Interstratal differences and the *ABA-restriction: An argument for Harmonic Layer Theory

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Interstratal differences: Guébie

[+ATR] – [−ATR]

(1) a. sɨ^{2}-a^{2}
be.tired.IPFV-CAUS
'causes to be tired'

b. wi^{3}-ə^{2}
cry.IPFV-CAUS
'cause to cry' (28)

c. ju^{4} gbala$^{3.4}$ si^{3}
boy climb.PFV trees
'a boy climbed trees' (Sande, 2017, 28,43)

- ATR-vowel harmony only applies within words but not across words

(2) Interstratal differences in Guébie: Vowel harmony

Stem 1	Word 2	Phrase 3
VHarm	VHarm	–

Interstratal differences: Nuuchahnulth

(3) a. ħasaqsuɬ
/ħas-ʔaqsuɬ/
loud-at.the.mouth
'loud voice'

cf. ʔapʔaqsuɬ
/ʔap-ʔaqsuɬ/
LOC-at.the.mouth
'mouth'

b. ciʕasʔaːqtɬqa
/ciʕas-ʔaːqtɬ-qaˑ/
WOO-INTENT-3.SUB
'he was going to talk marriage' (Stonham, 2007, 110+111)

- only stem-level affixes are undergoers of post-fricative /ʔ/-deletion

(4) Interstratal differences in Nuuchahnulth: Post-fricative /ʔ/

Stem 1	Word 2	Phrase 3
Del	–	–

Interstratal differences: Shona

V=underlying H; V́=surface H, V=underlying H not realized

(5)

a. á-cha-téng-á
3SG-FUT-buy-FV
'*s/he will buy*' (Myers, 1997, 864)

b. há-ti-teng-es-e
HORT-1PL/SUBJ-buy-CAUS-FV
'*let us sell*' (Myers, 1997, 870)

c. badzá gúrú
hoe big
'*big hoe*' (Myers, 1997, 874, FN.21)

- adjacent H's tolerated between words (5-c) but not within (5-a+b)
- different (macro)stem structures in (5-a+b):

(6) [á-cha]-[téng-á] vs. [há]-[ti-tenges-e]

(7)

	Derivation 1			Derivation 2	
	H H a- cha	H teng-a		H ha	H H ti-teng-es - e
1: Macrostems	H a cha Fusion	H teng a (H-spread)		H ha -	H ti teng es e Fusion (+H-Spread)
2: Words	H H a chateng a Retraction			H ha ti teng es e Deletion	

(8) Interstratal differences in Shona: Adjacent H-tones

Stem 1	Word 2	Phrase 3
Fus	(Ret)> Del	(Ret)> −

One language=Different co-grammars

- Lexical Phonology → **Stratal OT**

  (Kiparsky, 1982, 1985; Kaisse and Shaw, 1985; Mohanan, 1986) → (Kiparsky, 2015; Trommer, 2011, t.a.; Bermúdez-Otero, 2018, i.p.)
- **strata** differ in their morpho-syntactic and phonological properties
- they are ordered: The output of a lower stratum feeds into the input of the next stratum

But how different are interstratal differences across languages?

Are there no restrictions about interstratal differences within one language?

The Plan

2. Interstratal differences are restricted: *ABA

- no ABA-patterns in tonal OCP-typology

3. Proposal: Harmonic Layer Theory

- inherently excludes ABA-patterns
- derives interstratal differences from cyclic optimizations with **a single phonological grammar**
- based on predictable **activity adjustments** across layers

4. Case study: Kashaya

- interstratal differences but **problematic in standard stratal** model
- derivable in HLT from a single grammar and predictable activity adjustment

Interstratal differences are restricted

Restrictions on stratal differences: Lexical Phonology

Continuous Stratum Hypothesis (Mohanan, 1982, 1986)

aka: 'Stratum Domain Hypothesis' or 'Continuity of Strata Hypothesis'

The domain of a rule is specified as a set of continuous strata (Mohanan, 1982).
The domain of a rule may not contain nonadjacent strata (Mohanan, 1986).

Strong Domain Hypothesis (Kiparsky, 1984, 1985)

A phonological pattern enforced in any given level must also be enforced at all earlier levels.

- ➙ not translatable into OT
- ➙ rejected on empirical grounds (?)
  against the SDH:
  Turkish velar drop (Inkelas and Orgun, 1995) or Dagbani H-Spreading (Hyman, 1993)

e.g. Inkelas and Zoll (2007)

My proposal: The *ABA-restriction

(9) The *ABA restriction
In a given language L: It is impossible that the same phonological context shows phonological behaviour P1 in layer ① and ③ but a different phonological behaviour P2 in the intermediate layer ②.

(10) Impossible patterns: Abstract overview

	Identical context C:		
Layer	*Pattern A	*Pattern B	*Pattern C
Stem ①	no repair	process P1	process P1
Word ②	process P1	no repair	process P2
Phrase ③	no repair	process P1	process P1

*Layers=morpho-syntactic structures corresponding to a cyclic optimization in HLT (∼strata)

The *ABA-restriction

(11) Abstract overview

	Impossible under *ABA			Possible under *ABA		
	*Pattern A	*Pattern B	*Pattern C	Pattern D	Pattern E	Pattern F
①	no repair	process P1	process P1	no repair	no repair	no repair
②	process P1	no repair	process P2	no repair	process P1	process P1
③	no repair	process P1	process P1	process P1	process P1	process P2

- more restrictive than the CSH: It excludes pattern A
- less restrictive than the SDH: It allows patterns D-F

What about the arguments against CDH&SDH?

- not only derivable in OT: It falls out from the architecture of Harmonic Layer Theory; it's **not a restriction imposed on possible grammars**
- no convincing empirical counterevidence:
  - typology of OCP-effects for tones
  - apparent ABA-patterns are morpheme-specificity

The typology of OCP resolutions

DFG-Project Morphological strata of tone", Leipzig (Tebay, Trommer, Zimmermann)

(12) An OCP context: OT

H H	OCP-H	MAX-H	DEPL	UNIF	SPEC	*!H
a. H H –	-1					
b. H Del		-1			-1	
c. H L H DS			-1			-1
d. H Fus				-1		
e. H L Diss		-1	-1			

The OCP and interstratal differences: A mini-typology

- languages where at least two different behaviours can be observed in tonal OCP contexts within stems, words, phrases
  → 13 languages and 9 different patterns

(13) Our languages (so far) (Hammarström et al., 2019)

1.	Jita	jit	Atlantic-Congo	East Bantu->Northeast Savanna	Tanzania
2.	Kishambaa	ksb	Atlantic-Congo	East Bantu->Northeast Savanna	Tanzania
3.	Chizigula	ziw	Atlantic-Congo	East Bantu->Northeast Savanna	Kenya+Tanzania
4.	Tiriki	ida	Atlantic-Congo	East Bantu->Northeast Savanna	Kenya
5.	Shona	sna	Atlantic-Congo	East Bantu->Southern Bantu	Mozambique
6.	Tswana	tsn	Atlantic-Congo	East Bantu->Southern Bantu	Botswana
7.	Venda	ven	Atlantic-Congo	East Bantu–>Southern Bantu	S. Africa+Zimbabwe
8.	Dagaare	dga	Atlantic-Congo	Gur->Northern Central Gur	Ghana
9.	Dagbani	dag	Atlantic-Congo	Gur->Northern Central Gur	Kenya+Tanzania
10.	Moore	mos	Atlantic-Congo	Gur->Northern Central Gur	Burkina Faso
11.	Chitonga	toi	Atlantic-Congo	East Bantu->Botatwe	Zambia
12.	Bari	bfa	Nilotic	Eastern Nilotic	South Sudan
13.	Moro	mor	Heibanic	West-Central Heibanic	Sudan

