

24.901/931, 2026

Introduction to Phonology

Lecture 22

Announcements

- Quiz today
- Readings on *Word formation in OT*
Kager 1999 Chap. 5

Summary of stress constraints

- *Culminative* constraints: STRESS, ONESTRESS
- *Rhythmic* constraints: *LAPSE, *CLASH, *EXTLAPSE
- *Edge marking*: STRESSL, STRESSR
Edge avoidance: NONFINALITY, NONINITIALITY,
EXTNONFIN/EXTNONINITIALITY
- *Main stress*: MAIN STRESS R/L
(one * for each stress that precedes/follows main stress)

Recap basic rankings and stress typology

- All stress systems:

must rank STRESS L/R vs. (EXT)NONINIT/FINAL

may have to rank STRESSL vs. STRESSR

- One-stress systems rank:

ONESTRESS >> *(EXT)LAPSE and STRESSR or STRESSL

- Two-stress systems:

STRESSR and STRESSL >> ONESTRESS >> *(EXT)LAPSE

- N-stress systems:

*(EXT)LAPSE >> ONESTRESS

How do *Clash violations (nn) ever arise?

One way is for higher constraints to fix rhythm at both ends of the word.

Also, for *LAPSE >> *CLASH.

Another way involves interactions with weight.

- Araucanian (Mapudungun: Chile, Argentina): rhythm invariant on the left only.

wu.lé	01	‘tomorrow’
ti.pán.to	010	‘year’
e.lù.mu.jú	0201	‘give us’
e.lù.a.é.new	02010	‘he will give me’
ki.mù.ba.lù.wu.láj	020201	‘he pretended not to know’

- Southern Paiute (Uto-Aztecan: Arizona): rhythm in 3+ words fixed on both edges

ʃápi	10	‘belly’
tɪβáa, pa.íkip	010	‘down west’, ‘hair’
ʃinánɣwàɸi	0120	‘coyote’
qut ʃáqarĩa	01020	‘being light-grey’
nanɬáka.ìɬɪŋwi	010220	‘brothers to each other’
natíjapà.antùkwa	0102020	‘to be between his hoofs’

Araucanian: rhythm varies at the right edge

01, 010, 0201
02010,
020201

	*CLASH	*LAPSE	NONINIT	STRESSL	NONFIN
☞020201				*	*
020100		*!		*	
020210	*!			*	
202010			*!		

	*CLASH	*LAPSE	NONINIT	STRESSL	NONFIN
☞02010				*	
20201			*!		*
00201		*!		*	*

S.Paiute: rhythm fixed at both ends

		*NONFIN	*LAPSE	NONINIT	STRESSL	*CLASH
S.Paiute 10, 010, 0120, 01020 010220	☞ 010220				*	*
	010200		*!		*	
	010202	*!			*	
	102020			*!		

Why 10, not *01?

Why 010220, not *012020?

Clash with main (1) stress is worse than clash with 2: *n//1

Another system with clash

- Tauya (Papua New Guinea)

nònó	21	‘child’
ùnetá	201	‘mat’
mòmùnepá	2201	‘X sat and X . . . ’
jàpatìjəfó	20201	‘my hand’

Tauya

Tauya
21, 201,
2201,
20201
220201

	*LAPSE	STRESSL	STRESSR	*CLASH@1	*CLASH
2201					*
2001	*!				
0201		*!			
2010			*!		
2021				*!	*

*CLASH@1: One * for each n//1

Ternary systems

- Cayuvava (Bolivia, now extinct)

é.ne	10	‘tail’
á.ka.he	100	‘stomach’
ki.hí.be.re	0100	‘I ran’
a.ri.ú.u.tʃa	00100, *20100	‘he came already’
à.ri.hi.hí.be.e	200100, *020100	‘I already put top on’
ma.rà.ha.ha.é.i.ki	0200100, *2020100	‘their blankets’
i.ki.tà.pa.re.ré.pe.ha	00200100, *02020100	‘the water is clean’

