

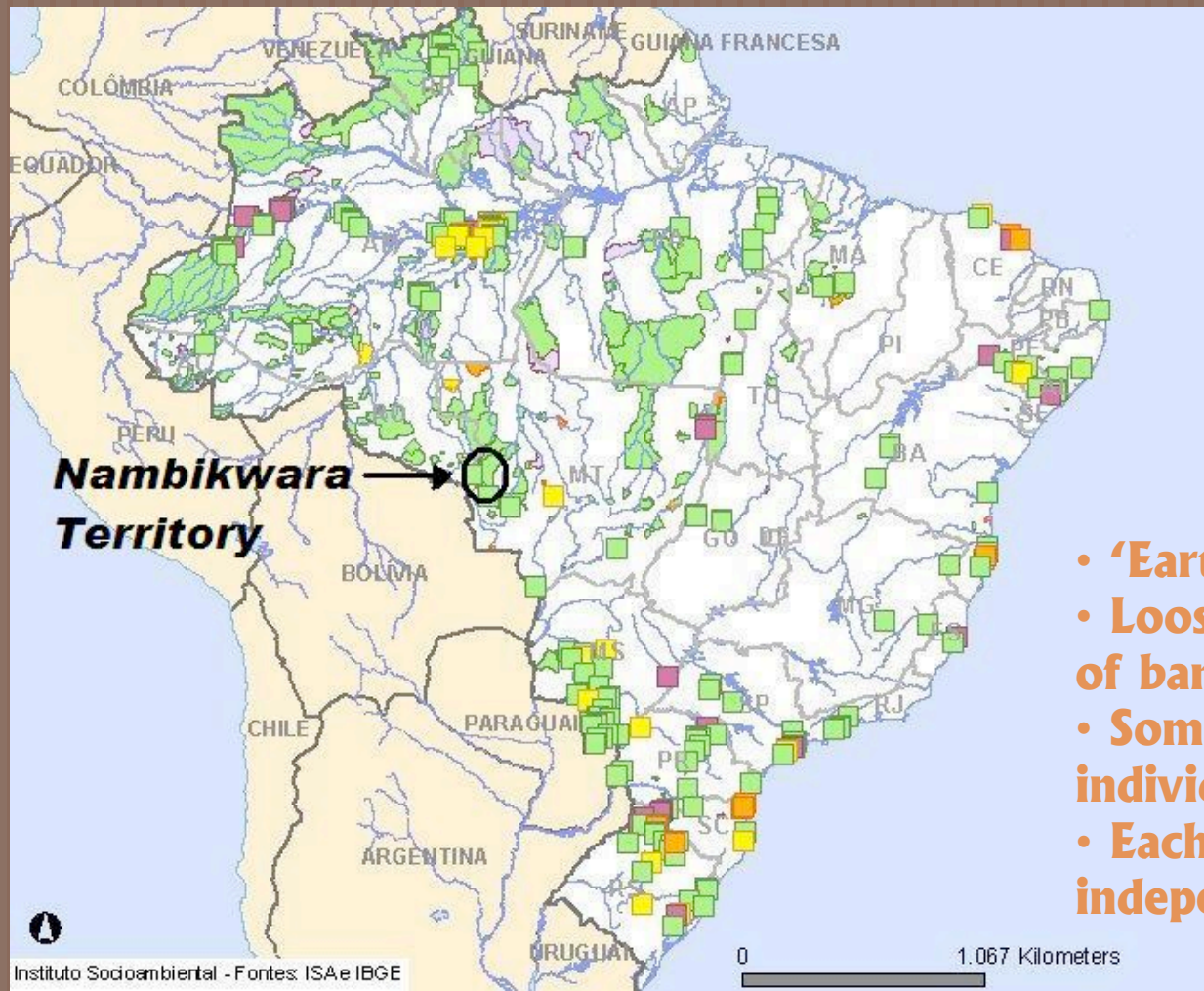


PRE-ORALIZED NASAL CODAS IN MAMAINDÊ

David M. Eberhard – SIL Brazil
dave_eberhard@sil.org

**and the Oral Vowel Enhancement
Proposal**

Location of the Nambikwara Family



- 'Earth' peoples
- Loose knit cluster of bands
- Some 1200 individuals total
- Each band highly independent

NAMBIKWARA FAMILY - *includes languages with living descendents*
(parenthesis indicate moribund languages)

(Sabanê)

Northern Nambikwara Branch

Southern Nambikwara Branch

ROOSEVELT CLUSTER

- (Latundê)
- (Lakondê)
- (Tawandê)
- (Sowaintê)

GUAPORÉ CLUSTER

- Mamaindê
- Negarotê
- (Tawendê)

- | | | | |
|----------------|--------------|----------------|---------------|
| MANDUCA | CAMPO | GUAPORÉ | SARARÉ |
| Hukuntesu | Kithãulhu | Hahãintesu | Katitãulhu |
| Siwaisu | Wakalitesu | Waikisu | |
| Niyahlosu | Halotesu | Alantesu | |
| | Sawentesu | Wasusu | |

List of Southern Nambikwara languages taken from Telles and Wetzels (forthcoming:2)

Mamaindê environment

- 250 individuals
- 4 communities



Mamaindê environment

- 250 individuals
- 4 communities
- Increased contact w/outside world
- High rate of bilingualism

Highly endangered



Rich Mamaindê Phonology

- 4 contrastive vowel qualities yielding 16 vowels
 - oral, nasal, creaky voice, nasal and creaky voice
- Intricate place feature spreading process from vowels to consonants
- Tonal system with 2 tones, tone plateauing, and floating tones
- Stress system that is predicated on syllable weight, syllable position, and 4 lexical strata
- Biphasic oral/nasal segments in codas

We will be studying the Biphasic oral/nasal Segments in Mamaindê



[bm], [dn], [gŋ] (lets listen!)

a. primarily nasal [^bm, ^dn, ^gŋ] ?

