The strength and weakness of tone: A new account to tonal exceptions and tone representations

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Background: Weak Activation in Phonology

- **Gradient Symbolic Representations**
  (=GSR Smolensky and Goldrick, 2016; Rosen, 2016)
  - symbols in a linguistic representation have numerical degrees of presence or activity; can be weakly active
  - all output elements are discrete and fully active

- related accounts that directly implement some concept of strength are, for example, Rhodes (2012); Inkelas (2015); Vaxman (2016*a*,*b*); Sande (2017)

Main Claims

- **Gradient Symbolic Representations** open up a new perspective on tone:
  - lexical exceptions
  - representation of multiple tone heights
- input and **output representations may be gradient**, dissenting from earlier applications of GSR to segmental phonology
- gradience can have **phonetic consequences**

This talk: Three Case Studies from Tone

T → Weak in MOL Mixtec: **Exceptional non-trigger**

TBU → Weak in MIG Mixtec: **Exceptional non-undergoer**

Weak in Oku: **Different tone registers**
as different degrees of tone combinations

L-Spreading in Oku

L-Spreading with Noun Plural -sé

H	júó	júó-sé	‘bee(s)’	má	má-sé	‘lake(s)’	
L°	bài°	bài-sé	‘father(s)’	ntɛ̀k°	ntɛ̀k-sé	‘village(s)’	**-H**
M	sə̄	sə́-sé	‘fish’	kān	kán-sé	‘monkey(s)’	
HL	búò	búó-**sē**	‘dog(s)’	fê	fé-**sē**	‘hoe(s)’	**-M**
L	mbàk	mbàk-**sè°**	‘cloud(s)’	kà	kà-**sè°**	‘basket(s)’	**-L°**
ML	ntīɛ̀	ntīɛ̄-**sè°**	‘ground(s)	ndɔ̄ŋ̀	ndɔ̄ŋ̄-**sè°**	‘horn(s)’	

L-Spreading in the Associative Construction

	Citation	**Genitive**		
	kē-kóf	kè-kōf	‘tick’	
Strong H-Nouns:	kē-fém	kè-fēm	‘cockroach’	$L+H_s \Rightarrow L+\mathbf{M}$
	kē-vúf	kè-vūf	‘bone’	
	kē-láŋ	kè-làŋ°	‘cocoyam’	
Weak H-Nouns:	kē-fó	kè-fò°	‘medicine’	$L+H_w \Rightarrow L+\mathbf{L}^\circ$
	tē-vəl	tə̀-və̀l°	‘feathers’	

Oku

- Grassfields Bantu language of the Ring subgroup
- all data from Hyman (2010)
- typical Grassfield alternations originally analysed by extensive use of different floating features

Phonetic Surface Tones

H	High	M	Mid
L	Low	L°	**Unreleased** Low
HL	High-Falling	ML	Mid-Falling

Utterance-Internal Neutralization

$$\mathrm{L}^{\circ} \quad \rightarrow \quad \mathrm{L} \quad /\_\_ \ldots$$

$$\mathrm{HL} \quad \rightarrow \quad \mathrm{H} \quad /\_\_ \ldots$$

$$\mathrm{ML} \quad \rightarrow \quad \mathrm{M} \quad /\_\_ \ldots$$

Noun Plurals

L-Spreading with Noun Plural -sé

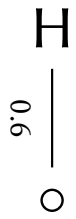
H	júó	júó-sé	‘bee(s)’	má	má-sé	‘lake(s)’	
L°	bài°	bài-sé	‘father(s)’	ntɛ̀k°	ntɛ̀k-sé	‘village(s)’	**-H**
M	sə̄	sə́-sé	‘fish’	kān	kán-sé	‘monkey(s)’	
HL	búò	búó-**sē**	‘dog(s)’	fê	fé-**sē**	‘hoe(s)’	**-M**
L	mbàk	mbàk-**sè°**	‘cloud(s)’	kà	kà-**sè°**	‘basket(s)’	**-L°**
ML	ntīɛ̀	ntīɛ̄-**sè°**	‘ground(s)	ndɔ̄ŋ̀	ndɔ̄ŋ̄-**sè°**	‘horn(s)’	

