Denis BERTET — Phorum, UC Berkeley — April 30, 2018

What exactly is the phonological feature [nasality] in Ticuna (isolate, Western Amazonia)?

Special thanks!

Javier Sánchez Gregorio and Loida Ángel Ruiz (San Martín de Amacayacu, Colombia)

Myriam Lapierre, Amalia Skilton, Lev Michael (UC Berkeley)

Ana María Ospina (Universidad Nacional de Colombia)

Antoine Guillaume (DDL, Lyon 2)

Main question

What ***phonological* analysis** would best account for the ***surface* configuration of nasality** in Ticuna?

[a] [ba] [pa] *[ma]

[ã] *[bã] *[pã] [mã]

Specifically:

- is nasality a phonological property of V, C, or σ?
- what rules govern how nasality surfaces in the final output?

Main claim

A number of possible unsatisfactory phonological analyses

One I find much preferable:

- **[nasal] is a lexical, privative feature of σ**
- **[nasal] is linked to the first segment of σ**
- **[nasal] nasalizes the latter if it is a target segment (*i.e.* V and voiced C); otherwise [nasal] is left unrealized**
- **phonetic nasality spreads to the right of [nasal]-bearing nasalized segments up to any C (all C are opaque to phonetic nasality spreading)**

Happens to correspond exactly to the analysis implied by my supposedly pre-analytical, practical transcription system…

1. Introduction to data and language

2. Structure of the SMAT syllable

3. Nasality as a phonological property of segments?

4. Nasality as a phonological property of syllables?

5. A revised version of nasality as a property of syllables

6. Two elaborations

7. Conclusions

1. Introduction to data and language

Data

Fieldwork (2015-2017, PhD project, supervisor: Antoine GUILLAUME, DDL research center & Université Lumière–Lyon 2, ASLAN Labex)

San Martín de Amacayacu Ticuna (SMAT; Colombia)

Language

Ticuna ≈50,000~60,000 speakers (Peru, Colombia, Brazil), vital as a whole

SMA Ticuna ≈550 speakers

Isolate (or Yuri-Ticuna?: Carvalho 2009, Goulard & Montes 2013)

Language

Goulard (2009)

2. Structure of the SMAT syllable

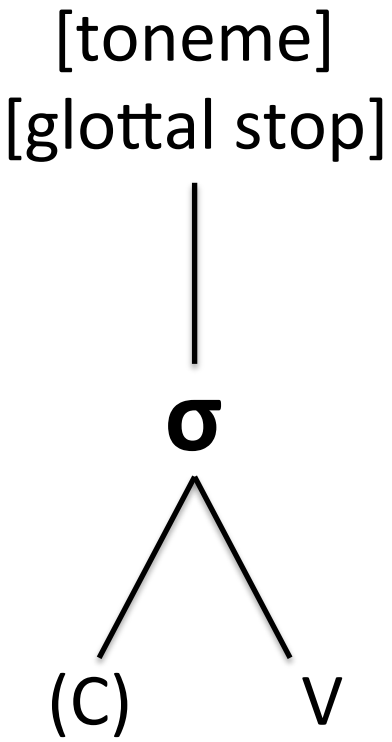
2 major types of syllables

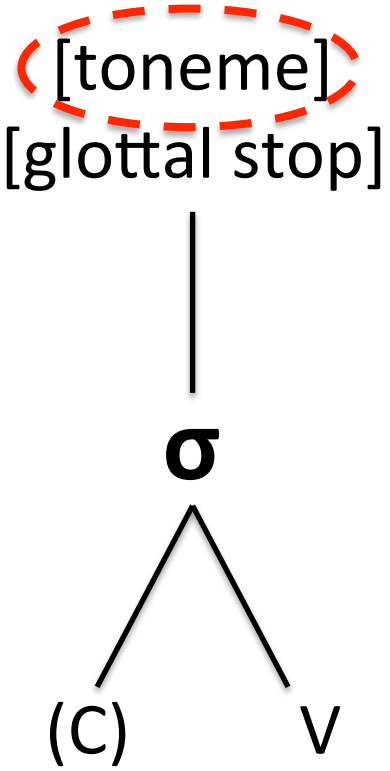
Stressed σ́ *vs* unstressed σ

Stress is demarcative (*i.e.* not distinctive); automatically on first syllable of stressed syntactic words

Among other differences, poorer C, V, and tone inventories in σ

N.B.: here we will discuss mostly σ́ (unless stated otherwise)

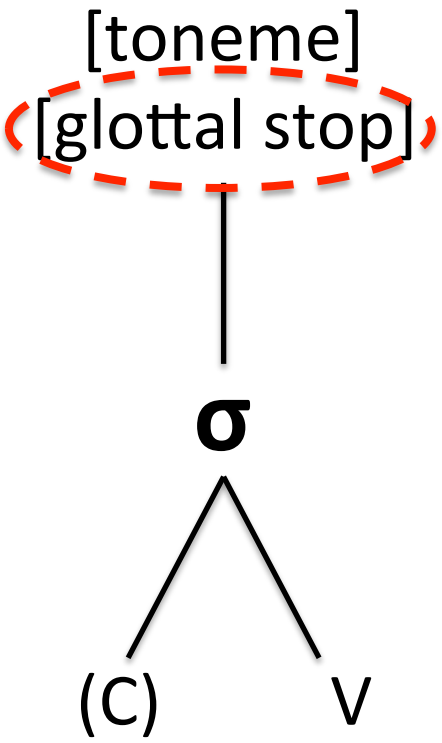

[toneme]
[glottal stop]
σ
(C)
V



Obligatorily filled in non-epenthetic syllables; mostly lexically determined

Roughly speaking, 10 possible values in ́; makes use mostly of pitch, but also phonation

Strictly orthogonal to nasality
=> irrelevant for today's discussion

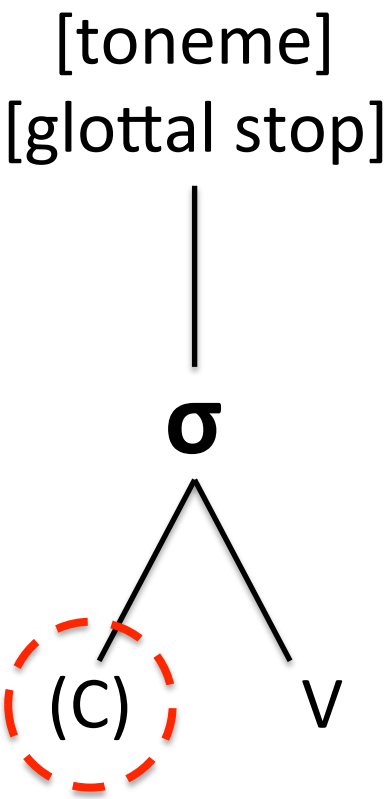


Presence (*vs* Ø) lexically determined

Realized as coda [ʔ] (often brings about an epenthetic syllable)
N.B.: ≠ word-initial non-phonological [ʔ]

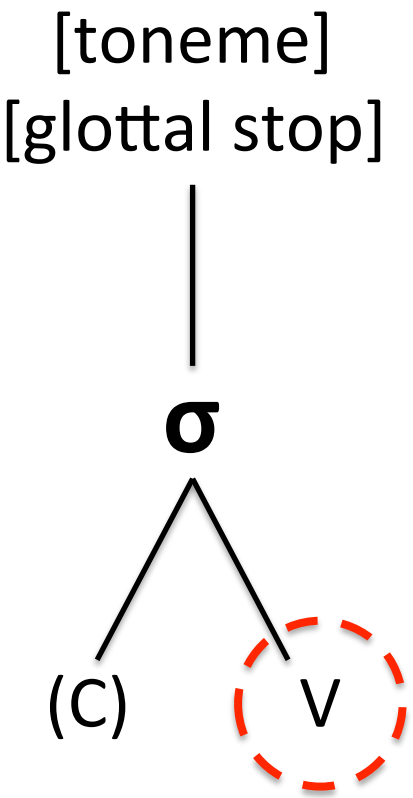
Better analyzed as a feature of σ than as a coda C