OR

b. primarily oral [^b^m, ^dⁿ, ^g^ŋ] ?

Types of Biphasic oral/nasal Segments in Mamaindê



[bm], [dn], [gŋ] (lets listen!)

a. primarily nasal [^bm, ^dn, ^gŋ] ?

OR

b. primarily oral [^b^m, ^dⁿ, ^g^ŋ] ?

Types of Biphasic oral/nasal Segments in Mamaindê



[bm], [dn], [gŋ] (lets listen!)

a. primarily nasal [^bm, ^dn, ^gŋ] ?

OR

b. primarily oral [^b^m, ^dⁿ, ^g^ŋ] ?

Objectives

- I will first establish the phonological status of these biphasic segments as underlyingly nasal, and the process involved as pre-oralization instead of post-nasalization.
- I will then 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. It will also demonstrate that adopting a specific set of parameters proposed by Wetzels (2008) is helpful in predicting the type of phonetic enhancement found in this language.

Distribution of biphasic oral/nasal, nasal/oral segments

Mostly found in South America, Africa, Australia,
and Austronesia

(Ladefoged, 1993:165-166; Wetzels, 2009:1; see also
Rosendall, 1992; and Mills, 1984.)

As well as in numerous other places, such as:

Cantonese (Chen and Clumeck, 1975:128).

Bonggi language of Borneo (Boutin 1993, 2000),

Malayic and Land Dayak language families (Blust
1997; Court 1967, 1970, 1972; Scott; 1964)

In Amazonia

Languages:

Yuhup, Dâw, Wari, Wansajot, Kaingang, Maxacali, Barasana, Apinaye, Maxacali, Xokleng, and Mebengokre.
(Wetzels , 2009)

Most commonly found in these families:

Macro-Je family -Apinaye, Kaingang, Maxacali, Xokleng
Maku family -Yuhup and Dâw.

To this list the Nambikwara family must also be added: Southern Nambikwara, Mamaindê, Negarotê, Latundê and Lakondê.

(Kroeker, 2001:79; Eberhard, 2009:85-91; Telles, 2002:56-57;)

In the Nambikwara family...

Southern Nambikwara (Kroeker, 2001:79) → [b^hm], [d^hn], [g^hŋ]
Mamaindê (Eberhard, 2009:85-91),
Negarotê (Eberhard, 2009:85-91)

Latundê and Lakondê (Telles, 2002:56-57) → [b^hm], [d^hn]

Sabanê (Antunes, 2004) → ∅

Telles (2002:56-57) notes that the pre-stopped nasals, while common in Lakondê, are quite rare in Latundê.

Biphasic segments in Mamaindê

[^bm]

| | | |
|----------------------------------|--|-------------|
| /kateunta-lat ^h a-wa/ | [ga ¹ deu ^b mdalat ^h wa] | it is alive |
| /waun-lat ^h a-wa/ | [¹ wau ^b m ^l at ^h wa] | it is red |
| /taun-tu/ | [¹ dau ^b mdu] | tail |
| /leunʔ-tu/ | [¹ leu ^b mʔdu] | tapir |

[^gŋ]

| | | |
|---------------|--|------------------------|
| /sin-tu/ | [¹ si ^g ŋdu] | meat |
| /jalinʔja-tu/ | [ja ¹ li ^g ŋʔjaru] | puberty flute music |
| /walinʔ-tu/ | [wa ¹ li ^g ŋʔdu] | anteater: type ‘mirĩm’ |
| /wainsi-tu/ | [¹ wai ^g ŋʔsiru] | medicine |

[^dn]

| | | |
|-----------------------------|--|----------------|
| /jalakwatun-tu/ | [jalakwa ¹ du ^d ndu] | howler monkey |
| /ʔon-lat ^h a-wa/ | [¹ ʔo ^d nlat ^h wa] | he is lazy |
| /nahon-sa-tu/ | [na ¹ ho ^d nsaru] | sweet beverage |
| /nakajanʔ-tu/ | [naga ¹ ja ^d nʔdu] | person/indian |

Phonological status: Evidence from distribution

Here we have biphasic segments alternating with simple nasals
(when in the Coda, preceded by oral V)

/alain-sihtəʔ/

cross.over-IN.ORDER.TO.DS

[a.laiŋ^ɰsih.rəʔ]

in order for him/her to
cross over

/naʔtun-hĩʔ/

to.be.full-THEN.DS

[naʔ.du^dn.hĩʔ]

he/she is full, then...

/kateun-k^hatoʔ/

be.alive-THEN.SS

[ka.deu^m.k^hə.rəʔ]

he/she is alive, then...

No alternation in intervocalic position, or after nasal V

/alain-a-sihtaʔ/

cross.over-S1-IN.ORDER.TO.DS

[a.lai.nə.sih.ɾaʔ]

in order for me to cross over

/naʔtun-a-hĩʔ/

to.be.full-S1-THEN.DS

[naʔ.duː.nə.hĩʔ]

I was full, then...

/kateun-a-hĩʔ/

be.alive-S1-THEN.DS

[ka.deu.nə.hĩʔ]

I was (still) alive, then...