Number of stresses is minimized, subject to avoidance of extreme lapse

*EXTLAPSE >> ONE STRESS >> *LAPSE

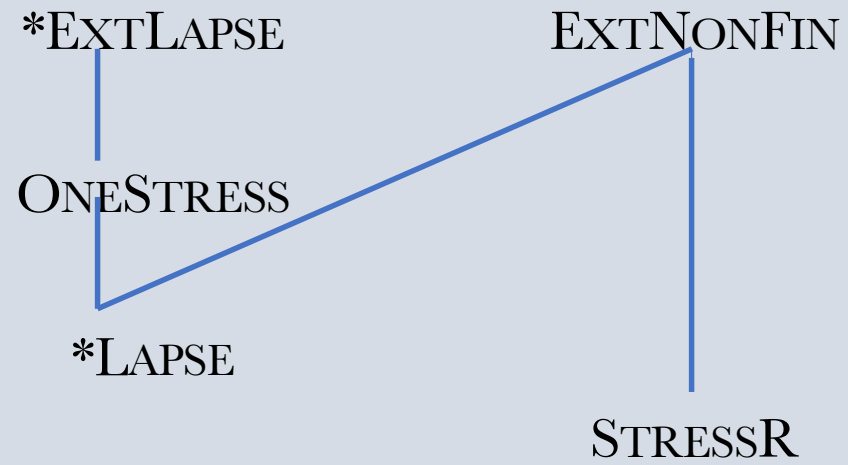
Alternative: *EXTLAPSE, *n0n >> *LAPSE

A simple approach to difference binary vs. ternary : ONESTRESS vs.*LAPSE

		*EXTLAPSE	*LAPSE	ONESTRESS
Warao 202010 0202010 20202010	☞ 0202010			**
	0200100		*!*	*
	0000010	*!***	****	
		*EXTLAPSE	ONESTRESS	*LAPSE
Cayuvava 200100 0200100 00200100	0000100	*!*		****
	☞ 0200100		*	**
	2020100		**!	*

Also required is EXTNONFIN, to decide between 100 and *010;
0100 and *0010

Cayuvava



Weight effects on stress

Weight-stress preview

- Heavy σ (C_0VVC_0 , C_0VCC_0) attract stress away from expected positions
Latin: normally, stress antepenult (*réfíci*t); penult if penult heavy (*reféctus*, *refé:ci:*)
English: final usually stressless (*óccu*[*pənt*]); but gets stress if C_0VVC_0 (*óccu*[*p^hàI*])
- Light syllables (e.g. C_0V) can reject stress.
French stress is final (*livré* [livʁé]); but stress shifts if final contains ə (*livre* [lívʁə])

Weight scale

- Some heavy σ are more likely to attract stress; they are longer/louder, i.e. heavier.
- Overall:

$C_0VVCC_0 > C_0VV$ [varies] $C_0VCCC_0 > C_0VC > C_0V_{\neq \emptyset} \dots > C_0\emptyset$.

- Scale is universal in an implicational sense:
 - If one syllable type attracts stress away from default position, that's C_0VVC
 - If C_0VC attracts stress, then $C_0VV(C)$ also does.
 - Sometimes only $C_0VV(C)$ does.
 - Frequently no difference: Latin C_0VC - C_0VV act alike & differ from C_0V
 - But not always: English C_0VV stressed finally, but not C_0VC ; cf. *occupy/occupant*
- Like sonority, the scale of weight has a phonetic interpretation:
 - loudness*: V's louder than C's, more Vs offer a longer loud region
 - duration*: longer rime (e.g. more Xs) vs. shorter, more Xs longer than fewer

Weight categories as subdivisions of the weight scale

- Binary weight systems partition the scale into 2 regions, e.g.

$C_0VVCC_0 > C_0VV > C_0VCCC_0 > C_0VC > C_0V_{\neq \emptyset} \mid > C_0\emptyset.$

Heavy | Light (French)

$C_0VVCC_0 > C_0VV \mid C_0VCCC_0 > C_0VC > C_0V_{\neq \emptyset} \dots > C_0\emptyset.$

Heavy | Light (Latin)

- Non-binary systems

ExtraHeavy | Heavy | Light (English)

$C_0VVCC_0 > C_0VV > C_0VCCC_0 > C_0VC > \mid C_0V_{\neq \emptyset} \dots > C_0\emptyset.$

SuperHeavy | ExtraHeavy | Heavy | Light (Hindi: Pandey 1989)

Two Weight/Stress Effects

- Stress attracted to heavy σ : **penalize stressless heavies**
 - General constraint: (heavy = C_0VC , C_0VV , any σ heavier than C_0V)
 - *STRESSLESSHEAVY (WSP): one * if any heavy σ is stressless
 - Specific constraints for the heaviest syllables, e.g.,
 - *STRESSLESSVV (WSP VV): one * if a C_0VVC_0 σ is stressless
- Stressed repelled by a light σ : **penalize stressed lights**
 - *STRESSEDLIGHT (SWP): one * for any stressed σ that's light
(WSP means *weight-to-stress*; SWP means *stress-to-weight*.)

