The power of a single representation: Morphological tone and allomorphy

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Allomorphy: its logic and limitations
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➙ **discuss instances of surface alternations in the domain of morphological tone**

➙ **propose mono-representational optimality-theoretic analyses based on markedness and faithfulness constraints on (autosegmental) tone**

1. Introduction

1.1 PCSA and mono- vs. polyrespresentational analyses

(1) *Phonologically conditioned suppletive allomorphy (PCSA)* (for example Paster, 2006)
The surface representation/effect of one morpheme M is different depending on the phonological context and this difference cannot be attributed to phonological changes independently expected in this context.

(2) *Segmental PCSA in Moroccan Arabic* (Mascaró, 2007)

	Base	3.Sg.Masc		*Possible analysis:*
a.	ʃafu	ʃafuh	'error'	3.Sg.M ↔ /h/ /V__
b.	ktab	ktabu	'book'	3.Sg.M ↔ /u/ /C__

➙ **poly-representational analysis**

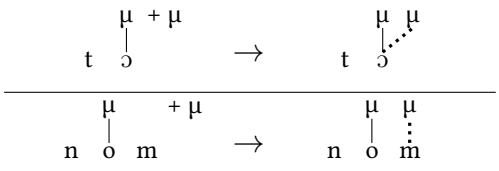
- another analysis: an elsewhere allomorph 'steps in to fill the gap left behind' by phonological blocking (Paster, 2009*a*, 19)

- non-concatenative 'PCSA': in (3), different operations (gemination, vowel lengthening) apply and in (4), one non-concatenative operation applies in different positions of its base

(3) *Non-concatenative 'PCSA' in Asante Twi* (Dolphyne, 1996; Paster, 2010)

	Base		Past (+Obj)	
a.	tɔ	'to buy'	tɔː	P80/98
	dane	'to turn'	daneː	P80/99
b.	nom	'to drink'	nomː	P80/99
	ɔpameː	's/he sewed (it)'	ɔpamː	D91

Possible analysis:

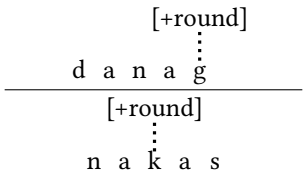


➙ **mono-representational analysis**

(4) *Non-concatenative 'PCSA' in Chaha* (McCarthy, 1983, 179)

	Base	3.Sg.Masc.Object	
a.	danag	danag^{w}	'hit'
	nadaf	nadaf^{w}	'sting'
b.	nakas	nak^{w}as	'bite'
	kafat	kaf^{w}at	'open'

Possible analysis:



➙ mono-representational analysis

- the gist of the μ-affixation analysis in (3): an abstract element can be realized through different strategies (similar examples are Davis and Ueda, 2002; Zimmermann, 2013; Stonham, 2007)
- the gist of the feature-affixation analysis (4): a feature searches for the host to which it can associate without violating markedness (for example Zoll, 1994; Banksira, 2011)

1.2 Tonal allomorphy

(5) *San Miguel el Grande Mixtec*[1] (McKendry, 2013, 55)

	Base	Perturbed		
a.	nē^{ʔ}è	né^{ʔ}è	'cry'	M L → H L
b.	īsù	īsú	'deer'	M L → M H

➢ H overwrites either the first or second base tone

(6) *Molinos Mixtec* (Hunter and Pike, 1969, 38)

	Base		Perturbed		
a.	kīti̱	'animal'	síví kítí	'name of the animal'	M M → H H
b.	rī̱ŋkī	'mouse'	síví ríŋkī	'the mouse's name'	M M → H M

➢ a H overwrites only the first or both base tones

(7) *Yucunany Mixtepec Mixtec I* (Paster and Beam de Azcona, 2004*a*, 3-4)

	Base	1.Sg		
a.	kwà'ā	kwà'ā̱à	'my man's sister'	L M → L ML
	sì'ī	sì'ī̱ì	'my leg'	L M → L ML
b.	chá'à	chá'àyù	'I am short'	HL → HL yù
	tūtù	tūtùyù	'my paper'	M L → M L yù

➢ an additional tone in some contexts and realization of segments in others

(8) *Yucunany Mixtepec Mixtec II* (Paster and Beam de Azcona, 2004*a*, 3-4)

	Base	1.Sg		
a.	nàmá	nàmáà	'my soap'	L H → L HL
	kwíi̱í	kwíi̱íi̱	'I am narrow/thin'	HLH → HLHL
b.	la'la	'mucus'	la'là	M M → M L
	xá'nu̱	xá'nù	'my cigarette'	H M → H L

➢ a new contour tone in some contexts and overwriting of the original base tone in others

- the different types of tonal allmorphy can be categorized as in (9)

[1]Notation: high tone H á 1 | lowered mid tone ä 3
mid tone M ā 2 | low tone L à 4

(9) *Allomorphy and morphological tone*

Given phonological contexts C_1 with tone pattern T_A and context $\ldots C_2$ with tone pattern T_B:

a. **Positional Allomorphy (PosA)**
The new tone pattern T_C is realized in position P_x of the base in C_1
and T_3 is realized in position P_y in C_2.

b. **Tone-Segment Allomorphy (TSA)**
The new tone pattern T_C is realized instead of T_A in C_1
and the new segmental material S is realized in C_2.

c. **Overwriting-Adding Allomorphy (OAA)**
The new tone pattern T_C is added to T_A in C_1
and the new tone pattern T_C is realized instead of T_B in C_2.