Strictly orthogonal to nasality
=> irrelevant for today's discussion



p	t		k	k^w(~ʍ)	ʔ
		t͡ɕ			
b	d		g		
		d͡ʑ			
m	n	ɲ	ŋ		
				w	
				w̃	

N.B.: ***phones*** *(~~phonemes~~); very slightly simplified*



i	ɯ	u
ɐ̟		o̟
aɪ̯	a	aʊ̯
ĩ	ɯ̃	ũ
ɐ̟̃		õ̟
ãɪ̯̃	ã	ãʊ̯̃

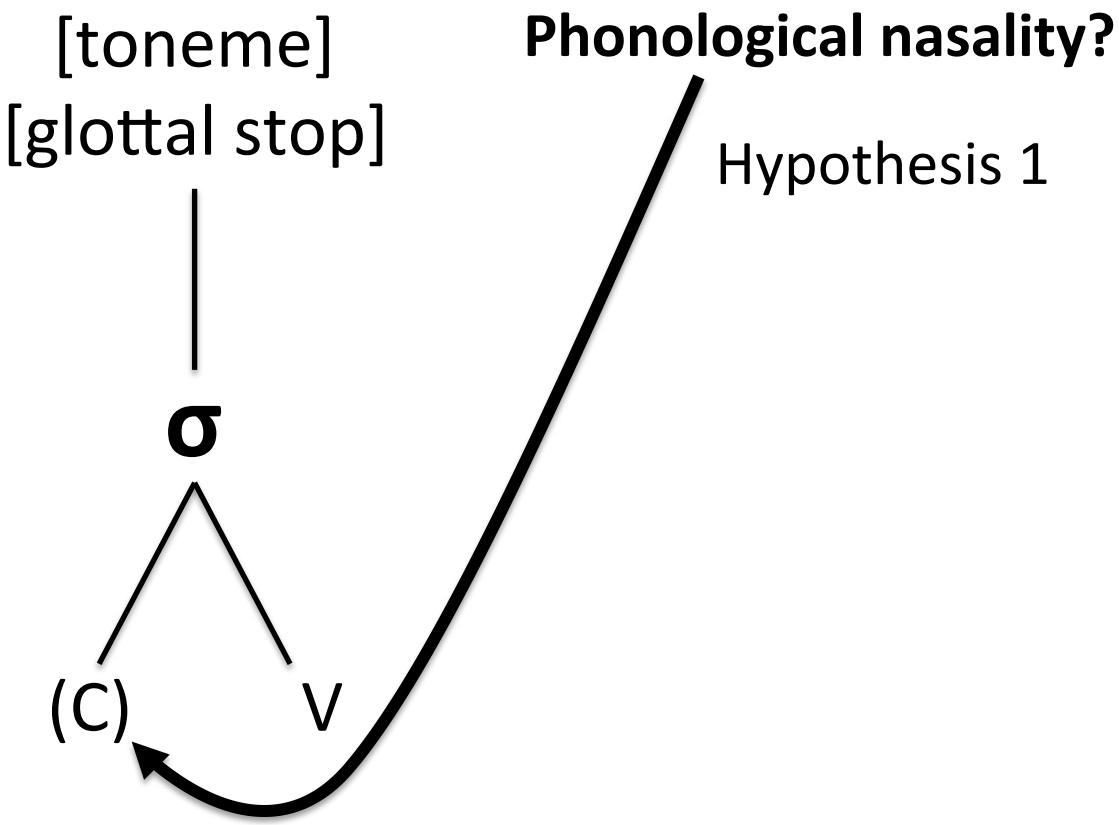
N.B.: ***phones*** *(~~phonemes~~); very slightly simplified*

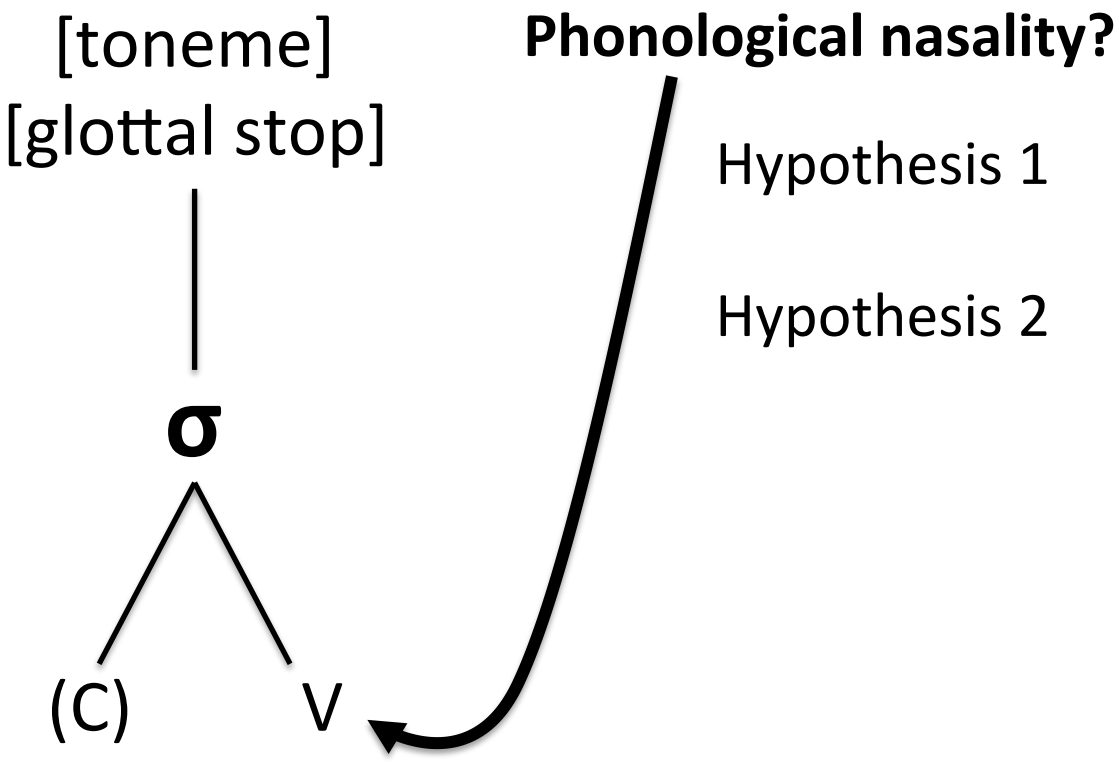
N.B.: ***phones*** *(~~phonemes~~); very slightly simplified*

p	t	t͡ɕ	k	kʷ (~ʍ)	ʔ	[-voice]	[-nasal]
b	d	d͡ʑ	g	w		[+voice]	[-nasal]
m	n	ɲ	ŋ	w̃		[+voice]	[+nasal]

i	ɯ	u	
ẹ	ọ		[-nasal]
a̯ɪ	a	aʊ̯	

ĩ	ɯ̃	ũ	
ẹ̃	ọ̃		[+nasal]
ã̯ĩ	ã	ãʊ̯̃	


[toneme]
[glottal stop]
σ
(C)
V
Phonological nasality?
Hypothesis 1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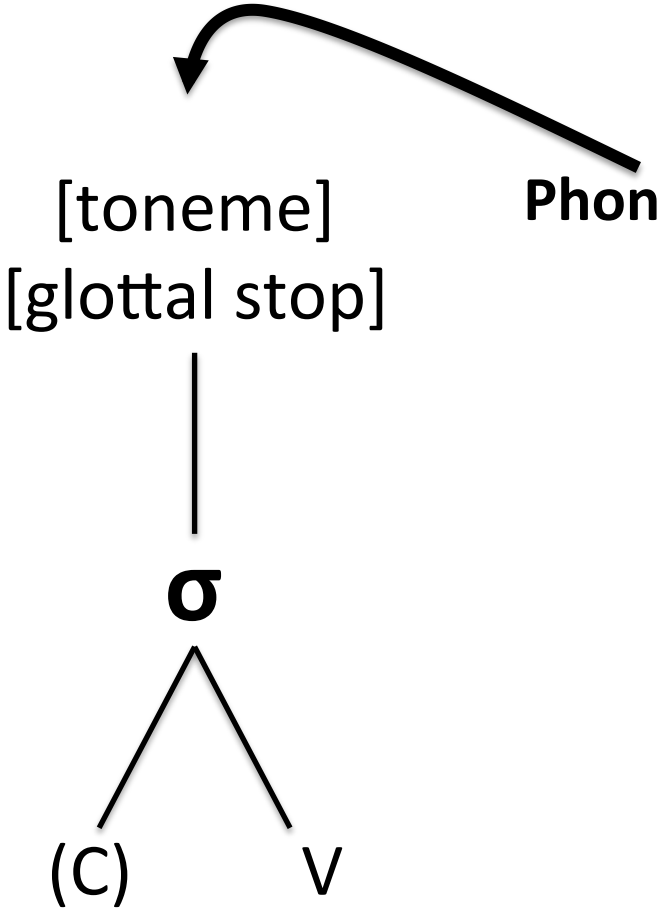
Hypothesis 2



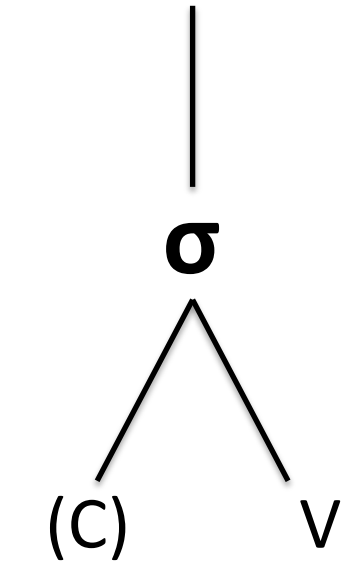
Phonological nasality?

