

Suffix independence in Paraguayan Guarani nasal harmony

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1 Introduction

- Crosslinguistically, phonological processes may apply equally to prefixes and suffixes, or these may show asymmetries in their participation in phonological rules.

(1) *Prefix independence in Yaka nasal consonant harmony*
(Ruttenberg, 1970; Hyman, 1995)

a. tsúb-idi b. tsúm-ini c. ma-dáfú, *ma-náfú
‘to wander’ ‘to sew’ ‘palm wine’

- This talk investigates the behavior of affixes in nasal harmony in Paraguayan Guarani.
- The nasal harmony system of Guarani has been described for decades, and has significantly contributed to developments in phonological theory (Gregores & Suárez, 1967; Walker, 1998; Beckman, 1998; Piggott, 2003; Estigarribia, 2020; to name a few).
- However, its interaction with the morphological and prosodic structure of the language remain relatively understudied.
- This work introduces two empirical findings regarding the behavior of affixes in Guarani nasal harmony, from original fieldwork.

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⇒ Suffixes show **independence** in **regressive** (leftward) nasal harmony.

(2) a. \overline{ja} -jeroky b. \overline{na} -kosina c. e- \overline{ju} -na, *e- \overline{nu} -na
[ɟa-ɟero'ki] [ɲã-kõsĩnã] [e-'ɟu-nã]
‘we dance’ ‘we cook’ ‘please come!’

⇒ There is **variation** across dialects on the independence of suffixes to **progressive** (rightward) harmony.

(3) a. **Both** b. **Oviedo** c. **“Urban”**
jagua-kuéra mitã- \overline{ng} uéra mitã- \overline{k} uéra
[ɟaɣ^wa-'k^wera] [mĩtã-'ɲ^gwera] [mĩtã-'k^wera]
‘dogs’ ‘children’ ‘children’

* I speculate that the prefix/suffix asymmetry falls from the prosodic structure of the language: suffixes are their own prosodic words.

Roadmap

§2: Overview of Paraguayan Guarani

§3: Regressive nasal harmony in roots and prefixes

§4: Regressive harmony in suffixes

§5: Progressive nasal harmony (*Coronel Oviedo* speakers)

§6: Dialectal variation in progressive harmony

§7: Discussion on sources of suffix independence

2 Overview of Paraguayan Guarani

2.1 Background

- Paraguayan Guarani is spoken by around 5-6 million people in Paraguay and neighboring areas of Argentina.

- It is the official language of Paraguay since 1992, along with Spanish. It is the only language in the Americas spoken by a majority that isn't exclusively indigenous.
- The data were collected in in-situ and virtual fieldwork.

	<i>in-situ</i>	<i>virtual</i>
(4)	6 speakers ages 24-70 Coronel Oviedo bilingual Guarani, Spanish	2 speakers ages 50, 60 Concepción, Asunción bilingual Guarani, Spanish, L2 English

- 📍 Coronel Oviedo • central-east Paraguay • ~50K
- 📍 Concepción • north-central Paraguay • ~258K
- 📍 Asunción • the capital • western Paraguay • ~2.3M

2.2 Basic phonology

- 12 phonemic vowels, all contrastive for nasality.

	front	central	back
(5) high	i, ĩ	ɨ, ĩ̃ (y, ỹ)	u, ũ
mid	e, ě		o, õ
low		a, ã	

- Guarani has voiceless stops, nasal-oral stops, and full nasal consonants.²

² Guarani nasal-oral stops are frequently characterized as “prenasalized stops” (Kaiser, 2008; Estigarribia, 2020; Thomas, 2014 for Mbya, among others) and even argued to be phonologically voiced oral stops (Piggott, 2003). However, I gloss nasal-oral stops as “post-oralized” stops ([m^b], rather than [m^{nb}]) since we will see later on that these trigger regressive nasal spread.

(6) a.	<i>poty</i> [po'ti] 'flower'	b.	<i>mboty</i> [m ^b o'ti] 'to close'	c.	<i>motyarõ</i> [mõtãã'rõ] 'to season'
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- Guarani is predominantly stress-final.³
- In morphologically complex words, primary stress shifts to the right-most lexically stressed syllable. Prefixes are never stressed.

