Linguistics 201A Winter 2023
Phonological Theory I B. Hayes

Class 19, 3/16/23: Stress II

1. Bureaucratic

- I can do appointments; Email queries would also be fine.
- I will meet office hours today at 2 on zoom: https://ucla.zoom.us/j/9777928981
- Future "one-person talks": we can schedule, I may be able to come in person, else we can zoom.
- Due date for such talks is Wed. Mar. 22 (mid Finals Week)
- Due date for the term paper itself is Mon. Mar. 27th (first day of Spring Break)

2. Protocol for today

- Be warned my laptop has sudden-shutdown issues, I'll come back as soon as I can.
- If I bail *personally* due to covid, please collectively go through the handout for the rest of the period.

3. Current assignments

- None other than final "talk" and paper, above.

4. Stress has a special typology

- Culminativity
- Strong gets stronger —
- Attachment to syllables, not segments
- Frequent though not inevitable rhythmic distribution

5. Hierarchical representation

- Foot and Prosodic Word as headed domains
- A metrical grid that marks headship and denotes clash.

```
(           x  )
(x . )(x .)(x .)
recon cili ation
```

6. Grids

- These have an ancestry from the 1980's
- Ray Jackendoff and Fred Lerdahl (1983) *A generative theory of tonal music* — hugely influential.
- In draft at the same time as Liberman's doctoral dissertation.

STRESS RULE TYPOLOGY

7. Trivial edge systems

- French and Persian are final, Korean and Bengali are initial
  - ... without secondary stress
- We can do this with ALIGN(Word, Left, x) and ALIGN(Word, Right, x)
  - Counting violations: ALIGN(Words, Left, x) based on number of syllables preceding the first stress
- Similar versions of align require that the word begin not with a stress per se, but with a foot containing the stress.
  - E.g. ALIGN(Word, Left, Foot, Left)

8. "Morphological" stress systems

- Often called accent systems.
- They work well in OT, don't rely much on metrical properties.
- Let stress be a phonemic property, morphemes can contrast for it, or for which syllable has stress.
- So there is IDENT(stress) — suitably formalized to match "x" – "no x"
- There are adjudicating constraints Leftmost and Rightmost
- Leftmost:
  - Place the actual stress on the leftmost possible place (penalize by counting pretonic syllables)
  - If dominated by IDENT, the "leftmost accented else leftmost" — Indoeuropean, Cupeño

9. Complications

- We need something, probably quite ad hoc, for "preaccenting" and "postaccenting" affixes, which are common in these systems.

10. Languages

- They are all over the world
- Ancient Greek, Sanskrit, Slavic, Baltic
- Russian, Modern Hebrew
- Japanese — but since it's not stress, there can be unaccented words.

11. Literature

- Work of John Alderete (Simon Fraser), Tony Yates (UCLA)
- Work of Morris Halle and Paul Kiparsky on Indo-European languages
- Purely-analytic work on the made-up "Paka" language family, invented by Bruce Tesar (see 2014 book) — a widely used toy example for mathematical phonologists.

SYLLABLE WEIGHT

12. This is now a much better understood topic

- Book by Kevin Ryan (*Prosodic Weight*, 2019) gives typology, phonetic explanation
- Matt Gordon (2007 book *Syllable Weight*), relied on in part by Ryan also has excellent typology and phonetic theory.
- Basically, there are two main systems
  - Only CVV heavy
  - CVV and CVC heavy
- But many details and amendments, many of them phonetically sensible

13. Two constraints used to connect stress and weight

- WEIGHT-TO-STRESS
  - Violated if there is a heavy syllable that doesn't have stress.
  - Responsible for the stress-attracting property of heavy syllables.
- STRESS-TO-WEIGHT
  - Violated if there is a stressed syllable that isn't heavy.
  - Responsible for frequent tonic lengthening and gemination. /páta/ → [pá:ta] (Italian) or [pátta] (Yupik).

