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Nasalization in Awetí[1]

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Abstract
This paper describes several synchronic processes of nasalization in Awetí, Tupian Stock, and puts forward six phonological rules, and their order of application, in order to describe the regular process of nasalization of the language. Some diachronic considerations are also presented, based on the comparison with some Tupí-Guaranian languages, and a couple of diachronic rules corresponding to the Proto-Awetí-Tupí-Guaraní are suggested.
Keywords: Nazalization. Morpho-phonological processes. Sound changes. Awetí. Tupian Stock

Resumo
Este artigo descreve diversos processos sincrônicos de nasalização que ocorrem na língua Awetí, tronco Tupí, e postula seis regras fonológicas necessárias para dar conta do processo regular de nasalização dessa língua, determinando sua ordem de aplicação. Também são avançadas algumas considerações diacrônicas, a partir da comparação de casos emblemáticos de nasalização em algumas línguas da família Tupí-Guaraní, e propõe regras fonológicas que deveriam estar já ativas em estágio Proto-Awetí-Tupí-Guaraní.
Palavras-chave: Nazalização. Processos morfofonológicos. Mudanças sonoras. Awetí. Tronco Tupí.

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Introduction

We initially present some phonological features of Awetí, a language belonging to the Tupí family[2]. The segmental phonemes are as follows: p, t, ts, k, ʔ, m, n, ŋ, w, z, y, r, l, i, ɨ, u, e, a, o, ĩ, ɨ̃, ũ, ẽ, ã, õ (z represents a palatal retroflex fricative; the mid vowels e, o, ẽ, õ are typically realized as ɛ, ɔ, ɛ̃, ɔ̃ – although this is not documented in 11 onward). In root-initial position, occurrences of z, l, and w are rare, there is only one instance of ts, r, and n, and none of ŋ. Therefore, most roots begin with the sounds p, t, k, ʔ, y, m, or a vowel. In root-final position, there are stops, all the nasals, glides, and vowels, but no instances of ts, ʔ, z, r, l, and only two occurrences of w.

Stress is predictable at the root level, always occurring on the final syllable. However, given the presence of numerous unstressed suffixes, it is possible to find paroxytone, proparoxytone, and even words with stress on the fourth syllable from the right (as in [itózokotu] 'my future departure' /i-tó-zoko-tu/ 1sg-IR-fut-nom). The most common syllable patterns at the word level are CV, V (only in initial position), and CVC (only in final position). That is, there are no internal consonant clusters. However, the VC pattern occurs in some monosyllabic roots (generally resolved within the word). At higher levels of structure beyond the word, phonetic consonant clusters are observed. Depending on the analysis adopted for the glides y and w, the CCV(C) pattern can also be admitted, where the first consonant is a stop followed by a glide (e.g., kwat 'sun', i-pyá 'broad')

1. Intrinsic nasality

Let us now examine the intrinsic nasality and the process of nasalization in Awetí. Nasality is contrastive in vowels, both in stressed and unstressed syllables, whether following an oral or nasal consonant, but not before a nasal consonant, where they are always nasal (Emmerich & Monserrat, 1972). On the other hand, there is contrast between final syllables with a nasal vowel or a nasal consonant, but not between syllables with a nasal vowel followed by an oral consonant and syllables with a nasal vowel followed by a nasal consonant. The examples below illustrate these points[3]:

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[2] The hypothesis of a late separation between the Awetí and Tupí-Guaraní families from a Proto-Awetí-Tupí-Guaraní stage was originally suggested by Rodrigues (1984/1985) and formally reiterated by Rodrigues & Dietrich (1997).

[3] Following a phonetically nasal vowel, consonants are voiced to a greater or lesser degree. In non-phonemic transcriptions, we will generally present the voiced form. The voiceless x voiced opposition is not contrastive in consonants. This is also clear in Portuguese loanwords, or in the writing of Portuguese by Awetí speakers, where confusion between voiceless and voiced obstruents is frequent, and not only in nasal environments: _ançol_ for 'anzol' ('fishhook'), _rete_ for 'rede' ('net'), _Rudes_ for 'Ruth', etc.