(7) a.	<i>a-karu-se</i> [a-ka'ru-se] 1SG-eat-DES 'I want to eat'	b.	<i>a-karú-ta</i> [a-ka'ru-ta] 1SG-eat-FUT 'I will eat'
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3 Roots and prefixes in regressive harmony

- In Guarani, nasality is contrastive only at the stressed syllable. The nasality of preceding unstressed syllables is completely predictable from the nasality of the stressed syllable.

(8) a.	<i>tupa</i> [tu'pa] 'bed'	b.	<i>tupã</i> [tũ'pã] 'god'	c.	*[tu'pã]
				d.	*[tũ'pa]

→ Voiced segments nasalize, voiceless segments are *transparent*.

- Nasal-oral stops are also triggers in any position.

(9) a.	<i>panambi</i> [pãã'm ^b i] 'butterfly'	b.	<i>angiru</i> [ãŋ ^g i'ru] 'friend'
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³ However, I assume stress is lexically specified: there are a handful of stress-based minimal pairs, and suffixes are unpredictably stressed or unstressed.

- Some voiced consonants alternate due to regressive nasal spread.

(10)	$mb \sim m$	$nd \sim n$	$ng \sim \tilde{g}$	$j \sim \tilde{n}$
	$m^b \sim m$	$n^d \sim n$	$\eta^g \sim \eta$	$\zeta \sim \eta$

(11)	a. $\overline{mb}o'a$ [m ^b o'ʔa] 'position'	b. $\overline{mo}'\tilde{a}$ [m ^o 'ʔ [~] ā] 'almost'; NEG.FUT
(12)	a. $a\overline{]a}$ [a'ɕa] 'during'	b. $a\overline{]}\tilde{a}$ [ā'ñā] 'evil, bad'

⇒ **Prefixes undergo** nasal harmony: their vowels nasalize, and they show the same alternations found in roots.

(13)	a. $\overline{nd}a-karú-i$ [n ^d -a-ka'ru- ⁱ] NEG-1SG-eat-NEG 'I don't eat'	b. $\overline{ni}ai-pytyvõ-i$ [n-ā ⁱ -pĩtĩvõ- ⁱ] NEG-1SG-help-NEG 'I don't help'
(14)	a. $i\overline{]y}vate$ [iɕ-iva'te] 3-tall 'he is tall'	b. $i\overline{]}\tilde{n}akāporā$ [iη-ākāpō'ra] 3-smart 'he is smart'

- And, various prefix alternations may stack at a long distance from the nasal trigger.

(15)	a. $\tilde{n}ande$ $\overline{nda-]a-]o-h-ayhú-i}$ [ñā'n ^d e] [n ^d a-ɕa-ɕo-ha ⁱ 'hu- ⁱ] 1PL.INCL NEG-1PL.IN-REC-love-NEG 'we don't love each other'
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b.	$\tilde{n}ande$ $\overline{na-]a-]o-hendú-i}$ [ñā'n ^d e] [nā-ηā-ηō-hē'n ^d u- ⁱ] 1PL.INCL NEG-1PL.IN-REC-listen-NEG 'we don't listen to each other'
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⇒ **Prefixes also trigger** regressive nasal harmony.

(16)	a. $\overline{nd}a-puká-i$ [n ^d -a-pu'ka- ⁱ] NEG-1SG-laugh-NEG 'I don't laugh'	b. $\overline{ni}a-mbo-puká-i$ <i>ichúpe</i> [n-ā-m ^b o-pu'ka- ⁱ] NEG-1SG-CAUS-laugh-NEG 3 'I didn't make him laugh'
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Takeaways:

- Regressive harmony is triggered by stressed nasal vowels and nasal-oral stops (in any position).
- Regressive spread induces segment alternations: nasal-oral stops ~ nasal consonants, and j [ɕ] ~ \tilde{n} [η].
- * Prefixes fully participate in regressive harmony: they **trigger and undergo** nasalization.