14. Another family of systems producible with these ingredients: "Default to same"

- WEIGHT-TO-STRESS >> LEFTMOST >> RIGHTMOST

- Assume only one metrical layer.

  - If just one heavy, it must get the stress.
  - If more than one heavy, the leftmost gets the stress.
  - If no heavy, leftmost gets the stress.

- This is just like morphological accent, except that the role of underlying stress is taken by weight.

15. Examples of "default to same Left" from my old book

Language	*Info*	*Counts as heavy*
Amele	Gum, Papua New Guinea	CVC (no phonemic CVV)
Au	Torricelli, New Guinea	contains [i,a,a:,o,u] vs. [ɨ,ᵃ]. Vowel length apparently irrelevant.
Lhasa Tibetan		CVV
Lushootseed	Salishan, Washington	non- schwa vowel; vowel length is phonemic, but short non-schwa vowels attract stress
Mongolian	Altaic	CVV
Murik	Lower Sepik, New Guinea	CVV

Yana	Hokan, N. California	CVV, CVC

16. Is there "default to opposite"?

- E.g. "rightmost heavy else leftmost"
- People certainly used to think so but perhaps now in doubt — these systems are not well documented empirically.
- Gordon, Matthew (2000) Re-examining default-to-opposite stress. In *Berkeley Linguistics Society*, vol. 26, no. 1, pp. 101-112.

RHYTHMIC STRESS: KEY ELEMENTS

17. This is a classic area for factorial typology

- Ideally, all we will have to do is discover the right constraints and OT/factorial will do the rest, showing how well the constraint inventory matches typology.

18. NON-FINALITY

- This has been widely observed: that otherwise valid metrical constraints are overridden to keep stress off of final syllables.
- We used it, freely ranked, in our analysis of Finnish from Class 1.

[ˈra vin ˌto lat] obeys NonFinality 'restaurants'
[ˈra vin to ˌlat] avoids a bad foot

- Three versions are needed:
  - "Don't stress the final syllable"
  - "Don't put stress on the final foot"
  - "Don't let the final syllable be part of a foot"

19. A simpler example of NONFINALITY: Hopi (Jeanne 1981)

(10) a. táavo 'cottontail'
páawikʸa 'duck'
b. ʔácvewa 'chair'
léstavi 'roof beam'
c. qötősompi 'headband'
melóoni 'melon'
kóho 'wood', *wári* 'to run', *láho* 'bucket'.

- This is the first version of the above three, overriding the construction of a left-edge iambic foot.

20. Extrametricality

- Before OT the work of NONFINALITY was often done with a form of hidden structure, "extrametricality" diacritics, in Hayes (1980, 1981, 1995, other people)
- It seems obviously the result of constraint ranking from the OT perspective, at least to me.
- Yet occasionally some analysts bring extrametricality back …

21. PARSE-SYL

- In some analyses it pays to leave syllables unfooted — often this gets ternary stress intervals from binary feet, when violated.
- We saw this in our Finnish analysis (Day 1), where you skip a syllable in order to avoid making a quantitatively bad foot.

```
  (x               )
  (x   .)    (x   .)
['ka las te ˌlem me]                    'we're fishing'
```

(same for *rávintolàt*, above)

22. FT-BIN

- Many languages don't want to form the smallest possible foot.
  - *foot of one syllable, where quantity irrelevant
  - *foot of one mora, where quantity relevant
- Indeed, often the minimal foot is the minimal word.

23. ALL-FEET-LEFT, ALL-FEET-RIGHT

- This is the OT version of directionality, counting up all syllables to the (L/R) of all feet.
- We've done it for Indonesian to get the "middle foot" of a seven-syllable word in the right place.
- It does massive counts (one syllable count per foot) and is computationally problematic to some.

24. LEFTMOST/RIGHTMOST

- When there are multiple feet, prefer to lodge the main stress mark on the leftmost/rightmost available lower grid mark.