Conflicts between stress constraints and WSP

- ONE STRESS vs. *STRESSLESS HEAVY (WSP) in ...HL*H... words
- *CLASH vs. WSP in strings like HH*
- *CLASH & *LAPSE vs. WSP in strings like ...H LL H...
- STRESSL/R, *CLASH vs. WSP in strings like #LH, HL#
- (EXT)NONFINALITY/NONINITIALITY vs. WSP in #HLL, LLH#

Tübatulabal (Uto-Aztecan, Kern Co, CA; Voegelin 1935)

- a. 0201 ipónihwín ‘of his own skunk’
- b. 0201 wítaṇhatal ‘the Tejon Indians’
- c. 020201 pitípitídinát ‘he is turning it over repeatedly’
- d. 2221 yú:dú:yú:dát ‘the fruit is mashing’
- e. 2020201 wítaṇhatalá:bacú ‘away from the Tejon Indians’
- f. 202201 ánaṇí:nínimút ‘he is crying wherever he goes’

Voegelin report equal stresses, hence the transcriptions; later work suggests main stress on right

Generalizations on Tübatulabal stress

- Stress the last.
- Stress every $C_0VV \sigma$
yú:dú:yú:dát not *yu:dú:yu:dát
- But not every C_0VC
wítaŋhátalá:bacú, not *wítaŋhátalá:bacú
- Don't lapse.
ánaŋí:nínimút, not *ánaŋí:nínimút

Only $C_0V:C_0$ counts as heavy (= WSP VV is active)
CVC does not (= general WSP is not active)

pítípítídinát LLLL	STRESSR	WSP(VV)	*LAPSE	*CLASH
☞ 020201				
202010	*!			
yú:dú:yú:dát HHHL				
☞ 2221				***
0201		*!*		

aṇí:nínimút LHLL	STRESSR	WSP(VV)	*LAPSE	*CLASH
☞ 02201				*
20201		*!		
02001			*!	

aŋí:nínimút LHLL	STRESSR	WSP(VV)	*LAPSE	*CLASH
☹️👉 02201				*
20201		*!		
02001			*!	
👉 02021				*

- clashes with 1 are avoided: 02201 > *02021: cf *Clash@1
- clashes of VVC0V are preferred to VC₀V(V) clashes

aṇí:nínimút LHLL	STRESSR	WSP(VV)	*LAPSE	*CLASH	CLASH @1
☞ 02201				*	
20201		*!			
02001			*!		
02021				*	*!

- clashes with 1 are avoided: 02201 > *02021
- clashes of VVC0V are preferred to VC₀V(V) clashes

One-stress systems with weight

Options in such systems

- a. Stress the Leftmost/Rightmost Heavy of the word:

$\#L^* 'H\sigma^*$, or $\sigma^* 'HL^* \#$

- b. Stress on Leftmost/Rightmost Heaviest of the word.

- c. Stress on Leftmost/Rightmost Heavy in a Left or Right window of 2-3 σ :

$\#((L)L)'H\sigma^*$, or $\sigma^* 'H((L)L)\#$

- d. Stress on Leftmost/Rightmost Heaviest in a Left or Right window

$\#((L)L)'H\sigma^*$, or $\sigma^* 'H((L)L)\#$

- e. Any of the options in (a-d) plus edge avoidance.

Kashmiri

- Light, C_0V ; Heavy, $C_0VV > C_0VC$
- All nonfinal σ are light: $\text{phí.ki.ri, sí.ri.na.gar, pá.ha.ra.da.ri:}$
- One nonfinal σ heavy: $\text{ni.rán.dʒan, mu.lá:.he.za, róph.va.rukh}$
- Several non-final σ heavies of same degree of weight $\text{ba.gán.dar.la.din, mahá:ra:zi, dé:.vi:.li:}$
- Different kinds of heavies bá:.gam.bar
 $\text{mas.rá:.wun, nar.pí:.ras.tan,}$
 $\text{nan.di.ké:.for, ar.dó:.no:.ri.for}$