1. moʔé [mɔʔɛ] 'to teach'

2. kɨy [kɨy] 'this'

3. tetá [tɛta] 'big'

4. napó [napɔ] 'his root'

5. akúp [akup] 'hot'

6. tĩ [tĩ] 'beak'

7. tã [tã] (characteristic of male speech)

8. eʔé [eʔe] 'to grate'

1a. maʔẽ [ma'ɛ̃] 'to see'

2a. kĩy [kĩỹ] 'to kill'

3a. tetã [tɛ̃dã] 'to play'

4a. nãpó [nãbɔ] 'his hand'

5a. ẽtúp [ɛ̃dup] 'to hear'

6a. tíŋ [tĩŋ] 'white'

7a. tán [tãn] 'to run'

8a. eʔén [ɛʔ'ɛ̃n] 'to vomit'

9. [kãŋ], but not *[kaŋ] or *[kãk] 'bone'

10. [tĩm], but not *[tɨm] or *[tĩp] 'to plant'

11. [mãnĩʔɔk], but not *[maniʔɔk] 'manioc'

The last three items allow for alternative solutions within a classical structuralist phonemic analysis: (a) vowel nasality can be considered non-phonemic before nasal consonants, leading to the interpretation of the relevant words as /kaŋ/, /tɨm/, and /maniʔok/; or (b) consonant nasality in examples (9) and (10) can be considered non-phonemic, since the emergence of a nasal consonant following a nasal vowel in closed final syllables is predictable, thus leading to the underlying representation of these items as /kãk/ and /tĩp/, respectively.

Argument (b) is supported by the symmetrical behavior of the final phoneme /y/ in the same context, which presents a nasal allophone [ỹ] (e.g., /ãy/ [ãỹ] 'tooth'). From another perspective, however, the morphophonemic behavior of these consonants makes their interpretation as nasal consonants, rather than stops preceded by nasal vowels, more plausible. The fact that the vowels are phonetically nasalized in these words is thus part of the broader process of nasalization in the language.

2. Regressive nasality

In other words, alongside intrinsic nasality—phonemically nasal vowels and consonants—Awetí exhibits a nasalization process with diverse features, the most general of which is as follows: if any segment of the root

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or a prefix within a word is intrinsically nasal, all preceding vowels and glides within those boundaries are automatically nasalized. The formula below represents this phonological rule, which applies simultaneously to all segments meeting these conditions:

General Regressive Nasalization Rule (RN) I
(RN)   [-cons] → [+nas] / [# ------- (CV)ₒ [+nas] (x)] root

This rule accounts not only for examples (9–11), which we repeat here for clarity, but also for the following examples (12–16), including distinct prefixes:

9. káŋ [kãŋ] 'bone'

10. tɨm [tɨ̃m] 'to plant'

11. maniʔok [mãnɨ̃ʔok] 'manioc'

12. topã [tõbã] 'storm'

13. yomém [ñõmẽm] 'beiju' (a type of flatbread)

14. a-potazõ [ãbõdãzõ] '[I] stole'

15. o-te-kɨ̃y [õdẽgɨ̃ỹ] 'he killed himself'

16. e-pot-ẽúp-éyu [ẽbõrẽdupeyu] 'you are thinking'

Rule (RN) also accounts for the nasalization of personal prefixes before the only two derivational prefixes that have a nasal consonant (*mo-* 'causative' and *emĩ-* 'patient'), which therefore fall within its scope of application:

17. yo-mo-tó [ñõmoto] 'give!' (2sg-caus-IR)

18. it-emĩ-mo-tó [ĩdẽmĩmoto] 'what was given by me' (1sg-pac-caus-IR)

The rule (RN) also applies to compound words:

19. tɨ̃+teʔẽ [tɨ̃deʔ'ẽ] 'sea' (water, salty liquid)

Beyond this general characteristic of regressive nasalization, there are other, more restricted cases of both regressive and progressive nasalization, which will be examined in the following sections.