Central Assumptions on Tonal Representation

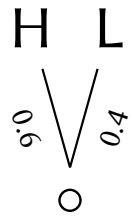
- association of melody tones to tonal root nodes ('○')
  is of gradient strength $0 \leq \mathcal{S} \leq 1$
- H-tone association might be strong (0.6) or weak (0.4)
- Mid tones are tonal root nodes ('○')
  associated to both L- and H-melodies (cf. Hyman, 1993)
- **M** is a **higher** Mid-tone (0.6 H/0.4 L)
  L° is a **lower** Mid-tone (0.4 H/0.6 L)

Representation of Level Tones

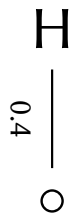
H_s Strong High



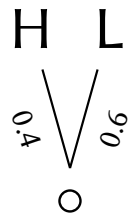
M Mid



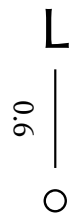
H_w Weak High



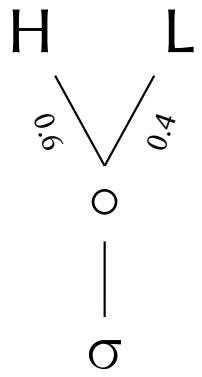
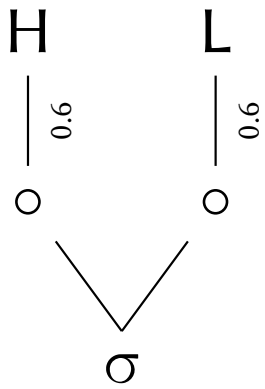
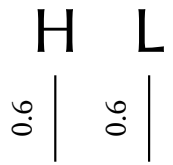
L° Unreleased Low



L (Released) Low



Mid vs. Contour Tone

	Mid	**Falling Contour**
Representation:		
Abbreviation:	 kfən	 njâm

Additional Background Assumptions

- the analysis derives the word-level phonology
- contour simplification (ML $\rightarrow$ M and HL $\rightarrow$ H) and neutralization of L$^{\circ}$ to L in non-final position happen later in the phrasal phonology
- preoptimization ensures that values of association are either $\{0, 0.4, 0.6, 1.0\}$ (and nothing else)

L-Spreading with Noun Plural -sé

H	júó	júó-sé	‘bee(s)’	má	má-sé	‘lake(s)’	
L°	bài°	bài-sé	‘father(s)’	ntɛ̀k°	ntɛ̀k-sé	‘village(s)’	**-H**
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L	mbàk	mbàk-**sè**°	‘cloud(s)’	kà	kà-**sè**°	‘basket(s)’	**-L**°
ML	ntīɛ̀	ntīɛ̄-**sè**°	‘ground(s)	ndɔ̄ŋ̀	ndɔ̄ŋ̄-**sè**°	‘horn(s)’	

Gist of the Analysis

- L spreads to following weak H (the plural suffix)
  ⇒ **Low Mid** (L°) suffix

- both components of a HL (Falling) tone spread
  ⇒ **High Mid** (M) suffix

- 'mixed' (M and L°) Tones are unable to spread

Constraints (I)

$\mathcal{S}(\circ) = 1$ The sum of association strengths linked to a single tonal root node should equal 1

(undominated)

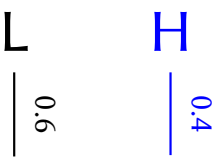
L > A L tone should extend at least to one TBU to its right

H > A H tone should extend at least to one TBU to its right

Constraints (II)

*MixedSponsor	A sponsor-$\circ$ for tone τ should not be specified for tone τ' ($\tau' \neq \tau$)
Max^{M}	A $\circ$ which is mostly L (≥ 0.5) in the input should also be mostly L (≥ 0.5) in the output (and the same for mostly H tones)
*Upgrade H	Do not epenthetically augment the activation of a lexical H tone

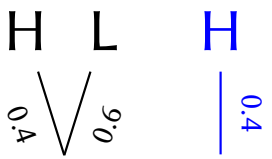
Low + Weak High



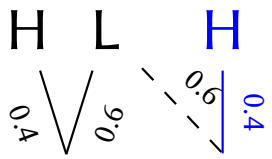
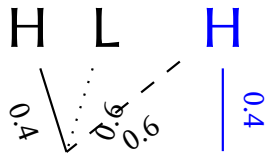
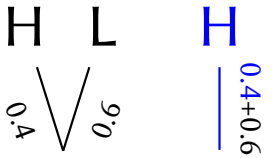
Input: kà sə́

