

NASAL HARMONY IN AWETÍ: A DECLARATIVE ACCOUNT

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ABSTRACT: This article describes and analyses nasal harmony (or spreading of nasality) in Awetí. It first shows generally how sounds in prefixes adapt to nasality or orality of stems, and how nasality in stems also ‘extends’ to the left. With abstract templates we show which phonetically nasal or oral sequences are possible in Awetí (focusing on stops, pre-nasalized stops and nasals) and which phonological analysis is appropriate for account for this regularities. In Awetí, there are intrinsically nasal and oral vowels and ‘neutral’ vowels which adapt phonetically to a following vowel or consonant, as is the case of sonorant consonants. Pre-nasalized stops such as “nt” are nasalized variants of stops, not post-oralized variants of nasals as in Tupí-Guaranian languages. For nasals and stops in syllable coda (end of morphemes), we postulate arqui-phonemes which adapt to the preceding vowel or a following consonant. Finally, using a declarative approach, the analysis formulates ‘rules’ (statements) which account for the ‘behavior’ of nasality in Awetí words, making use of “structured sequences” on both the phonetic and phonological levels. So, each unit (syllable, morpheme, word etc.) on any level has three components, a sequence of segments, a constituent structure (where pre-nasalized stops, like diphthongs, correspond to two segments), and an intonation structure. The statements describe which phonetic variants can be combined (concatenated) with which other variants, depending on their nasality or orality.

KEYWORDS: Nasal harmony; Awetí; declarative phonology; pré-nasalized consonants.

INTRODUCTION

In several branches of the Tupí family (lowlands of South America) there exists nasal harmony (NH) or, in other terms, ‘spreading’ of nasality. In the following I describe NH for one particular Tupian language, Awetí, the closest relative of the well-known large Tupí-Guaraní subfamily. Awetí is the language I am studying for 11 years now (including some 14 month of fieldwork and several additional months of work with usually two speakers in Belém).

¹ Museu Paraense Emílio Goeldi / Belém & Goethe Universität Frankfurt. In the years 2001–2005 our research was sponsored by the Volkswagenstiftung within the Program for the documentation of endangered languages (DOBES). Therefore, during those years the focus was on a collection of a large corpus of annotated primary data (see *Awetí Documentation* in the references).

The contribution takes a ‘declarative’ position, describing the facts on two levels, a phonetic and a phonological one, and the relations that hold among these levels, in principle without making use of ‘processes’ or derivations (other than as handy metaphors). The underlying framework (Lieb 1979d; 1999; 2008) is close to an improved modern version of the traditional Trubetzkoyan conception. Due to this position, the presentation does not presuppose knowledge of this specific theory but should be accessible with general knowledge of traditional / structuralist phonological concepts. In the first part (sections 1 and 2) I give a general informal description of NH in Awetí. This first part is a slightly improved version of parts of Drude (2008). In the second part (sections 3 and 4) I provide more details on the theoretical background and apply this conception outlining an axiomatic declarative description of NH in Awetí.

1. GENERAL DESCRIPTION OF NASAL HARMONY IN AWETÍ

The phonology of Awetí and its nasal harmony (NH) have been studied already in the 1970’s especially by Ruth Monserrat (Emmerich and Monserrat 1972; Monserrat 1976). The following presentation, however, is based on my own empirical observations, working with Awetí speakers. It diverges (mostly in the form of analysis, only occasional in the observed facts) from Monserrat’s account, which cannot be discussed in this contribution.

I start the discussion of NH in Awetí by comparing two paradigms of indicative, unmarked for aspect forms the two transitive verbs *nātātu* ‘to wait for sb./sth.’ (monosyllabic stem: *tā*) and *nātupu* ‘to look at / see sb. / sth.’ (monosyllabic stem: *tup*), listed in phonetic representation in (1):²

(1) Ps.	<i>nātātu</i>	<i>nātupu</i>	Ps.	<i>nātātu</i>	<i>nātupu</i>
1	[ãntã]	[atupˀ]	1+2	[tʃĩntã]	[tʃitupˀ]
2	[ẽntã]	[etupˀ]	1+3	[ʒžõntã]	[ɔzɔjtupˀ]
3	[wẽntã]	[wejtupˀ]	2+3	[pẽntã]	[pejtupˀ]

² Note that Awetí expressions not explicitly marked as phonological (in slashes “/.../”) or phonetic (in brackets “[...]”) representations are orthographical. This paper, however, does not deal at all with Awetí writing and orthography (see Drude, Awetí et al. to appear for a description of these).

Both paradigms contain the same person prefixes *a-*, *e-*, *wej-*, *ti-*, *ozoj-*, and *pej-*. But all these person prefixes are phonetically nasalized throughout before a root with a nasal vowel, while the person prefixes are oral before stems without nasal segment.

