First come – first served: The serial interaction of feet and tone

Eva Zimmermann
Universität Leipzig

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Main Claim

- opposing phonological preferences in HS can be resolved by a 'first come-first served'-principle: **Optimization of underlying elements has priority over optimization of inserted structure**

- a serial optimization account allows to predict **positionally restricted tone/accent systems** from the order between foot parsing and tone association

- this correctly predicts
  - **non-local templatic accent systems** as in Mayo and Tagalog that are impossible to capture in a SPOT alternative and
  - the **asymmetric distribution of different defaults** in Goizueta Basque that are not as easily captured in a SPOT system.

Positionally Restricted Accent Systems

- lexical contrast for pitch: Prototypical tone
- positionally restricted, usually only a single V/σ: Prototypical stress
  - A special third pattern with an 'accent' mark? (e.g. for Japanese McCawley (1968); Ross (1985); Haraguchi (1991); Kubozono (1993))

➙ 'accent' patterns always reanalyzable as **tonal and/or metrical patterns and their interaction** (Hyman, 2009; Köhnlein, 2019)

1. Non-local templates in Mayo

Mayo (Uto-Aztecan; Hagberg (1989, 1990, 2006); Hyman (2009); Spahr (2016))

- one vowel in every word is realized with a higher pitch

(1) *Mayo accent (Hagberg, 2006, 73)*

Accented		Unaccented	
ch**ú**pnake	'will harvest' TRNS	ponn**á**ke	'will play' TRNS
h**í**-chupnake	'will harvest' INTR	hi-p**ó**nnake	'will play' INTR
h**í**-hi-chupnake	'will always harvest'	hi-h**í**-ponnake	'will always play' INTR
ch**í**knake	'will sweep' TRNS	wis**é**ka	'sawing' TRNS
h**í**-chiknake	'will sweep' INTR	hi-w**í**seka	'sawing' INTR
h**í**-hi-chiknake	'will always sweep' INTR	hi-h**í**-wiseka	'always sawing'

→ a **non-local templatic** accent system: The stem determines the stress pattern for the whole word and is not necessarily stressed itself

Serial Account in a Nutshell

Conflict for tones as head of a φ (e.g. de Lacy, 2002)

Tones are preferably initial:

H
|
(h i)$_{\varphi}$ c h u p n a k e

Iambic feet are preferably binary:

H
|
(h i p o n)$_{\varphi}$ n a k e

(independent evidence for the assumed φ structure from loanwords and reduplication)

Underlying contrast: Stems with/without a floating H-tone

- underlying floating H-tones are associated to their preferred position before feet are built
- without a floating H-tone, the unmarked foot is created before a default H is inserted

Steps in a Serial Account of Mayo

(2)

1. Morpheme Concatenation

h i - p o n n a k e	H h i - c h u p n a k e

2. Floating H-association

h i p o n n a k e	H h i c h u p n a k e

3. Foot assignment

(h i p o n)$_{\varphi}$ n a k e	H (h i)$_{\varphi}$ c h u p n a k e

4. Insertion of H on foot head

H (h i p o n)$_{\varphi}$ n a k e	H (h i)$_{\varphi}$ c h u p n a k e
φ =☺ – T=☹	φ =☹ – T=☺

Harmonic Serialism (McCarthy, 2008*a*,*b*, 2010; Elfner, 2009, 2016; Moore-Cantwell, 2011; McCarthy et al., 2012; Torres-Tamarit, 2012; Pruitt, 2012; Pater, 2012)

- GEN is restricted by **gradualness** and there is a **GEN-EVAL-Loop** that continues as long as a new step is **harmonically improving**
- possible one-step operations in the domain of feet and tone:
  (McCarthy et al., 2012; Breteler, 2018)
  1. Link a tone to a TBU
  2. Insert a tone and link it to a TBU
  3. Build a foot
  4. Delink a tone from a TBU

Constraints 1

(3) *H associates and wants to be initial*

a. *FltH

Assign * for each tone not associated to a TBU.

b. Align(H,L)

Assign * for every TBU that intervenes between the left word edge and the leftmost TBU a tone H is associated to.