25. *CLASH

- No adjacent stressed syllables.
- This obcures OO-correspondence in English (seen e.g. in *assìmilátion* vs. *clàssificátion*):
  - *Atómic* cannot inherit from *átom* because *ÀTÓMIC would have a clash
  - *CLASH >> IDENT-OO(stress)

- Sometimes hard to tell whether it is *CLASH or FTBIN at work, as here.
- A cute comparison is *Fràncisco* vs. *Sàn Fr*[ə]*ncísco*, where medial heavy syllables in English can get destressed.

26. Hardest part — defining possible foot types

- Hayes (1995) suggested we get interesting typological predictions if we adopt a primitive sets of three foot types, which is asymmetrical

Foot type	*Optimal version*	*Less preferred*
Syllabic trochee	two syllables, left strong **[táp tap]**	stressed monosyllable **[táp]**
Moraic trochee	either two syllables left strong **[tá ta]** or monosyllabic heavy **[táp]**	stressed light **[tá]**
Iamb	two syllables, right strong, left light and right heavy **[ta táp]**	two lights or one heavy **[ta tá]**, **[táp]** worse: one light [tá]

- He relies on results of early-20th-century psychologists, "Iambic-Trochaic Law," that iambic rhythm tends to be durationally contrastive, trochaic durationally even.
  [Amazingly large and inconclusive followup literature!]
- Notably, iambic systems often beef up LĹ to LH́
- Strikingly, moraic trochee systems are reluctant to beef up LL to H́L, despite WEIGHT TO STRESS.
  - Hayes, Bruce. "Iambic and trochaic rhythm in stress rules." In *Annual Meeting of the Berkeley Linguistics Society*, vol. 11, pp. 429-446. 1985.
  - Prince, Alan. "Quantitative consequences of rhythmic organization." *CLS* 26, no. 2 (1990): 355-398. (Hayes 1985 BLS, Prince 1990)

27. The Hayes inventory is too elaborate and needs to be simplified using constraints

- Kager includes the constraints BE IAMBIC and BE TROCHAIC
  - These are a good idea, since in some languages iambic and trochaic feet actually compete.
- He also suggests END FOOT IN HEAVY as a possible formalization.
- Note that the Finnish pattern (trochees, but avoid iambic quantity) is quite natural but not included in Hayes's old system.

28. All else is ordinary OT

- MAX and DEP to govern syllable loss, quantity changes.
- IDENT(stress): both IO for phonemic stress and OO
- Parallelism, so that when you change something somewhere you needn't do any fancy footwork to attend to its consequences elsewhere — candidates are just candidates.

- Factorial typology, and testing for
  - Undergeneration
  - Overgeneration

PARADEBEISPIELE FOR THE THREE MAJOR FOOT TYPES

29. Source of example clips

- Hayes (1995, *Metrical Stress Theory*), which see also for empirical discussion and full refs.

30. Syllabic trochees in Pintupi

- Pama-Nyungan, Australia, work of Hansen and Hansen

(1)	a. σ́ σ	*páɳa*	'earth'
	b. σ́ σ σ	*tʲúʈaya*	'many'
	c. σ́ σ σ̀ σ	*máʟawàna*	'through from behind'
	d. σ́ σ σ̀ σ σ	*púʟiŋkàlatʲu*	'we (sat) on the hill'

31. Rough OT analysis

FEET ARE SYLLABIC TROCHEES	undominated
FTBIN	undominated
PARSE SYLLABLE	only dominated by FtBin
ALL-FEET-LEFT	mimicking left-to-right construction
LEFTMOST	undominated

32. Correct parses for 4 and 5 syllables

```
(x)          )      (x              )
(x   .)(x   .)      (x   .)(x   .)
 σ   σ   σ   σ       σ   σ   σ   σ   σ
```

33. Minimal word in Pintupi

- This is two syllables.
- Presumed ranking for Rich Base phonotactics: FTBIN >> DEP
- This is a common ranking for all foot types; in many languages the minimal word is the same as the supraminimal foot

34. Creek

- Muskogean, Oklahoma
- Data and generalizations mostly from UCLA work of 1980s (Munro and her students); the locals feel pretty sure this description is right.