In view of this regularity, we assume that the vowels of the person prefixes are not determined phonologically for orality or nasality, as this can be predicted from the context (e.g., the next vowel). Accordingly, the phonological explicit representation for the first person prefix is /a-, where the underlined “a” stands for a ‘neutral’ “a”-vowel (i.e., an “a” without any of the two properties, neither ‘nasal’ nor ‘oral’; for details see section 4.1, especially (16), below).

While the vowels of the person prefixes are ‘neutral’, the vowel of the stem *tã* is intrinsically nasal, so the phonological representation of the stem *tã* is /tã/. In the end it is that /ã/ in the stem that ‘triggers’ phonetic nasality in all the other segments in (1). Equally, the /u/ in *tup* is intrinsically oral, and preceding vowels and consonants phonetically harmonize with it in orality.

As can be seen in (1), too, if the stem-initial *t* follows immediately a vowel, an additional *n* appears in the nasal forms.³ (Before the other stops, *p* and *k*, the respective homorganic nasals *m* or *ŋ* occur under the same circumstances.) We analyze this sequence, [nt], as a pre-nasalized phonetic variant of the stop /t/. Pre-nasalization always happens to stops when they occur *after* a nasal vowel – or after a nasalized one, as in this case. It can be seen that the final /ã/ is not the immediate cause for pre-nasalization of the stop, because stops that do not occur following a phonetically nasal vowel, for instance at the beginning of words, cannot be pre-nasalized; cf. (2a&b). When a vowel precedes the stem, pre-nasalization will occur with the same segment, as in (2c), with the person prefix *e-* ‘2.Sg’.

(2) a. [tãm] ‘village’ b. *[ntãm] (‘village’) c. [ẽntãm] ‘your_{SG} village’

So, pre-nasalization is a case where a segment harmonizes with its immediately *preceding* segment. But generally, in Awetí elements harmonize with nasal (or oral) segments *at their right* (i.e., NH generally ‘works’ right to left). Indeed, suffixes do not harmonize with

³ After the only consonant that occurs in this position, the palatal [ɲ] (a nasal allophone of /j/), [n] may be present but difficult to identify.

stems in Awetí, they are usually oral. This is illustrated in (3) for the imperfective suffix *-zoko* (*-oko* after consonants, which in turn are realized ‘*lenis*’⁴, as in [3b]).

(3) a. [ãntãzəkɔ] ‘I used to wait’ b. [atuβəkɔ] ‘I used to look’

There is a second case where segments harmonize in nasality or orality with segments to their left: Morpheme-final segments such as [p] in (1) and [m] (2) always correspond in orality or nasality with the *preceding* vowels. Indeed, we assume that the nasal/oral contrast is neutralized for consonants in this position (end of morpheme), for the not-matching sequences are not possible, cf. (4), where ‘#’ represents a word boundary followed by silence or certain segments.

(4) a. *[…tãp^h#], *[…tũp^h#] b. *[…tam#], *[…tum#]

Due to this neutralization, we conclude that on the abstract phonological level in this position an archiphoneme /P/ is present: /ã-tuP/ [atup^h] ‘I saw’, /tãP/ [tãm] ‘village’. It does not carry neither the property ‘oral’ nor ‘nasal’, similar to the ‘neutral’ (underlined) vowels.⁵ Again, nasalization (and oralization) of these segments illustrates NH ‘working left to right’, again affecting, however, only one segment, as can be observed again in the imperfective suffix *-(z)oko* after the root *tem* ‘to leave, go out’, in (5).

(5) [ãntẽmɔkɔ] ‘I’m about to leave / I used to leave’ – *[ãntẽmõŋkɔ]

Nasalization concerns not only person prefixes but prefixes in general. For instance, the reflexive prefix is /te-/ , oral before oral stems and nasal before nasal ones, cf. (6).

⁴ This term has been, to our knowledge, first used by Schleicher (1998) for TG and pTG.

⁵ Assuming archiphonemes /P, T, K/, which are different from usual stops /p, t, k/ and nasals /m, n, ŋ/, which are separate phonemes elsewhere, is independently justified due to *lenization*: frequently (after an oral vowel and when followed by another vowel due to affixation, composition or even across word borders) these segments show voiced continuant allophones [β, r, ɣ], as [atuβəkɔ] ‘I used to look’ in (3), or in [etay itetɛ] ‘you cry about me’ (inter-word-sandhi).

- (6) a. [atɛtup̃] ‘I saw myself’ b. [ãntẽŋkãj̃] ‘I hurt/kill myself’

The second, nasal form, phonologically /a-te-kĩj/, demonstrates that nasalization may extend over several syllables until the left end of a word.

Nasal consonants, too, cause nasalization of segments to their left, but not to their right. Both can best be seen in the case of prefixes containing nasal consonants. One example is the causative prefix *mo-*, cf. (7), with the intransitive stem *tak* ‘cry’.