Relevant constraints

- A constraint to explain: pá.ha.ra.da.ri:, *pa.ha.ra.da.rí:
- Another to explain: pá.ha.ra.da.ri:, *pá.ha.rà.da.ri:
- A constraint to explain: sí.ri.na.gar, *si.rí.na.gar, *si.ri.ná.gar
- A constraint to explain: ni.rán.dʒan, *ní.ran.dʒan
- Also: mahá:ra:zi, *máha:ra:zi
- Also: nan.di.ké:.for, *nán.di.ke:.for

Kashmiri

paharadari:			NONFIN	ONESTRESS	WSP (VV)	STRESSL	*LAPSE
	LLLLH	☞ 10000			*		***
		00001	*!			4*	***
		10200		*!	*	*	*
mula:heza	LHLL	☞ 0100				*	*
		1000			*!		**
maha:razi	LHHL	☞ 0100			*	*	*
		0120		*!		*	
		0010			*	2*!	*

Kashmiri

		NONFIN	ONESTRESS	WSP (VV)	WSP	STRESSL
LHHLH bagandarladin	01000				**	*
	01200		*!			*
	00100				***	**!
	10000				***!	
HHHLH ardo: no: ri for	0100			*	***	*
	21200		*!*		*	
	1000			*!*	***	

The other effect of weight on stress is
the Stress-to-Weight Principle (SWP)
(*stressed light)

Simplest reflex of SWP is the greater length of Vs or VCs under stress:
e.g. Italian, Romanian, Spanish pronunciation of Alabama [ælə'bæmə]
as [ala'ba:ma].

Choctaw (Muskogean: Alabama, Oklahoma)

No stress reported. Addition of any affix causes changes in the length of Vs.

Affixes:	tʃi- ‘you’	-li ‘I’	-tʃi ‘causative’	
Verbs:	habi:na	LHL	pisa	LL
	tʃi-ha:bina	LHLL	tʃi-pi:sa	LHL
	habi:na-tʃi	LHLL	pisa:-tʃi	LHL
	tʃi-ha:bina:-tʃi	LHLHL	tʃi-pi:sa-tʃi	LHLL
	habi:na-tʃi:-li	LHLHL	pisa:-tʃi-li	LHLL
	tʃi-ha:bina:-tʃi-li	LHLHLL	tʃi-pi:sa-tʃi:-li	LHLHL
	‘receive a present’		‘see’	

Choctaw stress (Muskogean: Alabama, Oklahoma)

Suppose we equate length with stress. Assume first stress is main stress.

Affixes:	ʔi- ‘you’	-li ‘I’	-ʔi ‘causative’	
Verbs	habí:na	010	pisa	00
	ʔi-há:bina	0100	ʔi-pí:sa	010
	habí:na-ʔi	0100	pisí:-ʔi	010
	ʔi-há:biná:-ʔi	01020	tʔi-pí:sa-ʔi	0100
	habí:na-ʔí:-li	01020	pisá:-ʔi-li	0100
	ʔi-há:biná:-ʔi-li	010200	ʔi-pí:sa-ʔí:-li	01020
	‘receive a present		‘see’	

Choctaw: assuming all alternating V/V:s are short in UR

ʔi-há:biná:-ʔi	*V:##	*LAPSE	NONINIT	SWP	IDENTLONG
☞ LHLHL 01020					**
LLLL 02010				*!	
LHLLL 01000		*!*			*
ʔi-há:biná:-ʔi-li					
☞ LHLHLL 010200 or 010202		(*)		*	**
LHLHLH 010202	*!				***

*V:## no phrase-final long V

Phrasal rhythm

- From <http://www.native-languages.org/cl>
- Stress is reported as irregular and not transcribed.
- In isolation, words have no long initial or final V:s

los Λ ‘black’, nita ‘bear’, nafo:ba ‘wolf’, Λ tʃ Λ ff Λ ‘one’

- But words in phrases differ in both ways: both initial and final V:s occur.

nafo:ba lo:s Λ ‘black wolf’; nita: Λ tʃ Λ ff Λ ‘bear one’

- Then perhaps final V’s in verbs can also lengthen in phrases:

pisa: los Λ : nita ‘see black bear’

- So, subject to a ban on stressing or lengthening *phrase-final* Vs, it is possible for *word-final* Vs to be lengthened, and thus probably to be stressed.

Note no lengthening in closed syll: Λ tʃ Λ ff Λ = Λ tʃ Λ ff Λ No V: needed in closed σ .

What does Choctaw difference between words-in-phrase vs. words-in-isolation suggest about how stress is assigned?

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