Asymmetric foot inventory

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

	trochees	*iambs*
quantity-insensitive	**attested**	maybe unattested?
quantity-sensitive	**attested: moraic (LL), (H)**	**attested: "uneven" (LH), (H), (LL)**

  - Hayes (1995) argues, through an extensive typological survey, that these 3 are the only foot types. There are claimed to be <u>no languages with syllabic iambs</u>.

    - 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
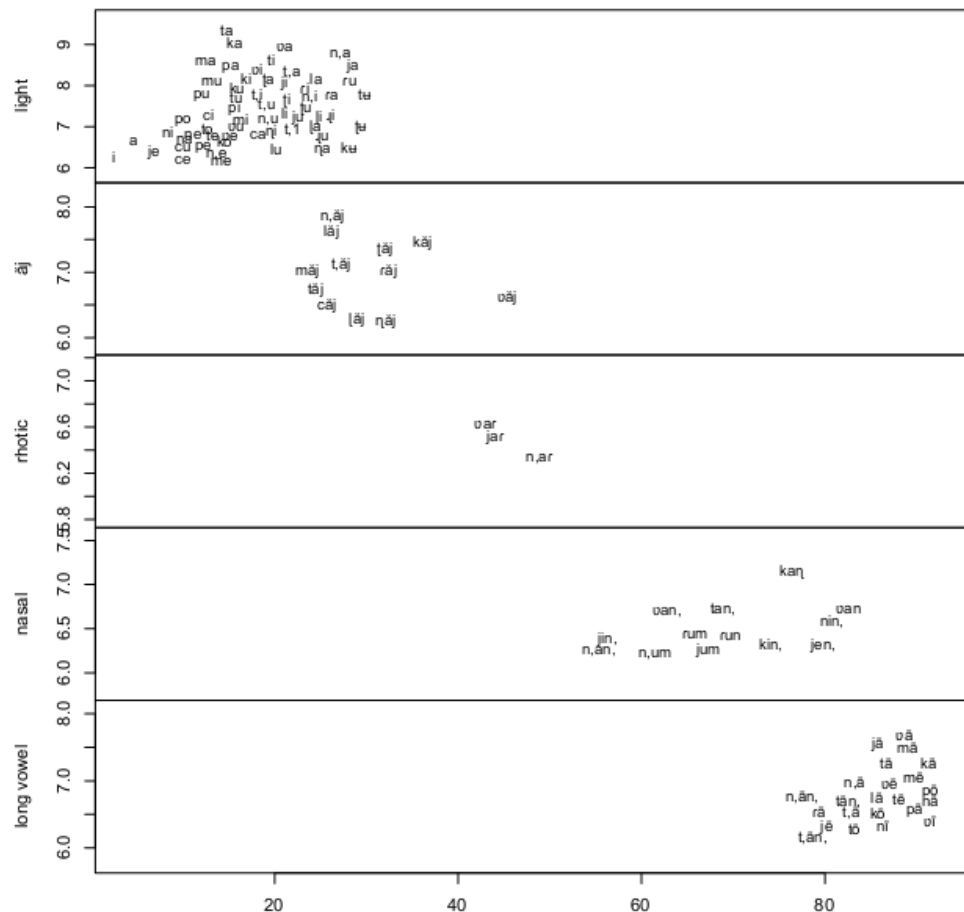

horizontal axis: percentage of the time each syllable type acts as though heavy in verse.

each vertical slice: a different syllable type

vertical axis within slice: log frequency of each type (doesn't seem to play much role, but helps spread out the points so they're more visible).

Figure 14: Figure 13 filtered into five phonological classes.　　　(Ryan 2011a p. 21)

- 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".