- (7) a. [ãmɔtak̃] ‘I made sb. cry’ b. [ãntẽmɔtak̃] ‘I made myself cry’

The vowel of this prefix is a neutral vowel, /o/, as in the case of other prefixes, as can be seen when it gets nasalized in front of nasal stems such as *tem* /tẽP/ ‘go out’, in (8).

- (8) [ãmõntẽm] ‘I made sb. go out’

Nasal harmony affects not only prefixes but holds also within stems of two or even more syllables. Mostly, stems are wholly nasal or fully oral, as those in (9).

- (9) a. [ãmpõwã] ‘I spun’ b. [ãŋkãrãj̃] ‘I scratched sb./sth.’
 c. [akĩsitɛ] ‘I feel shame’ d. [atatap̃] ‘I crossed sth.’

In these cases, we again propose that nasality or orality of the non-final vowels is phonetic (due to NH) and that in the phonological representation there are neutral vowels in the non-final syllables: /pɔwã/ ‘spin’, /kãrãj̃/ ‘scratch’, /kĩsitɛ/ ‘feel shame’, /tãtap̃/ ‘cross’.

There are, however, cases where a stem has two parts, one nasal to the left and one oral to the right (the opposite is not possible). One theoretical possibility for this would be of course that a nasal consonant /m, n, ŋ/ occurred in the middle (or beginning) of a stem. As a matter of fact (due to diachronic reasons), this does never happen, at least not in verbs;

apparently in Awetí nasal consonants occur only in verbal stems that have a nasal vowel anyway.

But sometimes a nasal *vowel* occurs in the non-final syllable of a stem. For instance there is a form that contrasts with a. in (6) only with respect to nasality, cf. (10).

(10) [ãntẽtup̃] ‘I heard sb/sth, I listened to sb/sth’

Morphologically, we propose that (10) has the following form: /at- ẽtuP/, where /at-/ is an allomorph of the first person singular prefix that occurs before transitive stems that start with a vowel.⁶ It is an empirical fact that in /ẽtuP/ ‘hear, listen’ and in similar stems an intrinsically nasal vowel occurs in a non-final syllable.⁷ Prefixes harmonize with that first, nasal, (rather than with the final) vowel. Intrinsically oral vowels occur only in final syllables of stems (and of suffixes), which is where neutral never occur.

Once there is nasality present in a word, all segments to its left are (directly or indirectly) affected by it. So, oral vowels or oral voiced consonants, or plain medial oral stops (other than pre-nasalized), do not occur left of nasal vowel or consonant in the same word, as is illustrated by the impossible forms in (11).⁸

(11) *[ãtã], *[atã], *[antã], *[antẽtup̃], *[ãtẽtup̃], *[ãtentup̃], ...

Finally we demonstrate that glottal segments are transparent to NH. Observe that the first syllables of (12a) but not of (12b) are nasal.

⁶ It is irrelevant in this context if the /t/ might be a separate morpheme, as can be argued.

⁷ This means that the distribution of nasal vowels overlaps with that of ‘neutral’ vowels, so the contrast oral–nasal is not completely neutralized in non-final syllables in Awetí stems, differently from most TG languages. Thus ‘neutral’ vowels are not genuine archiphonemes. We nevertheless stick to them because they allow straight forward to represent the mere phonetic nature of orality and nasality in most non-final syllables. In a stem with two phonetically nasal vowels it is impossible to determine if nasality of the left vowel is intrinsic or due to NH. We assume in the phonological representations that the latter is the case.

⁸ In fact, nasality in Awetí may be rather weak, on nasalized as well as on intrinsically nasal vowels, and may even disappear at all under circumstances the details of which have still to be identified (main factors seem to be velocity and carefulness of speech). The same holds for the pre-nasalization of stops. So, in certain styles of speech some of the forms listed here *can* occur. Generally, in this paper we always refer to the phonetic forms in the style of speech where nasality is fully realized. These forms are always possible and are preferred when elicited or in careful speech. So where we use a nasal symbol on the phonetic level, this indicates that nasality may (and usually will) be present and will always be the accepted and possibly the preferred pronunciation. – Other instances where an oral segment occurs left of a nasal segment are in case of composition.

(12) a. [ĩntẽʔĩnĩ] ‘my hammock’ b. [kajẽʔototapʔ] ‘our men’s house’

In *it- e² inĩ* in (12a), *i(t)-* is the nominal first person singular prefix and *e(?)-* is a prefix that marks alienable possession. (Both prefixes are represented by their consonant-final allomorphs that occur before vowels; the consonant does not occur before consonant-initial morphemes, hence the parentheses.) In (12b), *kaj- e’- ototap*, *kaj-* is the nominal prefix for the first person plural inclusive.