/wanũn-sa/

good-speech

[wanũnsa]

good speech

/na-ʔmĩn/

3Poss-skin

[naʔmĩn]

his skin

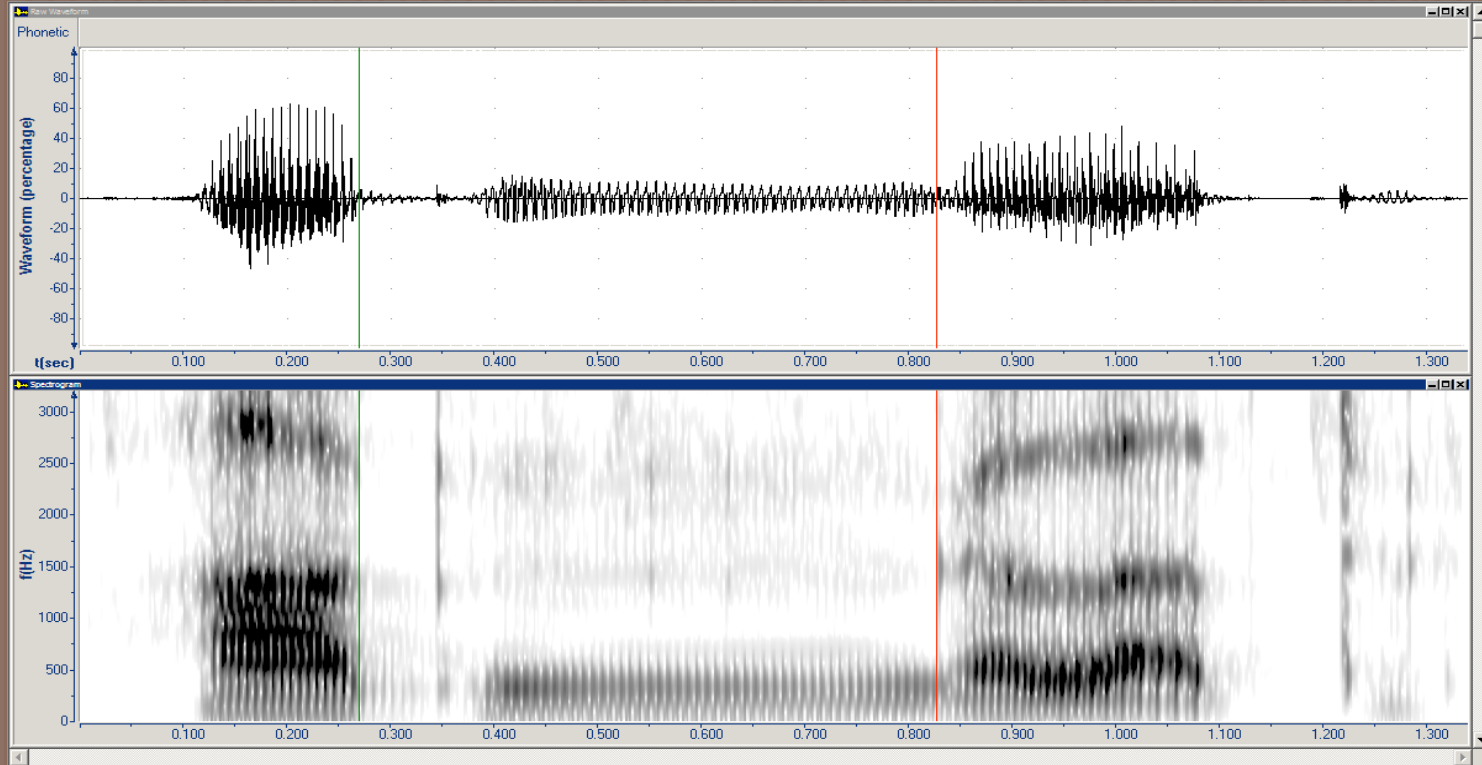
/hãn-latha-wa/

white-S3-Decl

[hãnlathwa]

it is white

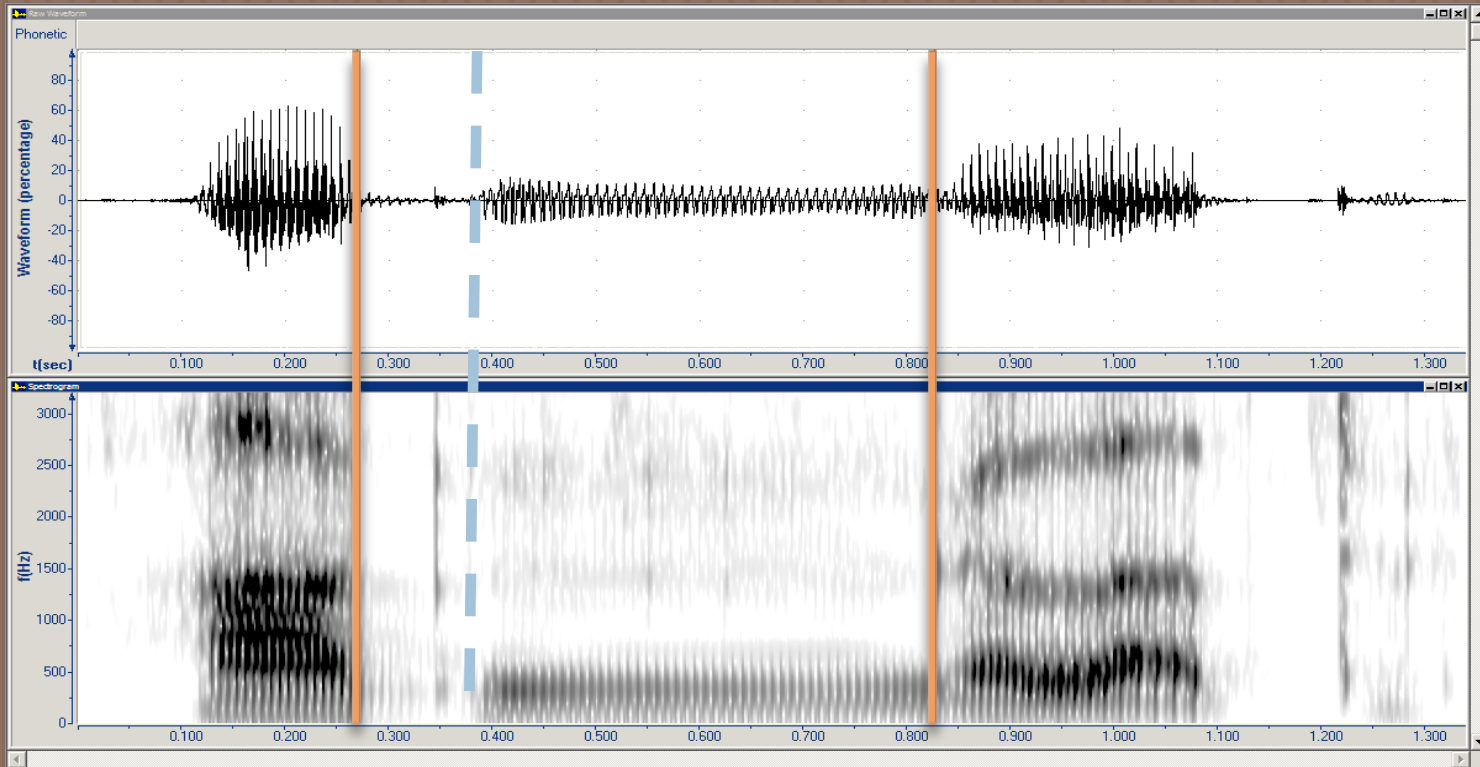
Phonological status: Evidence from phonetics