- Here's Ryan's English real-word data:
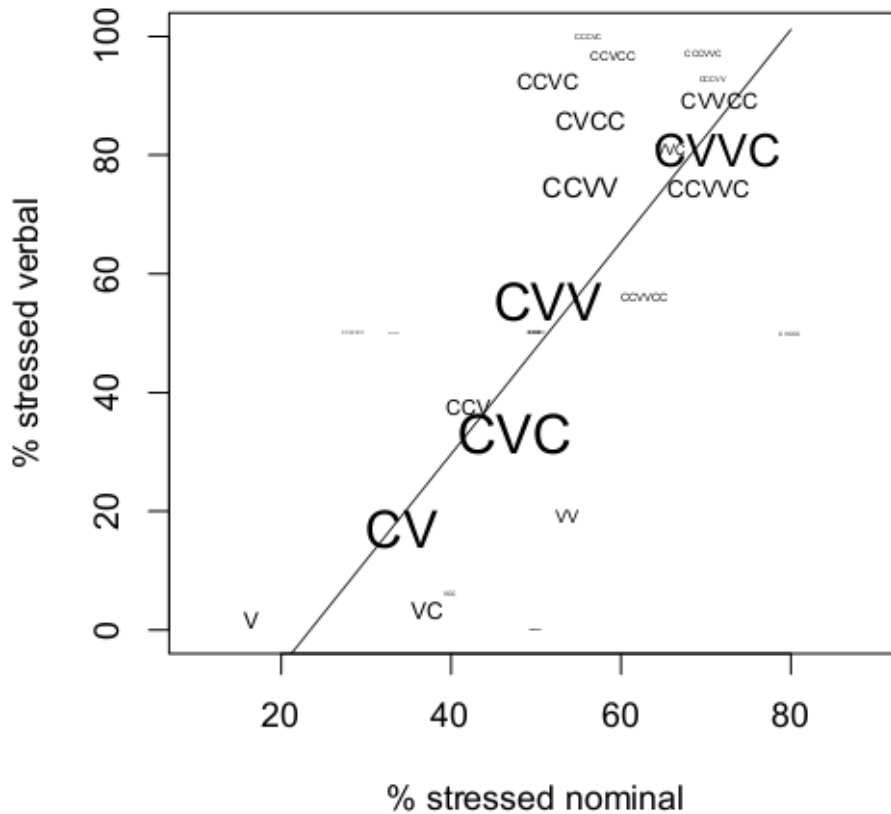
Size of font indicates frequency.

Notice that more-complex onset leads to more stress.

(Ryan 2011a, p. 179)

4.   Long exercise: Manam
Austronesian, Papua New Guinea, 8,000 speakers (Ethnologue & Gordon 2005). Data from Lichtenberk 1978, Lichtenberk 1983, Buckley 1998 .

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

1.	ú	'kind of fish trap'	*try drawing feet first*
2.	gá	'*Morinda citrifolia*'	• trochaic or iambic?
3.	máŋ	'bird'	• right- or left-aligned?
4.	pá.tu	'stone'	• what happens to leftovers:
5.	dá.mʷa	'forehead'	unfooted, or subminimal foot?
6.	tá.go	'not'	• which foot gets primary stress?
7.	zé.re	'sorcery'	
8.	bá.zi	'wing'	
9.	si.ŋá.ba	'bush'	
10.	ta.né.pʷa	'chief'	
11.	ga.rí.bʷa	'flower sheath of palm tree'	
12.	ì-.mo.ná.qo	'*3sg.rl*-eat'	
13.	ta.nè.pʷa-.tí.na	'chief-*int*'	
14.	bò.ta.zí.ŋa	'hole'	

15.	mó.a	'penis'	these shouldn't present any
16.	sá.i	'spoon'	problems for a preliminary analysis
17.	ró.a	'spouse'	based on 1-14. But once you're
18.	á.e	'leg'	done, check that these still work.
19.	so.ʔá.i	'tobacco'	
20.	ʔe.té.a	'side of canoe opposite outrigger'	
21.	ì-.bo.qá.u	'*3sg.rl*-be.bent'	
22.	ʔò.a.dé.ʔa	'then'	
23.	bò.a.zí.ŋa	'hole'	
24.	i-.mò.a.tú.bu	'*3sg*-be.heavy'	*explain why these are different*
25.	lún.ta	'moss'	
26.	móm.bʷa	'victory leaf'	
27.	u.táŋ	'*1sg.rl*-cry'	
28.	ém.be.ʔi	'sacred flute'	note: not *[èm.bé.ʔi]
29.	úŋ.gu.ma	'person from a village other than one's own'	
30.	èm.be.ʔi-.tí.na	'sacred.flute-*int*'	
31.	i-.dàn-.dàn-.la-.lá.ʔo	'*3sg.rl*-crawl-*rpl*-*lim*-thither'	not *[i-dan-dàn-la-láʔo]
32.	mòm.bʷa-.tí.na	'victory.leaf-*int*'	
33.	mà.la.bóŋ	'flying fox'	
34.	ná.i.ta	'who?'	*explain why these are different*
35.	mó.a.si	'song'	• why do these candidates win, instead of the candidate you would have expected based on the analysis up until now?
36.	ʔá.o.ga	'two pieces of wood rubbed against each other to produce fire'	
37.	bó.e.sa	'Boesa Island'	
38.	gó.a.i	'star'	
39.	tá.u.a	'trading partner'	• you'll have to invent a constraint here
40.	ta.mó.a.ta	'man'	
41.	i-.pò.a.sa.gé.na	'*3sg.rl*-be.tired'	
42.	gò.a.i-.tí.na	'start-*int*'	
43.	rò.a-.na-.tí.na	'her real husband'	
44.	jà.u.ja-.tí.na	'good-*int*'	
45.	j-u.n-à.u-.tí.na	'he hit me a lot'	
46.	wà.u.wá.u	'new'	
47.	di.sò.a.ʔi.nó.ʔa	'they sat down first'	
48.	bi.éŋ	'Bieng (place)'	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 $*\begin{bmatrix} -son \\ +voice \end{bmatrix}$ #