→ A mono-representational analysis?

→ All these different patters of allomorphy fall out in a mono-representational account given the nature of OT and markedness of tone association patterns

(10) *Analyses in this talk*

Language	Pattern	Analysis
Santo Tomás Ocotepec (section 3.)	OAA	–Prefix-H and -L with different overwriting/contour creation preferences –falling contours avoided if possible, rising c. tolerated
San Miguel el Grande Mixtec (section 4.)	PosA	–Infixation of an H that overwrites the initial tone –shift to second TBU if overwriting of M can be avoided
San Pedro Molinos Mixtec (section 5.)	PosA	–Infixation of an H that overwrites the initial tone –shift to second TBU if overwriting of M can be avoided –H-plateauing for perturbation-triggering morphemes
Yucunany Mixtepec Mixtec (section 6.)	OAA& TSA	–Suffixation of a tone and segments, the latter only realized as last resort

1.3 Mixtec languages

- indigenous languages, spoken in southern Mexico (Otomanguean)
- great diversity in what counts as a dialect/language: 1 Mixtec with many dialects (Caballero-Morales, 2008), 15 Mixtec languages in Bickel and Nichols (ongoing), 52 in Lewis et al. (2014), 84 in de las Lenguas Indígenas (2005)
- most communities have less than 50.000 speakers (McKendry, 2013)

(11) *State of Oaxaca*

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Phonology/Morphology

- 'couplet' as the basic unit, a binary (μ,σ) word stem
- complex and diverse tonal phenomena found in numerous varieties of Mixtec (starting with the work of Pike, 1944), referred to as 'tone perturbation' (=morphological tone)
- no uniform correlation between contour tones and long/short vowels (=different TBU's)
- the glottal 'stop' has a limited distribution in most varieties and is best analysed (in many) as a feature of vowels: /V$^{\text{ʔ}}$/ instead of /Vʔ/

2. Theoretical assumptions

- an optimality-theoretic phonological system Prince and Smolensky (1993)

(12) *A monorepresentational account of PCSA in OT: the phonology decides*

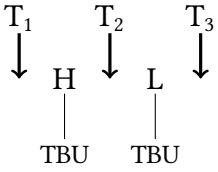
Given affix A and ranking R,
the ranking of faithfulness and Align constraints in R predict a preference order of strategies to realize A: X » Y » Z » …

- context I: X surfaces, the preferred strategy to realized A
- context II: X excluded by high-ranked markedness constraints: second-best Y surfaces
- context III, X and Y excluded: next-best Z surfaces
- …

- 'conservative' autosegmental approach to tone (Leben, 1973; Goldsmith, 1976; Yip, 2002)
- tone affixes are marked for prefixing/suffixing to a base pivot – generalizing the pivot affixation theory of Yu (2007) from segments to tone (cf. also Yu, 2002, 2003; Zimmermann and Trommer, 2013)

(13) *Pivot affixation for tone*[2]

Possible affixation sites in Mixtec:



Lexical entries:

T_1 /__#T

T_2 /#T__

T_3 /T#__

- reordering/metathesis is taken to be impossible: if tone T_1 is linearized in a way that it precedes H, it must always precede H and can never follow it

3. Contour creation or overwriting: Santo Tomás Ocotepec (Mie)

3.1 Data (Mak, 1958; McKendry, 2013)

- H, M, L; rarely contours that are only derived
- there are different paradigms for tone perturbation (in 'special' close-knit sequences like N+ descriptive A, the preceding couplet always triggers change on following couplet)
- the continuative is only expressed by raising (for example /ʒàʔā/ 'will pass' → /ʒáʔā-nā/ 'is passing'; L M ← H M (Mak, 1958, 67))
- all patterns of this raising perturbation are listed in (14), (15) given lowering perturbation found after complete /nìː/

(14) *Raising in the imperfect*

M H	→	H H	
M M	→	H M	Overwriting
M L	→	H L	
L H	→	HL H	
L M	→	HL M	Contour creation
L L	→	H L	

(15) *Lowering after /nìː/* (Mak, 1958, 67)

M H	→	LM H	
M M	→	LM M	Overwriting
M L	→	LM L	
L H	→	L H	
L M	→	L M	Contour creation
L L	→	L L	

➢ The riddle: a morphological H overwrites M and creates a contour with L; a morphological L 'overwrites' L and creates a contour with M

[2] A stratal OT system where bases are optimized prior to affixation: can ensure that, for example, all TBU's are specified for tone (Egalitarian Stratal OT Trommer, 2011; Bermúdez-Otero, in preparation).