Interstratal OCP-asymmetries: Shona (Myers, 1986, 1997)

[...] – (Macro)Stems

(14)

Fus at 1 between Obj+root

[tí-téng-és-é]

1PL/SUBJ-buy-CAUS-FV

'we should sell' (M7:870)

(15)

Del at 2, fed by Fus at 1

[há]-[ti-teng-es-e]

HORT-1PL/SUBJ-buy-CAUS-FV

'let us sell' (M7:870)

(16)

No Del at 2

[í]-[badzá]

COP-hoe

'(it) is a hoe' (M7:860)

(17)

– at 3

badzá gúrú

hoe big

'big hoe' (M7:874, FN.21)

(18)

Stem 1	Word 2	Phrase 3
Fus	Del	–

Interstratal OCP-asymmetries: Kishambaa (Odden, 1982)

(19)

Fus at 1 between Obj+root

[ku]-[wá̱-kó̱m-á]

INF-them-kill-FV

'to kill them' (O2:191)

(20)

DS at 2 (+HSpread)

[ní̱-kí]-[ꜝchí̱-kó̱m-á]

1SG-PROG-it-kill-FV

'I was killing it' (O2:191)

(21)

DS at 3

ní̱ ꜝkú̱i̱

COP dog

'it is a dog' (O2:187)

(22)

Stem 1	Word 2	Phrase 3
Fus	DS	DS

Interstratal OCP-asymmetries: Bari (Yokwe, 1986)

(23)

– at 1: Root+singulative

a. kàmú-tát ‘guest’
b. bóyí-tát ‘wild fig tree’
cf. yàng’ò-tát ‘yaws’, p.172

(24)

Diss at 2: Ass.prfx+NP2

b. /kú’bâ ló-kúlàng’/
kú’bâ ló-kùlàng’
‘the in-law of Kulang’, p.254

(25)

Diss at 3 between V+NP

d. /pòní à ’dép kópò/
pòní à ’dép kòpò
‘Poni held the cup’, p.207

(26)

Diss at 3: NP2+ass.prfx

c. /rét ná-bòngóʔ/
rét nà-bòngóʔ
‘the tear of the cloth’, p.259

(27)

Stem 1	Word 2	Phrase 3
–	Diss	Diss

OCP resolutions across layers: The patterns we found

(28)

	①	②	③	
Moro	Del	–	–	(Jenks and Rose, 2011, 2015)
Shona	Fus	Del	–	(Myers, 1986, 1997)
Chitonga	Fus	Del	–	(Bickmore and Mkochi, 2018)
Dagaare	Diss	DS	–	(Anttila and Bodomo, 2022)
Tiriki	Diss	Diss	–	(Paster and Kim, 2011)
Moore	Diss	Diss	–	(Kenstowicz et al., 1988; Kenstowicz, 1994)
Dagbani	Diss	Diss	–	(Hyman, 1993)
Jita	Del	Del	–	(Downing, 1996, 2014)
Chizigula	Del	Del	–	(Kenstowicz and Kisseberth, 1990)
Kishambaa	Fus	DS	DS	(Odden, 1982)
Tswana	Fus	Fus	DS	(Zerbian, 2015; Zerbian and Kügler, 2015, 2023)
Venda	Fus	Fus	Diss	(Cassimjee, 1992)
Bari	–	Diss	Diss	(Yokwe, 1986)

➙ lots of variation but **no pattern contradicts the *ABA-restriction**

A novel theory: HLT

Harmonic Layer Theory: Defining assumptions

1. cyclic evaluation at **three layers** (=stem, word, phrase)
2. one and **the same grammar** optimizes at each layer
3. phonological elements can have **gradient activity** that results in gradient constraint violations

Background: Gradient Symbolic Representations (=GSR)

- all linguistic symbols have **activity** that can **gradiently** differ
  (e.g. Smolensky and Goldrick, 2016; Rosen, 2016, 2019*a*,*b*; Zimmermann, 2018*a*, 2019; Kushnir, 2019)

- different activities result in **gradient constraint violations** of both faithfulness and markedness constraints
  (Zimmermann, 2021, im Erscheinen; Faust and Smolensky, 2017; Jang, 2019; Walker, 2019)

- grammatical computation modeled inside **Harmonic Grammar** where constraints are weighted (Legendre et al., 1990; Potts et al., 2010)

➞ this can predict **lexical exceptions**: elements in the underlying representation of a morpheme can have an exceptional activity and behave differently in the phonology

GSR and constraint violations

- gradient constraints are **violated/satisfied relative to the activity** of the relevant elements

(29) a. MAX-H: Assign -x violation for every H_x in the input without an output correspondent.

b. MAX-L: Assign -x violation for every L_x in the input without an output correspondent.

c. *H: Assign -x violation for every H_x.

d. *L: Assign -x violation for every L_x.

(30) Gradient activity=gradient constraint violations

H_1 $L_{0.8}$	MAX-H 20	MAX-L 20	*H 10	*L 10	
☞ a. H_1 $L_{0.8}$			-1.0	-0.8	-18
b. $L_{0.8}$	-1.0			-0.8	-28
c. H_1		-0.8	-1.0		-26

GSR and constraint cloning

- constraints exist in a gradient (31-a+c) and categorical (31-b+d) version

(31) a. MAX-H: Assign -x violation for every H_x in the input without an output correspondent.

b. ||MAX-H||: Assign -1 violation for every H in the input without an output correspondent.

c. *H: Assign -x violation for every H_x.

d. ||*H||: Assign -1 violation for every H.

(32) Gradient activity=gradient constraint violations

H_1 $H_{0.8}$	MAX-H 20	||MAX-H|| 1	*H 10	||*H|| 1	
a. H_1 $H_{0.8}$			-1.8	-2.0	-20
b. $H_{0.8}$	-1.0	-1.0			-21
☞c. H_1	-0.8	-1.0			-17

CONS=gradient constraint; ||CONS||=categorical constraint

A prediction of every GSR system: Activity adjustment as a phonological operation

(33) a. *H: Assign -x violation for every TBU associated to H_x.

b. IDACT: Assign -x violation for every input tone H_a corresponding to output tone H_b where a-b=x and x is > 0.

c. $\text{IDACT}_{\leq 0.2}$: Assign -x violation for every input tone H_a corresponding to output tone H_b where a-b=x and x is > 0.2.

