

First come, first serve: Serial Optimization of Tone and Foot Structure in Mayo

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Main Claim

- the competition between opposing phonological preferences in a HS account can follow a ‘first come-first serve’-principle: **Optimization of underlying elements has priority over optimization inserted default structure**
- a serial optimization account allows to predict **positionally restricted tone/accent systems** from the order between between foot parsing and tone association
- this HS account also predicts the **non-local templatic accent system** of Mayo that looks like an inherently anti-cyclic system

Plan

1. Mayo
 - 1.1 Data and Generalizations
 - 1.2 A HS Account of Mayo
 - 1.3 Further Predictions and Discussion
2. Extension to Other Patterns
3. Summary

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 <u>ú</u> pnake	‘will harvest’ TRNS	ponn <u>á</u> ke	‘will play’ TRNS
h <u>í</u> chupnake	‘will harvest’ INTR	hip <u>ó</u> nnake	‘will play’ INTR
h <u>í</u> hichupnake	‘will always harvest’	hih <u>í</u> ponnake	‘will always play’ INTR
ch <u>í</u> knake	‘will sweep’ TRNS	wis <u>é</u> ka	‘sawing’ TRNS
h <u>í</u> chiknake	‘will sweep’ INTR	hiw <u>í</u> seka	‘sawing’ INTR
h <u>í</u> hichiknake	‘will always sweep’ INTR	hih <u>í</u> 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

Stress/tone/(pitch) accent/...?

- the dilemma:
 - lexical contrast for high pitch: Prototypical tone?
 - exactly one high-pitched V which is positionally restricted to the initial two V's: Prototypical stress?
- possible solution: a special third pattern with an 'accent' mark (e.g. for Japanese McCawley (1968); Ross (1985); Haraguchi (1991); Kubozono (1993))
- another solution: 'accent' patterns always reanalyzable as tonal and/or metrical patterns (Hyman, 2009; Köhnlein, to appear)
 - ➔ Mayo is another examples where **foot structure and tone assignment interact**

Feet and Tone in Mayo

The head of a foot = A high tone

(2)

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

- another example for well-established interaction between metrical structure and tone (e.g. de Lacy, 2002)

Serial Account in a Nutshell

Conflict: Preferred positions for a H-tone (=head of a φ)

- the initial V: (hí) $_{\varphi}$ ponnake
- inside an unmarked and hence bisyllabic left- aligned φ : (hichúp) $_{\varphi}$ nake

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 H-tone, the unmarked foot is created before a default H is inserted

Steps in a Serial Account for Mayo

(3) Stem without floating H	Stem with floating H
1. Morpheme Concatenation	
h i - c h u p n a k e	<div style="text-align: right; margin-right: 20px;">H</div> h i - p o n n a k e
2. Floating H-association	
h i c h u p n a k e	<div style="text-align: right; margin-right: 20px;">H</div> <div style="text-align: center; margin-right: 20px;"> </div> h i p o n n a k e
3. Foot assignment	
(h i c h u p) _φ n a k e	<div style="text-align: right; margin-right: 20px;">H</div> <div style="text-align: center; margin-right: 20px;"> </div> (h i) _φ p o n n a k e
4. Insertion of H on foot head	
<div style="text-align: center; margin-right: 20px;">H</div> <div style="text-align: center; margin-right: 20px;"> </div> (h i c h u p) _φ n a k e	<div style="text-align: right; margin-right: 20px;">H</div> <div style="text-align: center; margin-right: 20px;"> </div> (h i) _φ p o n n a k e

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


- (4)
- a. ALIGN(H;L)
Assign * for every TBU that intervenes between the left word edge and the leftmost TBU a tone H is associated to.
 - b. FTBIN
Assign * for each φ that is not binary on the σ level.
 - c. HD ω (after (Ito and Mester, 2009))
Assign * for every prosodic word that does not dominate a foot.
 - d. φ HD \rightarrow H (=LICENSE(MIN-R, H) (Breteler, 2018, 20))
For each MinFt, assign * if its rightmost syllable is not associated to a H tone.
 - e. *FLTH
Assign * for each tone not associated to a TBU.
 - f. DEPH
Assign * for every tone in the output without an input correspondent.

Additional undominated constraints

- (5) a. RHT:I (Kager, 1999)
 Assign * for every foot with initial prominence.
- b. ALIGN($\varphi, L; \omega, L$)
 Assign * for every σ that intervenes between the leftmost σ in a φ and the left word edge.


Step 1, no underlying H: Foot building

(6)

	*FLTH	H _D ω	φ _{H_D→H}	ALIGN(H;L)	FTBIN	DEPH
h i - c h u p n a k e						
a. h i c h u p n a k e		*!				
 b. (h i c h u p) _φ n a k e			*			
c. (h i) _φ c h u p n a k e			*		*!	