	*MixSp	Max^{M}	L >	H >	*Up H
☞ a. kà sə°				*	
b. kà sə̄				*	*!
c. kà sə́			*!	*	*

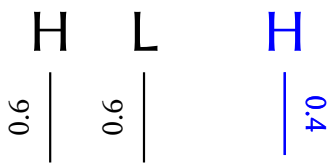
Low° + Weak High



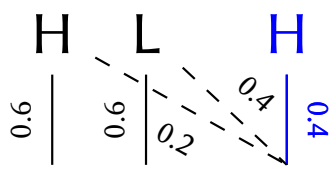
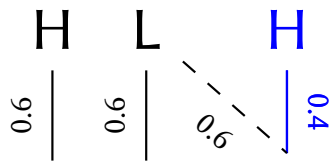
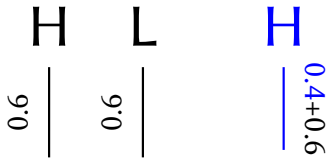
Input: njàm° sə́

	*MixSp	Max^{M}	L >	H >	*Up H
 a. njàm° sə̀°	*!			*	
 b. njám° sə́		*!	*	*	
 ☞ c. njàm° sə́				*	*

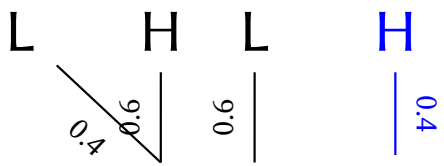
HL + Weak High



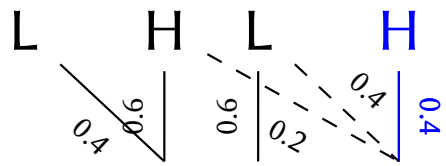
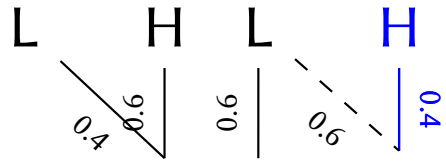
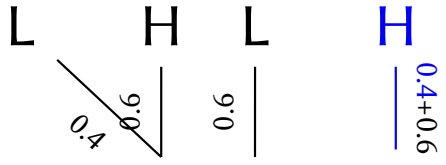
Input: njâm sə́

	*MixSp	Max^{M}	L >	H >	*Up H
☞ a.  njâm sə̄					
b.  njâm sə̀°				*!	
c.  njâm sə́			*!	*	*

ML + Weak High



Input: ntòk sə́

	*MixSp	Max^{M}	L >	H >	*Up H
a.  ntòk sə̄	*!				
☞ b.  ntòk sə̀°				*	
c.  ntòk sə́			*!	*	*

Associative Constructions

L-Spreading in the Associative Construction

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	kē-láŋ	kè-làŋ°	‘cocoyam’	
Weak H-Nouns:	kē-fó	kè-fò°	‘medicine’	$L+H_w \Rightarrow L+\mathbf{L}^\circ$
	tē-vəl	tə̀-və̀l°	‘feathers’	

Associative Constructions

- genitive forms exhibit L-spreading from prefix to H-tone noun root

- two classes of H-tone nouns:

  - strong H-tone becomes M
  - weak H-tone becomes L°

L-Spreading in the Associative Construction

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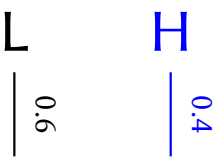
Associative Construction: Analysis

- genitive is marked by a floating Low-tone on the prefix
- L-Spreading to the right in parallel to L-tone spreading in plurals
- (no leftwards H-Spreading due to Crisp-Edge)
- independent evidence that L° is ‘weaker’/lower variant of M

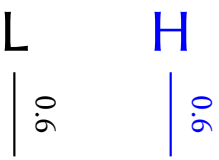
Low + Weak High



Input: kè láŋ

	*MixSp	Max^{M}	L >	H >	*Up H
☞ a. kè làŋ°				*	
b. kè lāŋ				*	*!
c. kè láŋ			*!	*	*