(34) Tone decay

$H_{1.0}$	$\text{IDACT}_{\leq 0.2}$ w=∞	MAX-H w=20	*H w=10	IDACT w=1	$\mathcal{H}$
a. $H_{1.0}$			-1.0		-10.0
b. Ø		-1.0			-20.0
c. $H_{0.5}$	-0.5		-0.5	-0.5	∞
☞ d. $H_{0.8}$			-0.8	-0.2	-8.2

HLT: Predictable loss of activity at every layer

- cyclic optimization with the same grammar can hence predict **monotonic activity adjustment across layers**

(35) Predictable decay by 0.2

	INPUT	OUTPUT
1	H_1	$H_{0.8}$
2	$H_{0.8}$	$H_{0.6}$
3	$H_{0.6}$	$H_{0.4}$

→ and given that elements with different activities can behave differently, monotonic activity adjustment predicts **interstratal differences**

Different behaviour for OCP problems: Shona in a nutshell

(36) Different OCP reactions in Shona

Input	Optimal at 1 Fus	Optimal at 2 Del	Optimal at 3 –
H H	H	H	H H
	–H–	H	H H

HLT thresholds: Fusion is the default repair but

- the weaker the H, the cheaper deletion
- the weaker the H, the easier it is to tolerate the OCP

(37)

a. OCP-•: Assign -x violation for every H_x followed by another H if both are associated with adjacent TBU's.

b. MAX-H: Assign -x violation for every H_x in the input without an output correspondent.

c. ||UNIF||: Assign -1 violation for every pair of input tones corresponding to the same output tone.

Shona in HLT

1

$H_{1.0}$ $H_{1.0}$		OCP-• 27	MAX-H 20	‖UNIF‖ 17	$\mathcal{H}$
a. $H_{0.8}$ $H_{0.8}$	−	-0.8			-21.6
b. $H_{0.8}$	Del		-1.0		-20.0
☞ c. −$H_{0.8}$−	Fus			-1.0	-17.0

2

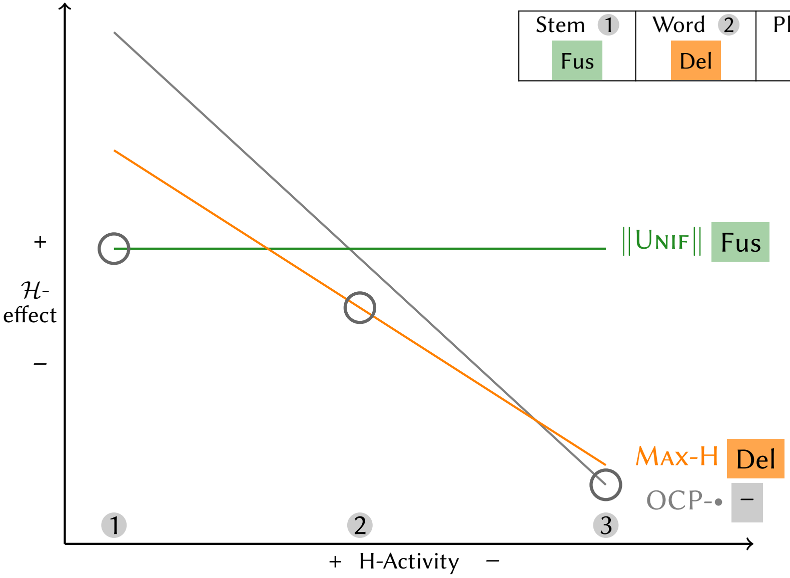
$H_{0.8}$ $H_{0.8}$		OCP-• 27	MAX-H 20	‖UNIF‖ 17	$\mathcal{H}$
a. $H_{0.6}$ $H_{0.6}$	−	-0.6			-16.2
☞ b. $H_{0.6}$	Del		-0.8		-16.0
c. −$H_{0.6}$−	Fus			-1.0	-17.0

3

$H_{0.6}$ $H_{0.6}$		OCP-• 27	MAX-H 20	‖UNIF‖ 17	$\mathcal{H}$
☞ a. $H_{0.4}$ $H_{0.4}$	−	-0.4			-10.8
b. $H_{0.4}$	Del		-0.6		-12.0
c. −$H_{0.4}$−	Fus			-1.0	-17.0

Shona/Chitonga: HLT thresholds

Stem 1	Word 2	Phrase 3
Fus	Del	–



Kishambaa: OCP repairs (Odden, 1982)

(38) Two optimal strategies

Input	Optimal at 1 Fus	Optimal at 2 & 3 DS
H H	H	H L H
	–H–	H (L) H

HLT account in a nutshell: Gradual weakening by 0.2

- for a strong H, the downstep repair is blocked since the *!H violations are quite severe
- for weaker H's, the *!H violations are tolerated and L-insertion is a cheaper repair than fusion

Kishambaa: HLT tableaux

1

$H_{1.0}$ $H_{1.0}$		OCP-H 14	*!H 10	‖UNIF‖ 8	‖DEP-L‖ 1	$\mathcal{H}$
a. $H_{0.8}$ $H_{0.8}$	–	-0.8				-11.2
b. $H_{0.8}$ (L_1) $H_{0.8}$	DS		-0.8		-1.0	-9.8
☞ c. –$H_{0.8}$–	Fus			-1.0		-8

2

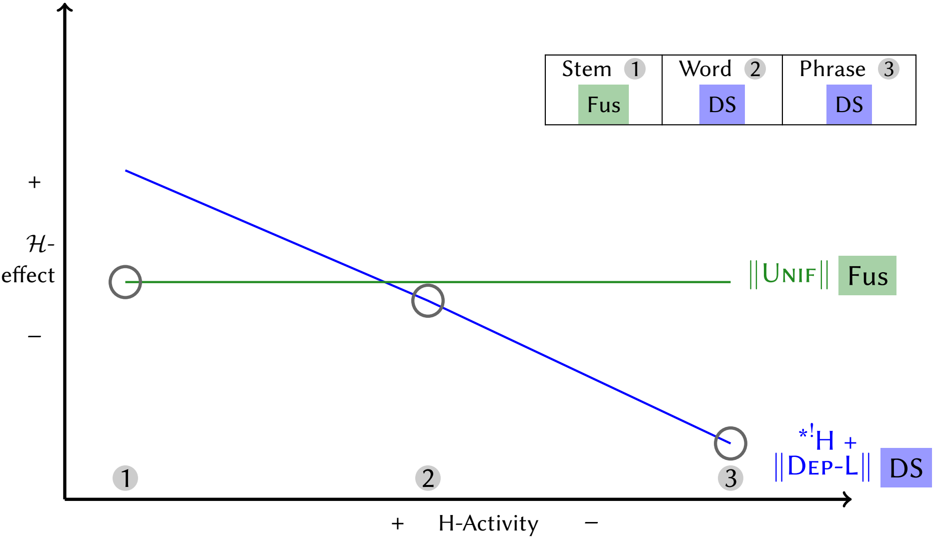
$H_{0.8}$ $H_{0.8}$		OCP-H 14	*!H 10	‖UNIF‖ 8	‖DEP-L‖ 1	$\mathcal{H}$
a. $H_{0.6}$ $H_{0.6}$	–	-0.6				-8.4
☞ b. $H_{0.6}$ (L_1) $H_{0.6}$	DS		-0.6		-1.0	-7.7
c. –$H_{0.6}$–	Fus			-1.0		-8