3.2 Analysis

✺✺ An H- and L-prefix are added; the former preferably overwrites, the latter preferably creates a contour if this does not result in additional markedness✺✺
H /__# and L /__#

- TBU=μ (parallelism to Mig in section 4.)
- different ranking for the markedness constraints penalizing rising/falling contours (16-a+b): an M is overwritten if this avoids a falling contour, but a rising contour LM is created in order to avoid deletion of M (16-c)
- and undominated (16-d) excludes 'contour' tones without a contour

(16)

a.	*Rise	Assign a violation mark for every rising sequence of adjacent tones associated to the same TBU.
b.	*Fall	Assign a violation mark for every falling sequence of adjacent tones associated to the same TBU.
c.	Max M	Assign a violation mark for every input M without an output correspondent.
d.	*[TT]	Assign a violation mark for every pair of adjacent identical tones that are associated to one TBU.

- affixation of H results in contour creation (17-I) since realization of L is more important; in overwriting (17-II) since realization of M is less important

(17) *Prefix-H in Mie*

	*[TT]	Max H	Max L	*Fall	Max M	*Rise
H_a L_1 M_2 (σ σ)	I. L M → HL M					
a. L_1 M_2 (σ σ)		*!				
☞ b. H_a L_1 M_2 (σ σ)				*		
c. H_a M_2 (σ σ)			*!			
H_a M_1 H_2 (σ σ)	II. M H → H H					
a. H_a M_1 H_2 (σ σ)				*!		
☞ b. H_a H_2 (σ σ)					*	

- affixation of L results in overwriting since higher-ranked markedness excludes an LL-'contour' (18-I); in contour creation (18-II) since realization of M is more important

(18) *Prefix-L in Mie*

	*[TT]	Max H	Max L	*Fall	Max M	*Rise
L_a L_1 M_2 (σ σ)	I. L M → L M					
a. L_a L_1 M_2 (σ σ)	*!					
☞ b. L_a M_2 (σ σ)			*			
L_a M_1 H_2 (σ σ)	II. M H → LM H					
☞ a. L_a M_1 H_2 (σ σ)						*
b. L_a H_2 (σ σ)					*!	

3.3 Summary

- a prefix-H and -L with different preferences for overwritgin/contour creation due to different markedness of rising/falling contours
- complication without an explanation so far: LH/LM bases of the form /CVʔV/ do not show contour creation in the imperfect (17-I) but overwriting HH/HM

➙ C-T-interaction (cf. section 4.) penalizing a glottalized V bearing a contour tone

4. Alternations in the placement of a tone: San Miguel el Grande Mixtec (Mig)

4.1 Data (Pike, 1944; Mak, 1950; Goldsmith, 1990; Tranel, 1995*a*; McKendry, 2013)

- H, M, L, no contours
- again, many 'perturbing' morphemes, with or without segmental content
- imperfect, for example, is perturbation alone: for most bases, the initial base tone is simply replaced by H (cf. (19))

(19) *Imperfective* (McKendry, 2013, 45)

	Irrealis	Imperfective		
a.	kānī^{n}	kánī^{n}	'hit'	M M → H M
	kānā^{n}	kánā^{n}	'call'	M M → H M
b.	kìkū	kíkū	'sew'	L M → H M
c.	ʃìkó	ʃíkú	'sell'	L H → H H

- for M L bases, however, not all bases show the expected HL (20-d), others become MH (20-e)

(20) *Asymmetry for ML* (McKendry, 2013, 55)

	Base	Perturbed		
d.	nē^{ʔ}è	né^{ʔ}è	'cry'	M L → H L
	nūù^{n}	núù^{n}	'face'	
	kī^{ʔ}ù	kí^{ʔ}ù	'go'	
e.	īsù	īsú	'deer'	M L → M H
	kūtù	kūtú	'nose'	
	jāù	jāú	'hole'	

- generalization: couplets with a long vowel and those with a first glottalized vowel show HL, the rest MH

(21) *Perturbating morphemes (grey: H on second TBU)* (Mak, 1950, 83)

HH	→	HH	
HM	→	HM	
HL	→	HL	
MM	→	HM	
LH	→	HH	
LM	→	HM	
MH	→	MH	
ML	→	HL	for (C)CV^{ʔ}(C)V and CV$_1$ː
ML	→	MH	for (C)CVCV and CV$_1$V$_2$

- analyses in Goldsmith (1990) ((morpheme-specific) tone association rules) and Tranel (1995*a*) & Tranel (1995*b*) (OT: M is default ø-tone and TBU's want to preserve their status of being ±associated to a tone)

4.2 Analysis

✺✺ An H-infix that can choose between associating to first or second TBU ✺✺
H /#T__

- TBU=μ
  - no 'contours' on short vowels, only on long vowels, hence not the σ
  - CVː-σ's attract stress and can hence not plausibly be analysed as sequence of two identical V's (cf. McKendry (2013) and in contrast to the claim in Pike (1948))
- no contour tones in Mig, hence (22) is undominated

(22) *Contour$_{μ}$ (=*Cnt$_{μ}$) — Assign a violation mark for every μ that is associated to more than one tone phonetically (Yip, 2002, 80).