(4) *Foot is built and wants to be binary*

a. Haveφ! (after (Ito and Mester, 2009))

Assign * for every prosodic word that does not dominate a foot.

b. FtBin

Assign * for each φ that is not binary on the σ level.

Constraints 2

(5) *Every foot needs a H and every H is in a foot*

a. φHD->H (=License(Min-R, H) (Breteler, 2018, 20))
For each MinFt, assign * if its rightmost syllable is not associated to a H tone.

b. H->φHD (=License(Min-R, H))
For each H, assign * if it is not associated to a syllable that is rightmost in a MinFt.

(6) *Feet are always left-aligned and iambic*

a. RhT:I (Kager, 1999)
Assign * for every foot with initial prominence.

b. Align(φ,L;ω,L)
Assign * for every σ that intervenes between the leftmost σ in a φ and the left word edge.

HS Optimization: Step 1, No Underlying H

(7) *Foot building*

h i - p o n n a k e	*FltH	H->φHD	FtBin	Have φ!	φHD->H	Align(H,L)
a. h i p o n n a k e				*!		
☞ b. (h i p o n)$_{\varphi}$ n a k e					*	
c. (h i)$_{\varphi}$ p o n n a k e			*!		*	
d. H ↓ h i p o n n a k e		*!		*		

HS Optimization: Step 2, No Underlying H

(8) *Default H*

(h i p o n)$_\varphi$ n a k e	*FltH	H->φHD	FtBin	Haveφ!	φHD->H	Align(H,L)
a. (h i p o n)$_\varphi$ n a k e					*!	
☞ b. H | (h i p o n)$_\varphi$ n a k e						*
c. H | (h i p o n)$_\varphi$ n a k e		*!			*	

HS Optimization: Step 1, Underlying H

(9) *Tone association*

H h i - c h u p n a k e	*FltH	H->φHD	FtBin	Haveφ!	φHD->H	Align(H,L)
a. H h i - c h u p n a k e	*!			*		
b. H (h i c h u p)$_{\varphi}$ n a k e	*!				*	
☞ c. H h i c h u p n a k e		*		*		
d. H h i c h u p n a k e		*		*		*!

HS Optimization: Step 2, Underlying H

(10) *Foot building*

	*FltH	H->φHd	FtBin	Haveφ!	φHd->H	Align(H,L)
H h i c h u p n a k e						
a. H h i c h u p n a k e		*!		*		
☞ b. H (h i)$_{\varphi}$ c h u p n a k e			*			
d. H (h i p o n)$_{\varphi}$ n a k e		*!			*	

HS Account for Mayo: RotB

(11) OCP ≫ *FltH , MaxFlt, DepAL(H-μ)$_{Affix}$ ≫ H->φHd ≫ FtBin ≫ Haveφ! ≫ φHd->H ≫ Align(H,L), Max$_{AL}$, DAL, DepH*

(12) *Predicted outcomes for some bi-/trisyllabic inputs with 0-2 H's*

1.	σ σ	(σσ)	A: VV́
2.	H σ σ	(σ)σ	U: V́V
3.	H σ σ	(σσ)	A: VV́
4.	H σ σ	(σσ)	A: VV́
5.	H H σ σ	(σ)σ	U: V́V
6.	H H σ σ	(σ)σ	U: V́V
7.	H H σ σ	(σ)σ	U: V́V
8.	σ σ σ	(σσ)σ	A: VV́
9.	H σ σ σ	(σ)σ σ	U: V́V
10.	H σ σ σ	(σσ)σ	A: VV́
11.	H σ σ σ	(σσ)σ	A: VV́
12.	H σ σ σ	(σσ)σ	A: VV́
13.	H H σ σ σ	(σ)σ σ	U: V́V
14.	H H σ σ σ	(σ)σ σ	U: V́V
15.	H H σ σ σ	(σ)σ σ	U: V́V
16.	H H σ σ σ	(σ)σ σ	U: V́V
17.	$σ_{Af}$ σ σ	($σ_{Af}$σ)σ	A: VV́
18.	H $σ_{Af}$ σ σ	($σ_{Af}$σ)σ	A: VV́
19.	H $σ_{Af}$ σ σ	($σ_{Af}$σ)σ	A: VV́
20.	H $σ_{Af}$ σ σ	($σ_{Af}$)σ σ	U: V́V
21.	H H $σ_{Af}$ σ σ	($σ_{Af}$)σ σ	U: V́V