3

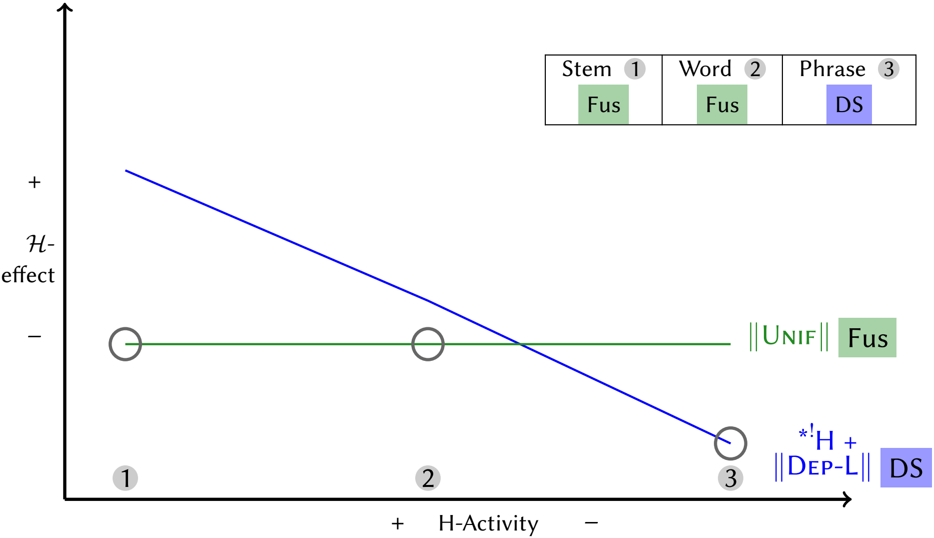
$H_{0.6}$ $H_{0.6}$		OCP-H 14	*!H 10	‖UNIF‖ 8	‖DEP-L‖ 0	$\mathcal{H}$
a. $H_{0.4}$ $H_{0.4}$	–	-0.4				-5.6
☞ b. $H_{0.4}$ (L_1) $H_{0.4}$	DS		-0.4		-1.0	-5.4
c. –$H_{0.4}$–	Fus			-1.0		-8