- the H is an infix after the first tone – it can associate to either the first or second TBU

Affixing the imperfect-H

1. It association to the first TBU and **overwrites a base-H**

- undominated Max-H$_{Af}$ (23-a) demands that the affix-H must associate to some TBU (implementation of *Float (Yip, 2002, 80)) and since contours are impossible, overwriting results

- preference for association with initial TBU follows from (23-b) (in fact an Align constraint for tone, cf. (Yip, 2002, 80))
- note that higher-ranked $\text{Max}_{\text{AL(T-}\mu\text{)}}$ ensures that underlying association of H to non-initial μ are preserved

(23)

a.	Max H_{Af}	Assign a violation mark for every affix H in the input without an output correspondent.
b.	#H!	Assign a violation mark for every phonetically visible H that is not associated to the stem-initial TBU.
c.	Max $^{T}AL^{\mu}$	Assign a violation mark for every association line between a tone T and a μ M in the input without an output correspondent.

(24) *Affix-H: Association to the initial base-μ and overwriting of H*

	*Cnt$_{\mu}$	Max H_{Af}	Max $^{T}AL^{\mu}$	#H!
H_1 H_a H_2 (μ μ)	I. HH → HH			
a. H_1 H_2 (μ μ)		*!		*
b. H_1 H_a H_2 (μ μ)	*!			**
c. H_1 H_a H_2 (μ μ)	*!			*
☞ d. H_a H_2 (μ μ)			*	*
H_1 H_a L_2 (μ μ)	II. HL → HL			
a. H_1 H_a (μ μ)			*	*!
b. H_1 H_a L_2 (μ μ)	*!			
☞ c. H_a L_2 (μ μ)			*	

2. **M-tones are preferably not overwritten** and the morphological H associates to the second TBU as last resort (25-III)

- #H! is dominated by Max-M (16-c) and initial M tones are hence preserved if possible (even if this implies an OCP violation – the constraint is irrelevant)

- if a non-realization of M cannot be avoided (since both base-μ's are M), the preference for the initial TBU kicks in again (25-II)

(25) *Affix-H: preferably no overwriting of M*

	*CNT$_{\mu}$	MAX H$_{AF}$	MAX ^{T}AL$^{\mu}$	MAX M	#H!
M$_1$ H$_a$ L$_2$ | | μ μ	I. ML → MH				
a. M$_1$ H$_a$ L$_2$ | ⋰ | μ μ	*!				
☞ b. M$_1$ H$_a$ | ⋮ μ μ			*		*
c. H$_a$ L$_2$ ⋮ | μ μ			*	*!	
M$_1$ H$_a$ M$_2$ | | μ μ	II. MM → HM				
a. M$_1$ H$_a$ | ⋮ μ μ			*	*	*!
☞ b. H$_a$ M$_2$ ⋮ | μ μ			*	*	

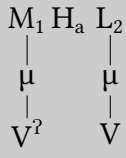
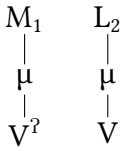
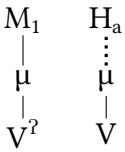
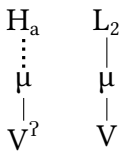
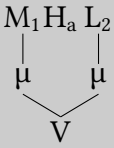
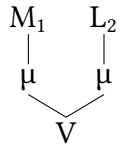
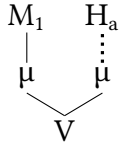
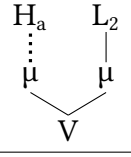
3. The H associates to the first TBU even if this implies non-realization of an M to **avoid rising contours on long vowels and a H preceded by a glottal**

- the relevant markedness constraints are given in (26)
  - (26-a) is a non-local constraint: there is no direct association between the V and the tone(s) since the μ is the TBU
  - (26-b) implements a C-Tone interaction: well-known effect for voicing and laryngeal features (cf. e.g. Yip, 2002; Hansson, 2004; Tang, 2008)

(26) a. *RISE V — Assign a violation mark for every rising contour that is associated to one vowel.

b. *ʔV́ — Assign a violation mark for every high-toned V preceded by a glottalized V.

(27) *The ML-asymmetry*

	Max H_{AF}	Max $^{T}AL^{\mu}$	*Rise V	$^{*?}\acute{V}$	Max M	#H!
	I. ML → HL					
a. 	*!					
b. 		*		*!		*
☞ c. 		*			*	
	II. ML → HL					
a. 	*!					
b. 		*	*!			*
☞ c. 		*			*	