4 Suffixes in regressive harmony

- **Recall...**

- Stress shifts to the rightmost lexically stressed syllable ((7), §2).
- The nasality of preceding unstressed syllables is determined by the nasality of the stressed syllable ((8), §3).
- However, underlyingly stressed vowels still trigger regressive nasal harmony even when stress has shifted onto an oral suffix.⁴

⁴ The stress rule and regressive nasalization are in a counterbleeding interaction: the

- (17) a. $\overline{[n-ai-pytyv\tilde{o}-i]}$
 $[n-\tilde{a}^i-p\tilde{t}\tilde{i}\tilde{v}\tilde{o}^i]$
 NEG-1SG-help-NEG
 ‘I don’t help’
- b. $\overline{[n-ai-pytyv\tilde{o}-s\tilde{e}-i]}$
 $[n-\tilde{a}^i-p\tilde{t}\tilde{i}\tilde{v}\tilde{o}^i-se^i]$
 NEG-1SG-help-DES-NEG
 ‘I don’t want to help’

- Suffixes retain the oral/nasal contrast, even when they are lexically unstressed.

- (18) $-mba$ [m^ba] $-ma$ [mã] $-ta$ [ta] $-na$ [nã]
 TOT CMPL FUT REQ

- Lexically unstressed nasal suffixes fail to trigger regressive spread onto preceding roots and prefixes.

- (19) a. $a-\overline{[jap\acute{o}-ma]}$
 $[a-\zeta a^i po-mã]$
 1SG-work-CMPL
 ‘I already worked’
- b. * $a-\overline{[n]apo-ma}$
 * $[a-\jmath\tilde{a}p\tilde{o}-mã]$
- c. $e-\overline{[j\acute{u}-na]}$
 $[e-\zeta u-nã]$
 IMP-come-REQ
 ‘please come!’
- d. * $e-\overline{[n]u-na}$
 * $[e-\jmath\tilde{u}-nã]$

- Even stressed nasal suffixes fail to trigger regressive spread onto roots and prefixes.

- (20) a. $h-\overline{[nd]u-’\tilde{y}}$
 $[h-\tilde{e}n^d u-’\tilde{y}^i]$
 3POS-listen-PRV
 ‘deafness’
- b. * $h-\overline{[n]u-’\tilde{y}}$
 * $[h-\tilde{e}n\tilde{u}-’\tilde{y}^i]$
- c. $o-\overline{[jehu-r\tilde{o}]}$
 $[o-\zeta ehu^i-r\tilde{o}]$
 3-happen-if
 ‘if it happens’
- d. * $o-\overline{[n]ehu-r\tilde{o}}$
 * $[o-\jmath\tilde{e}h\tilde{u}-r\tilde{o}]$

- And, all nasal suffixes fail to trigger spread onto preceding suffixes, even when preceding suffixes are lexically unstressed.

stress rule bleeds regressive nasalization, but regressive nasalization must precede the stress rule.

- (21) a. $o-\overline{[n\tilde{e}’\tilde{e}-mba-ma]}$
 $[o-\jmath\tilde{e}^i\tilde{e}^i-’mba-mã]$
 3-talk-TOT-CMPL
 ‘he finished talking’
- b. $a-\overline{[jap\acute{o}-ta-ma]}$
 $[a-\zeta a^i po-ta-mã]$
 1SG-work-FUT-CMPL
 ‘I will already work’

- * However, suffixes still trigger regressive harmony within their morphological boundary, even when unstressed.⁵

- (22) a. $\overline{[nd-a-ikatu-’\tilde{m}o’\tilde{a}-i]}$
 $[n^d a^i katu-m\tilde{o}^i ’\tilde{a}^i]$
 NEG-1SG-able-NEG.FUT-NEG
 ‘I won’t be able to’
- b. $che-r-\overline{[nd]u-ramo}$
 $[j\tilde{e}-r-\tilde{e}^i n^d u-r\tilde{a}m\tilde{o}]$
 1SG-POSS-listen-if
 ‘if you hear me’

Takeaways:

- Although prefixes both trigger and undergo regressive nasal harmony, suffixes are independent:

1. A nasal element in a root still triggers leftward nasal spread even if stress shifted onto a suffix.
2. All suffixes must be specified for nasality, even the lexically unstressed.
 → They retain the oral/nasal contrast
 → They trigger regressive spread within their suffix boundary
3. All suffixes fail to undergo nasalization from following nasal elements.