Kishambaa: HLT thresholds

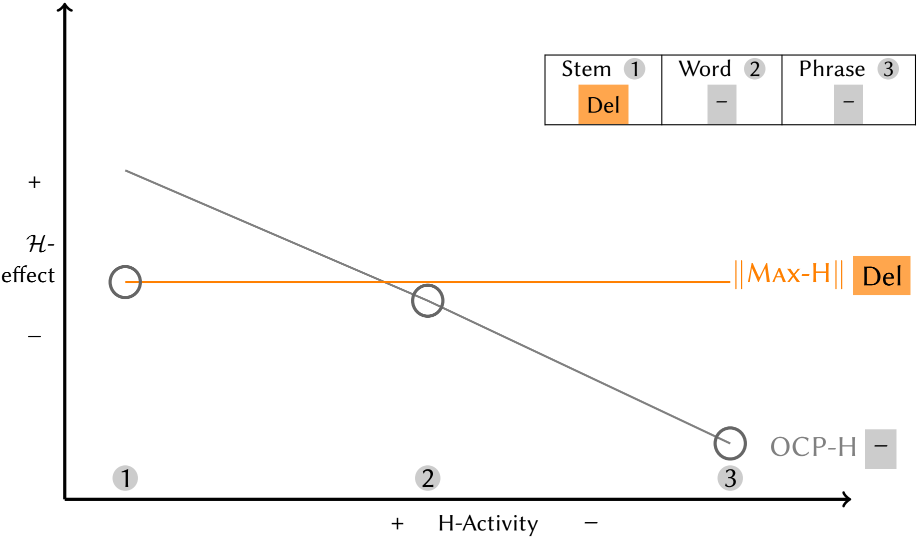
Stem 1	Word 2	Phrase 3
Fus	DS	DS



Tswana/Venda: HLT thresholds

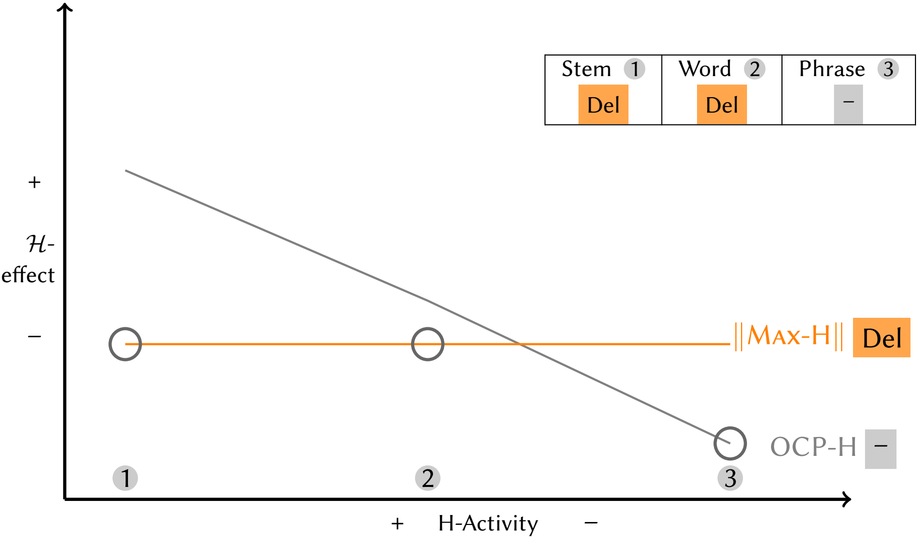


Moro: HLT thresholds



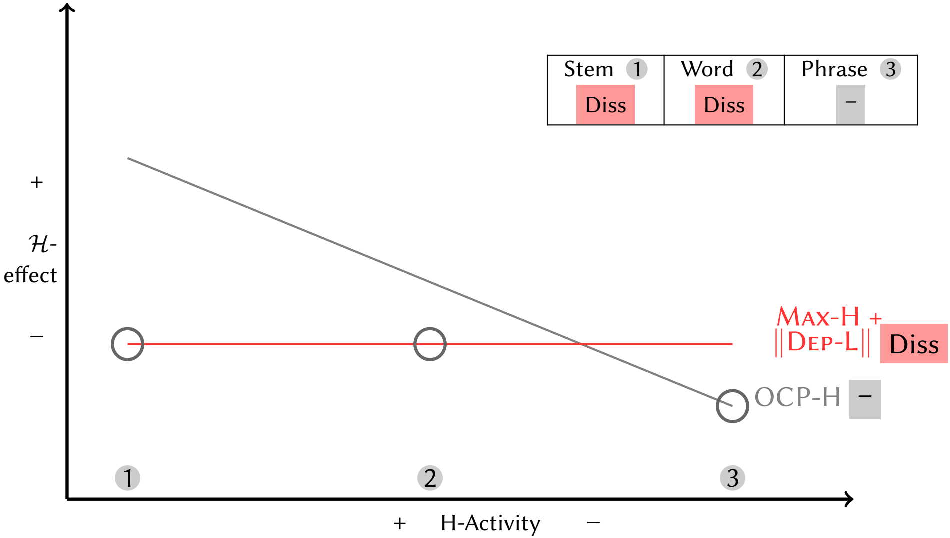
Jita/Chizigula: HLT thresholds

Stem 1	Word 2	Phrase 3
Del	Del	–

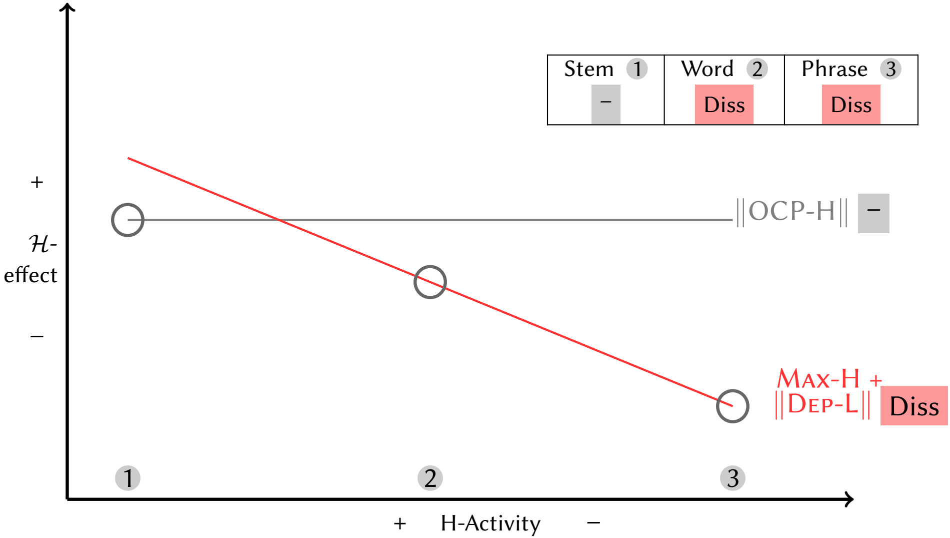


Tiriki/Dagbani/Moore: HLT thresholds

Stem 1	Word 2	Phrase 3
Diss	Diss	–



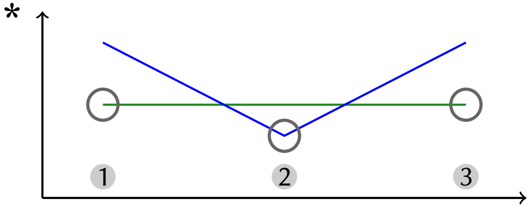
Bari: HLT thresholds



Interstratal differences in HLT

- fall out from predictable activity adjustment across layers if the $\mathcal{H}$-effects of constraints cross
  - if one is categorical and the other gradient
  - if two gradient constraints differ in their weighting (='steepness' of their $\mathcal{H}$-effect)

➙ and predictable activity adjustment is **restricted by monotonicity**



(39) The *ABA restriction
In a given language L: It is impossible that the same phonological context shows phonological behaviour P1 in layer ① and ③ but a different phonological behaviour P2 in the intermediate layer ②.

Kashaya

Interstratal differences in Kashaya

Kashaya in HLT: An overview

- the metrical structure of Kashaya seems to both be **an argument and a challenge for a classical stratal system**
- predictable **activity adjustments for multiple elements** predict different interstratal differences

Kashaya: Background

- Pomoan, California; ‘two or three dozen’ speakers (Buckley, 1994*a*)
- described extensively in, for example, Buckley (1994*b*), Buckley (1998), or Buckley (2017); based on Oswalt (1961) and fieldwork by E. Buckley
- metrical structure:
  - iambic lengthening (=IL) for foot heads
  - one pitch accent/H-tone (=PA); ideally on the leftmost foot head

Metrical structure in Kashaya: Background

- iterative iambic feet

(40) (CV.**CV**)(CV.**CV**)(CV.**CV**)

- (nonfinal) CVC and all CVː syllables are heavy; there are no* degenerate feet

(41) (CV.CV)(CVC)(CVː)CV

- The initial syllable is extrametrical (42-a+b) unless the word starts with a monosyllabic root (42-c).

(42)
a. <CV>(CV.CV)CV
b. <CV>(CV.CV)CV
c. (CVCV)(CV.CV)

Morphological structure in Kashaya: Background

(43) Verbs in Kashaya

<table>
<tr><td colspan="3">Word</td><td></td></tr>
<tr><td colspan="3">Stem</td><td rowspan="2">-suffix]</td></tr>
<tr><td>[[prefix-</td><td>root</td><td>-suffix]</td></tr>
</table>

- instrumental prefixes: maximally one, most verb forms have one
- stem-level suffixes are optional: adverbial meaning, aspect, valence,…
- one word-level suffix is obligatory:
  mood, evidentials, SR, NEG, REM.PST,…

Metrical structure: Three relevant processes

Iambic lengthening (=IL)

(44) /CV CV CV CV CV/ –> (CV.CVː)(CV.CVː)CV

The challenge: Not all CV-foot heads undergo IL...

Pitch accent (=PA)

A H-tone is realized on the leftmost foot head.

(45) /CV CV CV CV CV/ –> (CV.CV́ː)(CV.CVː)CV

The challenge: Sometimes it's further to the right...

Iambic lengthening

[[. . .] . . .] – morphological stem/word
(. . .)(. . .) – my foot structures

(46) [[mo-mul-itʃ'-ed] -u]
(mo.múː)(li.tʃ'eː)du
[[run-around-REFL-DUR] -ABS]
'run in circles' (B17:114)

(47) [[kel-mul-ad-utʃed] -u]
(kél)(mu.laː)(du.tʃeː)de
[[peer-around-DUR-DUR] -ABS]
'keep peering around' (B17:115)

Iambic lengthening and initial extrametricality

(48) [[ʧa-qʰam-ala-w-ibiʧ] -ʔ]
<ʧa>(qʰa.máː)(la.wiː)biʔ
[[by.knife-cut-down-MVMT-INCEP] -ABS]
'start to cut downward' (B17:115)

(49) [[qaʔʧʼaʈ-ad-uʧed] -u]
<qaʔ>(ʧa.ʈáː)(du.ʧeː)du
[[cry-DUR-DUR] -ABS]
'used to cry and cry' (B17:115)

Iambic lengthening: Only stems

- only stem vowels undergo IL; vowels of word-level suffixes never do

(50) [[mo-matʃ-ed] -ela]
(mo.máː)(tʃe.de)la
[[run-in-DUR] -PERF.IPFV]
'I keep running in there' (B17:120)

(51) [[s'i] -pʰila]
(s'i.pʰí)la
[[do] -DS.FUT]
'if it happens' (B17:120)

Iambic Lengthening and Strata

- that stem-level affixes don’t undergo IL follows if
  IL only applies at the stem stratum

(52) Stratal derivation for [[mo-matʃ-ed] -ela]

1. Stem: IL	/mo-matʃ-ed/	→	(mo.maː)tʃe<d>
2. Word: –	(mo.maː)tʃe<d>-ela	→	(mo.maː)(tʃe.de)la

Pitch accent: Default

- H is usually realized on the leftmost foot-head (cf. above).