4.3 Summary

(28) *Summary: complete ranking for Mig (affix tone in boldface)*

	*CNT$_{\mu}$	MAX H$_{AF}$	MAX ^{T}AL$^{\mu}$	*RISE V	*$^{?}$V́	MAX M	#H!	MAX H
H **H** M								
a. H **H**			*			*!	*	
☞ b. **H** M			*					*
H **H** L								
a. H **H**			*				*!	
☞ b. **H** L			*					*
M **H** H								
☞ a. M **H**			*				*	*
b. **H** H			*			*!	*	
M **H** M								
a. M **H**			*			*	*!	
☞ b. **H** M			*			*		
L **H** H								
a. L **H**			*				*	*!
☞ b. **H** H			*				*	
L **H** M								
a. L **H**			*			*!	*	
☞ b. **H** M			*					
M **H** L [VV]								
☞ a. M **H**			*				*	
b. **H** L			*			*!		
M **H** L [V:]								
a. M **H**			*	*!			*	
☞ b. **H** L			*			*		
M **H** L [V:$^{?}$]								
a. M **H**			*		*!		*	
☞ b. **H** L			*			*		

- monorepresentational analysis based on the assumption that the H-affix is an infix and can in principle 'choose' between associating to the first or second TBU

5. Positional allomorphy and H-plateauing: San Pedro Molinos Mixtec

5.1 Data (Hunter and Pike, 1969)

- H, M, L; no contours
- stress is dependent on tone

(29) *Tone perturbation* (Hunter and Pike, 1969, 38)

	Base		Perturbed		
a.	ʒìʧí	'dry'	ʒāʔā ʒíʧí	'dry chiles'	L H → H H
	ʧìká	baskets	kùː ʧíká	'four baskets'	L H → H H
b.	kīt̄ī	'animal'	síví kítí	'name of the animal'	M M → H H
c.	rīŋkī	'mouse'	síví ríŋkī	'the mouse's name'	M M → H M

- interesting contrast between (29-b) and (29-c): the same surface tone pattern but different effects; the crucial difference is that the perturbed morpheme in (29-b) is a perturbation-trigger itself whereas the one in (29-c) is not

(30) *Tone perturbation pattern (highlighted: different from Mig)*

HH	→	HH	
HM	→	HM	
HL	→	HL	
MH	→	MH	
LH	→	HH	
MM*	→	HH	(*Couplets that trigger H-perturbation)
MM	→	HM	
LM*	→	HH	
LM	→	HM	
ML	→	MH	CVCV
ML	→	HL	CVV or CVʔV
LL	→	MH	CVCV
LL	→	HL	CVV or CVʔV

5.2 Analysis

✺✺ Infixed H prefers to associate to the initial TBU & an H-plateauing effect ✺✺
H /#T__

- contra Hunter and Pike (1969) assumption: I take V_1V_1 to be monosyllabic but bimoraic: the μ is the TBU then (and no contours are possible)
- very similar to the analysis for Mig (28):
  - an infixed H prefers to associate to initial TBU
  - M's are preferably not overwritten and H associates to second TBU instead
  - only if this would result in a rising contour on a long V or an H following a /ʔ/, the M is overwritten

- interesting additional effect that cannot be found in Mig: association to both TBU's for bases that are perturbation-triggers themselves

- I argue that this is a plateauing effect resulting from a morpheme contiguity effect: if a morpheme contains more than one H, all TBU's inbetween the two high tones need to by high as well (31)

- the floating H does not associate with the base couplet itself due to Alternation ('If an association line links two elements of colour α, the line should also have colour α.') that penalizes inserted association lines between elements affiliated with the same morpheme (van Oostendorp, 2007, 2012)

(31) MorphTone Plateau (=MTP): Given a H_a affiliated with morpheme M and a TBU_1 affiliated with morpheme M and associated to H:
Assign a violation mark for every TBU_x that is not associated with a H and intervenes between TBU_1 and a TBU associated to H_a.

(32) *Affix-H: Tone-Plateauing*

	MTP	*CNT$_\mu$	Max H$_{AF}$	Max ^{T}AL$^{\mu}$	Max M	#H!
M$_1$ H$_a$ M$_2$ (μ μ)	I. M M → H M					
a. M$_1$ H$_a$ M$_2$ (μ μ)		*!				
b. M$_1$ H$_a$ M$_2$ (μ μ)		*!				*
☞ c. H$_a$ M$_2$ (μ μ)				*	*	
d. H$_a$ (μ μ)				**!	**	*
M$_1$ H$_a$ M$_2$ H$_3$ (μ μ)	II. M M → H H					
a. M$_1$ H$_a$ M$_2$ H$_3$ (μ μ)		*!				
b. H$_a$ M$_2$ H$_3$ (μ μ)	*!			*	*	*
☞ c. H$_a$ H$_3$ (μ μ)				**	**	

- one other thing remains mysterious (LL>MH)

6. One morpheme=Different tones or segments: Yucunany Mixtepec (Mix)

6.1 Data (Pike and Ibach, 1978; Paster and Beam de Azcona, 2004*a,b*; Paster, 2009*b*)

- no codas, restricted set of initial onset clusters (N+Stop/Affr, s+Stop, ʃ+C)
- H, M, L, and contour tones
- no length contrast for vowels, couplets are bisyllabic CVV or CVCV
- 1.Sg morpheme is tone perturbation alone: a low tone is added:
  - creates a contour for H-final stems (33-a)
  - overwrites M on final σ (33-b) if this would not create an LHL (33-c)[3] or if M is preceded by a L (33-d)
  - if the stem ends in L, a segmental allomorph /–yù/ surfaces (33-e)