(4) a.	/⌣ ◡́/	*cokó*	'house'	
		ifá	'dog'	
b.	/⌣ ◡́ ⌣/	*am-ífa*	'my dog'	
		osána	'otter'	
c.	/⌣ ⌣ ⌣ ◡́/	*pom-osaná*	'our otter'	
		apataká	'pancake'	
d.	/⌣ ⌣ ⌣ ◡́ ⌣/	*am-apatáka*	'my pancake'	
		anokicíta	'to love'	
e.	/⌣ ⌣ ⌣ ⌣ ⌣ ◡́/	*isimahicitá*	'one to sight at one'	
		am-anokicitá	'to love mine'	
f.	/⌣ ⌣ ⌣ ⌣ ⌣ ◡́ ⌣/	*itiwanayipíta*	'to tie each other'	
		amanokic-ak-íta	'to love mine (pl.subj.)'	

(5) a.	/—́/	*fó:*	'bee'	T 162
b.	/⌣ —́/	*nihá:*	'lard'	T 162
c.	/— —́/	*hoktí:*	'woman'	Jackson 91

(7) a.	/— ⌣ ◡́/	*ta:skitá*	'to jump (sg. subj.)'	J 82
	/⌣ ⌣ — ⌣ ◡́/	*atilo:yitá*	'to gather (pl. obj.)'	J.M. p.c.
	/ —⌣ ⌣ — ⌣ ◡́/	*nafkitika:yitá*	'to hit (pl. obj.)'	J 82
b.	/— ⌣ ◡́ ⌣/	*ta:shokíta*	'to jump (dual subj.)'	J 82
	/⌣ — ⌣ ◡́ ⌣/	*tokoɬhokíta*	'to run (dual subj.)'	J 82
c.	/— ⌣ ⌣ ⌣ ◡́/	*iŋkosapitá*	'one to implore'	H 204

35. Rough OT analysis

FEET ARE IAMBS	undominated
FTBIN	undominated
PARSE SYLLABLE	only dominated by FTBIN
ALL-FEET-LEFT	mimicking left-to-right construction
RIGHTMOST	undominated

36. Correct parses for 4-lights, 5-lights, heavy + two lights, light + heavy

```
(          x)      (          x   )       (      x)      (   x)
(.   x)(.  x)      (.   x)(.  x)          (x)(.  x)      (.  x)
 v   v  v  v        v   v  v  v  v          -  v  v        v  -
```

37. Comments

- The tricky part is that the metrical structure is not (obviously) referred to by phonetic realization; very fancy hidden structure.

38. Cairene Classical Arabic

- Mid-century work of Harrell; mode of pronouncing Classical words by modern Cairene scholars. Similar variety on the radio at the time.
- First metrical analysis by John McCarthy (1979, *LI*)
- CVC and CVV are heavy; CVCC and CVVC are "superheavy" (trimoraic?)

(12) a. Stress the final syllable if it is superheavy or colloquial /CVː/:

/⏑ ⏖/	*katábt*	'I wrote'	Harrell 1957, 15
/– ⏖/	*haǰǰáːt*	'pilgrimages' *Cl.*	Mitchell 1975, 77
/⏑ ⏑́/	*gatóː*	'cake'	Mi 81

b. Otherwise, stress the penult provided it is heavy:

/⏑́ –/	*béːtak*	'your (m.sg.) house'	H 15
/⏑ ⏑́ ⏑/	*katábta*	'you (m.sg.) wrote' *Cl.*	Mi 78
/⏑ ⏑́ –/	*mudárris*	'teacher'	McCarthy 1979a, 446
/– ⏑́ ⏑/	*haːðáːni*	'these (m.dual)' *Cl.*	Mi 77

c. Otherwise, stress the penult or the antepenult, whichever is separated by an even number of syllables from the closest preceding heavy syllable (A), or (if there is no such syllable) from the beginning of the word (B):

i. Penultimate Stress

A.	/– ◡́ ◡/	*qattála*	'he killed' *Cl.*	Mi 77
	/◡ – ◡́ –/	*mudarrísit*	'teacher (f. construct)'	McC 446
	/– ◡ ◡ ◡́ ◡/	*ʔadwiyatúhu*	'his drugs (nom.)' *Cl.*	Mi 79
B.	/◡́ –/	*fíhim*	'he understood'	Kenstowicz 1980, 42
	/◡ ◡ ◡́ –/	*šaǰarátun*	'tree (nom.)' *Cl.*	Mi 78
	/◡ ◡ ◡́ ◡/	*katabítu*	'she wrote it (m.)'	H 15
	/◡ ◡ ◡ ◡ ◡́ –/	*šaǰaratuhúmaː*	'their (dual) tree (nom.)' *Cl.*	Mi 79

ii. Antepenultimate Stress

A.	/– ◡́ ◡ ◡/	*ʔinkásara*	'it got broken' *Cl.*	Mi 77
	/– ◡ ◡ ◡́ ◡ ◡/	*ʔadwiyatúhumaː*	'their (dual) drugs' *Cl.*	Mi 79
B.	/◡́ ◡ ◡/	*kátaba*	'he wrote' *Cl.*	Mi 77
	/◡ ◡ ◡́ ◡ ◡/	*šaǰarátuhu*	'his tree (nom.)' *Cl.*	Mi 80

- Comments
  - [qattála] is really amazing — heavy rejecting stress for a light, despite the three syllable window.

39. Constraints needed

FEET ARE MORAIC TROCHEES	
ALL-FEET-LEFT	equivalent of left-to-right footing
FTBIN	undominated (no /v/ words)
FANCY NON-FIN	We do something fancy to permit stress on final superheavy.
RIGHTMOST	undominated

40. Correct parses for representative cases

```
(      x      )    (      x         )    (   x   )    (   x      )
(x  .)(x  .)        (x  .)(x  .)(x  .)    (x)(x  .)    (x)(x  .)
 v  v  v  v  v       v  v  v  v  v  v       –  v  v       –  v  v  v
```

```
(   x   )           (    )
   (x)                 (x)
 v  –  v             v  –
```

- Note that final CVC behaves as light, final CVVC, CVCC as heavy — we mess with the moraic structure to get this

CAN WE ARGUE FOR CONSTITUENCY IN METRICAL STRESS THEORY?

41. Proposals for foot-free theory

- Prince, Alan S. (1983) Relating to the grid. *Linguistic inquiry* (1983): 19-100.
- Gordon, Matthew. "A factorial typology of quantity-insensitive stress." *Natural Language & Linguistic Theory* 20, no. 3 (2002): 491-552.

42. Yidiŋ

- Australia, Queensland; field work of Robert M. W. Dixon
- A favorite of metrical phonologists since the 1970s

The feet are disyllabic, but WEIGHT TO STRESS determines whether they are iambic or trochaic.

```
( .  x)        (.  x)
 gindanu  →  ginda:n
```

A rare instance of Parse syl >> Max

Both minimal word and reduplicative template are syllabic trochees — this is a general pattern and has been taken as an argument for metrical constituency.

43. Huariapano

- Panoan, Peru, extinct
- Work of Ryan Bennett (2012 Santa Cruz dissertation)

- The feet can be iambs or trochees, depending on complex factors.
- Irrespective, a process of Coda /h/ Epenthesis applies in odd-numbered syllables, going left to right.

- So, this is left side of foot, irrespective of labeling.

FINIS