Step 2, no underlying H: Assignment of default H

(7)

	* _{FLTH}	H _D ω	φ _{H_D→H}	ALIGN(H;L)	FTBIN	DEPH
(h i c h u p) _φ n a k e						
a. (h i c h u p) _φ n a k e			*!			
b.  (h i c h ^H u p) _φ n a k e				*		*
c. (h ^H i c h u p) _φ n a k e			*!			*


Step 3, no underlying H: Convergence

(8)

		*FLTH	H _D ω	φ _{H_D} ->H	ALIGN(H;L)	FTBIN	DEPH
	(h i c h ^H u p) _φ n a k e						
☞ a.	(h i c h ^H u p) _φ n a k e				*		
b.	(h i c h u p) _φ n a k e	*!		*			
c.	(h i) _φ c h ^H u p n a k e			*!		*	


Step 1, underlying floating H: Tone association

(9)

	H h i - p o n n a k e	*FLTH	H _D ω	φ _{H_D} →H	ALIGN(H;L)	FTBIN	DEPH
a.	H h i p o n n a k e	*!	*				
b.	H (h i p o n) _φ n a k e	*!		*			
 c.	H h i p o n n a k e		*				
d.	H h i p o n n a k e		*		*!		

Step 2, underlying floating H: Foot building

(10)

		* _{FLTH}	H _D ω	φH _D ->H	ALIGN(H;L)	FTBIN	DEPH
	$\begin{array}{c} \text{H} \\ \\ \text{h i} \end{array} \text{ ponnake}$						
a.	$\begin{array}{c} \text{H} \\ \\ \text{h i} \end{array} \text{ ponnake}$		*!				
 b.	$\begin{array}{c} \text{H} \\ \\ (\text{h i})_{\phi} \end{array} \text{ ponnake}$					*	
c.	$\begin{array}{c} \text{H} \\ \\ (\text{h i p o n})_{\phi} \end{array} \text{ nake}$			*!			

Step 3, underlying floating H: Convergence

(11)

		*FLTH	H _D ω	φH _D →H	ALIGN(H;L)	FTBIN	DEPH
	$\begin{array}{c} \text{H} \\ \\ (\text{h i})_{\phi} \text{ ponnake} \end{array}$						
☞ a.	$\begin{array}{c} \text{H} \\ \\ (\text{h i})_{\phi} \text{ ponnake} \end{array}$					*	
b.	$\begin{array}{c} \text{H} \\ \\ (\text{h i p o n})_{\phi} \text{ nake} \end{array}$			*!			
c.	$\begin{array}{c} \text{H} \\ \\ \text{h i} \quad \text{ponnake} \end{array}$		*!				

Summary: The ‘First come-first serve’-Account

- competition between an ideally positioned H and an ideal bisyllabic foot is resolved by the **order of operations, determined by a representational contrast**: An underlying floating H-tone is optimized first whereas a default-H is inserted only after foot-parsing
- non-serial alternative: Constraints are sensitive to the status as being underlying/morphologically coloured or epenthetic/colourless
 $\text{ALIGN(H;L)}_{\text{MORPH}} \gg \text{FTBIN} \gg \text{ALIGN(H;L)}_{\text{EPENTHETIC}}$

Further Prediction: Default Accent in Mayo

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

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

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

An Independent Argument for the Assumed Foot Structure

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

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

a. *Unaccented stems: C₁VC₂*

noká	nok~nóka	‘speak’	*non~nóka
bwaná	bwan~bwána	‘cry’	*bwab~bwána

b. *Accented stems: C₁VC₁*

nóka	nón~noka	‘know language’	*nók~noka
tíwe	tít~tiwe	‘be ashamed’	*tíw~tiwe

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

- unaccented: (noká) φ
- accented: (nó) φ ka

Richness of the Base?

Only tone-less morphemes or stems with floating H's?

Option 1

Pre-optimization prior to concatenation excluding all possible morpheme types (Trommer, 2011).

Option 2

All possible representations result in attested forms.

RotB: All possible representations result in attested stem behaviour

- (14) *Underlyingly associated H's?* p o n n a k e ^H_|
 Unmarked foot is assigned first: Behave as unaccented stems.
- (15) *More than one H?* p o n n a k e ^{H H}
 Are neutralized to a single H due to the OCP.
- (16) *Underlying φ structure?* (p o n n a) _{φ} k e ^H
 Is always overwritten: $\text{DEPAL}(\omega-\varphi) \gg \text{MAX}\varphi$.
- (17) *Affixes with H?* h i - p o n n a k e ^H
 Are never associated: $\text{DEPAL}(\text{H}-\mu)_{\text{AFFIX}} \gg * \text{FLTH}$.

