

Anti-depressor consonants in Mulao

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1. Introduction

(1) The aim of this paper is to show that laryngealized consonants, such as aspirates and glottals, voiceless sonorants and fricatives, in Mulao only allow high tone in their syllable. This is due to markedness constraints on the tone-prosodeme relationship, which penalizes low tone on these consonants. The term ‘*anti-depressor*’ refers to these laryngealized consonants.

(2) Mulao (or Mulam)

- a. A minority language spoken in Guangxi Zhuang Autonomous Region.
- b. Seventy thousand speakers, most of them live in Luocheng (based on 1977 census)

(3) Data¹

a. Some onsets require a high tone

	<i>high</i>		<i>low</i>
Glottal stop	[ʔuk ⁵⁵]	‘to exit, to go out’	*[ʔuk ¹¹]
Glottalized	[ʔjem ⁴²]	‘to borrow’	*[ʔjem ¹¹]
Voiceless sonorant	[nɔ ⁵³]	‘rat, mouse’	*[nɔ ²⁴]
Aspirated	[k ^h ɛ:k ⁴²]	‘guest’	*[k ^h ɛ:k ¹³]
	[p ^h o ⁴⁴]	‘bed’	*[p ^h o ¹¹]

b. Other onsets do not require a high tone

	<i>high</i>		<i>low</i>	
Sonorants	[ja ⁴²]	‘cloth’	[ja ¹¹]	‘also, too’
	[lau ⁴⁴]	‘snail’	[lau ¹¹]	‘to leak’
Voiceless	[kuŋ ⁵³]	‘stalk, stem’	[kuŋ ¹²¹]	‘grasshopper’
	[pa:k ⁴²]	‘mouth’	[pa:k ¹¹]	‘white’
	[taŋ ⁴⁴]	‘stool’	[taŋ ²⁴]	‘to stand’

(4) Overview

- a. Proposal Section 2
- b. Mulao phonology and tonology Section 3, 4
- c. Analysis Section 5
- d. Typology Section 6
- e. Consonants and their effect on pitch Section 7

¹ All data in this presentation come from Wang and Zheng (1993).

3. Mulao phonology: Segments

(11) Consonants (Wang and Zheng 1993: 4-5)

	labial	alveolar	palatal	velar	glottal
stops	p	t	c	k	ʔ
aspirated	p^h	t^h	c^h	k^h	
fricatives	f	s	ç	ɣ	h
affricates		ts			
aspirated		ts^h			
nasals	m̥ m	n̥ n	ɲ̥ ɲ	ŋ̥ ŋ	
liquids		l̥ l			
glides		w		j	
pre-glottalized		ʔw		ʔj	ʔɣ

- Syllables with onsets in the heavy-lined boxes only co-occur with high tone.
- Onsets can be labialized, palatalized, or uvularized.

4. Mulao phonology: Tone

(12) Tonal inventory

	<i>level</i>	<i>contour (falling)</i>
High	55 or 44	53 or 42
	<i>level</i>	<i>contour (rising)</i>
Low	11 (or 121)	12 or 24

- Register features and contour features for tonal classification (Bao 1990)
- (Note) Patterns in contour tones:
In pursuing a registrogenesis theory in Southeast Asian languages compared to Old Chinese, Ferlus (2006: 11) reconstructs that low pitch is related to raising in vowels, and high pitch is related to lowering in vowels.

(13) Original description of tones in Mulao (Wang and Zheng 1993: 13)

odd	1	3	5	7short	7long
pitch	42	53	44	55	42
description	mid fall	high fall	mid level	high level	mid fall
even	2	4	6	8short	8long
pitch	121	24	11	12	11
description	low rise-fall	mid rise	low level	low rise	low level

Tonal classification is based on detailed phonetic description.