3. Progressive nasality

The glides /y/ and /w/ are the only segments that undergo systematic nasalization when they immediately follow a nasal segment. This can be expressed with a phonological rule as follows:

Progressive Nasalization Rule for Glides (GN')
(GN')   [-syll -cons] → [+nas] / [+nas] --------

Example (15) above demonstrates the progressive nasalization of /y/ within the root boundaries; examples (20) and (21) below illustrate it with the two suffixes that begin with /y/, and example (22) illustrates it with the only suffix that begins with /w/:

20. ozo-pɨpẽ-yu [õzõbɨ̌bẽñũ] 'we are sewing' (1pl-SEW-cont)

21. mitã-yɨt [mĩdãñɨt] 'little fishhook' (FISHHOOK-dimin)

22. nã-kã-wo [nãgãw̃õ] 'on one's branch' (3-BRANCH-loc)

A closer examination of the environments where rule (GN') can be applied is still needed, as there are various cases where glides are also nasalized even when separated from the nasal segment by other oral segments, or even by an entire oral syllable. This occurs both to the right and to the left. We provide examples below and then propose, tentatively, a modified version of (GN'):

23. mã-tsu-yɨt-itu [mãdzũñɨritu] 'something small like this' (here-like-dimin-nom)

24. o-ʔapát-e-yu tsã [oʔapareỹũdzã] 'they are lying down' (3-LIE-x-cont-nom THEY)

Note that in example (23), nasalization of /y/ creates an environment for rule (RN) to apply, thus nasalizing the vowel in /tsu/ and producing [mãdzũñɨritu]. It cannot be argued that /tsu/ is nasalized by influence of /mã/, since an oral syllable follows /mã/ in example (25) below:

25. mã-kɨpé [mãgɨpe] 'here'

Thus, rule (RN) must be ordered after rule (GN'). In example (24), we observe the nasalization of /y/ in a context of regressive expansion of nasality across a word boundary—beyond the scope of rule (RN). For the glide /w/, the suffix /-aw/ 'gerund' undergoes nasalization after a nasal root, whereas the same does not occur with the suffixes /-at/ 'agent,' /-ap/ 'circumstantial,' and /-ɨt/ 'animate being,' which have the same syllabic pattern, VC, suggesting that the final obstruent in these suffixes blocks nasalization. Examples (26) and (27) illustrate this type of nasalization:

26. pɨpẽ-aw [pɨ̌bỹãw̃] 'sewing'
27. kɨ̃y-aw [kɨ̃ỹtãw̃] 'killing'

Compare this with examples (28–30), with the suffixes -at, -ap, and -ɨt:

28. pɨpẽ-at [pɨ̌byat] 'tailor'
29. kɨ̃y-ap [kɨ̃ỹtap] 'circumstance of death'
30. iyém-ɨt [ĩñẽmɨt] 'lizard'

Additionally, in example (31), the glide /y/ is nasalized after the prefix *emĩ-*, even though it is at the end of the next syllable:

31. e-emĩ-pwáy-an [ẽmĩbw̃ãñãn] 'what will be requested by you' (-*an* 'fut')

Here, too, it cannot be argued that /y/ is nasalized by the influence of -*an*, since /y/ remains oral in example (32):

32. o-pót-e-yu-an-mẽ [oporeyãnẽ] 'will jump' (3-JUMP-x-cont-fut-ênf)

On the other hand, the last example shows that nasalization of /y/, when not contiguous to a nasal segment, is not highly systematic (as will be seen later, the suffix -*mẽ* triggers regressive nasalization). The nasalization of the entire syllable following *emĩ-* in example (31) results from the application of rule (RN) after the nasalization of /y/. In any case, *emĩ-* appears to nasalize /y/ only in contiguous syllables, since in example (33), where the glide is not in such a position, it remains oral:

33. (e)mĩ-ʔatopáy [(ẽ)mĩʔatopay] 'what was pushed'

The modified version of (GN') to account for derivations such as those in examples (23, 24, 26, 27, and 31) may take the following form:

Modified Glide Nasalization Rule (GN)
(GN) [-syll -cons] → [+nas] / [+nas] CV, VC ---------

In any case, what stands out from the examples of nasalization with /y/ is the clear synchronic tendency toward generalized nasalization, albeit without sharply defined boundaries.

With *emĩ-*, an interesting phenomenon occurs: in example (34), it triggers the nasalization of the root vowel, even though no *glide* is present:

34. (e)mĩ-ʔú [mĩʔũ] 'food'

This is an exception, but it highlights important facts about both the synchronic and diachronic aspects of the language. As will be discussed later, progressive nasalization in Awetí is likely a remnant of a once-productive process in Proto-Awetí-Tupí-Guaraní. Moreover, the consistent nasal realization of the second vowel in *emĩ-*, in contrast with the orality of the vowel in *mo-* for example, mandates its current interpretation as a nasal vowel, revealing a significant, though still infrequent, opposition between oral and nasal vowels following a nasal consonant. As will be noted later, this opposition did not exist in an earlier stage of the language and, possibly, not in the mentioned protolanguage either.

