

PRE-ORALIZED NASAL CODAS IN MAMAINDÊ: AND THE ORAL VOWEL ENHANCEMENT PROPOSAL  
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OBJECTIVES OF THIS STUDY

1. Show the primary articulatory form of the Mamaindê biphasic segments - [b<sup>m</sup>], [d<sup>n</sup>], [g<sup>ŋ</sup>] or [b<sup>m</sup>], [d<sup>n</sup>], [g<sup>ŋ</sup>]?
2. Explore three alternatives for the analysis of this pre-oralization process, first from a phonological (autosegmental) perspective, and then two analyses from a phonetic implementation approach. This paper will show that one of the phonetic alternatives is the more satisfactory of the three.
3. Demonstrate that adopting a specific set of parameters proposed by Wetzels is helpful in predicting the type of phonetic enhancement found in this language.

THE MAMAINDÊ BIPHASIC ORAL/NASAL SEGMENTS

[b<sup>m</sup>]

/kateunta-lat <sup>h</sup> a-wa/	[ga'deub <sup>m</sup> mdalat <sup>h</sup> wa]	it is alive
/waun-lat <sup>h</sup> a-wa/	['wau <sup>b</sup> m <sup>l</sup> at <sup>h</sup> wa]	it is red
/taun-tu/	['dau <sup>b</sup> mdu]	tail
/leun?-tu/	['leu <sup>b</sup> m?du]	tapir

[g<sup>ŋ</sup>]

/sin-tu/	['si <sup>ŋ</sup> du]	meat
/jalinjã-tu/	[ja'li <sup>ŋ</sup> ?jãru]	puberty flute music
/walinjã-tu/	[wa'li <sup>ŋ</sup> ?du]	anteater: type 'mirim'
/wajinsi-tu/	['wai <sup>ŋ</sup> tʃiru]	medicine

[d<sup>n</sup>]

/jalakwatun-tu/	[jalakwa'du <sup>d</sup> ndu]	howler monkey
/ʔon-lat <sup>h</sup> a-wa/	['ʔo <sup>d</sup> nlat <sup>h</sup> wa]	he is lazy
/nahon-sã-tu/	[na'ho <sup>d</sup> nsãru]	sweet beverage
/nakajan?-tu/	[naga'jã <sup>d</sup> n?du]	person/indian

DISTRIBUTION IN CODA FOLLOWING ORAL VOWELS:

/alain-sihta?/ cross.over-in.order.to.DS	→	[a.laiŋ.sih.ɾa?]	in order for him/her to cross over
/na?tun-hĩ?/ to.be.full-then.DS	→	[na?.dudn.hĩ?]	he/she was full, then...
/kateun-k'ato?/ be.alive-then.SS	→	[ka.deubm.k <sup>b</sup> ə.ɾə?]	he/she was still alive, then...

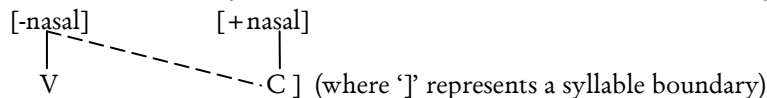
IN THE INTERVOCALIC POSITION, OR AFTER NASAL VOWELS:

/alain-a-sihta?/ cross.over-S1-IN.ORDER.TO.DS	→	[a.lai.na.sih.ɾa?]	in order for me to cross over
/na?tun-a-hĩ?/ to.be.full-S1-THEN.DS	→	[na?.du.na.hĩ?]	I was full, then...
/kateun-a-hĩ?/ be.alive-S1-THEN.DS	→	[ka.deu.na.hĩ?]	I was (still) alive, then...
/wanũn-sã/ good-speech	→	[wanũnsã]	good speech
/hãn-latha-wa/ white-S3-Decl	→	[hãnlathwa]	it is white

ORAL AND NASAL VOWELS ARE CONTRASTIVE:

/han-lat <sup>h</sup> a-wa/	→	[ha <sup>d</sup> nlat <sup>h</sup> wa]	it wiggles
/hãn-lat <sup>h</sup> a-wa/	→	[hãnlat <sup>h</sup> wa]	it is white
/nahĩ?/	→	[nahĩ?]	then...
/nahiktu/	→	[nahiktu]	his hand
/hũtu/	→	[hũru]	savannah wolf- (lobo guara)
/huktu/	→	[huktu]	bow
/han-a?-wa/	→	[ha:na?wa]	it does not wiggle
/hãn-a?-wa/	→	[hã:na?wa]	it is not white

ORALIZATION: AN AUTOSEGMENTAL ACCOUNT (WHICH ENDS UP REQUIRING BINARY FEATURES OF NASALITY)



## 2 PHONETIC ENHANCEMENT ACCOUNTS

Both based on Keyser and Stevens (2006) idea of a language specific Enhancement Component at the phonetic level, where secondary articulatory gestures add cues to the acoustic signal to enhance specific phonological contrasts which are in danger of losing their saliency.

### Coda Place Enhancement strategy

In some Australian languages (Arabana, Aranda, WaNgaNuru, Olgolo, and others), there are up to 6 distinctive places of articulation for these biphasic coda nasals (unfortunately the authors did not provide any data). Nasality is (apparently) not contrastive on vowels. Keyser and Stevens view the oral phase of the biphasic segments in these languages as a phonetic enhancement of the place of articulation of the coda, thus avoiding the perturbation of vowel formant transitions. (Keyser and Stevens 2006)

### The Voiced Stop Enhancement and Oral Vowel Enhancement strategies

Wetzels proposes two enhancement approaches, depending on whether biphasic segments are analyzed as being either underlyingly oral or nasal. He cites examples from Amazonian languages: Kaingang, Maxacali, Dâw, Yuhup, Wari, Wansajot. (Wetzels 2008:9-11)

*Voiced Stop Enhancement (VSE)*: In the former case, where biphasic segments are underlyingly oral, Wetzels contends that languages may add a nasal phase to these segments for the purpose of enhancing the voicing of the coda consonant. This he terms **Voiced Stop Enhancement (VSE)**.

*Oral Vowel Enhancement (OVE)*: The latter case, where these contour segments are underlyingly nasal, an oral phase may be added to a nasal consonant in order to make the orality of oral vowels more prominent preceding nasal codas. This is useful in languages where a primary contrast already exists between oral and nasal vowels and in contexts where this contrast might be in danger of being neutralized (such as before nasal codas). This he terms **Oral Vowel Enhancement (OVE)**.

### WETZELS' PARAMETERS FOR PHONETIC ENHANCEMENT OF BIPHASIC ORAL/NASAL SEGMENTS: (WETZELS 2008:11):

- /OralV/ ~ /NasalV/: Does the language have contrastive oral/nasal vowels?  
*If not, then OVE (Oral Vowel Enhancement) is excluded.*
- P/B ~ M: Does the language exhibit a contrast between nasal and non-nasal obstruents? \*  
*If so, VSE (Voiced Stop Enhancement) is excluded.*
- g > d > b: Does the language display a preference in the place of articulation in regards to the biphasic stops, such that dorsals > (are preferred over) coronals > (are preferred over) labials?  
*If so, then the VSE is predicted.*
- [Vbm] vs [mbV]: Do the biphasic segments occur in the coda and not in the onset? *If so, OVE is predicted.*
- [mb]/[bm] ~ [b]: Do the biphasic segments alternate with voiced stops? *If so, then VSE is predicted*
- [mb]/[bm] ~ [m]: Do the biphasic segments alternate with nasal stops? *If so, then OVE is predicted.*
- [NasalV][NasalC]: Are nasal consonants restricted to syllables with nasal vowels? *If so, then OVE is excluded.*  
\* - the wording on parameter (b) has been simplified to isolate the contrast under discussion

### Hypothetical OT account of /sun/ → [su<sup>d</sup>n] (an attempt to encode phonetic detail in OT constraints)

	/sun/	MAX-V	*VoralN.	MAX-Nrelease	MAX-Nmurmur	MAX-Nclosure
	a. sun		*!			
☛	b. su <sup>d</sup> n					*
	c. su			*!	*	*
	d. sūn	*!				
	e. sun <sup>d</sup>		*!	*		
	f. su <sup>d</sup> n <sup>d</sup>			*!		*
	g. sud			*!	*	*

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