[a g ŋ g a l a t^h wa]
'It is precious' (emphatic form)

Phonological status:

Listen to the length of the nasal phase -almost 4 times as long as oral phase (note also the gap in the voicing bar - interesting!)



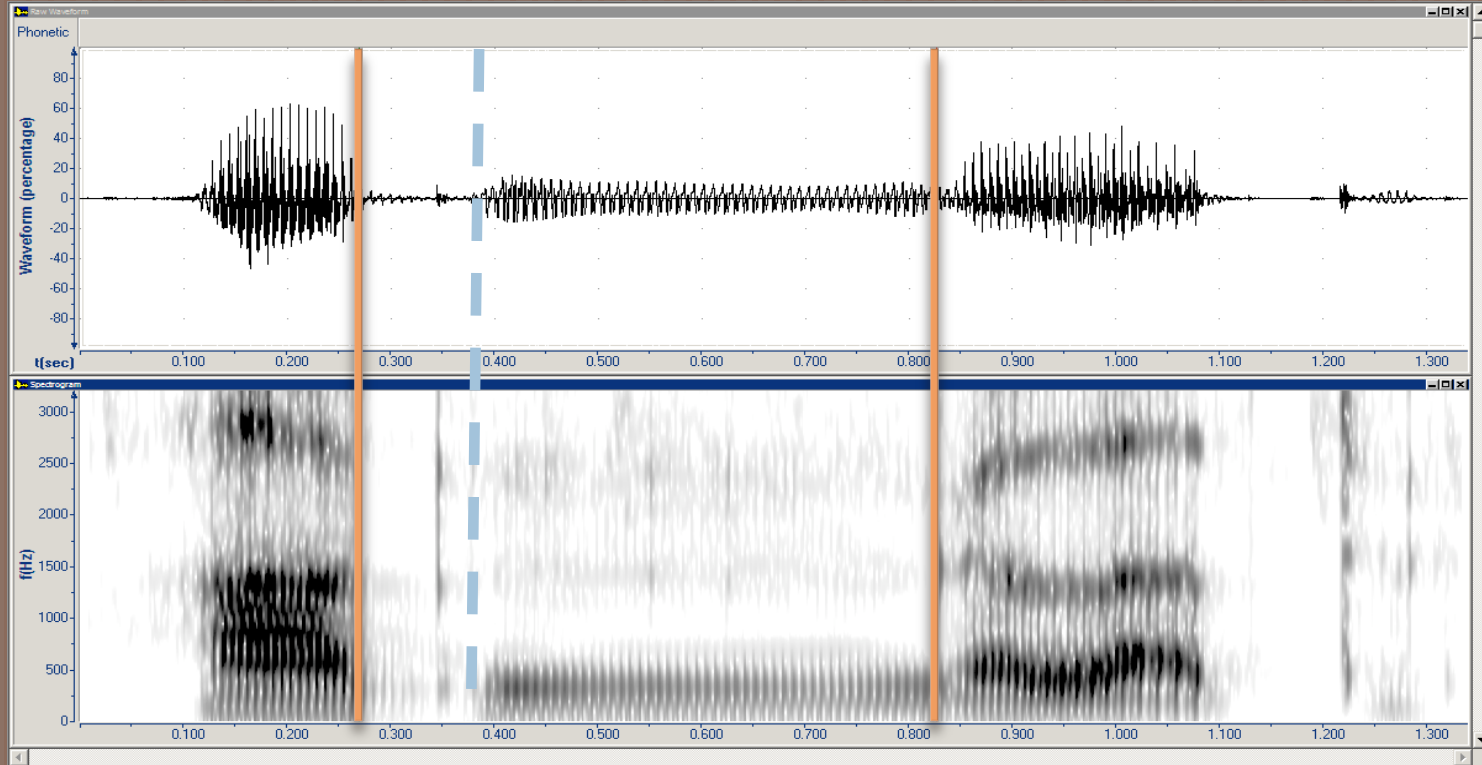
.118 .447ms

[a g ŋ g a l a t^h wa]

‘It is precious’ (emphatic form)




An emphatic that gives us a glimpse of both the language and the culture



.118 .447ms

[a g ŋ g a l a t^h wa]

‘It is precious’ (emphatic form)



We conclude that the nasal phase of these biphasic segments is underlying.