4. Another type of regressive nasality

Before a pause immediately followed by a nasal syllable, oral consonants, as well as the vowels immediately preceding them, undergo nasalization, and the consonants assimilate the place of articulation of the following nasal consonant. This represents a more restricted case of regressive nasalization, without the leftward scope or the rightward boundary of rule (RN).

Additionally, the first consonant of the consonant cluster may later be dropped, a more general rule, not restricted to this situation. Thus, two obligatory rules and one optional rule are required to accurately describe this process:

Partial Regressive Nasalization Rule for Vowels   OBLIGATORY
(PRN) V → [+nas] / --------- C[-nas] + syllable[+nas]

Regressive Nasal Assimilation Rule for Consonants   OBLIGATORY
(NAC) C → [+nas β place] / ------- # [C +nas β place] V[+nas]

Consonant Apocope Rule   OPTIONAL
(CAp) C → Ø / ----- C

The derivations resulting from the application of these three rules are presented in examples (35–41) below. Other internal transformations that are not relevant here have been excluded, as well as the explicit application of (RN) to the second form in each example:

	(NAC)	(PRN)	(CAp)
35. apúrɨt-tiʔíŋ-u 'parrot speech'	apúrɨndĩʔĩgu	apúrĩndĩʔĩgu	apúrĩdĩʔĩgu
36. taʔwát pwã 'jaguar's claw'	taʔwanbw̃ã	taʔwãnbw̃ã	taʔwãbw̃ã
37. mápap potán+yúŋ 'to treat phlegm'	mápambõdãñũŋ	mápãbõdãñũŋ	mápãbõdãñũŋ
38. akóy kám 'her chest'	akóỹgãm	akõỹgãm	---
39. aʔók maniʔók 'I uproot manioc'	aʔóŋmãniʔók	aʔõŋmãniʔók	aʔõmãniʔók
40. taʔwát mẽpɨt 'jaguar cub'	taʔwánmẽbɨt	taʔwãnmẽbɨt	taʔwãmẽbɨt
41. a-túp-nã-aʔɨn 'I have already seen him'	atúmnãʔɨ̃n	atũmnãʔɨ̃n	---

The derivation resulting from (PRN) typically occurs in speech alongside the optional rule (CAp). However, note that (CAp) does not apply in example (38) (which ends with a glide) or in example (41) (where the object pronoun *nã* is followed by the immediate past suffix *-aʔɨn*). It is also worth noting that the rules (NAC) and (PRN) cannot, under any circumstances, be subsumed within the general regressive nasalization rule (RN) or precede it. This is because, in examples (35–41), there is no further regressive expansion of nasality to the word boundaries, a process that would occur if rule (RN) were applied or if it were ordered after (NAC) and (PRN).

5. Nasal suffixes

The language has seven nasal suffixes[4], two of which, *–ĩ* 'attenuative' and *–mẽ* 'emphatic', expand nasality to the preceding words, but each does so in a distinct manner.

5a. Nasalization with the Suffix -ĩ

This suffix, which is not very productive, is found in only a few words. The fact that it is stressed and constitutes the only exception to the environment of rule (RN)—as it triggers nasalization throughout the entire word—might strongly suggest that it has been reanalyzed by speakers and has synchronically become part of the root.

It remains to be determined whether, historically, it caused nasalization of preceding segments. In Tupinambá, *-i ~ -ĩ* marked the diminutive. Portuguese words such as *capim* ('grass') and *surubim* (*Pseudoplatystoma corruscans*, a species of long-whiskered catfish) attest to the nasal variant, while *jacareí* and *Tamanduateí* reflect the oral variant. The following examples (42) and (43) illustrate the current situation in Awetí, with *-ĩ* interpreted as part of the root:

42. ɨwɨt=ĩ /ɨwɨt ĩ/ [ɨ̃w̃ ɨ̃tĩ] 'dust'
43. ɨwɨt-kɨt=ĩ /ɨwɨkɨt ĩ/ [ɨ̃w̃ ɨ̃kɨ̃tĩ] 'grass'