Hypothesis 1

Hypothesis 2

Hypothesis 3

3. Nasality as a phonological property of segments?



Hypothesis 1

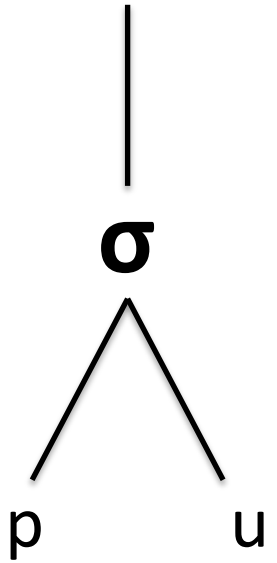
C = $C_{[-voice][-nasal]}$ *e.g.* /p/
$C_{[+voice][-nasal]}$ /b/
$C_{[+voice][+nasal]}$ /m/

V = V /u/

[toneme ^{31}]
~~[glottal stop]~~

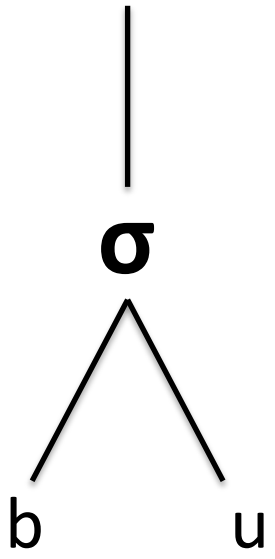
[pu^{31}]

‘to get used to’



[toneme ^{31}]

~~[glottal stop]~~

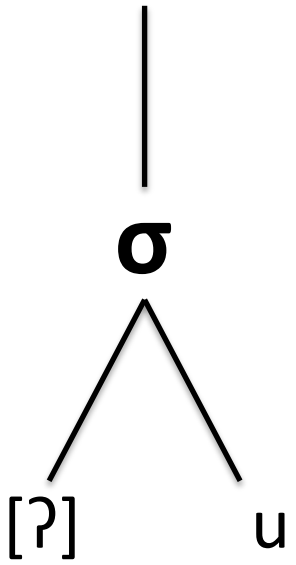


[pu^{31}] /pu^{31}/ ‘to get used to’

[bu^{31}] ‘to be born’

[toneme ^{31}]

~~[glottal stop]~~



[pu^{31}] /pu^{31}/ ‘to get used to’

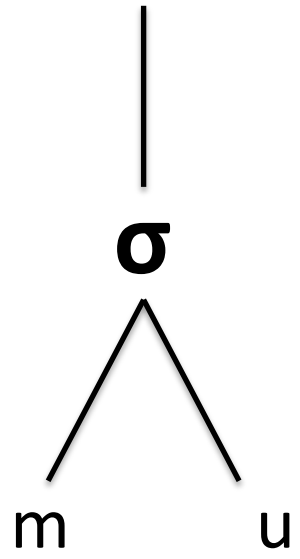
[bu^{31}] /bu^{31}/ ‘to be born’

[ʔu^{31}] ‘to touch’

(*[u] in stressed σ)

[toneme ^{31}]

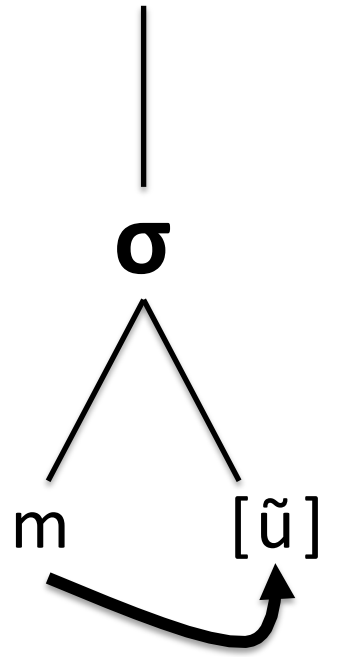
~~[glottal stop]~~



[pu^{31}]	/pu^{31}/	‘to get used to’
[bu^{31}]	/bu^{31}/	‘to be born’
[ʔu^{31}]	/u^{31}/	‘to touch’
[mũ^{31}]		‘to harpoon’

[toneme ^{31}]

~~[glottal stop]~~



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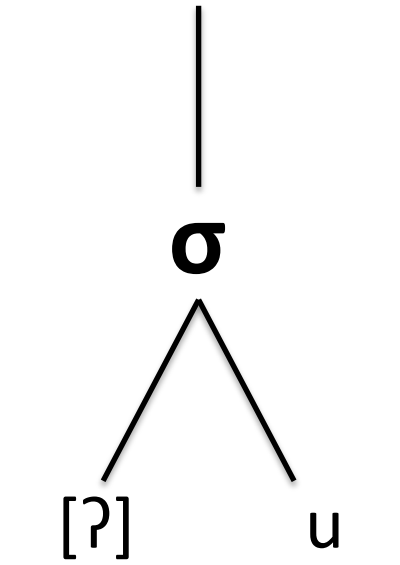

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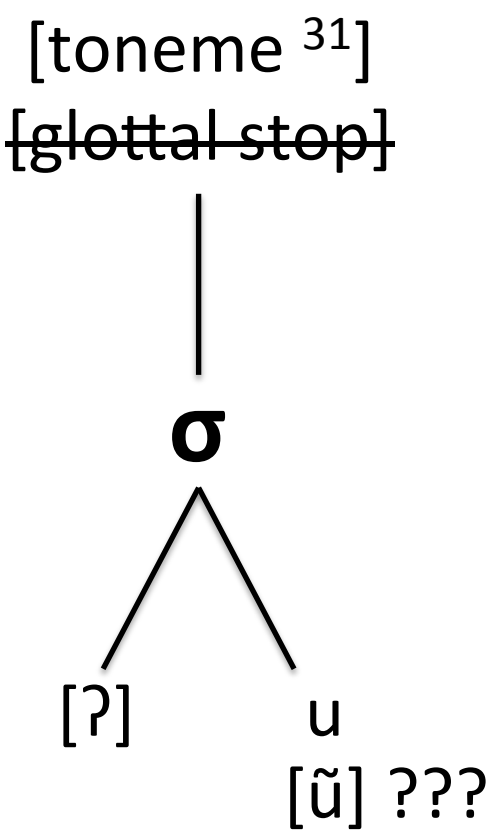
[ʔũ^{31}]		‘to go.IT2’



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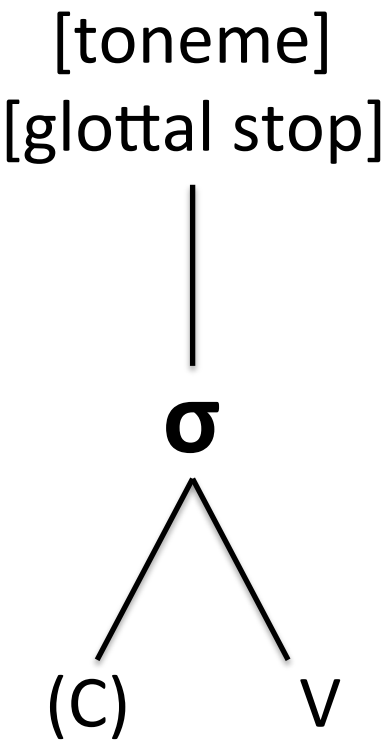