(33) *Tonal allomorphy in Yucunany Mixtepec* (Paster and Beam de Azcona, 2004*a*, 3-4)

a.	nàmá	'soap'	nàmáà	'my soap'	L H	→ L HL
	kwíìí	'narrow/thin'	kwíìíì	'I am narrow/thin'	HLH	→ HLHL
	vílú	'cat'	vílúù	'my cat'	H H	→ H HL
b.	lā'lā	'mucus'	lā'là	'my mucus'	M M	→ M L
	xá'nū	'cigarette'	xá'nù	'my cigarette'	H M	→ H L
c.	yùútī	'sand'	yùútīì	'my sand'	LH M	→ LH ML
	yòósō	'metate'	yòósōò	'my metate'	LH M	→ LH ML
d.	kwà'ā	'man's sister'	kwà'āà	'my man's sister'	L M	→ L ML
	kàā	'metal'	kàāà	'my metal'	LM	→ LML
e.	chá'à	'short'	chá'àyù	'I am short'	HL	→ HL yù
	tūtù	'paper'	tūtùyù	'my paper'	M L	→ M L yù
	sòkò	'shoulder'	sòkòyù	'my shoulder'	L L	→ L L yù

(34) *First person morpheme: more abstract*

a. H# → HL# (33-a)				
L	H	→	L	HL
HLL		→	HLHL	
H	LH	→	H	LHL
H	H	→	H	HL

b. M# → L# (33-b)				
M	M	→	M	L
H	M	→	H	L

c. LH M# → LH ML# (33-c)				
LH	M	→	LH	ML

d. LM# → LML# (33-d)				
L	M	→	L	ML
LM		→	LML	

e. L# → Lyù# (33-e)				
HL		→	HLyù	
M	L	→	M	Lyù
L	L	→	L	Lyù

[3] Paster and Beam de Azcona (2004*a*) dicusses the possibility that this is due to the difference between underlying M's and underlying tone-less σ: they conclude, however, that this would imply that all LH M stems have no tone on second σ – a strange coincidence.

6.2 Analysis

✺✺ A suffixed segmental /yu/ + L; the former only realized as last resort ✺✺
yu L /#__

- TBU=σ
  - default assumption since vowel length is not contrastive ('VV' notated to have enough space for contours)
- contour tones are possible, but dispreferred and avoided (in derived) contexts if possible – (35-a) is not undominated as in Mig

1. the 1Sg morpheme is **segmental /yu/ and a floating L**, the former is preferably not realized, the latter must be realized in all contexts

- the /yu/ underlyingly lacks a σ node and since Dep-σ (35-b) is higher ranked than Max-S (35-c), the suffix is preferably not realized (implies: all affixes that are realized in all contexts are underlyingly equipped with a σ)
- the L, on the other hand, must be realized due to undominated Max-L

(35)

a.	$^*\text{Contour}_\sigma$ ($=^*\text{Cnt}_\sigma$)	Assign a violation mark for every σ that is associated to more than one tone phonetically. (Yip, 2002, 80)
b.	Dep σ	Assign a violation mark for every output σ without an input correspondent.
c.	Max S	Assign a violation mark for every input segment without an output correspondent.

(36) *Preference for not realizing the segmental suffix but realization of the tone*

	L_1 H_2 L_a / σ_i σ_{ii} / na ma yu	Max L	Dep σ	$^*\text{Cnt}_\sigma$	Max S
a.	L_1 H_2 / σ_i σ_{ii} / na ma	*!			**
b.	L_1 H_2 L_a / σ_i σ_{ii} σ / na ma yu		*!		
☞ c.	L_1 H_2 L_a / σ σ / na ma			*	**

2. A contour is created with base-final H's but **overwriting of base-final M's** since Max-M (16-c) is ranked below $^*\text{Contour}_\sigma$

(37) *Affix-L overwrites a base-final M*

	Max L	Max H	Dep σ	*Cnt$_\sigma$	Max M
M_1 M_2 L_a / σ_i σ_{ii} / la la yu					
a. M_1 M_2 L_a / σ_i σ_{ii} / la la				*!	
☞ b. M_1 L_a / σ_i σ_{ii} / la la					*

3. No overwriting if two adjacent σ's both associated with an L at their left edge would result – a positional, non-local OCP (38) **banning two adjacent σ's starting both with a L**

- and for bases ending with an LM contour, overwriting makes no sense: it only avoids a violation of *Contour$_\sigma$ if both base tones are overwritten and that's excluded by Max-L (38-III)

(38) $^{*L}\sigma^{L}\sigma$ Assign a violation mark for every pair of adjacent σ's that are phonetically associated with an initial L.