Using typological parameters developed for phenomena of ‘spreading’, the general properties of NH in Awetí as shown above can essentially be resumed in the five statements in (13).

(13) Statements resuming nasal harmony in Awetí

1. Generally, using procedural metaphors, NH in Awetí ‘works’, or nasality ‘spreads’, from the right to the left.⁹
2. If it works from left to right, it affects at most one segment, while to the left it can cover several syllables, mostly until the beginning of the word.
3. The ‘source’ of nasality (segments that are believed to be nasal on the phonological level and with which other segments harmonize on the phonetic level), is usually (a) one of the intrinsically nasal vowels /ã, ẽ, ĩ, õ, ũ, ã/ or (b) one of the nasal consonants /m, n, ŋ/. (c) Besides these, phonetically nasal (including nasalized) vowels cause nasalization of a consonant at their right.
4. Segments that harmonize phonetically as to nasality or orality, that is, the affected ‘targets’ of nasal spreading, are: (a) the phonologically neutral vowels /a, e, i, o, u, ĩ/; (b) the voiced consonants (i.e., the glides /j, w/, the liquids /l, r/ and the reflexive fricative /z/); (c) the plosives /p, t, k/ and the affricate /ts/, which have pre-nasalized phonetic variants [mp], [nt], [ŋk] and [nts]; and (d) the final consonants /P, T, K/ which

⁹ In agreement with current phonological literature, we will often also use such metaphors, without, however, committing ourselves to the existence of *processes* and the like. What can be observed are, of course, (utterances of) word forms in which certain parts or sequences of segments are phonetically nasal (or nasalized), and of which we have reasons to believe that in a more abstract representation (‘phonological’ or better ‘morpho-phonological’) only some segments contain the property ‘nasal’ or similar, and these segments generally are found at the right end of the phonological correspondences of the phonetically nasal stretches. Again, in a procedural metaphor the nasal segments in the abstract representation can be said to be the ‘source’ or ‘cause’ or ‘origin’ of nasality in other segments in the phonetic representation, but of course the relationship between the two levels of representation is not of a temporal nature.

have among their oral variants the unreleased stops [p̚, t̚, k̚] and the ‘lenis’ continuants [β, r, γ], and as their nasal variants [m, n, ŋ].

5. The glottal segments /ʔ, h/ are not affected by, and transparent to, NH.¹⁰

2. A SYSTEMATIC JUSTIFICATION OF THE ACCOUNT OF NASAL HARMONY IN AWETÍ

A more systematic and abstract account of the phonetic forms attested in Awetí is given in Table 1, focussing on the stops (nasals and plosives including pre-nasalized plosives) which show the most intriguing variation in Awetí. On the left is the phonetic part of the table, each cell representing a pattern of a hypothetical phonetic sequence. In this part of the table, “a” stands for any phonetically oral vowel and “ã” for any phonetically nasal vowel. Analogously, “t” stands for any phonetically oral stop, “n” stands for any phonetically nasal consonant, and “nt” for any homorganic bi-segmental nasal-plosive consonant (pre-nasalized plosive or, in other languages, post-oralized nasal). Patterns which are impossible in Awetí are crossed out and shaded in grey.

On the right, we repeat the same table for the phonological level, that is, for each existing phonetic form we give our phonological interpretation. Again, underlined and capital letters are to be understood as before and as made explicit in (16) and (18), below. Observe that the phonological nature of the vowel in lines 1 and 2 depends on if other syllables follow in the word. Also, for facilitating the presentation, in lines 5–8 we assume that the vowel to the right is the last in a stem.

¹⁰ Articulatory phonetic studies may well prove that glottal segments are in fact also affected by NH (the position of the velum may vary). But this does still not necessarily imply that we would have to include the property (‘feature’) ‘nasal(ized)’ in these segments, or that these segments would have to count among the ‘targets’ of nasalization. In the conception used in this contribution, the phonetic level contains only (and all) properties of linguistic entities that are intended by a speaker in order to produce a ‘normal’ utterance of these entities. This condition do not seem to apply to ‘nasal(ized)’ in the case of glottal sounds in Awetí.

		Phonetic			Phonological		
		<i>a</i>	<i>b</i>	<i>c</i>	<i>a</i>	<i>b</i>	<i>c</i>
		[t]	[nt]	[n]	[t]	[nt]	[n]
1	[#..a]	#ta	# nta	#na	#t(a/a)		#n(a/a)
2	[#..ã]	#tã	# ntã	#nã	#t(ã/a)		#n(ã/a)
3	[a..#]	at#	ant#	an#	aT#		
4	[ã..#]	ãt#	ãnt#	ãn#			ãT#
5	[a..a]	ata	anta	ana	ata		
6	[ã..a]	ãta	ãnta	ãna		ãta	ana
7	[a..ã]	a tã	antã	anã			
8	[ã..ã]	ã tã	ãntã	ãnã		a tã	a nã

Table 1: Abstract possible and impossible sequences involving stops in Awetí

In order to illustrate these patterns, in (14) for each occurring pattern (identified by its cell) we list a word (mostly nouns, consisting only of a stem) of Awetí, naming its phonetic and phonological forms, and a gloss.