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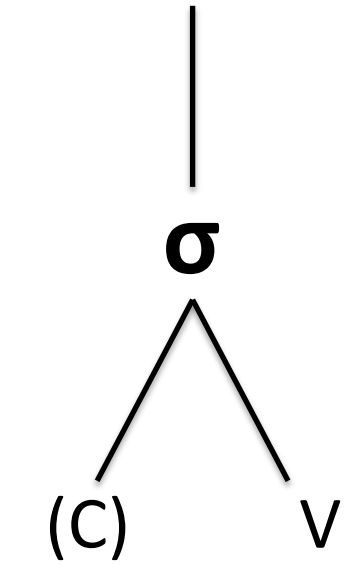
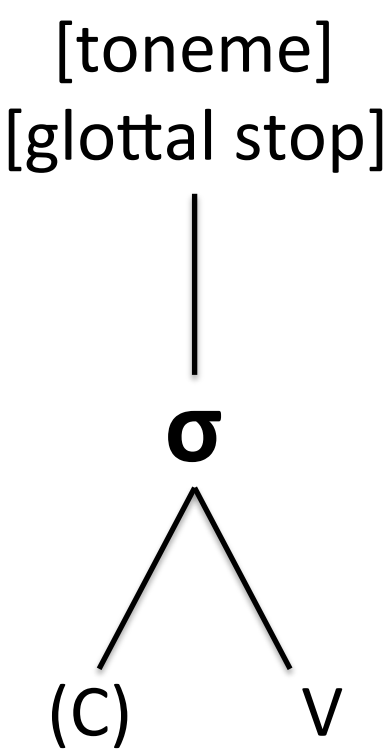


Hypothesis 2

C = $C_{[-voice]}$ $C_{[+voice]}$ *e.g.* /p/ /b/

V = $V_{[-nasal]}$ $V_{[+nasal]}$ /u/ /ũ/



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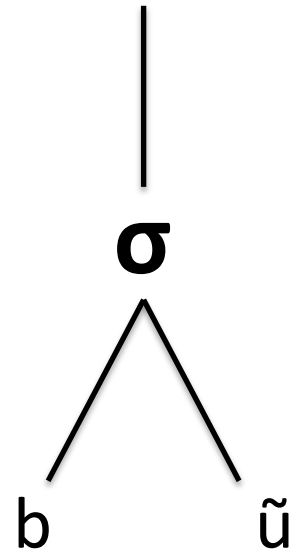
[toneme ^{31}]

~~[glottal stop]~~



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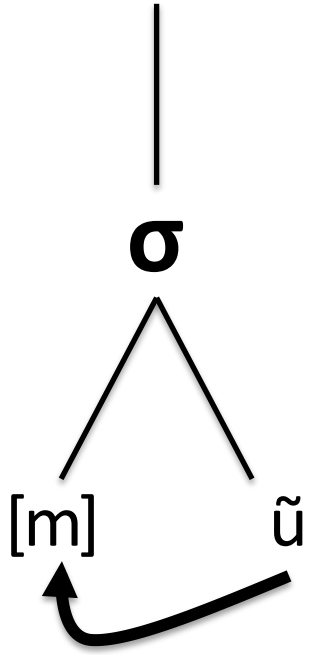

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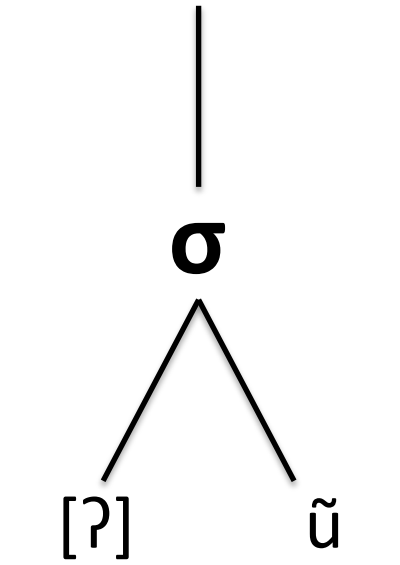

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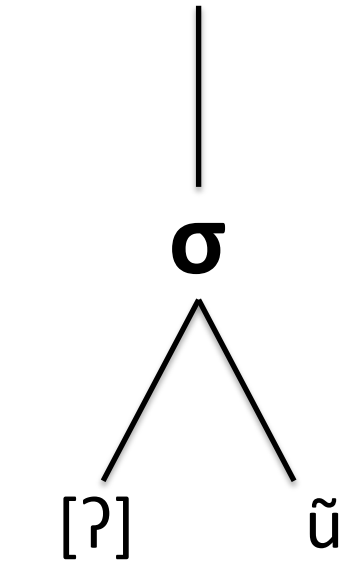

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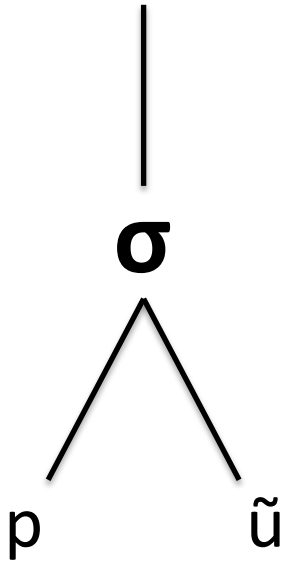
[toneme ^{31}]

~~[glottal stop]~~



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	/pũ/ ?	
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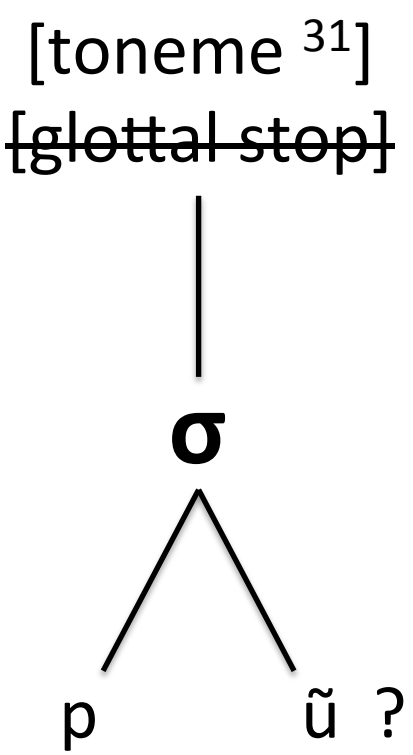

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Why doesn't expected /pũ/ surface as *[pũ]?

3 sub-hypotheses

[-voice] and [+nasal] incompatibility in the first place

$C_{[-voice]}$ and $V_{[+nasal]}$ incompatible *e.g.* /p/ + /ũ/ ***

Nasalization of [-voice] consonants

$C_{[-voice]} \rightarrow [C_{[+voice][+nasal]}] / \_V_{[+nasal]}$ *e.g.* /pũ/ → [mũ]

Denasalization of [+nasal] vowels

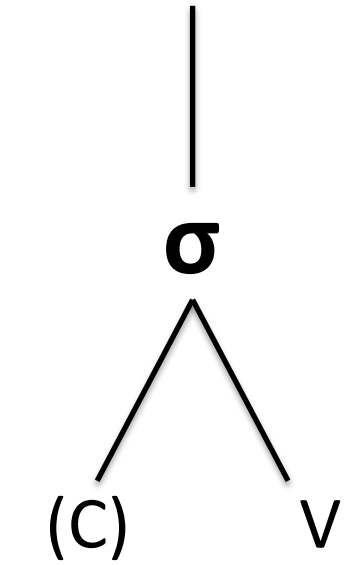
$V_{[+nasal]} \rightarrow [V_{[-nasal]}] / C_{[-voice]}\_$ *e.g.* /pũ/ → [pu]

Why doesn't expected /pũ/ surface as *[pũ]?