(53) [[<u>mo</u>-mul-itʃ'-ed] -u]
(mo.múː)(li.tʃ'eː)du
[[run-around-REFL-DUR] -ABS]
'run in circles' (B17:114)

(54) [[<u>kel</u>-mul-ad-utʃed] -u]
(kél)(mu.laː)(du.tʃeː)de
[[peer-around-DUR-DUR] -ABS]
'keep peering around' (B17:115)

(55) [[<u>mo</u>-matʃ-ed] -ela]
(mo.máː)(tʃe.de)la
[[run-in-DUR] -PERF.IPFV]
'I keep running in there' (B17:120)

Pitch accent: Avoidance of underlying long vowels

- PA is not realized on the initial foot-head if this head contains an underlying long V; it is realized one foot-head further right

(56) [[du-ʔyaːq-ad-qa] -ba]
<duʔ>(yaː)(qán')(qa.ba)
[[by.finger-think-DUR-CAUS] -SS.PST]
'after thinking about it' (B17:116)

(57) [[ʃulaːm] -iʔba]
<ʃu>(laː)(máʔ)ba
[[be.sick] -COND]
'would get sick' (B17:117)

(58) [[q'aː] -mela]
(q'aː)(me.lá)
[[leave.behind] -PERF.PFV
'I left' (B17:121)

(59) [[simaːq] -eti]
<si>(maː)(qa.tí)
[[sleep] -CONC
'although he's asleep' (B17:121)

Pitch accent: Realized on derived long vowels

- recall that PA does surface on long V's that are the result of IL

(60) [[mo-mul-itʃ'-ed] -u]
(mo.múː)(li.tʃ'eː)du
[[run-around-REFL-DUR] -ABS]
'run in circles' (B17:114)

(61) [[mo-matʃ-ed] -ela]
(mo.máː)(tʃe.de)la
[[run-in-DUR] -PERF.IPFV]
'I keep running in there' (B17:120)

PA and Strata

- that underlyingly long V's behave differently from V's that are predictably lengthened in the phonology can follow in a stratal system from **ordering IL after PA** assignment
  (=and PA avoids long vowels)

(62) Stratal derivation for [[du-ʔyaːq-ad-qa] -ba]

1. Stem: PA	/du-ʔyaːq-ad-qa/	→	<duʔ>(yaː)(qán')qa

(63) Stratal derivation for [[mo-mul-itʃ'-ed] -u]

1. Stem: PA	/mo-mul-itʃ'-ed/	→	(mo.mú)(li.tʃ'e)<d>
2. Word: IL	(mo.mú)(li.tʃ'eː)<d>-u	→	(mo.múː)(li.tʃ'eː)du

A stratal account for PA and IL: A paradox!

- the ordering we just assumed for PA is at odds with the explanation we had earlier for the difference between stem/word-level affixes!
  - ➙ Word-level affixes never undergo IL since IL applies early

(64) Failed stratal derivation for [[mo-matʃ-ed] -ela]

1. Stem: PA	/mo-matʃ-ed/	→	(mo.má)tʃe<d>
2. Word: IL	(mo.ma)tʃe<d>-ela	→	*(mo.máː)(tʃe.deː)la

Kashaya and strata: Taking stock

- simple stratal ordering accounts of IL and PA exclude each other
- possible solution: the avoidance of PA on an initial long V is due to initial **extrametricality of (Vː)-feet** (Buckley, 1994*b*, 2017)

➙ a HLT account predicts the Kashaya pattern from a **single grammar** and without syllable *and* foot-extrametricality:
Processes are not bound to certain domains/optimizations but to elements with certain activity ($\sim$ the number of optimizations they underwent)

Kashaya in HLT

The HLT account in a nutshell

IL can only apply to **V's that were weakened** once and within feet that are not yet weakened twice:
Stem-V's are still too strong at ① and the triggering feet will be too weak at ③

PA avoids long vowels but will **stay where it is** if a vowel is lengthened later

Activity adjustments in Kashaya

- phonological elements at different tiers adjust their activity differently

(65)

	Input ①	Output ①/ Input ②	Output ②/ Input ③	Output ③	
Feet		Ft_1	$Ft_{0.9}$	$Ft_{0.8}$	-0.1 Decay
Vowels	V_1	$V_{0.8}$	$V_{0.6}$	$V_{0.4}$	-0.2 Decay

- note that elements come into the structure at different times:
  - Ft are predictable, hence not underlying
  - word level suffixes only enter the optimization at ② with fresh input 1-activity for their V's

HLT account: IL

IL: Thresholds

- IL can only apply to vowels that were already weakened once: DepAL(V-μ) is otherwise too costly
- IL is only triggered by feet that are still strong enough: *Hd/σ_{μ} is otherwise not violated enough

(66) a. DepAL(V-μ) W=70
Assign -x violations for every input V_x that is linked to a μ via an inserted association line.

b. *Hd/σ_{μ} W=69
Assign -x violations for every Ft_x that has a monomoraic syllable in its head position.

IL: Stem-material lengthens only at ②

(67) [[**mo**-mul-iʧ’-ed] -u]

	DepAL(V-μ) 70	*Hd/σμ 69	$\mathcal{H}$
① No IL: Vowel ‘too strong’ IP: $mo_1mu_1li_1$ʧe_1			
☞ a. $(mo_{.8}.mu_{.8})_1$ $(li_{.8}.$ʧ$e_{.8})_1$ <d>		-2	-138.0
b. $(mo_{.8}.mu\!\!:_{.8})_1$ $(li_{.8}.$ʧ$e\!\!:_{.8})_1$ <d>	-2		-140.0
② IL: Vowel weak enough IP: $(mo_{.8}.mu_{.8})_1$ $(li_{.8}.$ʧ$e_{.8})_1$ <d> $-u_1$			
a. $(mo_{.6}.mu_{.6})_{.9}$ $(li_{.6}.$ʧ$e_{.6})_{.9}$ $du_{.8}$		-1.8	-124.2
☞ b. $(mo_{.6}.mu\!\!:_{.6})_{.9}$ $(li_{.6}.$ʧ$e\!\!:_{.6})_{.9}$ $du_{.8}$	-1.6		-112.0

(Non-final optimizations: PA is omitted for now)

IL: Word-level suffixes are not lengthened at ②

(68) [[**mo**-matʃ-ed] -ela]

	DepAL(V-μ) 70	*Hd/σ_μ 69	$\mathcal{H}$
① H-docking but no IL IP: $mo_1 ma_1$ ʧe_1d			
☞ a. $(mo_{.8}.ma_{.8})_1$ ʧ$e_{.8}$<d>		-1	69.0
b. $(mo_{.8}.ma\!\!:_{.8})_1$ ʧ$e_{.8}$<d>	-1		-70.0
② IL for stem- but not word material IP: $(mo_{.8}.ma_{.8})_1$ ʧ$e_{.8}$<d> $-e_1 la_1$			
a. $(mo_{.6}.ma_{.6})_{.9}$ (ʧ$e_{.6}.de_{.8})_1$ $la_{.8}$		-1.9	-131.1
☞ b. $(mo_{.6}.ma\!\!:_{.6})_{.9}$ (ʧ$e_{.6}.de_{.8})_1$ $la_{.8}$	-0.8	-1	-125.0
c. $(mo_{.6}.ma\!\!:_{.6})_{.9}$ (ʧ$e_{.6}.de\!\!:_{.8})_1$ $la_{.8}$	-1.8		-126.0

(Non-final optimizations: PA is omitted for now)

IL at ③?