- (14) 1a. [ta] /ta/ ‘eye’ [tukit̃] /tukiT/ ‘salt’
- 1c. [mɛ] /me/ (particle) [miʔak] /miʔaK/ ‘manioc starch’
- 2a. [tĩn] /tĩT/ ‘fly’ [tãʔɛ] /taʔɛ/ ‘(a certain) pot’
- 2c. [nã] /nã/ ‘he/she/it’ [nũjã] /nujã/ ‘meat, flesh, muscles’
- 3a. [ɛt̃] /eT/ ‘name’
- 4c. [ãmãn] /ãmãT/ ‘rain’
- 5a. [atu] /atu/ ‘grandfather (vocative)’
- 6b. [õtẽntap̃] /õtẽtaP/ ‘door’ (the part *ẽta*)
- 6c. [pĩĩĩit̃] /pĩĩĩiT/ ‘humming-bird’ (the part *ĩĩĩ*)
- 8b. [mĩntã] /mitã/ ‘fish-hook’
- 8c. [ĩnĩ] /inĩ/ ‘hammock’

In what follows, we justify our phonological analysis in a more systematic manner which permits comparison with the other two languages, below, with reference to the cells in Table 1.

As can be seen in the cells *6b* and *8b* in the phonological part, we analyze the pre-nasalized plosives as phonetic variants (‘allophones’) of the plain plosives rather than as post-orialized variants of the nasal consonants (as in many Tupí-Guaranian languages). The reason for this is that there is a contrast between the possible sequences *6b* and *6c* and between *8b* and *8c*; and *1b*, *6a* and *8a* are impossible whereas *1a* and *1c* do exist.

Equally, the reason for analyzing the left vowel (and similarly other non-last vowels) in *5a*, *6c* and *8b+c* as phonological neutral (unspecified for nasality or orality) lies in the fact that an oral vowel left of a nasal vowel is impossible in virtually all non-composed words in Awetí (no simple word following a pattern of any of *7a,b,c* exist), so that the nasality at the left of a nasal vowel (cf. *8b+c*) or nasal consonant (cf. *6c*) can be predicted from the nasality of the segment at right in question, or the orality of the left vowel in *5a* from that of the orality of the following consonant and vowel.

Only in the cases represented by *6b* the nasality of the left vowel cannot be predicted (phonologically, all segments at its right are oral), and we have to assume that in this case the nasality of the left vowel is phonological.

It is for two reasons that we conclude that it is the left, rather than the right, vowel that adopts to the other harmonically in a sequence of agreeing vowels: a) in the case of *6c* – in contrast with *6b* –, it appears obvious that it is the phonological nasality of the consonant of the right that ‘causes’ the phonetic nasality of the left vowel (observe that *3c*, *5c* and *7c* are impossible), and the impossibility of oral vowels continues to the left until the beginning of the word. It seems plausible that the direction of adaptation among vowels is the same. b) There is no case of a prefix that causes nasality or orality of distant segments of other prefixes or stems at their right – on the contrary, almost all prefixes have a phonetically oral variant that combines with oral stems and a nasal variant that combines with nasal stems or prefixes at their right (see *a-*, *te-* and *mo-* in the examples above). Suffixes, on the other hand, are almost always oral even if the stem ends in a nasal segment. The few suffixes that contain nasal segments do nevertheless not cause nasality of the word as a whole. This in turn is an argument for our analysis that the last vowel of the stem is always phonologically (inherently) oral or nasal, differently of most vowels in prefixes and differently of most vowels in non-final syllables in stems.

Finally, we adopt an analysis of the final consonants where the contrast between nasality and orality is neutralized in the consonants. We represent the final segments phonologically with capital letters as usually applied for archiphonemes. In principle, the facts represented by the lines 3 and 4 (the last consonant and the preceding vowel always correspond in nasality or orality) allow also for an alternative solution where it would be the nasality of the consonant which existed on the phonological level rather than that of the vowel. Our solution has been at least considered for several Tupí-Guaranian languages, and also for Awetí by Monserrat (1977: 2). She preferred the alternative solution, because their ‘morphonemic behaviour’ ‘permits a safer interpretation’ that way.

We, however, hold that this analysis generalizes best the behaviour of all final consonants (including glides which also agree in nasality / orality with the preceding vowel, as Monserrat (1977: 2-4) already admitted) and captures well the regularity of the pattern of all stems (where the final vowel is always inherently nasal or oral). Also, the final consonants show other unique features, especially lenition, which suggests that they may be particular phonemes (with a restricted distribution), allowing for an analysis where no phonological ‘features’ are deleted or exchanged by other incompatible features in order to obtain the phonetically attested forms.