N.B.: morphological or morphophonological processes cannot tell us anything (stressed syllables' shape is 100% lexical apart from [toneme] and [glottal stop])

⇒ no way to test whether specific cases of [pu] or [mũ] are indeed this hypothetical /pũ/ underlyingly (instead of merely /pu/ and /bũ/ respectively)

⇒ no way to test for any of these 3 (typologically unconvincing) sub-hypotheses

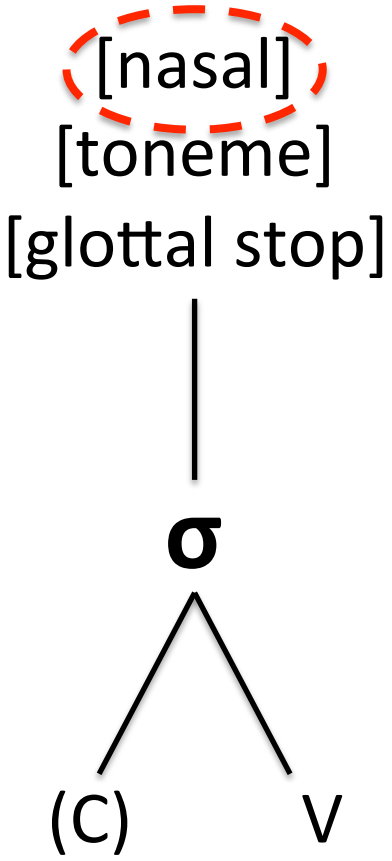


Hypothesis 2

C = $C_{[-voice]}$ *e.g.* /p/
$C_{[+voice]}$ /b/

V = $V_{[-nasal]}$ /u/
$V_{[+nasal]}$ /ũ/

4. Nasality as a phonological property of syllables?



Hypothesis 3

C = $C_{[-voice]}$ *e.g.* /p/
$C_{[+voice]}$ /b/

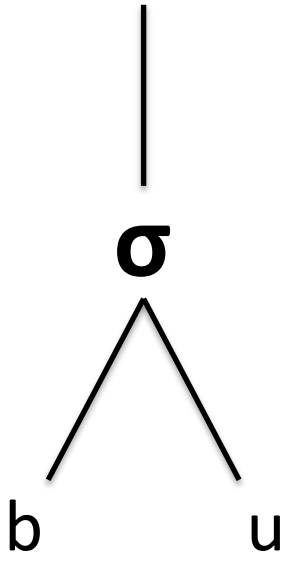
V = V /u/

[nasal] links to all of the domain's (=σ) segments

~~[nasal]~~

[toneme ^{31}]

~~[glottal stop]~~



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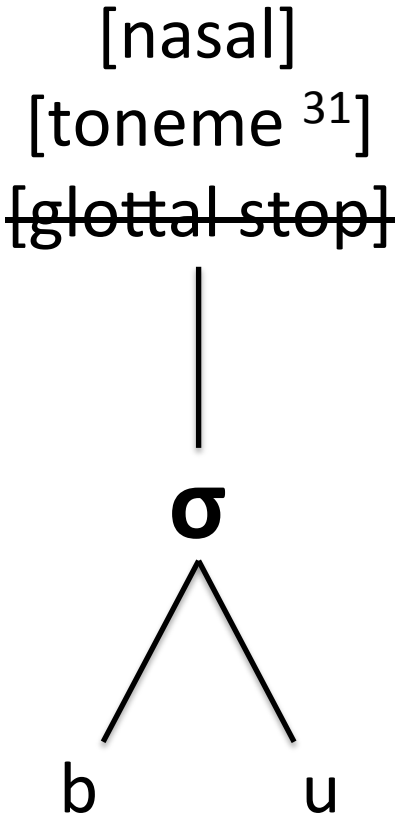

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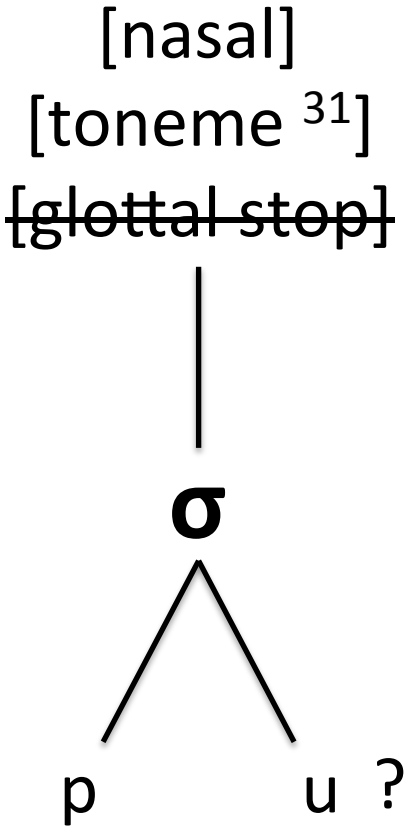

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(*[pũ])	/pũ/ ?	
[mũ^{31}]	/bu^{31}[nasal]/	‘to harpoon’
[ʔũ^{31}]	/ũ^{31}[nasal]/	‘to go.IT2’

Same problem: why is /pu[nasal]/ not *[pũ]?

3 sub-hypotheses

[-voice] and syllabic [nasal] incompatibility in the first place

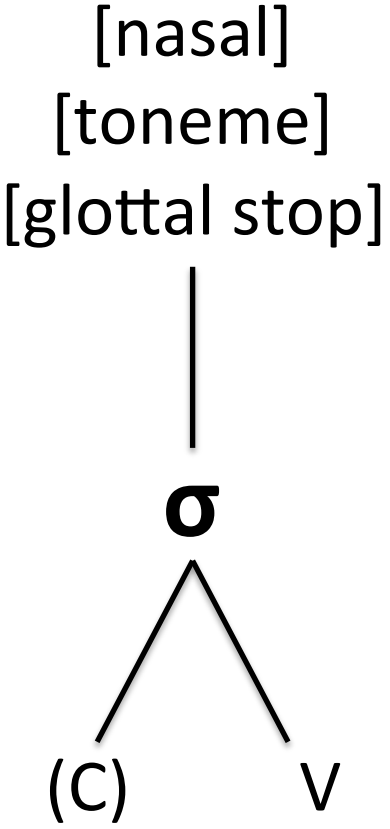
$C_{[-voice]}$ and [nasal] incompatible *e.g.* /p/ + [nasal] ***

Nasalization of [-voice] consonants

$C_{[-voice]} \rightarrow [C_{[+voice][+nasal]}] / \sigma[nasal]$ *e.g.* /pu[nasal]/ → [mũ]

No nasalization of vowels

$V \rightarrow [V_{[-nasal]}] / C_{[-voice]}\_[nasal]$ *e.g.* /pu[nasal]/ → [pu]

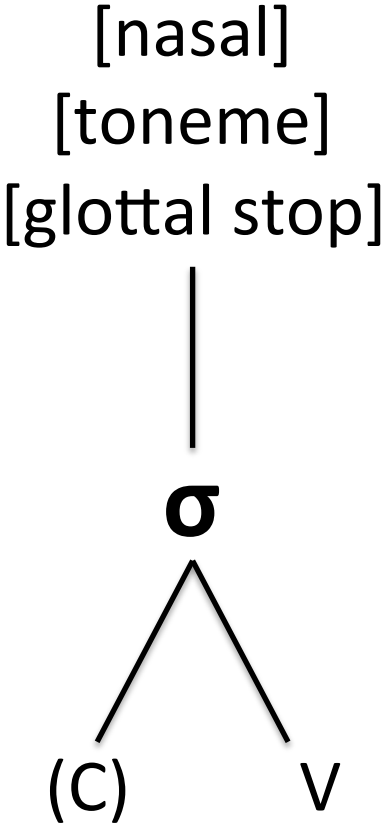


Hypothesis 3

C = $C_{[-voice]}$ / $C_{[+voice]}$ *e.g.* /p/ /b/

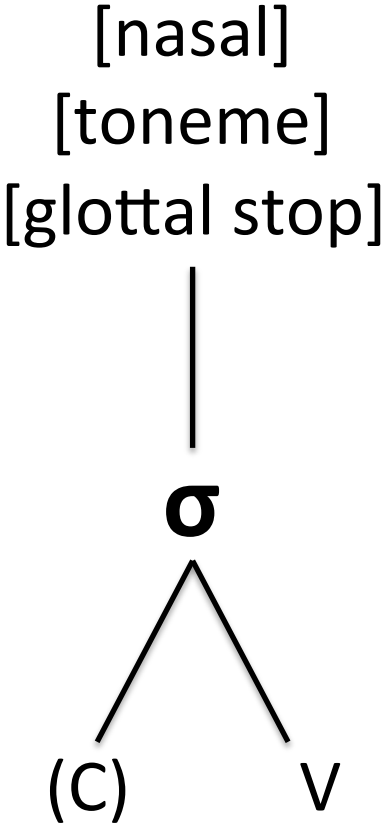
V = V /u/

[nasal] links to all of the domain's (=σ) segments



Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

- [nasal] is **left-aligned** and links rightwards to all segments up to next opaque segment
- /b/ is **target** of [nasal]
- /u/ is **target** of [nasal]
- /p/ is **opaque** to [nasal]