- (14) Maddieson (1978) urges cautions in phonological interpretation based on phonetic description. In interpreting the raw phonetic data of Jianyang citation tones, Chen (2000: 17-19) discusses possible influences from “the final lowering” and “the undershooting of phonological targets” in phonetic descriptions.

5. Analysis

- **Anti-depressor consonants (aspirates and glottals, voiceless sonorants and fricatives) require a H tone.**

- (15) Proposal

- Consonants are tone bearing units.
- There is **no faithfulness constraint** that preserves tone on non-moraic TBU's.
- Markedness constraints
 - TBU→T: Tone Bearing Units (TBU) must have a tone in the output.
 - *AD-L: Anti-depressor consonants must not host low tone in the output.
(The label ‘*anti-depressor*’ refers to the laryngeal consonants)

- (16) The analysis should account for:

- An unfaithful mapping of an input with laryngeal onsets and L tone: **(ii) below**

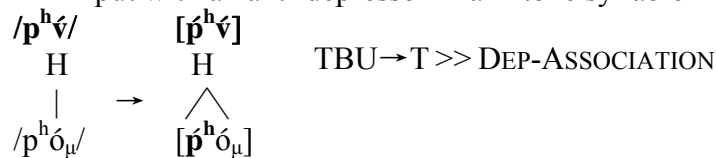
		input			output		
i.	laryngeal onsets	/p ^h ʋ/	high	→	[p ^h ʋ]	high	[p ^h o ⁴⁴] ‘bed’
ii.		/p ^h ʌ/	low	→	[p ^h ʋ]	high	
iii.	non-laryngeal onsets	/pʋ/	high	→	[pʋ]	high	[ja ⁴²] ‘cloth’
iv.		/pʌ/	low	→	[pʌ]	low	[ja ¹¹] ‘also’

- Faithful mappings of all other inputs: **(i, iii, iv) above**

5.1. Syllables with anti-depressor onsets

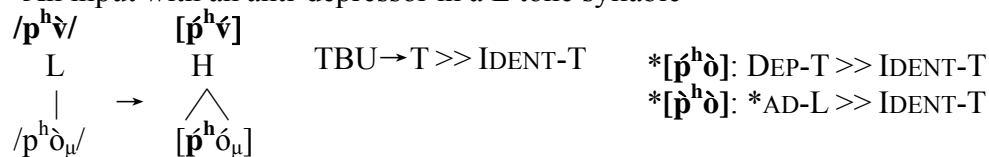
- **H tone inputs surface faithfully, but L tone inputs will surface with H tones.**
 - /p^hʋ/ high → [p^hʋ] high
 - /p^hʌ/ low → [p^hʋ] **high**
- **The banning of anti-depressor consonants in low tone syllables results from the requirement of high tone on these consonants.**

- (17) An input with an anti-depressor in a H tone syllable²



² Definition of constraints and the ranking argument are placed in the appendix.

(18) An input with an anti-depressor in a L tone syllable



(19) Ranking argument expressed by Hasse Diagram



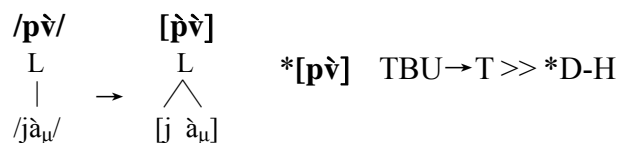
5.2. Syllables with other onsets

- Onsets that are not anti-depressors will be called depressors, which require a low tone in the output.

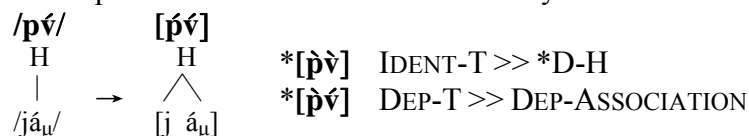
***D-H** Depressor consonants must not associate with high tone in the output.

- Both H tone inputs and L tone inputs surface faithfully.