Low + Strong High



Input: kè kóf

	*MixSp	Max^{M}	L >	H >	*Up H
a. kè kòf°		*!		*	
☞ b. kè kōf					
c. kè kóf			*!	*	*

Exceptional Non-Undergoers and Non-Triggers in Mixtec

Gradient Harmonic Grammar

Gradient Harmonic Grammar

- the original GSR-proposal is modeled inside **Harmonic Grammar**
  (Legendre et al., 1990; Potts et al., 2010)

- case studies of lexical exceptions in Mixtec will crucially rely on Harmonic Grammar and constraint ganging/threshold effects

  ➙ **partial violations of a markedness constraint are tolerated, full violations must be repaired**

Weak Activity in the Output and HG: Markedness Constraints

- violated by the number

  M! that the desired structure lacks to activity 1.0.
  (=weaker elements don't fulfill them as good)

  ***M** that the penalized structure is active.
  (=weaker elements don't violate them as bad)

Weak Activity in the Output and HG: Markedness Constraints

(1) a. ONS!: Assign violation 1-X for every σ with an onset of activity X.

b. *CC: Assign violation X for a sequence of two consonants in a syllable margin where X is the mean activity of the two C's.

(2) *Toy example: Weak activation and HG constraint evaluation*

$u_1k_{0.6}t_{0.8}$	ONS! 20	*CC 10	
a. $u_1k_{0.6}t_{0.8}$	-1	-0.7	-27
☞ b. $k_{0.6}u_1t_{0.8}$	-0.4		-8
c. $ʔ_1u_1k_1t_1$		-1	-10

Data

Two (Closely Related) Varieties of Mixtex, Otomanguean

- indigenous languages from Southern Mexico
- dialects/languages: 1 Mixtec with many dialects (Caballero-Morales, 2008), 15 Mixtec languages (Bickel and Nichols, ongoing), 52 in Lewis et al. (2017), 84 in de las Lenguas Indígenas (2005)
- most communities have less than 50.000 speakers (McKendry, 2013)

San Miguel el Grande Mixtec (=MIG)

- data from Pike (1944); Mak (1950); Hollenbach (2003); McKendry (2013)
- theoretical accounts: Goldsmith (1990); Tranel (1995*b*); Zimmermann (2016)

San Pedro Molinos Mixtec (=MOL)

- data from Hunter and Pike (1969)

Tones in MIG and MOL

- three level tones: H (=á), M (=ā), L (=à)
- TBU:
  - MIG: sequences of two tones only possible on long vowels: μ is the TBU and no true contour tones
  - MOL: only a single tone on one syllable (CV_1V_1=bisyllabic)
- common in Mixtec: 'perturbing' morphemes that trigger a tonal change on a following morphemes (Dürr, 1987; Hollenbach, 2003)
- autosegmental account: floating tones (Goldsmith, 1990; Tranel, 1995*a*,*b*)

MOL: Floating H-Tones

(3) (Hunter and Pike, 1969, 35-36)

	M1	M2	Surface	Tones
Non-perturbing morphemes				
a.	ʔùʃì 'ten'	rīŋkī 'mouse'	ʔùʃì rīŋkī 'ten mice'	LL MM→LL MM
b.	ʔɻ̱ɻ̱ 'one'	**sùʧī**^{H} 'child'	ʔɻ̱ɻ̱ sùʧī 'one child'	MM+LM^{H}→MM LM
Perturbing morphemes				
c.	**kᶣùᶣù**^{H} 'four'	ʧìká 'baskets'	kᶣùᶣù **ʧ**íká 'four baskets'	LL^{H} LH→LL **H**H
d.	**ʒāʔā**^{H} 'chiles'	ʒìʧí 'dry'	ʒāʔā **ʒ**íʧí 'dry chiles'	MM^{H} LH→MM **H**H
e.	**síví**^{H} 'name'	tèē 'man'	síví t**é**ē 'name of the man'	HH^{H} LM→HH **H**M
f.	**kītī**^{H} 'animal'	kūù 'to die'	kītī k**ú**ù 'the animal will die'	MM^{H} ML→MM **H**L