⁵ Thomas (2014) notes that suffixes in Mbya (Tupi-Guarani) fail to trigger regressive nasalization. It is unclear from this work if this is indeed a failure to trigger, as opposed to a failure for preceding suffixes to undergo nasalization.

5 Progressive nasal harmony

- Progressive harmony in Guarani has received some attention recently due to its striking differences from regressive harmony (Russell, 2022).

	Regressive	Progressive
Triggers	(stressed) nasal vowels, nasal-oral stops	(stressed) nasal vowels
Targets	voiced segments	voiceless stops
Locality	local	non-local
Productivity	exceptionless	lexically-specific

* The data in this section are from *Coronel Oviedo* speakers.

- Recall:** suffixes do not undergo regressive nasalization, and they trigger leftward spread up to the suffix boundary.

⇒ However, *some suffixes undergo* progressive harmony.

→ Some suffixes with initial voiceless stops see an alternation to either an initial nasal-oral stop or a nasal consonant.

→ This occurs even if stress has shifted away from the nasal trigger.

- (24) a. *óga*- \overline{pe}
[ˈoɣa-pe]
house-LOC
‘at the house’
- b. *kosina*- \overline{me}
[kõsĩˈnã-mẽ]
kitchen-LOC
‘at the kitchen’
- (25) a. *jagua*- $\overline{kuéra}$
[ɟayˈwa-kʷera]
dog-PL
‘dogs’
- b. *mitã*- $\overline{nguéra}$
[mĩtã-ˈɲɟˈwera]
child-PL
‘children’

- Although nasal-oral stops trigger regressive nasalization in any position, they fail to trigger progressive harmony alternations.

- (26) a. *panambi*- $\overline{kuéra}$
[pãñãᵐᵇi-ˈkʷera]
butterfly-PL
‘butterflies’
- b. **panambi*- $\overline{nguéra}$
*[pãñãᵐᵇi-ˈɲɟˈwera]

- However, other suffixes with initial voiceless stops never alternate in the presence of roots with stressed nasal vowels.⁶

- (27) a. *a-karú*- \overline{ta}
[a-kaˈru-ta]
1SG-eat-FUT
‘I will eat’
- b. *ai-pytyvõ*- \overline{ta}
[ãˈpĩtĩˈũõ-ta]
1SG-help-FUT
‘I will help’

- The alternations induced by progressive harmony may stack and occur non-locally.

- (28) a. *jagua*- $\overline{kuéra}$ - \overline{pe}
[ɟayˈwa-a-ˈkʷera-pe]
dog-PL-DOM
‘dogs’
- b. *mitã*- $\overline{nguéra}$ - \overline{me}
[mĩtã-ˈɲɟˈwera-mẽ]
child-PL-DOM
‘children’

- (29) a. *o-karu-se*- \overline{pa} - \overline{pota} - \overline{peve}
[o-karu-se-pa-pota-ˈpeve]
3-eat-DES-TOT-INCIP-until
‘until he is about to finish wanting to eat’
- b. *o-ñe’ẽ-se*- \overline{mba} - \overline{mbota} - \overline{meve}
[o-ɲẽˈẽ-se-mᵇa-mᵇota-ˈmẽve]
3-talk-DES-TOT-INCIP-until
‘until he is about to finish wanting to talk’

⁶ See Russell (2022) for a more detailed description of which elements show progressive harmony alternations and possible patterns about their distribution.

⇒ Verbal and nominal roots may also show progressive harmony alternations.

→ Some roots show alternations in compounds when the first root of the compound is nasal.