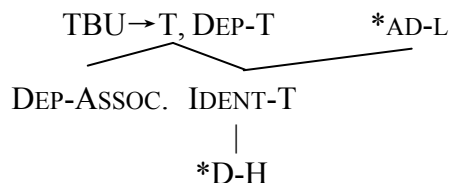
(20) An input with a L tone surfaces faithfully



(21) An input with a H tone surfaces faithfully



(22) Ranking argument expressed by Hasse Diagram

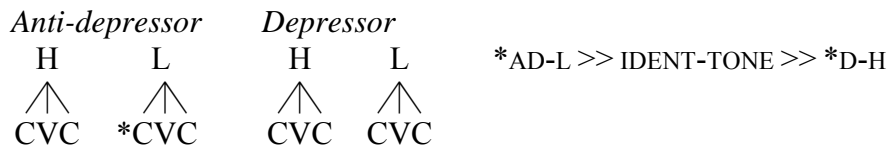


6. Typology: depressors vs. anti-depressors and others

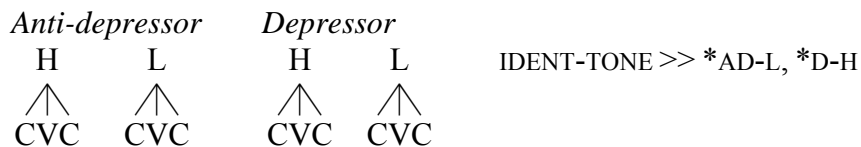
- Syllables with anti-depressor onsets will not surface with L tone only, syllables with depressor onsets will not surface with H tone only.

(23) Typology

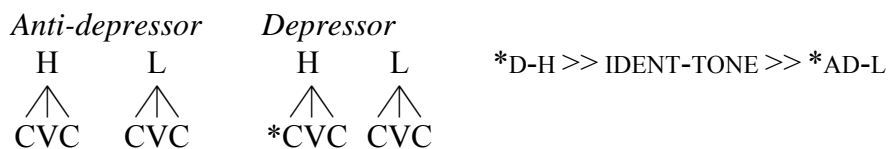
- a. Anti-depressors require H tone; no restriction on other onsets (**Mulao**)



- b. No restriction (**Vietnamese**)

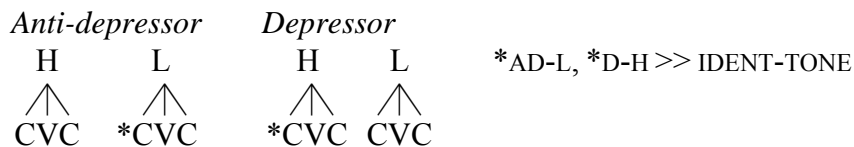


- c. No restriction on anti-depressors; depressors require L tone (**Tsonga**)



- H tone cannot spread across depressors.
- L tone is not blocked by anti-depressors.

- d. Anti-depressors require H tone; depressors require L tone (**Bade**)



- H tones cannot spread across depressors.
- L tone cannot spread across anti-depressors. (Schuh 2002)

(24) The theory predicts that no language should have:

- Anti-depressors that require only L tone³
- Depressors that require only H tone

³ Edmondson and Gregerson (1996) reports that Bolyu (also known as Lai), spoken in Guangxi Province, has words with aspirated onsets that only surface in L tone syllables. This will be an apparent challenge to the current proposal.