MIG: Floating H-Tones

(4) (Mak, 1950; McKendry, 2013)

	M1		M2		Surface	
a.	**kəbə̀^{H}**	‘day’	bīkō	‘fiesta’	kəbə̀ b**í**kō	M:83
b.	**^{n}dējū^{H}**	‘food’	bàʔā	‘good’	^{n}dējū b**á**ʔā	M:83
c.	**k^{w}āʔà^{H}**	‘many’	sùʧí	‘children’	k^{w}āʔà s**ú**ʧí	M:83
d.	**ʃīní^{H}**	‘head’	ʧìʔí	‘skunk’	ʃīní ʧ**í**ʔí	McK:85
e.	**nūù^{H}**	‘face’	nūʧī^{H}	‘beans’	nūù n**ú**ʧī	McK:84
f.	**βáá^{H}**	Emph	-tɨ̀^{H}	3.Anim	β**á**átɨ́	McK:92

Lexical Exceptions in MIG and MOL

1. Exceptional **non-undergoers in MIG**: some morphemes don't take a floating H-tone if this creates a marked structure

2. Exceptional **non-triggers in MOL**: some morphemes only optionally trigger H-Overwriting and never trigger H-Spreading

1. Exceptional Non-Undergoers in MIG

- some morphemes are exceptional **non-hosts for a preceding floating H-tone** if the preceding morpheme ends in H; an example is /-ðe/ 3.MHon (5-a-c) (Pike, 1948, 91)
- (5-d+e) show that this is not a regular phonological ban on *HH: other morphemes host floating H's and create such tone sequences

(5) *Exceptional non-host for floating H* (McKendry, 2013)

	M1		M2		Surface	
a.	**nūʧī^{H}**	'bean'	-ðē	3.MHon	nūʧīð**é**	McK:92
b.	**jēē^{H}**	'eat'	-ðē	3.MHon	jēēð**é**	McK:104
c.	βá**á**^{H}	Emph	-ðē	3.MHon	βááðē	McK:92
d.	βá**á**^{H}	Emph	**-tɨ̀^{H}**	3.Anim	βáátɨ́	McK:92
e.	ʃ**ī**n**í**^{H}	'head'	ʧìʔí	'skunk'	ʃīní ʧ**í**ʔí	McK:85

Additional Process in MOL: H-Spreading

- if a perturbing morpheme precedes a morpheme that ends in an M-toned TBU and is also perturbing, both TBU's of this morpheme become high

(6) H-Overwriting and Spreading

$$XX^{H}\ XM^{H} \rightarrow XX\ \mathbf{HH}$$

Additional Process in MOL: H-Spreading

(7) (Hunter and Pike, 1969, 35-36)

	M1	M2	Surface	Tones
H-overwriting and spreading				
a.	**síví**^{H}	**sùʧī**^{H}	síví s**úʧí**	HH^{H}+LM^{H}→HH **HH**
	‘name’	‘child’	‘name of the child’	
b.	**síví**^{H}	**kītī**^{H}	síví k**ítí**	HH^{H}+MM^{H}→HH **HH**
	‘name’	‘animal’	‘name of the animal’	
c.	**kītī**^{H}	**kāā**^{H}	kītī k**áá**	MM^{H}+MM^{H}→MM **HH**
	‘animal’	‘to eat’	‘the animal will eat’	
No spreading if M2 is not M-final				
d.	**kᶣùᶣù**^{H}	**ʒòò**^{H}	kᶣùᶣù ʒ**ó**ò	LL^{H}+LL^{H}→LL **H**L
	‘four’	‘mont(H)	‘four months’	
No spreading if M2 has no floating H				
e.	**síví**^{H}	tèē	síví t**é**ē	HH^{H}+LM→HH **H**M
	‘name’	‘man’	‘name of the man’	

2. Exceptional Non-Triggers in MOL: H-Spreading

(8) (Hunter and Pike, 1969, 36)