(39) *No adjacent L-initial σ: Contour creation vs. overwriting*

	Max L	$^{*L}\sigma^{L}\sigma$	*Cnt$_\sigma$	Max M
L_1 H_2 M_3 L_a / σ_i σ_{ii} / yu ti yu	I. LH M → LH ML			
☞ a. L_1 H_2 M_3 L_a / σ_i σ_{ii} / yu ti			**	
b. L_1 H_2 L_a / σ_i σ_{ii} / yu ti		*!	*	*
L_1 M_2 L_a / σ_i σ_{ii} / tzi tzi yu	II. L M → L ML			
☞ a. L_1 M_2 L_a / σ_i σ_{ii} / tzi tzi			*	
b. L_1 L_a / σ_i σ_{ii} / tzi tzi		*!		*

	Max L	*L σ L σ	*Cnt σ	Max M
L1 M2 La σi ka yu	III. LM → L ML			
☞ a. L1 M2 La σi ka			*	
b. L1 La σi ka			*	*!
c. La σi ka	*!			*

5. association of L to base-σ ending in an L is excluded by (16-d) – contour tones (adjacent tones associated to the same TBU) must be different

- realization of **/yu/ as last resort** to satisfy Max-L becomes optimal

(40) *No adjacent L's: realization of /–yù/*

	*[TT]	Max L	Dep σ	*L σ L σ
M1 L2 La σi σii tu tu yu				
a. M1 L2 La σi σii tu tu	*!			
b. M1 La σi σii tu tu		*!		
☞ c. M1 L2 La σi σii σ tu tu yu			*	*

6.3 Summary

- a monorepresentational analysis assuming a segmental portion of a morpheme that is only realized as last resort

→ the learner is faced with an instance of incomplete neutralization: in 3 of 4 possible contexts (depending on the phonological form of the base), she is only provided with a subset of evidence for the complete representation (only the tone, not the segmental content)

(41) *Allomorph selection in Yucunany Mixtepec: the complete ranking*

	*[TT]	Max L	Max H	Dep σ	$*^{L}{}_{\sigma}{}^{L}{}_{\sigma}$	$*\text{Cnt}_{\sigma}$	Max M	Max S
L H+**L** (34)-a								
a. L H		*!						**
☞ b. L H**L**						*		**
c. L **L**			*!		*			**
d. L H y**ù**				*!				
M M+L (34)-b								
a. M M**L**						*!		**
☞ b. M **L**							*	**
c. M M y**ù**				*!				
LH M+L (34)-c								
☞ a. LH M**L**						*		**
b. LH **L**					*!		*	**
c. LH M y**ù**				*!				
LM+L (34)-d								
☞ a. LM**L**						*		**
b. L**L**	*!					*	*	**
c. M**L**		*!				*		**
d. LMy**ù**				*!		*		
H L+L (34)-e								
a. H L		*!						**
b. H L**L**	*!							**
☞ c. H L y**ù**				*	*			

7. Summary

A fascinating **variety of different patterns** of tonal allomorphy in Mixtec given relative closeness and similarity in other domains.

Monorepresentational analyses for different tone allomorphy patterns:

❶ the morphological tone is marked for being a prefix/suffix to the first/last tone of the base:

- prefixes in Mie can only associate to first TBU: overwriting or contour creation
- infixes in Mig and Molinos can 'choose' between associating to first/second TBU
- suffix in Mix can only associate to final base TBU (overwriting or contour creation) or to the prosodically defective suffix as a last resort

❷ markedness constraints about possible associations of tones as autosegments/faithfulness constraints about different tones might exclude the more preferred strategy to realize the tone in certain contexts: **PCSA as phonological epiphenomenon in OT**

References

Banksira, Degif (2011), Featural mobility and phonology-morphology interface in Chaha, *in* 'Proceedings of the 2011 annual conference of the Canadian Linguistic Association'.

Bermúdez-Otero, Ricardo (in preparation), *Stratal Optimality Theory*, Oxford University Press, Oxford.

Bickel, Balthasar and Johanna Nichols (ongoing), 'Autotyp, developing an international network of typological linguistic databases', http://www.spw.uzh.ch/autotyp/.

Caballero-Morales, Gabriel (2008), *Diccionario del idioma mixteco*, Universidad Tecnológica de la Mixteca.

Davis, Stuart and Isao Ueda (2002), 'Mora augmentation processes in Japanese', *Journal of Japanese Linguistics* **18**, 1–23.

de las Lenguas Indígenas, Instituto Nacional (2005), 'Catálogo de las lenguas indígenas nacionales', Online at http://www.inali.gob.mx/clin-inali/. Mexico: INALI.

Dolphyne, Florénce Abena (1996), *A comprehensive course in Twi (Asante)*, Ghana University Press.

Goldsmith, John A. (1976), Autosegmental Phonology, PhD thesis, Massachusetts Institute of Technology.

Goldsmith, John, ed. (1990), *Autosegmental and Metrical Phonology*, Oxford: Blackwell.

Hansson, Gunnar Olafur (2004), Tone and voicing agreement in Yabem: representations vs. constraint interaction, Davis, CA. WCCFL 23.

Hunter, Georgia and Eunice Pike (1969), 'The phonology and tone sandhi of Molinos Mixtec', *Linguistics* .