7. High tone licensing laryngeal onsets (Anti-depressors)

- **Phonetic evidence:** *pitch-raising of anti-depressors on the following vowel.*

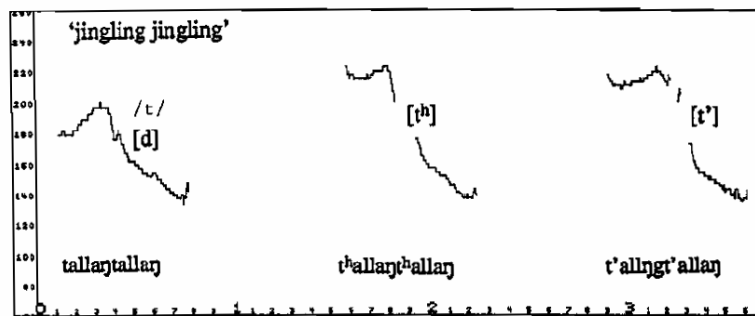
7.1 Aspirated consonants

(25) “Aspirated consonants ... occur in odd number tones only.”⁴

(26) Seoul Korean (Jun 1998: 193)

The tonal pattern of the Accentual Phrase is LHLH. When the initial segment is aspirated or tense, the Accentual Phrase becomes HHLH.

<i>plain</i>	<i>aspirated</i>	<i>tensed</i>
a. [tallaŋtallaŋ]	b. [t ^h allaŋt ^h allaŋ]	c. [t'allaŋt'allaŋ]



All three words mean ‘jingling’ with different nuances (Jun 1996: 45).

7.2 Glottal stop and glottalized consonants

(27) “Glottal stop ... and glottalized consonants ... in odd number tones only.”

(28) Arabic (Hombert et al. 1979: 49-51)

Glottal stop raises the fundamental frequency of the preceding vowel.

(29) See also Michaud (2004) for glottalization and tone in Hanoi Vietnamese.

7.3 Fricatives

(30) “Voiceless fricatives ... normally occur in odd number tones, ...”

(31) Korean (Cho et al. 2002: 221-222):

The pitch of the vowel onset after the fricative [s] is relatively higher than a lenis stop (but tends to be lower than an aspirated stop).⁵

(32) See also Vaux (1998) for relevant discussion.⁶

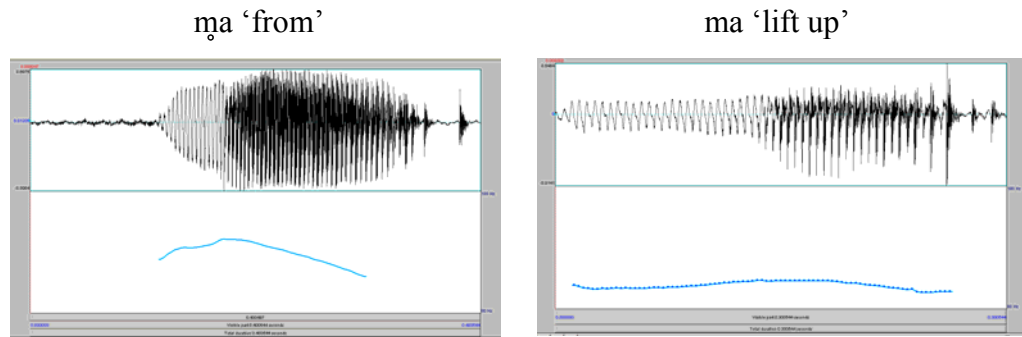
⁴ Odd number tones means H tones.

⁵ Thanks to Charles Chang for bringing this study to my attention. In his own study on Korean fricatives, Chang did not find the effect of fricatives on fundamental frequency (p.c. Charles Chang).

7.4 Voiceless sonorants

(33) “Voiceless nasals and laterals ... occur in odd number tones only.”

(34) Burmese⁷



Green (2005): Voiceless sonorants behave on par with aspirated segments

(35) The pitch track shows that a vowel after a voiceless nasal has a higher F0 compared to modal nasals.

8. Conclusion

(36) The requirement of high tone by anti-depressor onsets is accounted for under the proposal that consonants are TBU's, and a markedness constraint bans low tone on anti-depressors (*AD-L).

(37) Consonantal TBU's are different from moraic TBU's (moras or syllables) because there are no faithfulness constraints that preserve non-moraic tone.

(38) Typology of consonant-tone based on the current proposal is presented (*Sec. 6*).