5b. Nasalization with the Suffix -mẽ

With this suffix, the process begins with nasal assimilation of the final consonant of the root and nasalization of the preceding vowel (rules NAC and PRN). Subsequently, the second consonant in the cluster obligatorily

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[4] These are: *-an* 'nom fut', *-ɨwã* 'diff loc', *-eʔɨm* 'nom neg', *-aʔɨn* 'imed past ', *-wĩan* 'imed fut', *-ĩ* 'attentuat', *-mẽ* 'emph'.

drops. It should be noted that, in the case of the optional rule (CAp), it is the first consonant that drops. The rule for *-mẽ* is thus morphologically conditioned, applying only to this suffix when preceded by a nasal consonant (either underlying or derived through rule NAC). When *-mẽ* is preceded by a vowel, whether nasal or not, no change occurs.

Apocope Rule with *-mẽ*   OBLIGATORY
(Ap-mẽ)   C[+nas] → Ø / C[+nas] + --------- <emphasis>

Examples (44–49) below illustrate the derivations with *-mẽ*:

	(NAC)	(PRN)	(Ap-me)
44. opáp-mẽ 'really finished'	opámmẽ	opãmmẽ	[opãmẽ]
45. oʔát-mẽ 'really fell'	oʔánmẽ	oʔãnmẽ	[oʔãnẽ]
46. aʔók-mẽ 'I really uprooted'	aʔóŋmẽ	aʔõŋmẽ	[aʔõŋẽ]
47. ekɨy-mẽ 'really pulled'	ekɨỹmẽ	ekɨ̃ỹmẽ	[ekɨ̃ñẽ]
48. ikɨláw-mẽ 'really black'	ikɨláw̃mẽ	ikɨlãw̃mẽ	[ikɨlãw̃ẽ]
49. yúŋ-mẽ 'really kept'	ñũŋmẽ	-	[ñũŋẽ]

Compare these examples with (50) and (51), where the roots end in a vowel:

50. yopã-mẽ [ñõbãmẽ]   'to really hit'

51. etsé-mẽ [etsẽmẽ]   'to really enter'

The rule (Ap-mẽ), like (NAC) and (PRN), must be ordered after rule (RN), as the nasalization extends leftward only to the vowel contiguous to the nasal consonant.

6. Nasal assimilation

The specific process of nasal assimilation of the consonant preceding *-mẽ* and the subsequent deletion of the segment *m* in the suffix differs from both the more general process of nasalization in Awetí described by rule (CAp)—which deletes the first consonant in a consonant cluster—and

another characteristic process observed in some Tupí-Guaraní languages (such as Tapirapé, Tupinambá, and Guajajára), in which the initial stop of certain morphemes undergoes nasalization when preceded by nasal segments. If this nasal segment is a consonant, the nasal consonant is often subsequently deleted.

Among the most common morphemes undergoing such assimilation are (Tba) *katú*, (Tpe) *kãto*, (Gj) *katú* 'good, beautiful, well', which respectively appear as ŋgatú, ŋãtó, and ŋatú after a nasal segment[5]. Similarly, (Tba) *pukú*, (Tpe) *pokó*, 'long', are realized as *mbukú* in (Tba) and *mokó* in (Tpe) after a nasal segment. This also applies to the nominal past suffix *-pwéra* (Tba) or *-kwéra* (in some other Tupí-Guaraní languages). In Awetí, the suffix *-pút*, corresponding to *-pwéra* and carrying the same meaning of nominal past, is the only morpheme affected by this process, and even then, only when preceded by a nasal consonant. The rule below formalizes this process, and examples (52) and (53) illustrate the derivations:

Nasal Assimilation Rule with /-pút/
(NA-pút)   [-cont +ant -cor] → [+nas] / [-syll +nas] + --------- <nom past>

	(NA-pút)	(CAp)	
52. káŋ-pút	kãŋmút	kãmút	'bone outside the body'
53. mén-pút	mẽnmút	mẽmút	'ex-husband'

Compare these examples with (54), where the final segment of the root is a nasal vowel, and therefore (NA-pút) does not apply:

54. etɨmã-pút [ẽdɨ̃mãbút] 'leg detached from the body'.

In this case, only the voicing of the stop following the nasal occurs, which is a general rule of the morphophonemic structure.