	M1	M2	Surface	Tones
Never a trigger…				
a.	**síví**^{H} ‘name’	ʧi̱ʔī$^{(H)}$ ‘skunk’	síví ʧ**i̱**ʔī ‘name of the skunk’	HH^{H}+LM$^{(H)}$→HH **H**M
b.	**hìkī**$^{(H)}$ ‘fist, paw’	ʧi̱ʔī$^{(H)}$ ‘skunk’	hìkī ʧ**i̱**ʔī∼ʧìʔī ‘the skunk’s paw’	LM$^{(H)}$+LM$^{(H)}$→LM **H**M∼LM
…but always an undergoer (if realized)				
c.	ʧi̱ʔī$^{(H)}$ ‘skunk’	**kāā**^{H} ‘to eat’	ʧìʔī k**áá**∼kāā ‘the skunk will eat (it)’	LM$^{(H)}$+MM^{H}→LM **HH**∼MM
d.	**hìkī**$^{(H)}$ ‘fist’	**sùʧī**^{H} ‘child’	hìkī s**ú**ʧ**í**∼sùʧī ‘the child’s fist’	LM$^{(H)}$+LM^{H}→LM **HH**∼LM

2. Exceptional Non-Triggers in MOL: Optionally Perturbing

(9) (Hunter and Pike, 1969, 35-36)

	M1	M2	Surface	Tones
a.	**hìkī$^{(H)}$** ‘fist, paw’	tèē ‘man’	hìkī t**é**ē∼tèē ‘the man’s fist’	LM$^{(H)}$+LM→LM **H**M∼LM
b.	**hìkī$^{(H)}$** ‘fist, paw’	ʧìʔī ‘skunk’	hìkī ʧ**í**ʔī∼ʧìʔī ‘the skunk’s paw’	LM$^{(H)}$+LM→LM **H**M∼LM
c.	**ñùtī$^{(H)}$** ‘sand’	ʒìʧí ‘dry’	ñùtī ʒ**í**ʧí∼ʒìʧí ‘dry sand’	LM$^{(H)}$+LH→LM **H**H∼LH

Theoretical Account based on GSR

Exceptions in MIG and MOL in a GSR account

Exceptional non-undergoers in MIG =weak TBU	Exceptional non-triggers in MOL =weak tone
T_1 1 $TBU_{0.5}$	$T_{0.4}$ 1 TBU_1

Floating Tones: Overwriting

- **floating tones violate** *FLT-H
- floating H-tones are never deleted (=highest weight for MAXH)
- there are no contour tones: floating tone association results in **overwriting**

(10)
a. *FLT-H: Assign 1-X violations for every H-tone where X is the activity of TBU's this H is associated to. (Wolf, 2007)

b. MAXT: Assign violation X for any tonal activity X in the input that is not present in the output. (Yip, 2002)

c. *CONT: Assign X violations for every TBU associated to tones T_1 and T_2 where X is the mean activity of T_1 and T_2. (Yip, 2002)

Overwriting

(11)

L_1 H_1 + M_1 | | μ_1 μ_1	MaxH 200	*Cont 200	*Flt-H 60	MaxT 10	
a. L_1 H_1 M_1 | | μ_1 μ_1			-1		-60
b. L_1 M_1 | | μ_1 μ_1	-1			-1	-210
c. L_1 H_1 M_1 | \ | μ_1 μ_1		-1			-200
☞ d. L_1 H_1 | | μ_1 μ_1				-1	-10

GSR Account: Exceptional Non-Undergoers

Exceptional Non-Undergers in MIG in a Nutshell

- some μ's have an activity of 0.5: they are **weak hosts for a floating tone** since they don't avoid a *FLT-H violation fully

- association of a H to a weak host is not a good enough reason if a new OCP-violation is created

(12) OCP: Assign X violations for every pair of adjacent H-tones where X is the highest activity that both share.