- ➙ but wouldn't this mispredict IL for word-level suffixes at ③ when they are finally weak enough?

No: because any stem-level foot is by now too weak to trigger IL

No: there is '**deforestation**' (Buckley, 1994*a*) at ③ and only a single foot surfaces

- – not derived in the tableau: ALIGN(FT,L;PHRASE,L) has a higher weight than PARSE and only the leftmost foot surfaces

IL: Word-level suffixes are not lengthened at ③: Weak foot

(69) [[**s'i**] -p^{h}ila]

	DepAL(V-μ) 70	*Hd/σ_μ 69	$\mathcal{H}$
① No IL: V too strong IP: s'i$_1$			
☞ a. (s'i$_{.8}$)$_1$		-1	-69.0
b. (s'iː$_{.8}$)$_1$	-1		-70.0
② No IL: V too strong IP: (s'i$_{.8}$)$_1$ -p^{h}i$_1$la$_1$			
☞ a. (s'i$_{.6}$.p^{h}i$_{.8}$)$_{.9}$ la$_{.8}$		-0.9	-62.1
b. (s'i$_{.6}$.p^{h}iː$_{.8}$)$_{.9}$ la$_{.8}$	-1		-70.0
③ No IL: Ft too weak IP: (s'i$_{.6}$.p^{h}i$_{.8}$)$_{.9}$ la$_{.8}$			
☞ a. (s'i$_{.4}$.p^{h}i$_{.6}$)$_{.8}$ la$_{.6}$		-0.8	-55.2
b. (s'i$_{.4}$.p^{h}iː$_{.6}$)$_{.8}$ la$_{.6}$	-0.8		-56.0

(Non-final optimizations: PA is omitted for now)

IL: Word-level suffixes are not lengthened at ③: Deforestation

(70) [[**mo**-maʧ-ed] -ela]

	DepAL(V-μ) 70	*Hd/σ_μ 69	$\mathcal{H}$
① H-docking but no IL — IP: mo$_1$ma$_1$ʧe$_1$d			
☞ a. (mo$_{.8}$.ma$_{.8}$)$_1$ ʧe$_{.8}$<d>		-1	69.0
b. (mo$_{.8}$.maː$_{.8}$)$_1$ ʧe$_{.8}$<d>	-1		-70.0
② IL for stem- but not word materialIP: (mo$_{.8}$.ma$_{.8}$)$_1$ ʧe$_{.8}$<d> -e$_1$la$_1$			
a. (mo$_{.6}$.ma$_{.6}$)$_{.9}$ (ʧe$_{.6}$.de$_{.8}$)$_1$ la$_{.8}$		-1.9	-131.1
☞ b. (mo$_{.6}$.maː$_{.6}$)$_{.9}$ (ʧe$_{.6}$.de$_{.8}$)$_1$ la$_{.8}$	-0.8	-1	-125.0
c. (mo$_{.6}$.maː$_{.6}$)$_{.9}$ (ʧe$_{.6}$.deː$_{.8}$)$_1$ la$_{.8}$	-1.8		-126.0
③ No further IL: Deforestation — IP: (mo$_{.6}$.maː$_{.6}$)$_{.9}$ (ʧe$_{.6}$.de$_{.8}$)$_1$ la$_{.8}$			
☞ a. (mo$_{.4}$.maː$_{.4}$)$_{.8}$ʧe$_{.4}$.de$_{.6}$.la$_{.6}$			0.0
b. (mo$_{.4}$.maː$_{.4}$)$_{.8}$ʧe$_{.4}$.de$_{.6}$ː.la$_{.6}$	-0.8	-1	-70.0

(Non-final optimizations: PA is omitted for now)

HLT account: PA

PA: Counterbleeding

- H avoids long vowels: *LongT
- but if it already is associated to a V, it will remain there if the V gets long later: MaxAL(μ-T)

(71) a. *LongT W=6

Assign -x violations for every tone T_x that is associated to more than one TBU.

→and a H can't associate to only one μ of a σ: No contour tones

b. MaxAL(μ-T) W=50

Assign -x for every input association of H_x to a TBU without an output correspondent.

PA: Some more constraints

(72) a. ALIGN(H,L) W=4
Assign -n violations for every σ that intervenes between a H-toned σ and the left edge of the closest ω boundary.

b. HAVEH! W=5
Assign -1 violation for every output form without a H-tone.

c. *NHD/H W=∞
Assign -x violations for every tone T_x that is realized in the non-head position of a foot.

PA: H avoids long vowels at ①

(73) [[du-ʔ**yaːq**-ad-qa] -ba]

	MaxAL(μ-T) 50	*LongT 6	HaveH! 5	Align(H,L) 4	$\mathcal{H}$
① H docks further right to avoid Vː IP: du$_1$yaː$_1$qa$_1$dqa$_1$					
a. <du$_{.8}$>(yaː$_{.8}$)$_1$ (qa$_{.8}$d)$_1$ qa$_{.8}$			-1		-5.0
b. <du$_{.8}$>(yáː$_{.8}$)$_1$ (qa$_{.8}$d)$_1$ qa$_{.8}$		-1			-6.0
☞ c. <du$_{.8}$>(yaː$_{.8}$)$_1$ (qá$_{.8}$d)$_1$ qa$_{.8}$				-1	-4.0
② No reason for H to move IP: <du$_{.8}$>(yaː$_{.8}$)$_1$ (qá$_{.8}$d)$_1$ qa$_{.8}$					
☞ a. <du$_{.6}$>(yaː$_{.6}$)$_{.9}$ (qá$_{.6}$d)$_{.9}$ (qa$_{.6}$.ba$_{.8}$)$_1$ -1				-1	-4.0
b. <du$_{.6}$>(yáː$_{.6}$)$_{.9}$ (qa$_{.6}$d)$_{.9}$ (qa$_{.6}$.ba$_{.8}$)$_1$ -1	-1	-1			-56.0

PA + IL: H remains on V's that are lengthened at ②

(74) [[**mo**-matʃ-ed] -ela]