  - 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).
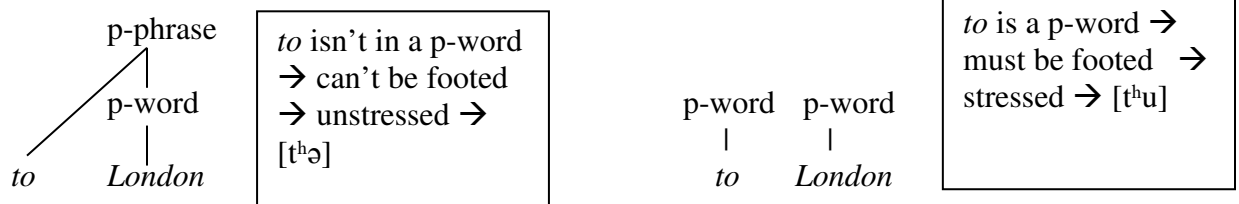 - And there can be conflicting constraints that disturb the relationship

6.   English example

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

	strong	*weak*
to	tʰu	tʰə
at	æt	ət
for	foɹ	fɚ
a	eɪ	ə
and	ænd	n̩

o   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 isn't in a p-word → can't be footed → unstressed → [tʰə]

to is a p-word → must be footed → stressed → [tʰu]

- To avoid cluttering the tableau, assume that the "t[u]"'s form a foot with stress; "t[ə]"'s are unfooted.

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

to London	ALIGN (LexWd,L,PWd,L)	ALIGN (PWd,R,LexWd,R)	FOOTMUST BEDOMINATED BYPWORD
a [tʰ**u** London]ₚᵂ𝒹			
b [tʰ**ə** London]ₚᵂ𝒹			
c tʰ**u** [London]ₚᵂ𝒹			
d tʰ**ə** [London]ₚᵂ𝒹			
e [tʰ**u**]ₚᵂ𝒹 [London]ₚᵂ𝒹			
f [tʰ**ə**]ₚᵂ𝒹 [London]ₚᵂ𝒹			

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

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

o 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?

looking at	ALIGN (LexWd,R, PWord,R)	ALIGN (PPhrase,R, Pwd,R)	ALIGN (PWd,R, LexWd,R)	FOOTMUST BEDOMINATED BYPWORD	PWORDMUST CONTAIN FOOT
a [looking **æ**t]ₚᵂ𝒹					
b [looking **ə**t]ₚᵂ𝒹					
c [looking]ₚᵂ𝒹 [**æ**t]ₚᵂ𝒹					
d [looking]ₚᵂ𝒹 [**ə**t]ₚᵂ𝒹					
e [looking]ₚᵂ𝒹 **æ**t					
f [looking]ₚᵂ𝒹 **ə**t					

⇒ *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.

[ɔnt.[ʔɛi.χən]ᵥ]ᵥ 'dispossess'   [[kɛrk]ɴ.[ʔœyl]ɴ]ɴ 'barn owl'   [[teː.kə.n]ᵥ ɪŋ]ɴ 'drawing'
[ɔn.[ʔeː.vən]ᴀ]ᴀ 'uneven'   [[rɛin]ɴ.[ʔaːk]ɴ]ɴ 'Rhine barge'   [[ʋɑn.də.l]ᵥ aːr]ɴ 'walker'

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

(ɔnt.)-(ʔɛi.χən)   (kɛrk.)-(ʔœyl)   (teː.kə.nɪŋ)
(ɔn.)-(ʔeː.vən)   (rɛin.)-(ʔaːk)   (ʋɑn.də.laːr)

o Let's fill in the alignment constraints:

/[ɔn [ɛːvən]ᴀ]ᴀ/				Dᴇᴘ-ʔ	NᴏCᴏᴅᴀ
☞ (ɔn.)(ʔɛː.vən)					
(ɔ.n)(ɛː.vən)					
(ɔ.nɛː.vən)					

/[[teːkən]ᵥ ɪŋ]ɴ /				Dᴇᴘ-ʔ	NᴏCᴏᴅᴀ
☞ (teː.kə.nɪŋ)					
(teː.kən.)(ʔɪŋ)					
(teː.kə.)(nɪŋ)					