(*DoY derivation for underlyingly associated H's: H-deletion – φ-building – H-epenthesis)

Mayo in a Parallel OT system?

(13) If $\text{MAX}_{\text{AL}} \gg \text{FTBIN} \gg \text{ALIGN(H,L)}$:

		underlying	output
a.	'Unaccented'	p o n n a k e	H (p o n n á)$_{\varphi}$ k e
	(=no H)	h i - p o n n a k e	H (h i p ó n)$_{\varphi}$ n a k e
b.	'Accented'	H c h ú p n a k e	H (c h ú)$_{\varphi}$ p n a k e
	(=associated H)	H h i - c h ú p n a k e	H (h i c h ú)$_{\varphi}$ p n a k e

- apparently only solution: $\text{ALIGN(H,L}_{\text{MORPH}}) \gg \text{FTBIN} \gg \text{ALIGN(H,L}_{\text{EPENTH}})$

Accent system in Tagalog (French, 1988; Schachter and Otanes, 1983; Hagberg, 2006)

(14) *Mirror image of Mayo at the right edge (Hagberg, 2006, 176)*

A. Stems with penult accent		B. Stems with final accent	
bá:sa	'read'	ʔupóʔ	'sit'
ba:sá-hin	'to read'	ʔupoʔ-án	'sits on X'

(15) *Exceptional suffixes (Hagberg, 2006, 179-80)*

a. ø-Adjectivizer: A-stems=final accent

bí:his	'way of dressing'	bi:hís	'dressed up'

b. Nominal: A-stems=final accent; B-stems=penult accent

húgas	'to wash'	hugas-án	'place for washing'
aklát	'book'	aklát-an	'library'

HS Account for Tagalog

(16)

A-stem	B-stem	A-stem+Adj	A-stem+Nom	B-stem+Nom
	H	H	L	H L
basa-hin	ʔupoʔ-an	biːhis-	hugas-an	aklat-an
1. Floating L-association				
–	–	–	hugasan	aklatan
2. Floating H-association				
–	ʔupoʔan	biːhis	–	aklatan
3. Foot assignment				
ba(sahin)$_\varphi$	ʔupo(ʔan)$_\varphi$	biː(his)$_\varphi$	huga(san)$_\varphi$	ak(latan)$_\varphi$
4. Turning Head-tone into H				
–	–	–	huga(san)$_\varphi$	–
5. Insertion of H on foot head				
ba(sahin)$_\varphi$	–	–	–	–

2. Different Defaults in Goizueta Basque

Four Prosodic Patterns (Hualde et al., 2008)

(17) *Prosodic contrasts in Goizueta Basque (Hualde et al., 2008, 3)*

		Rising pitch			Falling pitch	
2nd σ	A.	giz**ó**n	'man'	C.	pur**è**	'puree'
		al**á**ba	'daughter'		tip**ù**la	'onion'
		em**á**kume	'woman'		esk**ò**la	'school'
1st σ	B.	s**é**me	'son'	D.	b**à**so	'glass'
		úme	'children'		m**ò**ro	'Moor'
		áma	'mother'		l**è**ngusu	'cousin'

Serial Account in a Nutshell

Conflict: Preferred positions for tones as head of a φ

(18)