7. Glide nasalization

Let us return to the modified rule for glide nasalization (GN). In a form like *potazõ* ('to steal'), followed by the suffix *-at*, the suffix remains oral. However, if *-at* is followed by *-put*, the resulting form will be [põdãzõãmút], not *[põdãzõapút], as might be expected from rule (NA-put). To avoid incorrect derivations, it is therefore necessary either to reformulate (NA-put) or to postulate another rule to separate the nasalization of glides expressed in (GN) from the progressive nasalization of VC-pattern syllables.

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[5]In the case of Guajajára (Gja), in which there are no longer underlying nasal vowels (Soares, 1977), the initial nasality in ŋatú is a vestige of productive processes in an earlier stage, when there were nasal vowels. The data for Tapirapé (Tpe) are from Leite (1977).

Let us first consider what would happen if we kept (GN) and added a rule that nasalized the suffix *-at* when followed by *-put*, but not when *-at* marked a word boundary. After this rule (N-at), which we will not formalize here, the rule (NA-put) would be applied. Example (55) illustrates how the derivations would proceed:

55.   /potazõ-at/ 'thief'   /potazõ-at-put/ 'former thief'

(RN)   põdãzõat   põdãzõatput

(N-at)   -   põdãzõãnput

(NA-put)   -   põdãzõãnmut

(CAp)   -   põdãzõãmut

(EAV)   *[põdãzw̃at]   [põdãzw̃ãmút]

(VRNS) represents two general rules, not formalized in this study, for the raising of mid vowels and the non-syllabic occurrence of high vowels before a.

8. Vowel denasalization

For the correct final derivation of *potazõ-at*, yet another rule is necessary: a rule of vowel denasalization at internal junctures when followed by an oral vowel (or syllable) and a pause. This rule must be ordered after rule (N-at) to prevent the denasalization of the final vowel in /potazõ/ followed by *-at-put*:

Vowel Denasalization Rule
(DV) V → [-nas] / ------- + [-nas]

By applying (DV) to the result of (N-at), we obtain [põdãzoát]. This rule must then be ordered before (EAV), which yields the final derivation [põdãzwát].

Rule (N-at) accounts for cases involving *-at* and *-ap* at the end of a word or when followed (in the *-at* case) by *-put*, which, as noted, is the only suffix whose initial stop undergoes nasal assimilation. However, such a rule does not account for the nasalization that occurs with *-aw* (the gerundive suffix) in word-final position. Thus, it would need an additional specification in the left-hand side of the rule to exclude glides from its domain of application. In any case, such a rule would need to be ordered before (DV) to prevent the denasalization of a nasal vowel

before *-aw*, producing an incorrect result like **põdãzoáw*, with an oral final vowel.

9. Alternative interpretation

An alternative to rule (N-at), which seems more natural and appropriate, and which we will adopt here, is to modify the environment of rule (NA-put) (for the nasalization of the initial stop of *-put*) as follows:

Modified Nasalization Rule for *-put* (NA'-put)
(NA'-put)   [+cont +ant -cor] → [+nas] / [-syll +nas] + VC, CV + ------- <nom past>

By this rule, given the basic form /potazõ-at-put/, we would first have the nasalization of *-put*, followed by the nasalization of *-at* and the deletion of the first consonant in the cluster through the successive application of rules (NAC), (PRN), and (CAp). On the other hand, as previously noted, rule (RN) must precede (NAC) and (PRN), and rule (GN) must precede (RN). The overall ordering of the entire process is specified in (56) below, along with the corresponding derivations:

56.	/potazõ-aw/	/potazõ-at/	/potazõ-at-put/
(NG)	potazõaw̃		
(NR)	põdãzõãw̃	-	põdãzõatput
(AN'-put)	-	-	põdãzõatmut
(ANC)	-	-	põdãzõanmut
(NRP)	põdãzõãw̃	-	põdãzõãnmut
(ApC)	-	-	põdãzõãmut
(DV)	-	põdãzoat	
(EAV)	[põdãzw̃ãw]	[põdãzwat]	[põdãzw̃ãmut]

Thus, we see that the correct derivations in (56) required all the rules mentioned so far, except for the specific rule of consonant apocope for *-mẽ* (Ap-mẽ).