The last task of laying the background to this study is to determine if Nasality is contrastive on vowels....

| | | | |
|-----------------------------|---|--|-----------------------------|
| /nahĩʔ/ | → | [nahĩʔ] | then... |
| /nahiktu/ | → | [nahiktu] | his hand |
| /hũtu/ | → | [hũru] | savannah wolf- (lobo guará) |
| /huktu/ | → | [huktu] | bow |
| /han-lat ^h a-wa/ | → | [ha ^d nlat ^h wa] | it wiggles |
| /hãn-lat ^h a-wa/ | → | [hãnlat ^h wa] | it is white |
| /han-aʔ-wa/ | → | [ha:naʔwa] | it does not wiggle |
| /hãn-aʔ-wa/ | → | [hã:naʔwa] | it is not white |

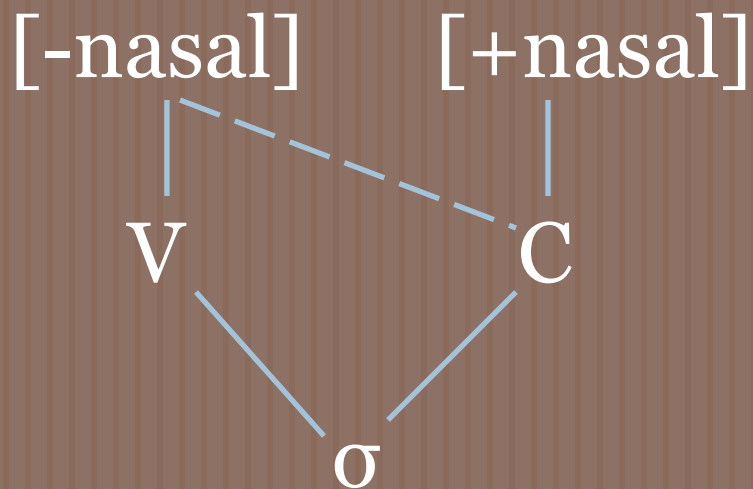
...which as you can see here it is.

Now to account for the oral phase...

There are several plausible ways to account for the partial oralization of nasals. The first one is phonological in nature, and the rest we will look at will be phonetic.

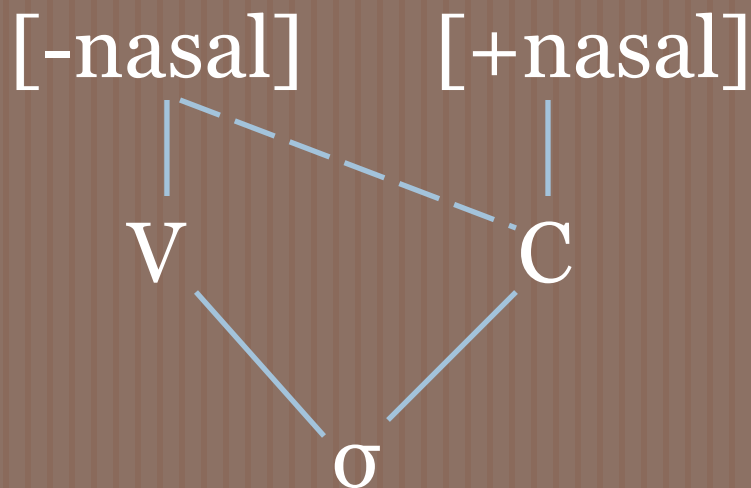
Phonological account: Autosegmental Spreading

ORAL SPREADING RULE



Autosegmental spreading

ORAL SPREADING RULE

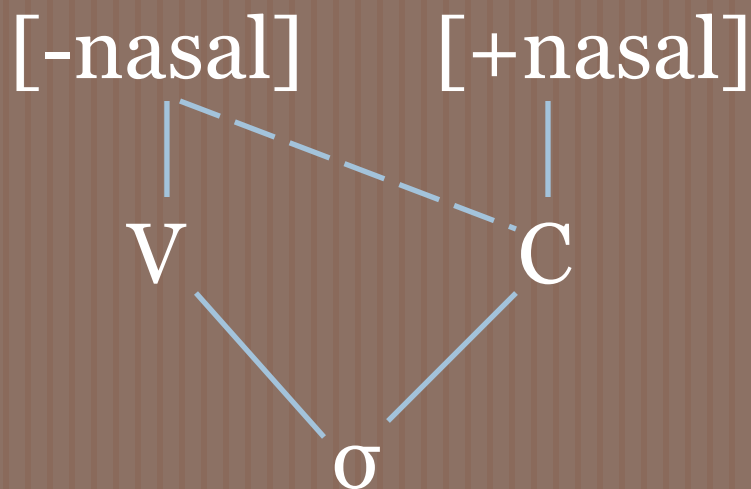


Negative:

Requires binary features for nasality

Autosegmental spreading

ORAL SPREADING RULE



- Numerous linguists (Piggot, Steriade, Kenstowicz, others) have argued against binary features for nasality.
- Feature theory continues to move toward unary features
- We would prefer an alternative analysis if possible...

2 Phonetic Accounts

Both will make use of the ...

Phonetic Enhancement Component
(Keyser and Stevens, 2006)

Component at the interface between phonology and phonetics, where secondary articulatory gestures are added to the signal in order to enhance or make more prominent specific phonological contrasts which are in danger of losing their saliency.

1. Coda Place Enhancement Strategy

Biphasic oral/nasal segments in Southern Central Australian languages (Arabana, Aranda, and WaNgaNuru) as well as in Olgolo, a North Queensland language, exhibit up to 6 contrastive places of articulation.

Keyser and Stevens view the biphasic oral/nasal segments as a result of a phonetic enhancement of the place of articulation of the coda. Specifically, the addition of an oral phase to the coda allows the vowel formants to be unperturbed by nasalization, thus enabling the formant transitions to be distinctive, highlighting the contrast found in the place features of the following coda. Especially helpful in languages with numerous place contrasts (Keyser and Stevens, 2006).