Foot binary σ	A.	gizón	C.	purè	φ =☺	T=☹
Tone initial σ	B.	séme	D.	bàso	φ =☹	T=☺

Underlying contrast: Stems with/without a floating H/L

- floating L's: associated to their preferred position before feet are built
- floating H's: associated to head of a binary foot after feet are built
- no floating tones: default-H's are inserted after feet are built
- associated tones on 1/2 V remain; others are deleted

→ different defaults for underlying vs. inserted and L- vs. H-tones

Steps in a Serial Account of Goizueta Basque

(19)

Lexical representation

L	H		H
b a s o	g i z o n	p u r a	s é m e

1. Floating L-association

L	H		H
b á s o	g i z o n	p u r a	s é m e

2. Foot assignment

L	H		H
(b á)$_\varphi$ s o	(g i z o n)$_\varphi$	(p u r a)$_\varphi$	(s é)$_\varphi$m e

3. Floating H-association

L	H		H
(b á)$_\varphi$ s o	(g i z ó n)$_\varphi$	(p u r a)$_\varphi$	(s é)$_\varphi$m e

4. Insertion of default-L on foot head

L	H	L	H
(b á)$_\varphi$ s o	(g i z ó n)$_\varphi$	(p u r á)$_\varphi$	(s é)$_\varphi$m e

HS Account for Goizueta Basque

(20) *FltL, DepL ≫ Haveφ! ≫ *FltH, φHd->H, H->φHd ≫ FtBin, Align(H,L), Max_{AL}, DAL, DepH

(21) *Predicted outcomes for bi-/trisyllabic stems with 0-1 tone(s)*

1.	σ σ	(σσ)	A: VV́
2.	σ σ	(σσ)	A: VV́
3.	σ σ	(σ)σ	D: V̀V
4.	σ σ	(σ)σ	B: V́V
5.	σ σ	(σ)σ	D: V̀V
6.	σ σ	(σσ)	A: VV́
7.	σ σ	(σσ)	C: VV̀
8.	σ σ σ	(σσ)	A: VV́
9.	σ σ σ	(σσ)σ	A: VV́
10.	σ σ σ	(σ)σ σ	D: V̀V
11.	σ σ σ	(σ)σ σ	B: V́V
12.	σ σ σ	(σ)σ σ	D: V̀V
13.	σ σ σ	(σσ)σ	C: VV̀
14.	σ σ σ	(σσ)σ	C: VV̀
15.	σ σ σ	(σσ)σ	A: VV́
16.	σ σ σ	(σσ)σ	C: VV̀

Goizueta Basque in a Parallel OT system?

(22) HAVEφ!, *FLTL, *FLTH, φHD->H, H->φHD, DEPL, ≫ DEPH, MAX_{AL}, DAL ≫ FTBIN ≫ ALIGN(H,L)

(23) *Predicted outcomes for bi-/trisyllabic stems with 0-1 tone(s)*

1.	σ σ	(σσ)	A: VV́
2.	H σ σ	H (σσ)	A: VV́
3.	L σ σ	L (σσ)	C: VV̀
4.	H σ σ	H (σ)σ	B: V́V
5.	L σ σ	L (σ)σ	D: V̀V
6.	H σ σ	H (σσ)	A: VV́
7.	L σ σ	L (σσ)	C: VV̀
8.	σ σ σ	H (σσ)	A: VV́
9.	H σ σ σ	H (σσ)σ	A: VV́
10.	L σ σ σ	L (σσ)σ	C: VV̀
11.	H σ σ σ	H (σ)σ σ	B: V́V
12.	L σ σ σ	L (σ)σ σ	D: V̀V
13.	H σ σ σ	H (σσ)σ	C: VV̀
14.	L σ σ σ	L (σσ)σ	C: VV̀
15.	H σ σ σ	H (σσ)σ	A: VV́
16.	L σ σ σ	L (σσ)σ	C: VV̀

Predictions of HS and SPOT and the Distribution of Accent

(24) *Different distribution of 4 patterns among 16 basic stem types*

	A: VV́	B: V́V	C: VV̀	D: V̀V	
SPOT	6	2	6	2	
HS	6	2	4	4	➙ frequency of classes in G.Basque

HS vs. SPOT: Different factorial typologies

- given the same constraint set, the positions for newly associating tones (=epenthetic, floating)
  - can be different **(=different defaults) in HS**.
  - are identical **(=a single default) in SPOT**.