10. Other cases of nasalization

We will now present some special cases where progressive or regressive nasalization occurs in one or more segments. At this point, we are unable to formalize these situations as phonological rules. First, observe

the contradictory realizations in (57) and (58), for which we currently have no explanation:

57. o-te-ewít-yu tsã [õdẽβĩñũdsã] 'they are copulating,' with general regressive nasalization triggered by the pronoun *tsã* ('they')

58. o-ʔapát-e-yu tsã [oʔapareỹũdsã] 'they are lying down,' with only partial regressive nasalization influenced by the same *tsã*.

Now consider examples (59–62):

59. a-táŋ it-e-karupáp-pɨwo [ãdãŋ ĩtekarupapɨwo] 'I put it in my bag,' with progressive nasalization in the second word affecting only the first vowel, influenced by the preceding consonant.

60. it-e-ʔip-atsám [ĩdẽʔĩ̃pãdzãm] 'my belt,' with total regressive nasalization, alongside (61) and (62), where the same segments do not undergo regressive nasalization in identical environments:

61. i-ʔiwát-atsám [iʔiwárãdzãm] 'my waistband-wrapping object'

62. i-pó-kút-atsám [ipokurãdzãm] 'my finger-wrapping object'

Examples (60–62) may indicate a process of rule loss, as (60) currently seems to correspond to a fixed, indivisible form, whereas (61) and (62) were artificially constructed forms, since 'ring' is not typically something 'that wraps,' nor is 'waist.' The commonly used form for 'my ring' is *i-pó-kút-etsát*, where the suffix *-etsát* indicates something that 'encircles without wrapping.' However, by accepting the requested form as possible and composing it without regressive nasalization, the speaker demonstrates in (60) a residual process.

Now consider (63) and (64), where regressive nasalization occurs in a vowel beyond the boundaries of the word, which is the proper domain for the application of rule (RN):

63. wey-ʔaká taʔẽ [weyakãtãʔẽ] '(he) broke the pot'

64. o-pút te-ʔinĩ [opũntẽʔĩnĩ] 'his hammock tore'

Finally, we observe cases such as (65–68), where a nasal consonant triggers progressive nasalization of subsequent vowels or syllables within the word boundary, alongside (69), where such nasalization does not occur:

65. n-uwáy [nũwáy] 'his tail'

66. mé-ɨwã [mẽɨ̃w̃ã] 'along the path'

67. my o-páp [mỹ opáp] 'twenty (foot ended)'

68. ne-ʔekɨt [nẽʔẽkɨt] 'honeycomb'

69. ne-piraʔɨt [nepiraʔɨt]

Examples (65–68) are crystallized forms, attesting to the existence of an active rule in Proto-Awetí-Tupí-Guaraní. Traces of this rule can also be found in Tupí-Guaraní languages, including Tupinambá. It must have been a very general rule of morphemic structure, postulating that all vowels following a nasal consonant are nasal. Residues of this rule include certain forms in Tupinambá with the causative prefix *mo-* where the following consonant is often nasal, often oral[6], like *mondyca ~ mossyca* /mo-sɨk/ 'to cause to arrive'; *mopoca* 'to shoot' (*poca* 'to explode, burst') alongside *momboca* 'to pierce' /mo-pok/. The very fact that the nasalization is inconsistently recorded suggests a trend toward the disappearance of this rule in Tupinambá.

In Awetí, we find only one word attesting to the rule's existence at an earlier stage. This is [mõdép] /mõtép/ 'to put inside,' possibly from */mo-tép/. All other forms with the causative prefix are oral today: [motó] /mo-tó/ 'to give (to cause to go)'; [mopir'á] /mo-pir'á/ 'to wet'; [mokúy] /mo-kúy/ 'to knock down,' etc.

Alongside this rule posited for Proto-Awetí-Tupí-Guaraní, there must have existed another (earlier? later? contemporary?) rule involving the partial denasalization of a nasal consonant before a phonemically oral vowel. That is, a rule that created non-continuant nasals, or nasals with oral post-occlusion, generally represented in historical Tupinambá sources as *mb, nd, ng*. These two rules would have been mutually neutralizing. Assuming they coexisted, how could their ordering, application, or mutual relationship be determined? Perhaps the behavior of affixes can shed light on this seemingly chaotic situation.