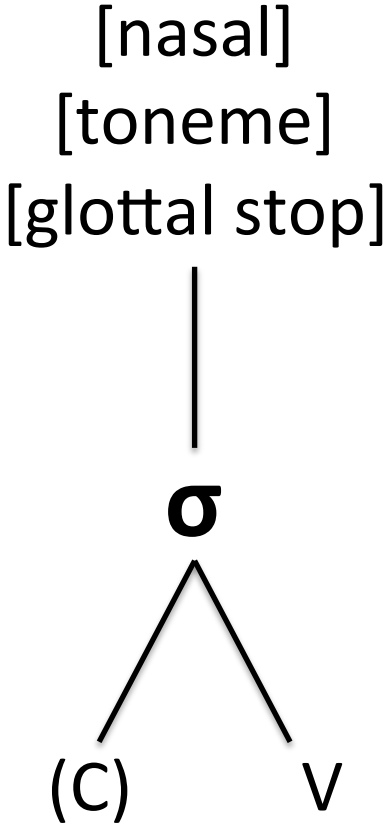


Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

/bu[nasal]/

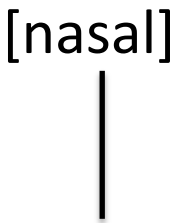
[nasal]

b u

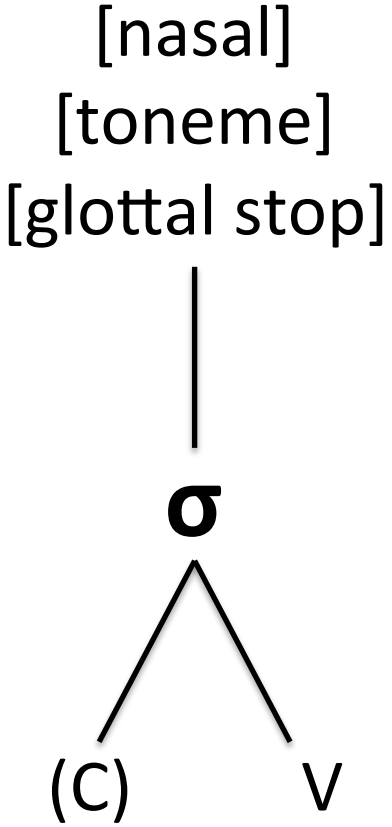


Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

/bu[nasal]/

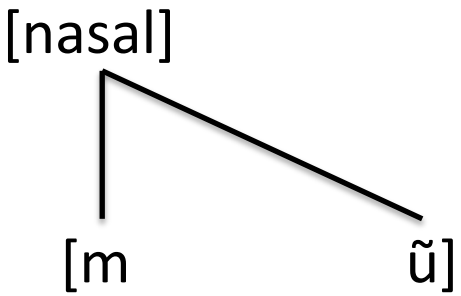


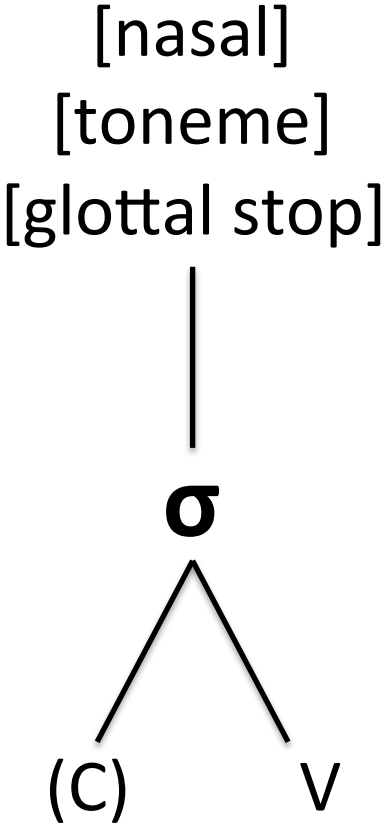
u



Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

/bu[nasal]/



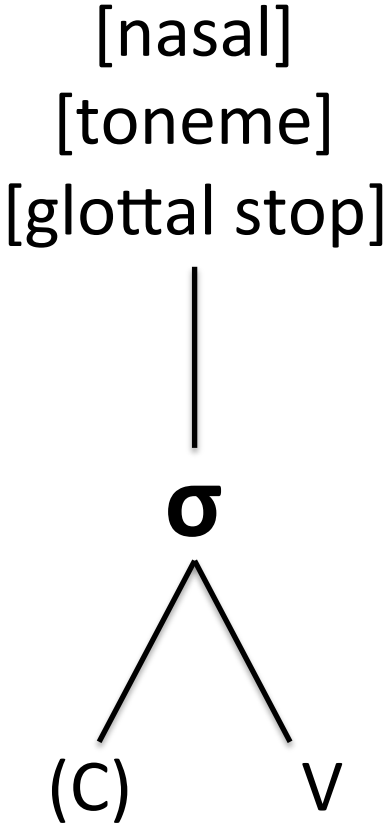


Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

/pu[nasal]/

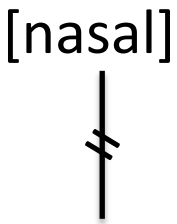
[nasal]

p u



Another sub-hypothesis to allow /pu[nasal]/ while *[pũ]:

/pu[nasal]/



[p u] (hence *[pũ])

BUT

Nasality does indeed spread to the right across syllables and morphemes as a regular process, but **only if next σ has no onset (all onsets are opaque to nasality spreading)**

BUT

[mũ^{31}] ‘to harpoon’ [-ę̃$^{1/4}$ru^{4}] ‘head’

[ˈmũː^{31}ę̃^{1}ru^{4}] ‘to harpoon smth in the head’

x

b u e

[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-ę̰$^{1/4}$ru^{4}] ‘head’

[ˈmũː^{31}ę̃^{1}ru^{4}] ‘to harpoon smth in the head’

[m] u e

|

[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-ę̃$^{1/4}$ru^{4}] ‘head’

[ˈmũː^{31}ę̃^{1}ru^{4}] ‘to harpoon smth in the head’

x

[m ũ] e

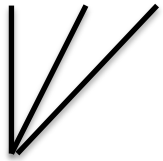
[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-ę̃$^{1/4}$ru^{4}] ‘head’

[ˈmũː^{31}ę̃^{1}ru^{4}] ‘to harpoon smth in the head’

[m ũ ẽ]



[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-**bę̣**^{1}ra^{1}] ‘lip’

[ˈmũː^{31}**bę̣**^{1}ra^{1}] ‘to harpoon smth in the lips’ (*[ˈmũː^{31}**mę̃**^{1}ra^{1}])

BUT

[mũ^{31}] ‘to harpoon’ [-**bẹ̃**^{1}ra^{1}] ‘lip’

[ˈmũː^{31}**bẹ̃**^{1}ra^{1}] ‘to harpoon smth in the lips’ (*[ˈmũː^{31}**mẹ̃**^{1}ra^{1}])

x

b u b

[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-**bę̣**^{1}ra^{1}] ‘lip’

[ˈmũː^{31}**bę̣**^{1}ra^{1}] ‘to harpoon smth in the lips’ (*[ˈmũː^{31}**mę̃**^{1}ra^{1}])

x

[m] u b

[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-**bę̣**^{1}ra^{1}] ‘lip’

[ˈmũː^{31}**bę̣**^{1}ra^{1}] ‘to harpoon smth in the lips’ (*[ˈmũː^{31}**mę̃**^{1}ra^{1}])

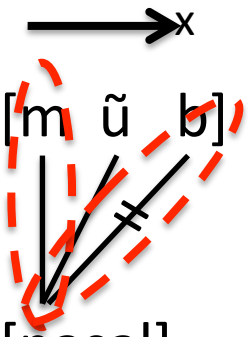
[m ũ] b

[nasal]

BUT

[mũ^{31}] ‘to harpoon’ [-**bẹ̃**^{1}ra^{1}] ‘lip’

[ˈmũː^{31}**bẹ̃**^{1}ra^{1}] ‘to harpoon smth in the lips’ (*[ˈmũː^{31}**mẽ**^{1}ra^{1}])

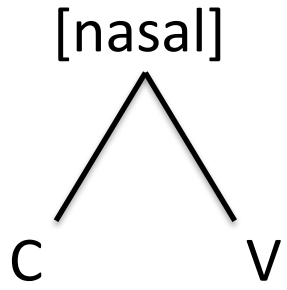


BUT

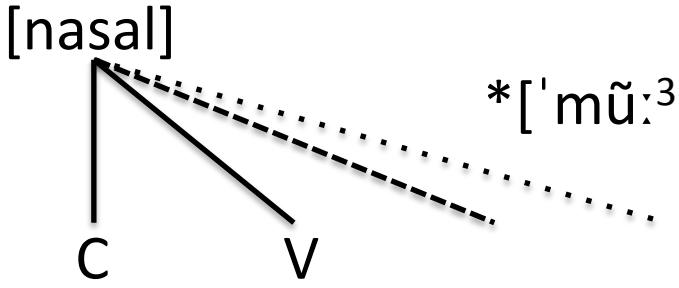
If syllabic [nasal] is left-aligned and links to next segments to the right, then:

- why is /b/ *target* (→ [m]) in the syllable [nasal] belongs to,
- BUT *opaque* in next syllables, even if part of the same morpheme (while [nasal] *does* link across syllables if no onset in following syllable)?