Floating H Associates to a Strong Host: No OCP-Violation

ⁿdeju(H)	'food'	bàʔa	'good'	ⁿdeju báʔa	M:83
ʃiní(H)	'head'	ʧìʔí	'skunk'	ʃiní ʧíʔí	McK:85

(13)

	L_1 H_1 + M_1 (μ)	MaxH 200	*Flt-H 50	OCP_H 15	MaxT 15	
a.	L_1 H_1 M_1 (μ)		-1			-50
☞ b.	L_1 H_1 (μ)				-1	-15

Floating H Associates to a Strong Host: OCP-Violation Irrelevant

βáá(H)	Emph	-tɨ̀(H)	3.Anim	βáátɨ́	McK:92
ʃiní(H)	‘head’	ʧìʔí	‘skunk’	ʃiní ʧíʔí	McK:85

(14)

	H1 H1 + L1 (μ1 μ1)	MaxH	*Flt-H	OCPH	MaxT	
		200	50	15	15	
a.	H1 H1 L1 (μ1 μ1)		-1			-50
☞ b.	H1 H1 (μ1 μ1)			-1	-1	-30

Floating H Associates to a Weak Host: No OCP-Violation

nutʃi$^{(H)}$	‘bean’	-ðe	3.MHon	nutʃiðé	McK:92

(15)

	MaxH	*Flt-H	OCP$_H$	MaxT	
$M_1\ H_1$ + M_1 | | μ_1 $\mu_{0.5}$	200	50	15	15	
a. $M_1\ H_1\ M_1$ | | μ_1 $\mu_{0.5}$		-1			-50
☞ b. $M_1\ H_1$ | | μ_1 $\mu_{0.5}$		-0.5		-1	-40

Floating H Association Blocked for Weak Hosts: Fatal OCP-Violation

βáá$^{(H)}$	Emph	-ðe	3.MHon	βááðe	McK:92

(16)

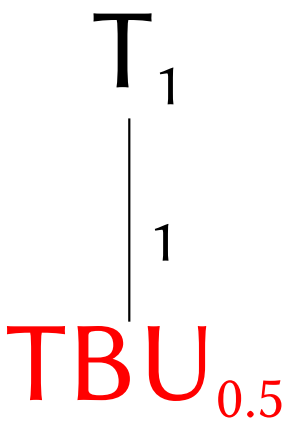
$H_1\ H_1$ + M_1 | | μ_1 $\mu_{0.5}$	MaxH 200	*Flt-H 50	OCP_H 15	MaxT 15	
☞ a. $H_1\ H_1$ M_1 | | μ_1 $\mu_{0.5}$		-1			-50
b. H_1 H_1 | | μ_1 $\mu_{0.5}$		-0.5	-1	-1	-55

Weak Hosts: Threshold Effects

(17)

Weight of	is greater than	the weight of
*FLT-H	≫	OCP + MAXT
OCP + MAXT	≫	0.5 x *FLT-H

Summary of the MIG Account: Exceptional Non-Undergoer



- weakly active **TBU** explains markedness-driven **exceptional non-undergoer** under the assumption of weak activity in the output

GSR Account: Exceptional Non-Triggers

Exceptional Non-Triggers in MOL in a Nutshell

- H-Spreading is triggered by the markedness of MH

(18) *[MH]
Assign X violation for every morpheme-internal sequence of M_1 and H_2 where X is the mean activity of M_1 and H_2.

- some floating H-tones have a weak activity of only 0.4
  - They are **don't violate** *FLT-H **as much as** fully active tones
  - They don't create **as bad a marked sequence of MH** as fully active tones

H-Spreading Triggered by a Fully Active H_1

(19)

	MaxH	*Flt-H	*[MH]	MaxT	
$\left[\begin{array}{cc} H_1 & H_1\,H_1 \\ \sigma_1 & \sigma_1 \end{array}\right]\left[\begin{array}{cc} M_1 & M_1\,H_1 \\ \sigma_1 & \sigma_1 \end{array}\right]$	100	71	28	24	
a. $\begin{array}{cccc} H_1 & H_1\,H_1 & M_1 & M_1\,H_1 \\ \sigma_1 & \sigma_1 & \sigma_1 & \sigma_1 \end{array}$		-2	-1		-170
b. $\begin{array}{cccc} H_1 & H_1 & H_1 & M_1\quad H_1 \\ \sigma_1 & \sigma_1 & \sigma_1 & \sigma_1 \end{array}$		-1	-1	-1	-123
☞ c. $\begin{array}{cccc} H_1 & H_1 & H_1 & \quad H_1 \\ \sigma_1 & \sigma_1 & \sigma_1\ \sigma_1 & \end{array}$		-1		-2	-119

No H-Spreading Triggered by a Partially Active $H_{0.4}$

(20)