A morpheme ending in a nasal consonant followed by an oral suffix would either nasalize the suffix vowel (assuming the first rule, a morphemic structure rule, was active and ordered first) or would somehow indicate that the vowel was oral. From this perspective, the partial denasalization rule could be understood as subsequent to the rule of vowel nasalization following a nasal consonant, arising from the need to maintain the orality of the suffix. Tupinambá forms such as /okén-ab-a/, recorded as *okendába* 'door' in historical sources, /tɨm-ar-a/ *tymbára* 'planter', and others attest to this stage. The rule might later have generalized to other internal situations within the morphemes, or it may always have been quite general, as evidenced by forms like /moná/ *mondá* 'to steal' and /namí/

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[6] The examples are from Barbosa (1967).

nambí 'ear' within roots. The fact is that, at least in Tupinambá, according to Rodrigues (1958), nasal consonants had continuant allophones (m, n, ŋ) before nasal vowels and non-continuant allophones (mb, nd, ŋg) before oral vowels.

In Awetí, none of these rules operate today. However, we have already observed traces of the first rule (Vowels are nasal after nasal consonants) in examples (65–68). As a residue of the second rule (Nasal consonants have oral post-occlusion before oral vowels), we find the morphophonemic alternation *m ~ mb, n ~ nd, ŋ ~* ŋg at root-final positions before certain suffixes. That is, with most suffixes beginning with a vowel, the continuant form of the preceding nasal appears at the morphological boundary. However, with five suffixes——*-aw, -ap, -at, -eyu,* and *-u*—the non-continuant form appears. In examples (70–74) below, the nasal is non-continuant. In (75) and (76), with other suffixes, the nasal is continuant:

70. /tɨm-éyu/ [tɨ̃mbéyu] (represented in this work as [tɨ̃béyu]) 'being planted'

71. /tiʔíŋ-at/ [tĩʔĩŋgat] (or [tĩʔĩgat]) 'the one who speaks'

72. /otén-ap/ [õdẽndáp] (or [õdẽdáp]) 'door'

73. /tém-u/ [tẽmbu] (or [tẽbu]) 'the exit'

74. /tán-aw/ [tãndãw̃] (or [tãdãw̃]) 'running'

75. /tɨm-oko/ [tɨ̃moko] 'to plant (future)'

76. /tán-ɨka/ [tãnɨka] 'to not run'

Let us return to Tupinambá. As early as the 16th century, the two rules already seem to conflict, as evidenced by contradictory records of the same words, by the same author (or scribe), when used with the causative prefix:

77. monguaba, moguaba, mboguaba /mo-kwab/ 'to make pass'

78. mboé /mo-'é/ 'to teach'

79. mbocaba, mocaba /mo-káb/ 'to shoot'

80. monguera /mo-kér/ 'to make sleep'

This suggests that the vowel of the prefix was sometimes interpreted by the speaker as nasal, leading to merely articulatory pre-nasalization with voicing of the following stop, and at other times as oral, resulting in oral post-occlusion with voicing of the preceding nasal consonant (both situations represented in the sources as *mb, nd, ng*). For an accurate representation of

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phenomena caused by distinct processes, in the first case, we might write ᵐb, ⁿd, ᵑg, and in the second, mᵇ, nᵈ, ŋᵍ. The question that remains is whether these two cases are, articulatorily and acoustically, the same thing.

In Awetí, the outcome appears to be identical, as we see when comparing modern forms such as [tõbã] or [tõᵐbã], and [nãbi] or [nãᵐbi], derived respectively from *tupã* and *namí*, but now synchronically /topã/ 'thunder, storm' and /nãpí/ 'ear'.

11. Conclusions

Six phonological rules are necessary to describe the regular process of nasalization in the Awetí language. These are, in order of application, as follows:

1. (GN) Nasalization of glides

2. (RN) General regressive nasalization

3. (NA'-put) Nasal assimilation of *-put*

4. (NAC) Nasal assimilation of consonants

5. (PRN) Partial regressive nasalization

6. (Ap-mẽ) Apocope of the consonant in the suffix

7. (DV) Partial denasalization of vowels

Between (5) and (6), the general, optional consonant apocope rule (CAp) is inserted, and after (7), the vowel raising and non-syllabic occurrence rules (VRNS) are applied. Other rules that are not directly relevant to the process under analysis have been excluded, as well as the general morphemic structure rule—which must precede all these rules—for optional voicing of consonants after a nasal vowel or glide.

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