Extension to Other Patterns

Other Positionally Restricted 'Accent' Systems

Tagalog (Austronesian, Hagberg (2006))

- stress is either on the final or penultimate syllable, depending on the stem (=mirror image of Mayo)

Chimwiini (Atlantic-Congo, Kisseberth and Abasheikh (2011))

- most words have a high tone on the penult TBU; in certain morpho-syntactic (phrasal!) environments, the H is final

Somali (Afro-Asiatic, Hyman (1981))

- H-tone on the final or penult TBU; depends primarily on morpho-syntactic context

Mee (New Guinea, Hyman and Kobepa (2013); Worbs (2016))

- two tone patterns A+B for words of all shapes
- tonal morphology: A changes into B

(18)

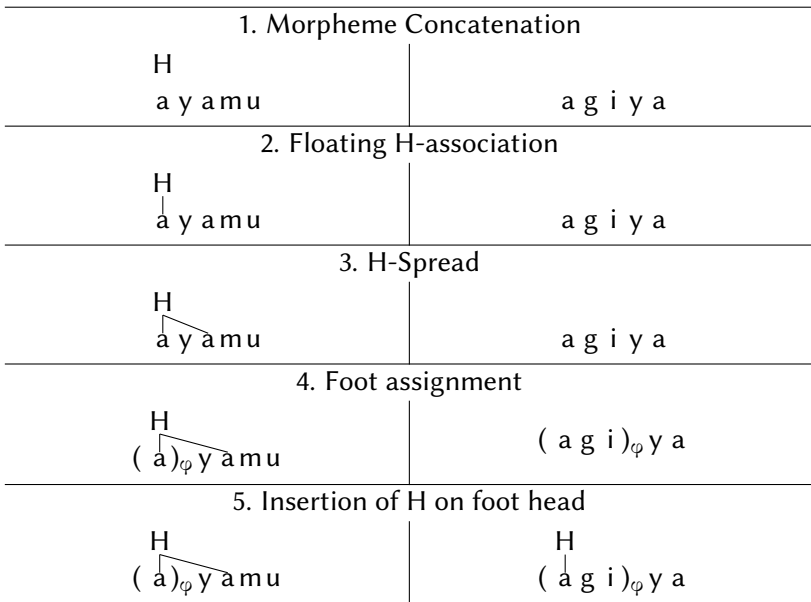
	μμ	μ.μ	μμ.μ	μμ.μμ	μ.μ.μ	
A.	bóù	údò	gáàbò	múùmàì	áyàmù	HL(L...)
	‘wind’	‘heavy’	‘quiet’	‘to finish’	‘chicken’	
B.	bóú	údó	gáátì	búúmàì	ágíyà	HH(L...)
	‘to skin’	‘testicle’	‘ten’	‘to swim’	‘net bag’	

HS Account for Mee

- An underlying tone associates to the initial TBU and spreads (=all syllables want to have a tone but maximally binary spread is possible)
 - Without a tone, a left-aligned binary foot is built first; a H tone is inserted into the foot head but cannot spread since it is illicit on the foot non-head
- Morphologically determined change from A to B:
A **floating tone**

Steps in a Serial Account for Mee

(19)



Summary

Summary and Discussion

- positionally restricted ‘accent’ systems results from a conflicting preferences for two suprasegmental elements resolved by **serial optimization**
 - underlying: earlier optimization vs. default: later optimization
- even predicts the apparently non-cyclic Mayo **templatic non-local accent** from an interaction of tone association and foot parsing
 - in spirit similar to the Lexical Phonology account in Hagberg (2006) but based on a single ranking of independently motivated phonological constraints

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Appendix: 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

Appendix: Further Data on Minimality-Induced Lengthening

- words are minimally bimoraic and final syllable is extrametrical phrase-finally: potential feeding of lengthening
- VL for unaccented stems (20-a), gemination for accented ones (20-b)

(20) *Phrase-final extrametricality and lengthening (Hagberg, 2006, 156+168)*

	Phrase-final	elsewhere	
a.	bwiík-a	bwik-á	‘sing’-PRS
	noók-a	nok-á	‘speak’-PRS
b.	chúpp-na	chúp-na	‘harvest’-PRS
	mákk-a	mák-a	‘give’-PRS

- preference for VL except if gemination allows to avoid shifting of H
- for long V’s, H is always on second μ ; VL for accented stems would hence result in shifting H from one μ to the other
 - for unaccented stems, the H has to shift anyway (since it can’t remain on final syllable)