Place features of Mamaindê biphasics are derived - and from previous vowel

[^bm] only following /au/ or /eu/


| | | |
|----------------------------------|--|-------------|
| /kateunta-lat ^h a-wa/ | [ga ¹ deu ^b mdalat ^h wa] | it is alive |
| /waun-lat ^h a-wa/ | [¹ wau ^b m ^l at ^h wa] | it is red |
| /taun-tu/ | [¹ dau ^b mdu] | tail |
| /leunʔ-tu/ | [¹ leu ^b mʔdu] | tapir |

[^gŋ] only following /i/

| | | |
|---------------|--|------------------------|
| /sin-tu/ | [¹ si ^g ŋdu] | meat |
| /jalinʔja-tu/ | [ja ¹ li ^g ŋʔjaru] | puberty flute music |
| /walinʔ-tu/ | [wa ¹ li ^g ŋʔdu] | anteater: type ‘mirĩm’ |
| /wainsi-tu/ | [¹ wai ^g ŋtʃiru] | medicine |

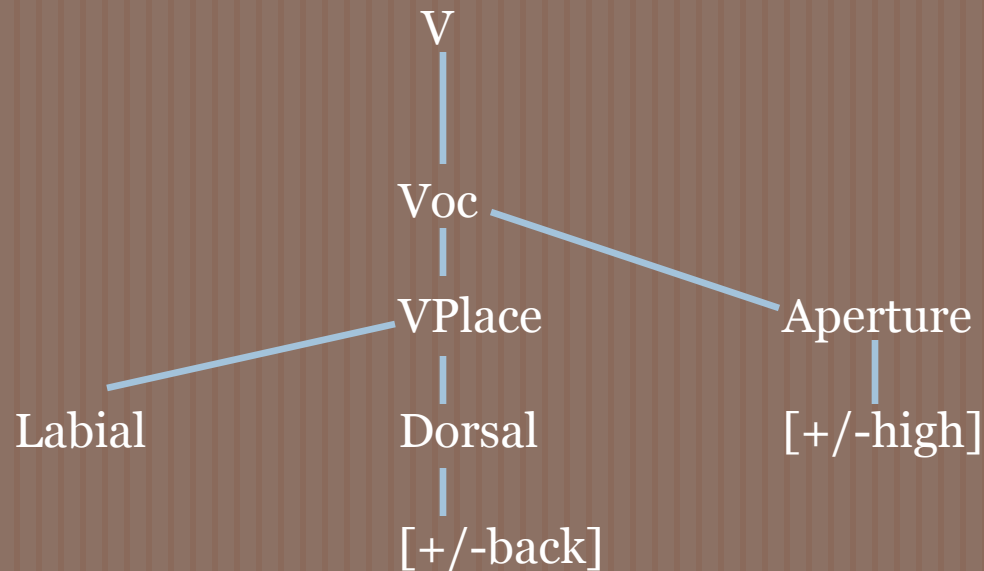
[^dn] only following /a/, /u/, /o/.

| | | |
|-----------------------------|--|----------------|
| /jalakwatun-tu/ | [jalakwa ¹ du ^d ndu] | howler monkey |
| /ʔon-lat ^h a-wa/ | [¹ ʔo ^d nlat ^h wa] | he is lazy |
| /nahon-sa-tu/ | [na ¹ ho ^d nsaru] | sweet beverage |
| /nakajanʔ-tu/ | [naga ¹ ja ^d nʔdu] | person/indian |



Although not on handout, let me very quickly step you thru the major points of this process whereby the coda nasals acquire their place features. This process is actually challenging enough to warrant another paper, and we obviously don't have time for that. So the next few slides will only show the basic highlights of that analysis.

First, it requires a specific Mamaindê vowel feature geometry

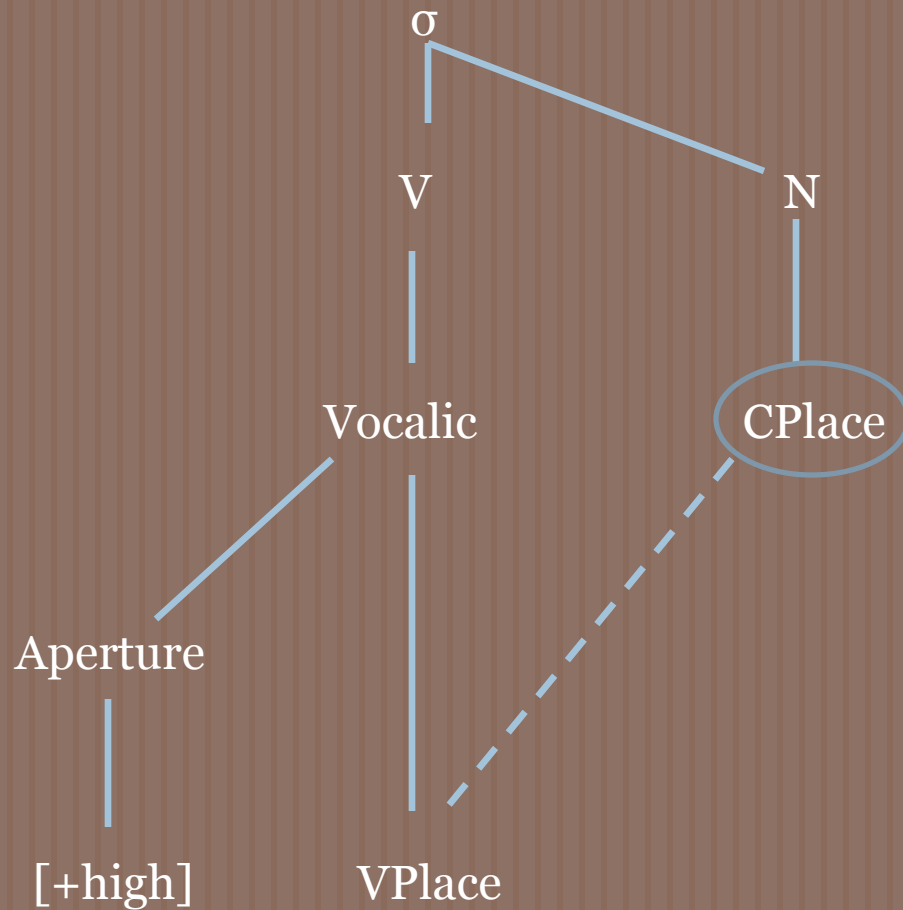


(Note the combination of the Halle/Sagey model and Clements model. I borrow the notion of all vowels as Dorsal from Halle, and the separation of height from place features from Clements. The need for viewing all vowels as Dorsal comes from the fact that the /i/ vowel precedes velar codas that are actually all pre-velars. Thus, Dorsal [-back] links the /i/ vowel and the pre-velar codas)

Secondly, it requires underspecification of Vowel Features:
 (underspecifying the redundant Low feature, and reducing the number of features for the second V place in diphthongs)

| | Dorsal | Labial | Aperture |
|----|--------|--------|----------|
| | [back] | | [high] |
| i | - | | + |
| e | - | | - |
| a | + | | - |
| o | + | X | - |
| u | + | X | + |
| Vu | | X | + |
| Vi | - | | + |

Once vowel features are defined, Vowel Place Spreading is possible.