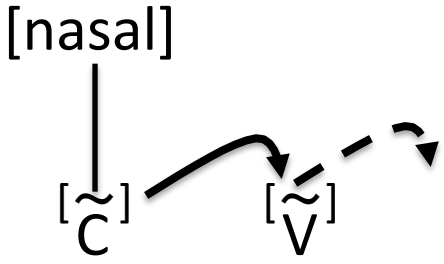
5. A revised version of nasality as a property of syllables



*[pũ]



*[ˈmũː^{31}mę̃^{1}ra^{1}] (from [-bę^{1}ra^{1}])



Two ≠ processes with ≠ rules:
[nasal] linking ≠ nasality spreading

Process A: [nasal] linking

[nasal] links to the first segment in the syllable

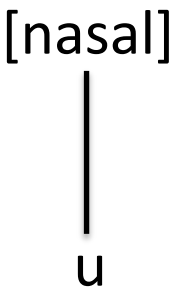
/p/ is not target (transparent/opaque) → [p]
/b/ is target → [m]
/V/ is target → [Ṽ]

Process B: nasality spreading

Obtaining phonetic nasality (if any) spreads rightwards until next C (all C are opaque to spreading)

(in some (Brazilian?) Ticuna varieties, obtaining phonetic nasality also seems to spread to the left until next C; see among others "TCA-19910303-AB-BRZ-llivre" from The Language Archive: https://arqling.museu-goeldi.br/corpora/a-z/Ticuna-TCA/Elicitacao-lexico/Metadata/TCA-19910303-AB-BRZ-llivre.imdi)

A: linking

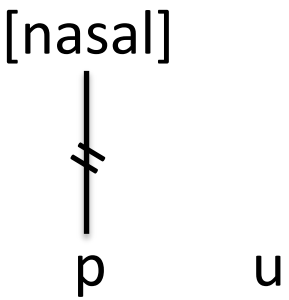


/u[nasal]/ → [ũ]

B: spreading

(towards immediately following V if any)

A: linking

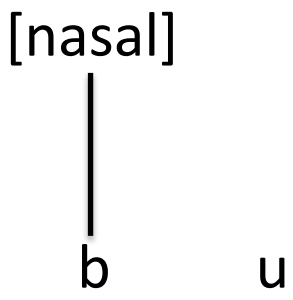


/pu[nasal]/ → [pu]

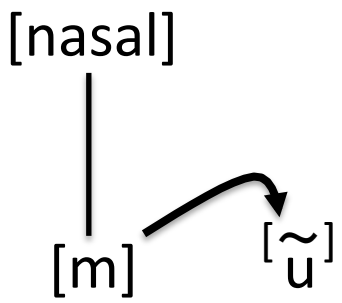
B: spreading

(none)

A: linking

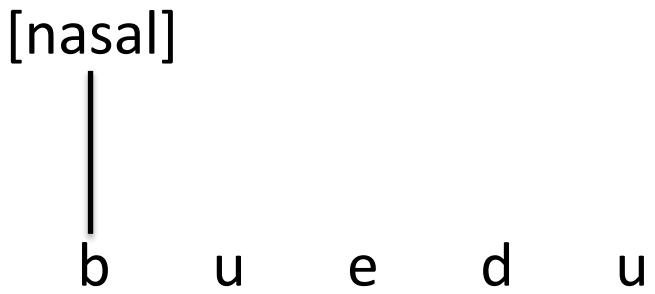


B: spreading

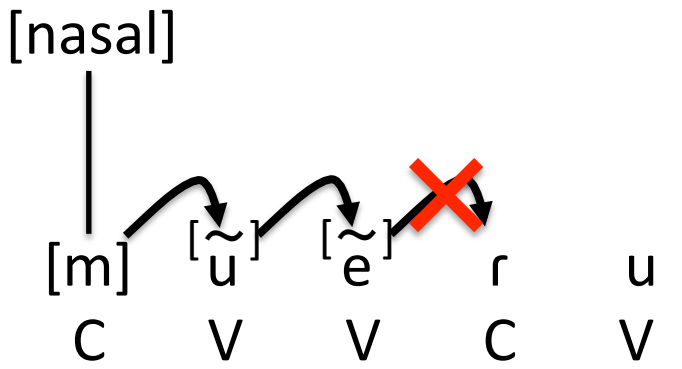


/bu[nasal]/ → [mũ]

A: linking

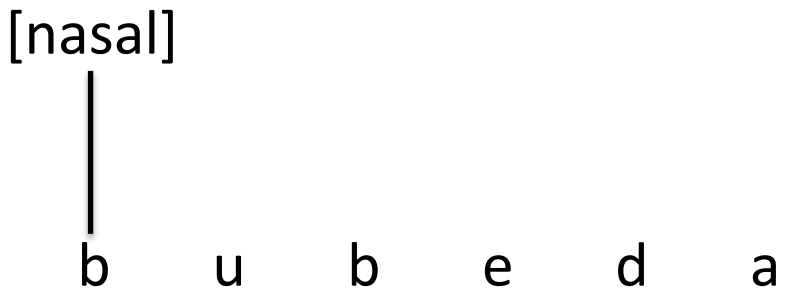


B: spreading

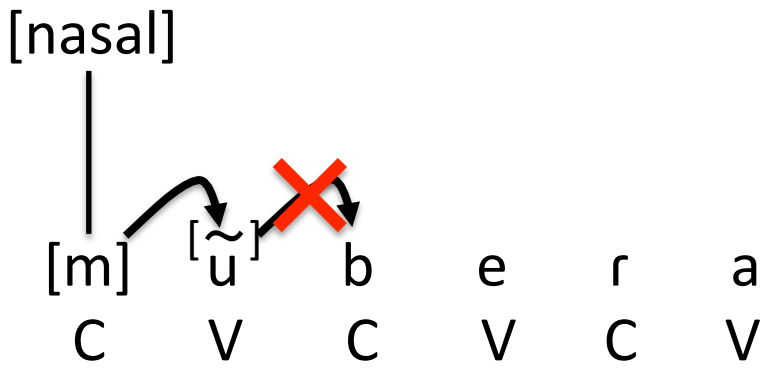


/mu^{31}e^{1}du^{4}/ → [ˈmũː^{31}ẽ^{1}ru^{4}]

A: linking



B: spreading



/mu^{31}be^{1}da^{1}/ → [ˈmũː^{31}bẹ^{1}ra^{1}]

6. Two elaborations

Phonological nasality is a privative feature (Ø *vs* [nasal])

Lexically non-[nasal] syllables are subject to nasality spreading

By contrast lexically [nasal] syllables are never realized oral

[ku:^{43}-e^{4}]	‘your mother’	*vs*	[ku:^{31}-ɯ̃^{1}]	‘your feces’
[nã:^{22}-ẽ^{4}]	‘his mother’		[nã:^{22}-ɯ̃^{1}]	‘his feces’
< /-e^{4}/ ‘mother’, phonologically unspecified for nasality			< /-ɯ^{1}[nasal]/ ‘feces’ phonologically specified as [nasal]	

Phonological nasality is a privative feature (Ø *vs* [nasal])

Lexically non-[nasal] syllables are subject to nasality spreading

By contrast lexically [nasal] syllables are never realized oral

⇒ **non-[nasal] is default, not a positive feature**

The case of [ŋV]

In SMAT (and other Ticuna varieties), one significant case of oral-nasal co-occurrence within syllable : [ŋV] syllables (*vs* expected [ŋṼ])

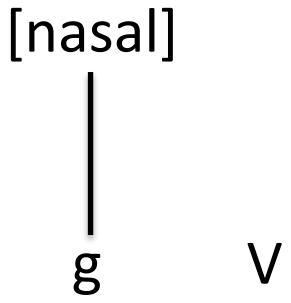
Ex: [ŋo̤$^{\text{modal-creaky}}$] 'to appear' (*vs* [ŋõ̤$^{\text{modal-creaky}}$] 'to bite')