(39) Future research

- a. What is the prediction of this theory in tonal languages that have contextually different moraic coda consonants (Elías Ulloa 2006, Moren 1999)?
- b. If a tonal language has moraic onsets (Topintzi 2006), what would the prediction be?

⁶ Thanks to Jose Elias-Ulloa for bringing this article to my attention.

⁷ Sound files are retrieved from the website on 'Vowels and Consonants' by P. Ladefoged. The pitch track is acquired using Praat 4.5.18. (<http://hctv.humnet.ucla.edu/departments/linguistics/VowelsandConsonants/vowels/chapter12/burmese.html>)

<Appendix 1: Constraints & Ranking>

(40) Constraints

- a. **TBU→T** Tone Bearing Units (TBU) must have a tone in the output.
- b. **DEP-ASSOCIATION** An association line in the input has a correspondent in the output.
- c. ***AD-L** Anti-depressor consonants must not associate with low tone in the output.
- d. ***D-H** Depressor consonants must not associate with high tone in the output.
- e. **MAX-T** The tone *associated to a mora* in the input has a corresponding tone in the output.
- f. **IDENT-T** The tone *associated to a mora* in the output has the same specification with the correspondent tone in the input.
- g. **DEP-T** The tone *associated to a mora* in the output has a corresponding tone in the input.

(41) Inputs with an anti-depressor onset

i. An input with H tone

	H /p ^h o/ 'bed' μ	TBU →T	DEP- ASSOCIATION
a. ☞	H ^ [p ^h o] μ		*
b.	H [p ^h o] μ	W*	L

ii. An input with L tone

	L /p ^h o/ μ	TBU →T	*AD-L	DEP -T	IDENT -T
a. ☞	H ^ [p ^h o] μ				*
b.	H L [p ^h o] μ			W*	L
c.	L [p ^h o] μ	W*			L
b.	L ^ [p ^h o] μ		W*		L

(42) Hypothetical inputs

i. An input with L tone on an onset

	L H /p ^h ó/ μ	TBU→ T	*AD -L	IDENT -T	DEP- ASSOC.
a.	H [p ^h ó] μ				*
b.	L H [p ^h ó] μ		W*		L

The shaded cell does not violate IDENT-T because the constraint does not evaluate non-moraic TBUs.

ii. An input with no tone

	/p ^h ò/ μ	TBU→T	*AD -L	DEP -T
a.	H [p ^h ò] μ			*
b.	[p ^h ò] μ	W*		L
c.	L [p ^h ò] μ		W*	*
d.	H [p ^h ò] μ	W*		*

(43) Inputs with plain onsets

i. An input with H tone

	H /já/ μ	TBU→T	IDENT-T	*D-H
a.	H [j á] μ			*
b.	H [já] μ	W*		L
c.	L [jà] μ	W*	W*	L

ii. An input with L tone

	L /jà/ μ	TBU→T	IDENT-T	*D-H
a.	L [j à] μ			*
b.	L [jà] μ	W*		L
c.	H [já] μ	W*	W*	L

<Appendix 2>

Q1. Can every consonant be a TBU?

→ The answer is ‘yes’ under the current proposal. As emphasized above, consonantal TBU’s are different from the TBU’s (moras, or syllables) in the literature.

- a. There is no moraic node between a consonant and a tone.
- b. The consonantal tone only has effects under a constraint ranking when IDENT-T is dominated.
- c. No faithfulness constraint targets consonantal tones.

Q2. Is there a natural class that groups these consonants together?

→ Some studies refer to these special consonants (depressors or anti-depressors) as unnatural classes of sounds (Schachter 1976). For now, I will assume that consonants have diacritics that mark them as depressors, or anti-depressors.

Q3. Are these diacritic universal?

→ Currently, I don’t have an answer for this question.

Acknowledgement:

I would like to thank James Bruno, José Elías-Ulloa and Brian D. McHugh for their helpful comments.

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