	DepAL(V-μ) 70	*Hd/σ$_\mu$ 69	MaxAL(μ-T) 50	*LongT 6	HaveH! 5	Align(H,L) 4	$\mathcal{H}$
① H-docking but no IL — IP: mo$_1$ma$_1$tʃe$_1$d							
a. (mo$_{.8}$.ma$_{.8}$)$_1$ tʃe$_{.8}$<d>^{H}		-1			-1		-74.0
☞ b. (mo$_{.8}$.má$_{.8}$)$_1$ tʃe$_{.8}$<d>		-1				-1	-73.0
c. (mo$_{.8}$.máː$_{.8}$)$_1$ tʃe$_{.8}$<d>	-1			-1		-1	-80.0
d. (mo$_{.8}$.maː$_{.8}$)$_1$ tʃé$_{.8}$<d>	-1					-2	-78.0
② IL and H remains — IP: (mo$_{.8}$.ma$_{.8}$)$_1$ tʃe$_{.8}$<d> -e$_1$la$_1$							
☞ a. (mo$_{.6}$.máː$_{.6}$)$_{.9}$ (tʃe$_{.6}$.de$_{.8}$)$_1$ la$_{.8}$	-0.8	-1		-1		-1	-135.0
b. (mo$_{.6}$.maː$_{.6}$)$_{.9}$ (tʃe$_{.6}$.dé$_{.8}$)$_1$ la$_{.8}$	-0.8	-1	-1			-3	-187.0

Summary: Kashaya in HLT

- a HLT account solves the apparent ordering paradox with a change of perspective: A process does not apply at a certain optimization but **only between elements that already underwent an optimization**:
  ➙ IL only applies to weakened vowels
- **counterbleeding** can follow from a single grammar since faithfulness constraints only become relevant once an elements received its position/nature at an earlier optimization:
  ➙ PA cares about underlying long vowels but not derived ones

Discussion and Conclusion

Summary

- HLT predicts interstratal differences from a single phonological grammar and predictable activity adjustment
- HLT can predict the metrical structure asymmetries in Kashaya that are not straightforward in a classical stratal system
- HLT inherently predicts the *ABA-restriction that is seemingly true across languages

Apparent ABA in Seri?

(75) Prefix classes in Seri (Cole, 1986)

	OBL	DIR	Object	Subject	Mood	NEG
V-deletion *VV	+	+	-	-	+	+
C__C /i/-deletion	-	-	-	-	-	-

But not compatible with a standard stratal architecture

- acknowledged in Cole (1986): Affixes within one stratum are arbitrarily marked for triggering [±cyclic] rules

➙ better analysed as **morpheme-specific undergoers** of deletion: Representational account as ghost/latent vowels (Zoll, 1996; Rubach, 2013; Zimmermann, 2019)

- corroborated by arguments that Seri has ghost/empty C's (Marlett and Stemberger, 1983; Marlett, 1997)

Apparent ABA in Choguita Rarámuri?

(76) Suffix classes in Caballero (2010)

	Derived stem		Syntactic stem			Aspectual stem			Finite verb			Sub verb
	INCH	TR	APPL	CAUS	APPL	DESID	MOT	EV	Voice/Asp	TAM	TAM	SUB
Stress	Shifting		Neutral			Shifting	Neutral		Shifting		Neutral	

But even more ‘strata’

And affix re-ordering across ‘strata’

- a cophonology account in Caballero (2008)

→ representational accounts exist that explain stress-behaviour of morphemes from different underlying representations (?)

Morpheme-specificity instead of ABA-patterns

- similar patterns where two different classes of affix-behaviour do not correlate with affix ordering:
  - tone replacive and non-replacive suffixes in Hausa (Inkelas and Zoll, 2007); representational re-analysis in Trommer (2021)
  - stress-dominant or recessive affixes in Moses Columbian Salish (Czaykowska-Higgins, 1993); representational re-analysis in Zimmermann (2018*b*)
  - a suffix not triggering in ATR-harmony ordered inbetween those that do in Karimojong (Lesley-Neumann, 2012); representational re-analysis in Trommer (2023)
  - ...

➞ morpheme-specificity is expected in a HLT system that is based on gradient representations: We expect that **lexical activity differences** can cross-cut the predictably activity adjustment

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Interstratal OCP-asymmetries: Moore (Kenstowicz et al., 1988; Kenstowicz, 1994)

(77)

H-toned suffix, p.78

	SG	PL	
a.	kòr-gó	kòr-dó	‘sack’
b.	ròò-gó	rò-tó	‘house’

(78)

Diss at 1/ 2 for the suffix, p.78

	SG	PL	
a.	wób-gò	wób-dò	‘elephant’
b.	láŋ-gò	lán-dò	‘hole’

(79) − at 3

a.	sá béd-a	‘big brooms’	
	cf. kor béd-a	‘big sacks’	p.83
b.	zá sáa-ga	‘bring a broom’	
	cf. ko sáa-ga	‘give a broom’	p.80

(80)

Stem 1	Word 2	Phrase 3
Diss	Diss	−

Moore: HLT tableaux

- based on a directional OCP: *H$\underline{\text{H}_x}$

1

$H_{1.0}$	OCP-H 10	‖MAX-H‖ 6	‖DEP-L‖ 1	$\mathcal{H}$
☞ a. $H_{0.8}$				0

2

$H_{0.8}$ $H_{1.0}$		OCP-H 10	‖MAX-H‖ 6	‖DEP-L‖ 1	$\mathcal{H}$
a. $H_{0.6}$ $H_{0.8}$	–	-0.8			-8.0
☞ b. $H_{0.6}$ $L_{0.8}$	Diss		-1.0	-1.0	-7

3

$H_{0.6}$ $H_{0.6}$		OCP-H 10	‖MAX-H‖ 6	‖DEP-L‖ 1	$\mathcal{H}$
☞ a. $H_{0.4}$ $H_{0.4}$	–	-0.4			-4.0
b. $H_{0.4}$ $L_{0.4}$	Diss		-1.0	-1.0	-7

Bari: HLT tableaux

1

		MAX-H 10	‖OCP-H‖ 10	‖DEP-L‖ 1	$\mathcal{H}$
	$H_{1.0}$ $H_{1.0}$				
☞ a.	$H_{0.8}$ $H_{0.8}$	–		-1.0		-10.0
b.	$H_{0.8}$ $L_{0.8}$	Diss	-1.0		-1.0	-11.0

2

		MAX-H 10	‖OCP-H‖ 10	‖DEP-L‖ 1	$\mathcal{H}$
	$H_{1.0}$ $H_{0.8}$				
a.	$H_{0.8}$ $H_{0.6}$	–			-1.0	-10.0
☞ b.	$H_{0.8}$ $L_{0.6}$	Diss	-0.8		-1	-9.0

3

		MAX-H 10	‖OCP-H‖ 10	‖DEP-L‖ 1	$\mathcal{H}$
	$H_{0.6}$ $H_{0.8}$				
a.	$H_{0.4}$ $H_{0.6}$	–			-1.0	10.0
☞ b.	$H_{0.4}$ $L_{0.6}$	Diss	-0.8		-1	-9.0

- in addition: ALTERNATION prohibits morpheme-internal OCP-repairs at 3 (=a deassociated H must be rescued unto a neighboring TBU)

Empirical arguments against the SDH

- Mohanan (1989) and syllabification in Malayalam: codas necessary early but only open syllables later
- Turkish Velar Drop Inkelas and Orgun (1995): only applies at levels 3+4 but not 1+2
- Dagbani High Tone Spreading Hyman (1993): HTS1 and HTS2 – both are seemingly phrasal (but also apply within words)
- vowel raising in Basque Hualde (1989)