Leben, William (1973), Suprasegmental Phonology, PhD thesis, MIT.

Lewis, M. Paul, Gary F. Simons and Charles D. Fennig (2014), *Ethnologue: Languages of the World, Seventeenth edition*, SIL International. Online version: http://www.ethnologue.com.

Mak, Cornelia (1950), 'A unique tone perturbation in Mixteco', *International Journal of American Linguistics* **16**, 82–86.

Mak, Cornelia (1958), 'The tonal system of a third Mixtec dialect', *International Journal of American Linguistics* **24**, 61–70.

Mascaró, Joan (2007), 'External allomorphy and lexical representation', *Linguistic Inquiry* **38**, 715–735.

McCarthy, John (1983), Consonantal morphology in the Chaha verb, *in* M.Barlow, D.Flickinger and M.Wescoat, eds, 'Proceedings of WCCFL 2', SLI, pp. 176–188.

McKendry, Inga (2013), Tonal Association, Prominence and Prosodic Structure in South-eastern Nochixtlán Mixtec, PhD thesis, University of Edinburgh.

Paster, Mary (2006), Phonological Conditions on Affixation, PhD thesis, University Of California, Berkeley.

Paster, Mary (2009*a*), 'Explaining phonological conditions on affixation: Evidence from suppletive allomorphy and affix ordering', *Word structure* **2**, 18–37.

Paster, Mary (2009*b*), 'The origin of (apparent) homophony avoidance in Yucunany Mixtepec Mixtec person marking', UCLA American Indian Seminar August 14, 2007.

Paster, Mary (2010), 'The verbal morphology and phonology of Asante Twi', *Studies in African Linguistics* **39**, 77–120.

Paster, Mary and Rosemary Beam de Azcona (2004*a*), 'Aspects of tone in Yucunany dialect of Mixtepec Mixtec', Conference on Oto-Manguean and Oaxacan Languages.

Paster, Mary and Rosemary Beam de Azcona (2004*b*), A phonological sketch of the Yucunany dialect of Mixtepec Mixtec, *in* C.Jany, ed., 'Proceedings of the 7th Annual Workshop on American Indigenous Languages', UC Santa Barbara.

Pike, Eunice and Thomas Ibach (1978), The phonology of the Mixtepec dialect of mixtec, *in* M.Jazayery, E.Plomé and W.Winter, eds, 'Linguistic and Literary Studies in Honor of Archibald A. Hill, Vol 2: Descriptive Linguistics', Mouton, pp. 271–285.

Pike, Kenneth L. (1944), 'Analysis of a Mixteco text', *International Journal of American Linguistics* **10**, 113–138.

Pike, Kenneth L. (1948), *Tone languages*, University of Michigan Press, Ann Arbor, MI.

Prince, Alan and Paul Smolensky (1993), 'Optimality theory: Constraint interaction in generative grammar', Technical reports of the Rutgers University Center of Cognitive Science.

Stonham, John (2007), 'Metathesis as prosodic repair', *Studies of Phonetics, Phonology and Morphology,* **13**, 3–24.

Tang, Katrina (2008), The Phonology and Phonetics of Consonant-Tone Interaction, PhD thesis, University of California, Los Angeles.

Tranel, Bernard (1995*a*), On the status of universal association conventions: Evidence from Mixteco, *in* J.Ahlers, L.Bilmes, J.Guenter, B.Kaisse and J.Namkung, eds, 'Proceedings of BLS 21', Vol. 21, pp. 299–312.

Tranel, Bernard (1995*b*), 'Rules vs. constraints: a case study', ROA-72.

Trommer, Jochen (2011), 'Phonological aspects of Western Nilotic mutation morphology', Habil. University of Leipzig.

van Oostendorp, Marc (2007), Derived environment effects and consistency of exponence, *in* S.Blaho, P.Bye and M.Krämer, eds, 'Freedom of Analysis?', Mouton de Gruyter, Berlin, pp. 123–148.

van Oostendorp, Marc (2012), 'Stress as a proclitic in Modern Greek', *Lingua* **122**, 1165–1181.

Yip, Moira (2002), *Tone*, Cambridge University Press.

Yu, Alan C. L. (2002), 'Understanding infixes as infixes', talk, given at NAPhC 2.

Yu, Alan C. L. (2003), The Morphology and Phonology of Infixation, PhD thesis, UC Berkeley.

Yu, Alan C. L. (2007), *A Natural History of Infixation*, Oxford University Press, Oxford.

Zimmermann, Eva (2013), 'Non-concatenative allomorphy is generalized prosodic affixation: The case of Upriver Halkomelem', *Lingua* (134), 1–26.

Zimmermann, Eva and Jochen Trommer (2013), The linearization of morphological weight, *in* F.Heck and A.Assmann, eds, 'Rule Interaction in Grammar', Vol. 90, University of Leipzig, pp. 123–161.

Zoll, Cheryl (1994), Subsegmental parsing: floating features in Chaha and Yawelmani, *in* J.Merchant, J.Padgett and R.Walker, eds, 'Phonology at Santa Cruz 3'.