- | | | | | | |
|---------|---------------------------|----|-------------------------|----|-----------|
| (30) a. | <i>h-asẽ-n̄g̃y</i> | b. | <i>ama-n̄g̃y</i> | c. | <i>ḱy</i> |
| | [h-ãṣẽ-ŋ ^{g̃} i] | | [ãmã-ŋ ^{g̃} i] | | [k̄i] |
| | 3POSS-cry-rain | | rain-rain | | 'rain' |
| | 'weep' | | 'rain' ⁷ | | |

→ In some causative constructions, the nasal causative prefix *mo-* alternates the initial voiceless stop of its following root.

- | | | | | |
|---------|-----------------------|----|---------------------------------------|-----------------|
| (31) a. | <i>o-p̄áy</i> | b. | <i>o-mo-m̄b̄áy</i> | <i>diego-pe</i> |
| | [o-'pa ⁱ] | | [õ-mõ-m ^b a ⁱ] | |
| | 3-wake-up | | 3-CAUS-wake.up | diego-DOM |
| | 'he/they woke up' | | 'they woke up Diego' | |
-
- | | | | |
|---------|---------------------------------------|----|---|
| (32) a. | <i>che-ḱaigue</i> | b. | <i>nde che-mo-n̄g̃aigue</i> |
| | [ʃe-ka ⁱ ɣ ^w e] | | [ʃẽ-mõ-ŋ ^{g̃} a ⁱ ɣ ^w e] |
| | 1SG-bored | | 2 1SG-CAUS-bore |
| | 'I'm bored' | | 'you bored me' |

- However, as with suffixes, other roots fail to show the alternation of the initial voiceless stop in the presence of nasal elements to the left.

→ In these, regressive harmony proceeds as expected.

- | | | | | |
|---------|----------------------------|---------------|----|-----------------------------|
| (33) a. | <i>a-mbo-pupu</i> | <i>nde-'y</i> | b. | <i>a-mo-ḱane'õ</i> |
| | [ã-m ^b o-pu'pu] | | | [ã-mõ-kãne ⁱ 'õ] |
| | 1SG-CAUS-hot | 2SG-water | | 1SG-CAUS-tired |
| | 'I boiled your water' | | | 'I made (someone) tired' |

Takeaways:

- Regressive and progressive nasal harmony are different phonological processes.
- In Guaraní progressive nasal harmony, the initial voiceless stop of some roots and suffixes alternates to either a nasal-oral stop or a nasal consonant.
- Progressive harmony is lexically-specific: only some roots and suffixes show alternations.

6 Dialectal variation

- The two speakers from Asunción and Concepción show the same regressive harmony pattern as Coronel Oviedo speakers.

⇒ However, they show **limited progressive harmony onto suffixes**.

- | | | | |
|---------|--|----|----------------------------|
| (34) a. | <i>panambi-ḱuéra</i> | b. | <i>mitã-ḱuéra</i> |
| | [pãñãm ^b i-'k ^w era] | | [mĩtã-'k ^w era] |
| | butterfly-PL | | child-PL |
| | 'butterflies' | | 'children' |

- | | |
|------|---|
| (35) | <i>o-ñe'ẽ-se-p̄a-p̄ota-p̄e've</i> |
| | [o-ɲẽʔẽ-se-pa-pota-'peve] |
| | 3-talk-DES-TOT-INCIP-until |
| | 'until he is about to finish wanting to talk' |

- And, sometimes they may vary in their production of alternations, even in the same form.

- (36) a. **Coronel Oviedo**
 mitã-nguéra-m̃e
 [mĩtã-ʎ^{9w}era-mẽ]
 child-PL-DOM
 ‘children’
- b. **“Urban”**
 mitã-nguéra-pe
 [mĩtã-ʎ^{9w}era-pe]
 child-PL-DOM
 ‘children’

⇒ These two speakers still show the same progressive harmony alternations in roots as those of Coronel Oviedo speakers, with no variation.

→ (31) o-mo-m̃báy; (32) che-mo-ngaigue.

→ (30) h-asẽ-ngy, ama-ngy.

- (37) a. o-k̃y
 [o-ʎi]
 3-rain
 ‘it rains’
- b. a-mo-ngy
 $\overleftarrow{[ã-mõ-ʎi]}$
 1SG-CAUS-rain
 ‘I made it rain’

* Therefore, speakers of more urban areas show limited progressive harmony alternations, but only for suffixes.