Complex dialectal, phonetic and diachronic case

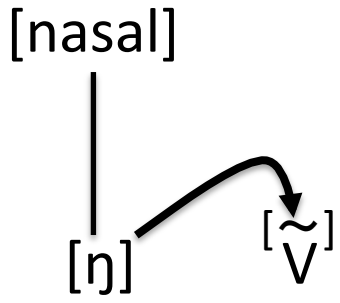
The case of [ŋV]

⇒ at first sight contradictory with nasality spreading if we think it is the realization of /gV[nasal]/; we expect [ŋṼ] (but *[ŋV])

A



B



The case of [ŋV]

Analysis: /ŋ/ in [ŋV] is a phoneme of its own (diachronic and dialectal evidence); if no [nasal] linked, no nasality spreading

A

~~[nasal]~~

ŋ V

B

~~[nasal]~~

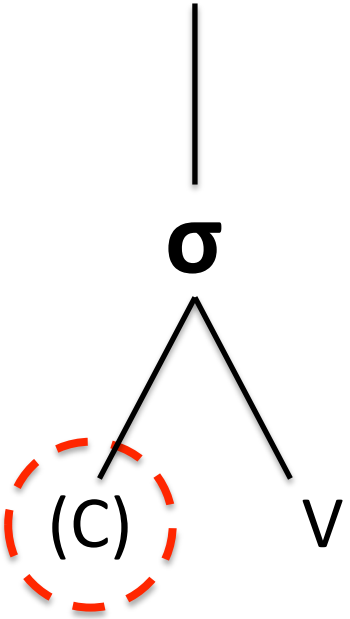
[ŋ] V → [ŋV]

The case of [ŋV]

=> nasality spreading is sensitive to [nasal]: **only occurs from a [nasal]-bearing segment** (phonetic nasality of that segment is necessary but not sufficient)

7. Conclusions

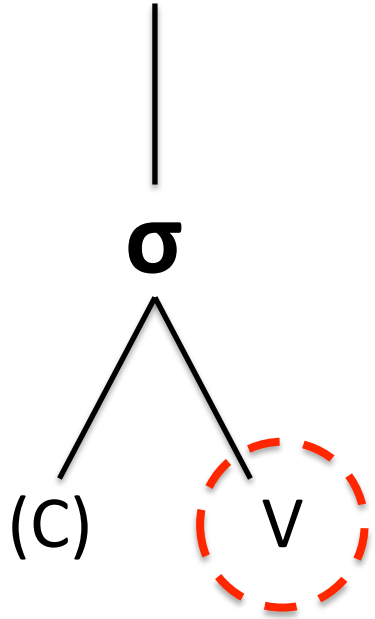
[nasal]
[toneme]
[glottal stop]



N.B.: ***phonemes*** *(~~phones~~)*

p	t	t͡ɕ	k	kʷ
b	d	d͡ʑ	g	w
			ŋ	

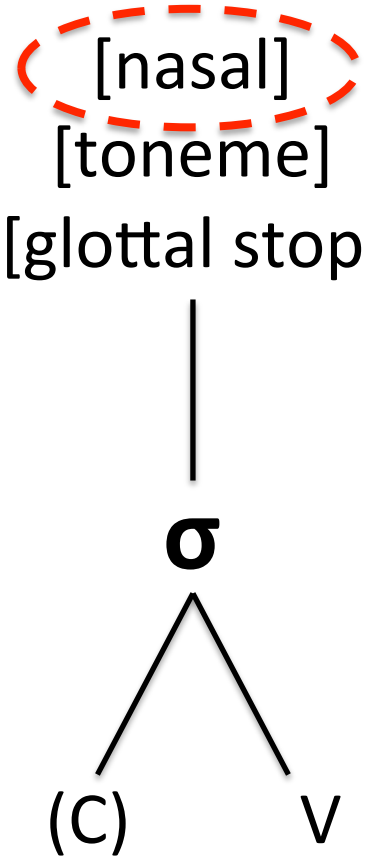
[nasal]
[toneme]
[glottal stop]



N.B.: ***phonemes*** *(~~phones~~)*

p	t	t͡ɕ	k	kʷ
b	d	d͡ʑ	g	w
			ŋ	

i		ɯ		u
	ɐ̟		ɵ̟	
aɪ̯		a		aʊ̯

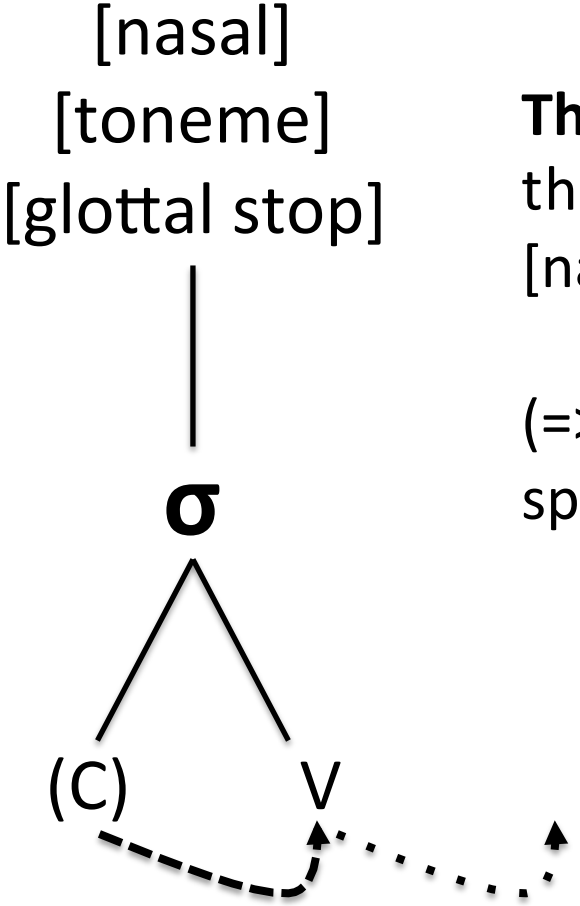


N.B.: ***phonemes*** *(~~phones~~)*

p	t	t͡ɕ	k	kʷ
b	d	d͡ʑ	g	w
			ŋ	

i	ɯ	u
ɐ̟		ɵ̟
aɪ̯	a	aʊ̯

[nasal] links to σ's first segment, which nasalizes if target ( )



Then high-level spreading of nasality to the right from target (=nasalized) [nasal]-bearing segments until next C

(=> only V's are targets of nasality spreading)

Residual facts left unaccounted for

- [ŋ, w̃, ɲ] never found in unstressed syllables (except for 2 secondary instances of [ɲ]) => [nasal] incompatible with /g, w, d͡ʒ/ in unstressed syllables? Why? Probably a mere lexical gap synchronically, due to diachronic sources of /g, w, d͡ʒ/

Residual facts left unaccounted for

- At least 2 words with probable nasality spreading to the left:
  [tǫ̃ː^{43}ʔõ^{5}] /toʔ^{43}o^{5}[nasal]/ (?), '*gaviota* (a bird)'
  [tǫ̃ː^{43}ʔõ^{5}ne^{1}] /toʔ^{43}o^{5}[nasal]de^{1}[nasal]/ (?), 'stairs'

- At least 1 onsetless syllable rejects nasal spreading (=> specified as [oral]?):
  [-ʔɯ^{1}ra^{1}] /ʔ.ɯ^{1}[oral]da^{1}/ (?), 'approximate(ly)'

Typological oddity

Only one nasal segment: /ŋ/!

Result of a complex and probably unusual diachronic process

In fact, younger speakers of Nazareth Ticuna (Colombia) have merged what must have been the reflex of SMAT /ŋ/ into /g/

No signs of instability in SMAT however

Three different sources for nasality on the surface

- nasality as a property of C: unique case of [ŋ(V)]; static
- nasality as an exponent of [nasal]: cases of [m, n, ɲ, ŋ(Ṽ), w̃], and some [Ṽ]; triggers nasality spreading
- nasality as a consequence of spreading: cases of other [Ṽ]s; spreads until next C

Three different sources for nasality on the surface

Would be interesting to collect experimental nasal airflow measurements for the last two types of nasality ([nasal]-linking *vs* nasality spreading)

Impressionistic observation that [Ṽ] due to [nasal]-linking are more nasal (*i.e.* involve more nasal airflow) than [Ṽ] due to nasal spreading; if confirmed, would strengthen the analysis

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Goulard, Jean-Pierre & Montes Rodríguez, María Emilia. 2013. Los yurí/juri-tikuna en el complejo socio-lingüístico del Noroeste Amazónico. *Liames* 13. 7-65.