Given our analysis of the sample forms, NH in Awetí can be accounted for by the ‘rules’ in (15), still referring to the patterns exemplified in the cells in Table 1.

(15) Informal declarative ‘rules’ of nasal harmony in Awetí.

1. Any neutral vowel at left of a nasal vowel (independent of the intervening consonant or consonants) is phonetically nasal (as *7a,b,c* are impossible) and equally at the left of a nasal consonant (for *3c, 5c* and *7c* are impossible).
2. Voiced consonants (glides, liquids or fricatives) in the same environment are also phonetically nasal (not covered by Table 1).
3. All these segments are oral if they are at the left of only oral segments (cf. *5a*).
4. Non-final plosives or affricates are pre-nasalized adjacent at the right of a nasal vowel (*6a* vs. *6b*) or adjacent at the right of a nasalized vowel (*8a* vs. *8b*), else as plain oral stops / affricate.
5. Final consonants correspond in nasality / orality to the preceding vowel (lines 3 and 4; this holds also for glides; other consonants do not occur in this position).

In the remaining sections we show how these rules are formulated in the underlying formal framework.

3. A DECLARATIVE ANALYSIS OF NASAL HARMONY IN AWETÍ 1: ‘UNITS’ (SEGMENTS AND SEQUENCES)

3.1. VOCALIC AND CONSONANTAL UNITS AT THE PHONOLOGICAL LEVEL AND THEIR PHONETIC VARIANTS

As informally introduced above, at the phonological level, there are segments that are intrinsically nasal or oral. These may ‘spread’ these features, ‘causing’ other segments to harmonize with them. Additionally, we postulate ‘neutral’ segments at the phonological level, that is, segments that do not have none of the properties “nasal” or “oral” and that phonetically ‘receive’ or ‘copy’ nasality or orality from other segments.

This holds in particular for most vowels in non-final syllables. For example, we propose phonologically three “e” vowels, one inherently oral (occurring only in final syllables of stems and in many suffixes), one inherently nasal (occurring mostly in final syllables but also sometimes in non-final syllables of stems, cf. *6b* in Table 1 and the example (10) /a_t-ẽtuP/), and one ‘neutral’ one occurring where the contrast is neutralized, i.e. in non-final syllables of most stems and in almost all syllables of prefixes.

(16) Three phonological “e” vowels: oral, nasal, and neutral.

/e/ = {open, front, oral}, with one main allophone:

[e] = {open-mid, front, oral, unrounded, ...};

/ẽ/ = {open, front, nasal}, with one main allophone:

[ẽ] = {open-mid, front, nasal, unrounded, ...};

/e/ = {open, front}, with two main allophones: [e] and [ẽ] (as above).

As can be seen by these examples, in the theory which underlies this contribution (Lieb 1999; 2008), *segments* are simply conceived as *sets* of properties (‘features’), on both the phonological and the phonetic level.¹¹ The segments on the phonetic level comprise all

¹¹ The fact that a meaningful tree-like structure (in fact, a classification system) on all features (of a given language, or in general) can be postulated, which is one of the major motivations for auto-segmental phonology, does *not* imply, in our point of view, that a structure of features is *part* of each segment; claims based on a feature structure can equally be made when the system is external to the individual segments.

properties an utterance of the segment has to have in order to be ‘normal’ (in a specific sense, which implies properties which are intended by native speakers, and properties necessary for an utterance to be accepted to sound normal by native speakers), so they usually contain a greater number of properties, and more specific properties, than the segments on the phonological level. These, in turn, only contain properties relevant for morphology, syntax or semantics. For instance, in the case of the “e” vowels, the phonetic segments have the more specific “open-mid” instead of “open”, and additionally contain the (phonologically redundant) property “unrounded”, and possibly other properties (indicated by the three dots).

The neutral vowel /e/ is the *intersection* of the two other vowels /e/ and /ẽ/, and this is indeed typical of archiphonemes. These occur in positions where some contrast is neutralized, and for this very reason the properties involved in that contrast are not represented in the archiphoneme.¹² As conceived by Trubetskoy (1989), archiphonemes are genuine segments on the phonological level alongside with the usual ‘phonemes’.

In the case of consonants that can be nasalized (the glides /j, w/, the liquids /l, r/ and the reflexive fricative /z/) we propose that they are equally ‘neutral’, in the same sense, as to nasality / orality on the phonological level. In their case, however, this is not due to any neutralization. For instance, we postulate the glide in (17).

(17) Neutral consonant /j/ and its allophones.

/j/ = {palatal, approximant}, with two main allophones: [j] & [ɲ], where:

[j] = {palatal, approximant, oral, voiced, ...},

[ɲ] = {palatal, approximant, nasal, voiced, ...}.