7 Implications

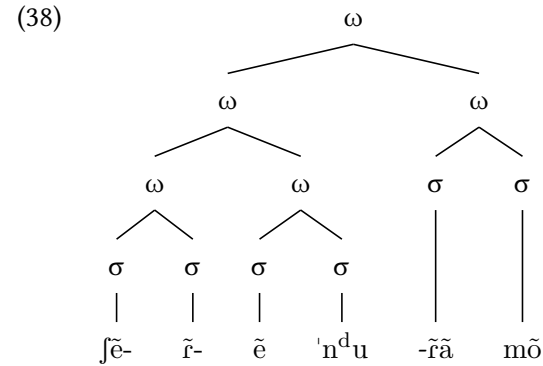
- This work finds that Paraguayan Guarani suffixes are independent to the nasality of roots and prefixes in regressive harmony, and only in certain dialects in progressive harmony.
- However, the claim of independence made here across the two processes is an *empirical* one.
- Recall that regressive and progressive harmony are distinct phonological processes of nasalization (table in (23)). So, the *source* of independence might also be distinct.

⇒ The independence of suffixes in **regressive** harmony is likely due to the morphological or prosodic structure of Guarani.

→ Suffixes are their own prosodic constituent.

→ Prefixes form a constituent with roots.

→ The domain of regressive spread is such prosodic constituent.



* That suffixes are a constituent outside of roots and prefixes is consistent with previous work on the stress system of Guarani (Dąbkowski, 2021).⁸

- The independence of suffixes in **progressive** harmony (in certain dialects) might also be due to prosodic structure.
 → This would explain why only suffixes, not roots, fail to alternate in “urban” dialects.
- But it may alternatively be due to *morphological regularization*.

⁸ The structure in (38) might pose problems for stress assignment. Here, unstressed suffixes such as *ramo* is its own prosodic word, which predicts that the previous prosodic word (that which contains prefixes and roots) carries secondary stress. Although Dąbkowski (2021) notes that Guarani shows secondary stress, I haven’t found evidence of secondary stress in my own work. Impressionistically and qualitatively, Guarani underlyingly stressed vowels show no increased duration, intensity, or rise in pitch, and these elements aren’t pitch accented when focused (Jun et al., 2023). I refer the audience to Dąbkowski (2021) for questions related to the difference between stressed and unstressed suffixes in the language’s prosodic structure.

- Speakers of more “urban” dialects of Guarani increasingly treat exceptional (alternating) elements as non-exceptional.
- Doesn’t explain why we see “regularization” only for suffixes in this dialect.

8 Closing

- An investigation of prefixes and suffixes in Paraguayan Guarani reveals that suffixes show differential behavior in nasal harmony.
 - Regressive and progressive nasal harmony (from roots and prefixes) proceed even when primary stress has shifted away from the nasal trigger.
 - Suffixes retain the oral/nasal contrast even when lexically unstressed.
 - Suffixes fail to undergo regressive nasalization from other suffixes to their right (but suffixes do trigger regressive spread)
 - In certain dialects, it is only suffixes (and not roots) that fail to show progressive harmony alternations.
- It also reveals ***dialectal variation*** in progressive harmony alternations.
 - Coronel Oviedo speakers show progressive harmony alternations in roots and suffixes.
 - The remaining two speakers (Asunción and Concepción) have limited alternations in suffixes, but show the same alternations in roots as Coronel Oviedo speakers.
- This work is among the first at studying variation across dialects of Paraguayan Guarani.
 - “Urban” vs. “rural” is an oversimplification.
 - I invite more principled studies on the distribution of the variation.
- * **More broadly:** this work suggests that the morphological and prosodic structure of the language plays a large role in its phonology:

- it bounds the leftward spread of nasality.
- it potentially explains why certain speakers fail to show progressive harmony alternations in suffixes but not in roots.
- it provides additional evidence that Guarani suffixes are their own prosodic constituents (Dąbkowski, 2021).

Aguyjevete!
Thank you!

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