I'm also assuming here that the Mamaindê nasal coda is underspecified for Place, and will only be filled in as Coronal at end of the phonology.

1. Coda Place Enhancement Strategy



All that to say that Coda Place Enhancement is not applicable to Mamaindê since place features of biphasics are not contrastive in this language.

2. Wetzels VSE and OVE

Wetzels (2008) proposed 2 complementary ways of accounting for biphasic segments in a number of Amazonian languages: Kaingang, Maxacali, Dâw, Yuhup, Mebengokre, Wansajot, Wari, Barasana.

A. Voiced Stop Enhancement (VSE)

When biphasic segments are underlyingly oral, languages may add a nasal phase to these segments for the purpose of enhancing the voicing of the coda consonant. This of course would be useful in languages which exhibit a contrast between voiced and voiceless stops, and in environments where that contrast is in danger of losing its perceptual saliency (such as a coda position) (Wetzels, 2008:9-11).

2. Wetzels VSE and OVE

B. Oral Vowel Enhancement (OVE)

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 a nasal C). (Wetzels, 2008:9-11)

Wetzels 7 Parameters* - to help predict the use of VSE or OVE

| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
|--|---|--|
| | | |
| | | |
| | | |
| | | |
| | | |

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

| | | |
|---|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

* Parameter (c) has been reworded for better clarity.

Parameter B is due to an expectation that enhancement features will not be used as primary contrastive features. Specifically, one would not expect (partial) nasalization to be used as an enhancement feature for voiced obstruents in a system that already uses the nasality as a primary feature to distinguish nasal consonants from oral ones.

Wetzels 7 Parameters*

| | | |
|---|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: is Dorsal the preferred place of articulation? | <i>If so, VSE is predicted.</i> | |
| | | |
| | | |
| | | |
| | | |
| | | |

* Parameter (c) has been reworded for better clarity.

Parameter C – because the necessity for secondary gestures to enhance the primary [voice] feature is greatest for dorsal stops, for which the area between the glottis and the point of constriction is smallest, while it is less urgent for coronals, and least urgent for labials.

Wetzels 7 Parameters*

| | | |
|---|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: is Dorsal the preferred place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: do biphasics prefer the coda? | <i>If so, OVE is predicted.</i> | |
| | | |
| | | |
| | | |

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Wetzels 7 Parameters*

| | | |
|---|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: is Dorsal the preferred place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: do biphasics prefer the coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: do biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| | | |
| | | |

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

| | | |
|---|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: is Dorsal the preferred place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: do biphasics prefer the coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: do biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: do biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| | | |

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

| | | |
|--|---|--|
| a. /OralV/~ /NasalV/: are there contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | |
| b. P/B~M: is there a contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: is Dorsal the preferred place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: do biphasics prefer the coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: do biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: do biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: are simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

* Parameter (e) has been reworded for better clarity.

Wetzels 7 Parameters*

Mamaindê

| | | |
|--|---|---|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | . |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

Mamaindê

| | | |
|--|---|--|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

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Wetzels 7 Parameters*

Mamaindê

| | | |
|--|---|--|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

Mamaindê

| | | |
|--|---|--|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Coda Nasal Place features are derived. Inconclusive. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

* Parameter (c) has been reworded for better clarity.

It's not the case that Mamaindê has 3 contrastive place features in the nasal coda. This parameter in Mamaindê is actually skewed by allophonic variation. As we have already seen, coda nasal place features are derived from the previous vowel, so it is more related to the distribution of the vowels and not the consonants.

Wetzels 7 Parameters*

Mamaindê

| | | |
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| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Coda N Place features derived. Inconclusive. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

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Wetzels 7 Parameters*

Mamaindê

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| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

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Wetzels 7 Parameters*

Mamaindê

| | | |
|--|---|---|
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| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Coda N Place features derived. Inconclusive. |
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| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | Biphasics DO alternate with nasal stops. OVE predicted |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | |

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Wetzels 7 Parameters*

Mamaindê

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| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Coda N Place features derived. Inconclusive. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | Biphasics DO alternate with nasal stops. OVE predicted |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | Simple nasals not limited to syllables with nasal vowels. OVE not excluded. |

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Wetzels' parameters, then, predict
Oral Vowel Enhancement (OVE)
for Mamaindê

Lengthened vowels add further supporting evidence of OVE.

/waan/ 'return' → [waan], but [wadn]*

Note that the biphasic is not employed following lengthened oral vowels. This is to be expected in the OVE account, since the presence of the oral phase of the biphasic is seen as *phonetic* instead of *phonological*. In these forms, the extra length on the vowel adds sufficient enhancement to orality such that the oral phase on the nasal is not necessary. These types of exceptions are virtually impossible to account for in a phonological approach.

Now a look at Wetzels' parameters within the rest of the Nambikwara family.

Wetzels 7 Parameters*

Southern Nambi

| | | |
|--|---|---|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops. VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Place features derived. Inconclusive. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda. OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | Biphasics DO alternate with nasal stops. OVE predicted |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | Simple nasals not limited to syllables with nasal vowels. OVE not excluded. |

(See Kroeker:2001)

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

Southern Nambi

| | | |
|--|---|---|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops. VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Place features derived. Inconclusive. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda. OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | Biphasics DO alternate with nasal stops. OVE predicted |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | Simple nasals not limited to syllables with nasal vowels. OVE not excluded. |

Same as Mamainde

(See Kroeker:2001)

* Parameter (c) has been reworded for better clarity.