Voiced consonants are ‘neutral’, but they are nevertheless no archiphonemes: they do not only occur in positions where certain contrasts of related phonemes are neutralized.

¹² It is a common convention to use capital letters for archiphonemes; and this could have been done also in the case of the neutral vowels like /e/. However, we feel that the underlined vowels allow easier reading than capital letters (which we use in the case of the morpheme-final consonants).

3.2. THE MORPHEME-FINAL NON-GLIDE CONSONANTS

There are only certain consonants that may occur at the very end of stems and suffixes. All morpheme-final consonants (including glides, which have been covered above) agree phonetically in nasality / orality with the preceding vowel which is, on this account, always phonologically inherently nasal or oral. That is to say that the contrast between nasal and oral consonants which exists elsewhere in Awetí words, is neutralized in this position.¹³ Therefore, on the phonological level it is again sufficient to assume archiphonemes which do not contain either property: their orality or nasality is only phonetic, irrelevant for morphology and higher structural levels, because it is determined by the phonological context.

Indeed, due to other variation (lenition), these final consonants are even more abstract; according to our proposal illustrated in (18) each of them contains only *one* feature on the phonological level, specifying the point of articulation, the only feature common to all allophones.

(18) The final consonants (archiphonemes) and their allophones.

/K/ = {velar}, with three major allophones: [kʔ], [ɣ], [ŋ].

/P/ = {bilabial}, with three major allophones: [pʔ], [β], [m].

/T/ = {alveolar}, with three major allophones: [tʔ], [r], [n].

The segments on the phonetic level are to be understood following the conventions of the IPA. See for instance the allophones of /K/ given in (19).

(19) The allophones of /K/.

[kʔ] = {velar, oral, stop, voiceless, without audible release, ...};

[ɣ] = {velar, oral, fricative, voiced, ...};

[ŋ] = {velar, nasal, voiced, ...}.

The first of the allophones occurs always after an oral vowel, either at the very end of the utterance (or before a pause), or before an (phonetically) oral stop. The second allophone

¹³ It is irrelevant in this context if these consonants are in the coda of the last syllable of the morphemes / words, or if they are extra-syllabic. The letter analysis is suggested by the syllable structure observed when (other) suffixes are added, especially in the case of lenition.

is a ‘*lenis*’ variant. It occurs only after an oral vowel, and only before another vowel (or possibly a glottal stop, in some cases before a glide). Finally, the third major allophone occurs after a nasal vowel, or before a nasal consonant. The analogous holds for the other final consonants in (18).

3.3. PLOSIVES AND THEIR VARIANTS; INTRODUCING STRUCTURED SEQUENCES

The plosive consonants have pre-nasalized variants after a (phonologically) nasal or (phonetically) nasalized vowel (possibly also after an intervening glide [ɲ]). These pre-nasalized variants consist of sequences of at least two segments. Take for instance the alveolar plosive /t/. This consonant also shows palatalization before /i/ (similar to many dialects of Brazilian Portuguese).

(20) Alveolar plosive /t/ of Awetí and its allophones / variants.

/t/ = {plosive, alveolar};

This consonant has four main phonetic variants [t, nt, tʃ, ntʃ], where:

[t] = {plosive, alveolar, oral, voiceless, ...}

[nt] : a sequence of two segments:

[n] = {alveolar, voiced, nasal, ...}

[t] = {plosive, alveolar, oral, voiceless, ...} (as above)

[tʃ] : a sequence of two segments: [t], (as above) [ʃ]

[ʃ] = {postalveolar, voiceless, fricative, ...}

[ntʃ] : a sequence of three segments: [n], [t], [ʃ] (all as above)

In these last cases of [nt], [tʃ] and [ntʃ] it is not quite appropriate to speak of ‘allophones’; allophony should rather be conceived as a relation that holds among segments (“a segment *x* on the phonetic level is an allophone of a segment *y* on the phonological level”; the term has been used in this sense in this section). More generally, we use the relation ‘variant’ which holds among *sequences* of segments. From this notion, the allophone-relation is

derivable as a special case. In this contribution we always use italics when referring to single segments (sets of features) and always an upright font when speaking of sequences of segments – to be more exact, symbols in upright fonts stand for *structured* sequences, in the following sense.

In the conception we use here, all structural units (such as morphs, words, syllables and their parts) as well as their phonetic variants are conceived as *structured sequences* (s.s.) consisting (being triples) of three components:

- a) a sequence of segments;
- b) a constituent structure of the sequence;
- c) an intonation structure.

The constituent structure (b) distinguishes the vocalic and consonantal units and renders, in particular, the syllables, if any, of the sequence. The intonation structure ascribes features to the syllables, if any, especially the tones, in the case of a tonal language, or the accentuation (in particular lexical accents, in the case of word forms).