H_1 $[$ $[$ L_1 M_1 $H_{0.4}$ σ_1 σ_1	MaxH 100	*Flt-H 71	*[MH] 28	MaxT 24	
a. H_1 L_1 M_1 $H_{0.4}$ σ_1 σ_1		-1.4	-0.7		-119
☞ b. H_1 M_1 $H_{0.4}$ σ_1 σ_1		-0.4	-0.7	1	-72
c. H_1 $H_{0.4}$ σ_1 σ_1		-0.4		-2	-76,4

H-Overwriting: Obligatory for H_1; Optional for $H_{0.4}$

(21)

	MaxH 100	*Flt-H 71	*[MH] 28	MaxT 24	
a. H_1 L_1 L_1 σ_1 σ_1		-1			-71
☞ b. H_1 L_1 σ_1 σ_1				-1	-24
☞ a. $H_{0.4}$ L_1 L_1 σ_1 σ_1		-0.4			-28,4
☞ b. $H_{0.4}$ L_1 σ_1 σ_1				-1	-24

(Formal implementation of this optionality within a probabilistic MaxEnt exists (Johnson, 2002; Goldwater and Johnson, 2003; Wilson, 2006) and is tested with Hayes (2009))

Weighting Argument: Too Weak to be a Trigger

(22) *H-Spreading*

a. Fully active H_1
$^*[MH] \gg$ MaxT

b. Partially active $H_{0.4}$
MaxT $\gg$ 0.7 x $^*[MH]$

→ Full problem=solution; partial problem=no solution

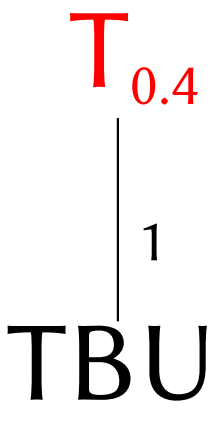
(23) *H-Overwriting*

a. Fully active H_1
*Flt-H $\gg$ MaxT

b. Partially active $H_{0.4}$
0.4 x *Flt-H $\sim$ MaxT

→ Full problem=solution; partial problem=optional solution

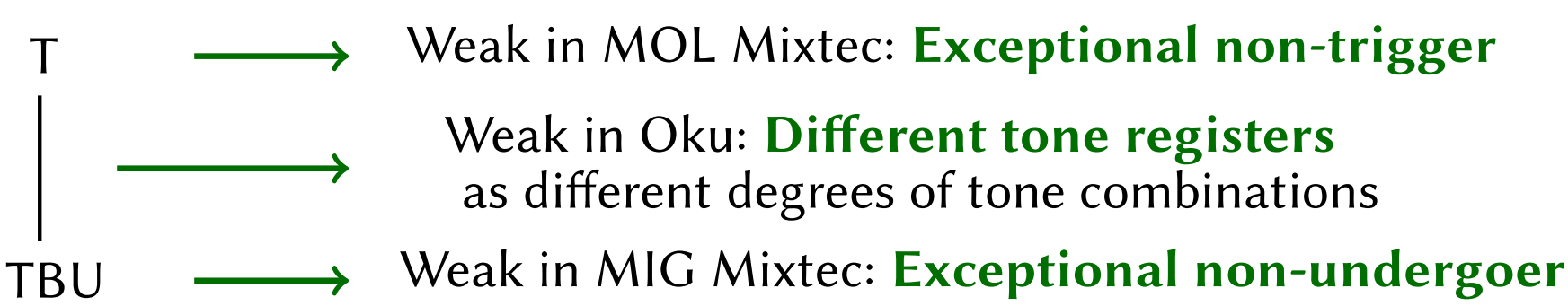
Summary of the MOL Account: Exceptional Non-Trigger



- weakly active **tone** explains **exceptional non-triggers** under the assumption of weak activity in the output: Markedness problem not as bad that action is called for

Summary and Conclusion

Summary and Conclusion



- gradient activity of all elements in an autosegmental representation:
  - certain lexemes behave differently in phonology
  - qualitatively identical phonological elements are interpreted differently by phonetics
- all three case studies crucially rely on **gradient activity in the output** (vs. Smolensky and Goldrick (2016); Rosen (2016))

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