Wetzels 7 Parameters*

Latundê/Lakondê

| | | |
|--|---|---|
| a. /OralV/~ /NasalV/: contrastive oral/nasal vowels? | <i>If not, OVE (Oral Vowel Enhancement) is excluded.</i> | DOES have contrastive oral/nasal vowels. OVE not excluded. |
| b. P/B~M: contrast between nasal and non-nasal obstruents? | <i>If so, VSE (Voiced Stop Enhancement) is excluded.</i> | DOES contrast nasal stops from non-nasal stops. VSE excluded. |
| c. g>d>b: Dorsal preference in the place of articulation? | <i>If so, VSE is predicted.</i> | Dorsal biphasic is lacking VSE not predicted. |
| d. [Vbm] vs [mbV]: biphasics prefer coda? | <i>If so, OVE is predicted.</i> | Biphasics ONLY in coda. OVE predicted |
| e. [mb]/[bm] ~ [b]: biphasics alternate with voiced stops? | <i>If so, VSE is predicted.</i> | Biphasics do NOT alternate with voiced stops. VSE not predicted |
| f. [mb]/[bm] ~ [m]: biphasics alternate with nasal stops? | <i>If so, OVE is predicted.</i> | Biphasics DO alternate with nasal stops. OVE predicted |
| g. [NasalV] [NasalC]: simple nasals restricted to syllables with nasal vowels? | <i>If so, OVE is excluded.</i> | Simple nasals not limited to syllables with nasal vowels. OVE not excluded. |

(See Telles:2002)

* Parameter (c) has been reworded for better clarity.

The OVE and the Nambikwara family



For the Nambikwara family as a whole, then, OVE is overwhelmingly the predicted strategy.

These 2 languages also exhibit partial and complete oralization

Latundê (Telles: 2002)

/aun-tan-ti/ [au^bmdãni] ~ [aubdãni] ‘it escaped’
/sin-tãn/ [si^dndãn] ~ [siddãn] ‘it was smoking’

Lakondê (Telles: 2002)

/on-wi-ta-ta/ [o^dn virara] ~ [odvirara] ‘I dont want to eat meat’

Wetzels’ 7 parameters do not deal with complete oralization, but it seems that phonetic accounts should fare better in situations like this where there is a graded or variable expression of an articulatory gesture – something that would be hard to define phonologically, but actually expected phonetically.

One last question: Phonetic Enhancement - Is it one Gesture or two? This question is quite relevant to the Mamaindê data.

Stevens and Keyser (2009) talk of 2 types of enhancement:

Type 1

This type involves a gesture which defines the contrastive feature, *plus* a non-contrastive gesture which is used for the purpose of enhancement. The enhancing gesture is superimposed over the primary gesture, thus requiring these two gestures to be distinct.

Type 2

This type occurs in regions adjacent to the contrastive feature being targeted, and appears to allow for a single gesture to be used for both feature defining and feature enhancing purposes. This is permissible apparently because, according to the authors, certain gestures can have a particular acoustic property on consonants, and a somewhat different acoustic property on vowels.

Mamaindê uses a *single* gesture for both purposes. Thus it employs type 2.

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Type 1

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Type 2

This type occurs in regions adjacent to the contrastive feature being targeted, and appears to allow for a single gesture to be used for both feature defining and feature enhancing purposes. This is permissible apparently because, according to the authors, certain gestures can have a particular acoustic property on consonants, and a somewhat different acoustic property on vowels.

Conclusion:



We have seen that:

1. The biphasic oral/nasal segments in Mamaindê are underlyingly nasal.
2. That an analysis that includes phonetic enhancement of the oral vowels (such as OVE) is most effective in accounting for the oralization of these segments.
3. That Wetzels' parameters can be helpful in diagnosing the type of phonetic enhancement found in this language.

Final Assumption:

Whatever analysis is used for these segments, it must bridge the gap between phonetics and phonology. The OVE does so by referencing enhancement gestures at the phonetic level, and accessing oral/nasal contrasts at the phonological level.

Another way of combining phonetic and phonological info could be by way of OT constraints that encode phonetic detail or articulatory tendencies.

Possible OT account of /sun/ ‘hit’

(where $*V_{\text{ORAL}}N$ prohibits oral vowels before tautosyllabic nasals)

| | /sun/ | MAX-V | $*V_{\text{ORAL}}N$ | MAX-N release | MAX-N murmur | MAX-N closure |
|---|----------------------------------|-------|---------------------|------------------|-----------------|------------------|
| | a.sun | | *! | | | |
| ☞ | b.su ^d n | | | | | * |
| | c.su | | | *! | * | * |
| | d.sũn | *! | | | | |
| | e.sun ^d | | *! | * | | |
| | f.su ^d n ^d | | | *! | | * |
| | g.sud | | | *! | * | * |

(*VoralN has already been attested to in the literature – see Kager, 1999:28)

Possible OT account of /mũn/ ‘good’

(where $*V_{\text{ORAL}}N$ prohibits oral vowels before tautosyllabic nasals)

| | /mũn/ | MAX-V | $*V_{\text{ORAL}}N$ | MAX-N release | MAX-N murmur | MAX-N closure |
|---|---------|-------|---------------------|------------------|-----------------|------------------|
| ☞ | a.mũn | | | | | |
| | b.mũdn | | | | | *! |
| | c.mũ | | | *! | * | * |
| | d.mun | *! | * | | | |
| | e.mudn | *! | | | | * |
| | f.mũdnd | | | *! | | * |
| | g.mũd | | | *! | * | * |

(*VoralN has already been attested to in the literature – see Kager, 1999:28)

Final Assumption:



Mamaindê biphasics assume an interface between phonetics and phonology that is transparent enough that crucial information is allowed to cross over between the two.

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