➙ Cf. excerpt of factorial typology (25) (done in OTHelp (Staubs et al., 2010))

- for iambic languages with one initial φ
- for 16 inputs (bi-/trisyllabic; 0-1 tone that is associated or not)

Defaults for Newly Associated Tones: Abstract of a Factorial Typology

(25) *SPOT (12 languages out of 394)*

No Tone		Floating Tone				Reassociation into φ	
σ σ	σ σ σ	σ σ fH	σ σ fL	σ σ σ fH	σ σ σ fL	σ σ σ H3	σ σ σ L3
H2	H2	H2	L2	H2	L2	H2	L2
L2	H2	H2	L2	H2	L2	H2	L2
H1	H1	H1	L1	H1	L1	H2	L2
L1	H1	H1	L1	H1	L1	H2	L2
H1	H1	H1	L1	H1	L1	H1	L1
L1	H1	H1	L1	H1	L1	H1	L1

(26) *HS (16 languages out of 161 unique ones)*

H2	H2	H2	L2	H2	L2	H2	L2
H2	H2	H2	L1	H2	L1	H2	L2
H2	H2	H1	L2	H1	L2	H2	L2
H2	H2	H1	L1	H1	L1	H2	L2
L2	H2	H2	L2	H2	L2	H2	L2
L2	H2	H2	L1	H2	L1	H2	L2
L2	H2	H1	L2	H1	L2	H2	L2
L2	H2	H1	L1	H1	L1	H2	L2

3. Summary

Summary and Discussion

- if conflicting preferences for two suprasegmental elements are resolved by serial optimization, underlying elements can be optimized earlier than inserted ones

- this predicts **templatic non-local accent** in Mayo and Tagalog
  - in spirit similar to the Lexical Phonology account in Hagberg (2006) but based on a single ranking of independently motivated phonological constraints

- and the **co-existence of different defaults** in Goizueta Basque

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Default Accent in Mayo

- Spanish loans are (with very few exceptions) stressed on the second vowel

(27) *Spanish Loanwords in Mayo (Hagberg, 2006, 79)*

Spanish	Mayo	
váca(s)	wakás	'cow'
cábra	kabára	'sheep'
domíngo	lomínko	'Sunday'
diós	lióh	'God'

Mayo: An Independent Argument for the Assumed Foot Structure

- bimoraic reduplication: asymmetry for accented/unaccented stems if the first syllable is open

(28) *Mayo reduplication (p.135+137)*

a. *Unaccented stems: C_1VC_2*

noká	nok∼nóka	'speak'	*non∼nóka
bwaná	bwan∼bwána	'cry'	*bwab∼bwána

b. *Accented stems: C_1VC_1*

nóka	nón∼noka	'know language'	*nók∼noka
tíwe	tít∼tiwe	'be ashamed'	*tíw∼tiwe

→ the base for reduplication is a φ (Hagberg, 2006)

- unaccented: $(\text{noká})_\varphi$
- accented: $(\text{nó})_\varphi\text{ka}$

Mayo account in Hagberg (2006)

- accented words have a floating stress autosegment
- linking rule links * L to R at every cycle and delinking rule delinks it at the end of every cycle
- foot building is also cyclic (=reduplication at every cycle possible)
- the delinking rule is turned off at the end of the lexical cycles: * is hence linked to leftmost stress-bearing unit for every word containing an accented stem
- postlexical stress insertion and linking inside foot R to L (=accounts for default stress on second syllable)

→ based on coexisting L-R and R-L linking rules in a single language

→ based on principles like the 'Degenerate Foot Principle' demanding that the presence of a 'lexical accent linked to any element that is being incorporated into a foot forces that foot to become degenerate' (p.19) that seem problematic from a cross-language perspective