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

/[rip]ᵥ [ən]det [kɑt]ɴ/ called a cat				Dᴇᴘ-ʔ	NᴏCᴏᴅᴀ
a (riːp.)(ʔən.)(kɑt)					
b (riː.pən)(kɑt)					

8. More evidence in Dutch: long-vowel diphthongization (p. 252)

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

[meᵊr]ɴ   'more'   [køᵊ.ˈraːl]ɴ   'coral'
[χøᵊr]ɴ   'smell'   [[koᵊr]ᵥ ɪŋ]ɴ   'test'

o   Why doesn't the alternation apply here:

[[[meː [rɛi.z]ᵥ]ᵥ₋ₙ]ᵥ   'to accompany'   [[køː]ɴ [rɪŋ]ɴ]ɴ   'cue ring'

[[mil.jøː]ɴ [ri.zi.kŏ]ɴ]ɴ 'environmental hazard'   [neː.oː[[reː.v]ɴ ians]ₐ]ₐ 'neo-Revian'

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

just spelling here, not IPA

	[[land]ɴ[bouw]ɴ]ɴ en [[tuin]ɴ[bouw]ɴ]ɴ	*optionally becomes*	land- en tuinbouw
	agriculture and horticulture		agri- and horticulture
but:	[[absurd]ₐiteit]ɴ en [[banal]ₐiteit]ɴ	*cannot become*	*absurd- en banaliteit
	absurdity and banality		absurd- and banality

o   Why not **absurd- en banaliteit*?

┌───┐
│ **Next time:** Course wrap-up and prospect; tips on next week's presentations, incl. handouts │
└───┘

References

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

Booij, Geert E. 1985. Coordination reduction in complex words: a case for prosodic phonology. In Harry Van der Hulst & Norval Smith (eds.), *Advances in Nonlinear Phonology*, 143–160. Dordrecht: Foris.

Buckley, Eugene. 1998. Alignment in Manam stress. *Linguistic Inquiry* 29. 475–496.

Chomsky, Noam & Morris Halle. 1968. *The Sound Pattern of English*. Harper & Row.

Ethnologue & Raymond G. Gordon. 2005. Ethnologue: Languages of the World, Fifteenth edition.

Gordon, Matthew. 2002. A Phonetically Driven Account of Syllable Weight. *Language* 78(1). 51–80.

Gordon, Matthew. 2005. A Perceptually-Driven Account of Onset-Sensitive Stress. *Natural Language & Linguistic Theory* 23(3). 595–653.

Gussenhoven, Carlos & Haike Jacobs. 1998. *Understanding Phonology*. Oxford: Oxford University Press.

Hayes, Bruce. 1989. Compensatory Lengthening in moraic phonology. *Linguistic Inquiry* 20. 253–306.

Lichtenberk, Frantisek. 1978. Thematic Consonants in Manam Transitive Verbs. *Anthropological Linguistics* 20(5). 185–193.

Lichtenberk, Frantisek. 1983. A Grammar of Manam. *Oceanic Linguistics Special Publications*(18). i–647.

Minkova, Donka. 1982. The environment for open syllable lengthening in Middle English. *Folia Linguistica Historica* 3(1). 29–58.

Peperkamp, Sharon. 1997. *Prosodic Words*. The Hague: Holland Academic Graphics.

Prince, Alan. 1990. Quantitative consequences of rhythmic organization. In M. Ziolkowski, M. Noske & K. Deaton (eds.), *Parasession on the Syllable in Phonetics and Phonology*, 355–398. Chicago: Chicago Linguistic Society.

Ryan, Kevin M. 2011a. Gradient weight in phonology. University of California, Los Angeles Ph.D. dissertation.

Ryan, Kevin M. 2011b. Gradient Syllable Weight and Weight Universals in Quantitative Metrics. *Phonology* 28(03). 413–454.

Ryan, Kevin M. 2014. Onsets contribute to syllable weight: Statistical evidence from stress and meter. *Language* 90(2). 309–341. doi:10.1353/lan.2014.0029.

Selkirk, Elisabeth. 1995. The prosodic structure of function words. In Jill Beckman, Laura Walsh Dickey & Suzanne Urbanczyk (eds.), *University of Massachusetts Occasional Papers: Papers in Optimality Theory*, 439–470. Amherst, Mass.: GLSA Publications.

Topintzi, Nina. 2006. Moraic onsets. University College London.

Topintzi, Nina. 2010. *Onsets: Suprasegmental and Prosodic Behaviour*. Cambridge University Press.