For instance, the phonetic word [ã'ntã] ‘I waited’ is a structured sequence that can graphically be designated as in Figure (“V” stands for “vocalic unit”, “C” for “consonantal unit”, “VcGr” for “vocalic group”, the individual segments are as identified above or analogous).

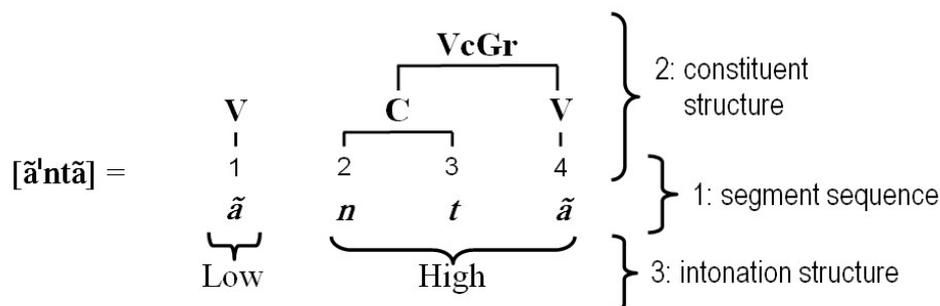


Figure 1: The tree components of the phonetic word [ã'ntã]

The first component of [ã'ntã] is the sequence of the segments [ã], [n], [t], and again [ã], in that order (each position is made explicit by a number above the segment; the brackets have been omitted in Figure 1).

The second component (from the numbers upwards) is a constituent structure of that sequence. It assigns, for instance, the constituent category “vocalic unit” to the first segment

(identified by its position in the sequence, using the number). In this structure, neither $[n]$, the second segment of the sequence, nor the third segment, $[t]$, are by themselves assigned to any constituent category. Rather, in this word these two segments (that is, the respective part of the sequence) are assigned *together* to the category “consonantal unit”.¹⁴ According to the constituent structure, there are two syllables in this word, informally: $[\tilde{a}]$ and $[nt\tilde{a}]$. (The syllables of a sequence are its largest parts assigned to “vocalic unit” or “vocalic group”.)

Finally, the intonation structure represents the fact that the second but not the first syllable carries lexical stress.¹⁵

In an even more explicit set-theoretical notation, the same triple (structured sequence) $[\tilde{a}'nt\tilde{a}]$ can be named like in (21).

(21) Three components of the phonetic word $[\tilde{a}'nt\tilde{a}]$ (set notation).

$$[\tilde{a}'nt\tilde{a}] = \langle \{ \langle 1, [\tilde{a}] \rangle, \langle 2, [n] \rangle, \langle 3, [t] \rangle, \langle 4, [\tilde{a}] \rangle \}, \\ \{ \langle \{1\}, V \rangle, \langle \{2,3\}, C \rangle, \langle \{4\}, V \rangle, \langle \{2,3,4\}, VcGr \rangle \}, \\ \{ \langle 1, \{Low\} \rangle, \langle 2, \{High\} \rangle \} \rangle$$

The relation “is a variant of” holds between structured sequences on the phonetic level and structured sequences on the phonological level – on both levels, structured sequences are triples of this type. Therefore, it is not the segment $/t/$, but the consonantal unit (structured sequence) $/t/$ that has at least four major phonetic variants as indicated above, two of them specified in (22) in set notation. The intonation structure is empty in all cases because these units do not have any syllables.

¹⁴ An analogous analysis is adopted for affricates or diphthongs and long vowels in other languages, which always have been a problem. This solution combines the mono-phonemic (one consonantal or vocalic unit) with the bi-phonemic (two segments) proposal.

¹⁵ Other labels than “Low” and “High” could have been chosen; they are not meant to be tones. Rather, in word forms and their parts, “High” marks syllables that carry lexical accent.

(22) The phonological unit /t/ and two of its variants, [t] and [nt].

/t/ = $\langle \{\{1,/t/\}\}, \{\{1\},C\}, \emptyset \rangle$, with phonetic variants:

[t] = $\langle \{\{1,[t]/\}\}, \{\{1\},C\}, \emptyset \rangle$

[nt] = $\langle \{\{1,[n]/\}, \{2,[t]/\}\}, \{\{1,2\},C\}, \emptyset \rangle$

Like /t/ and [t], most consonants and vowels have *unit sequences* (such as “ $\{\{1,/t/\}\}$ ”) with only one member (the segment /t/) as their first components.

Equally, the prefix /te/ ‘reflexive’ (or *te-*, the name used in morphology), a unit of the phonological level, has at least three (phonetic) variants as indicated in (23).

(23) The phonetic variants of the prefix *te-* ‘reflexive’.

[tɛ] – this variant occurs in oral context, that is, before (prefixes and) stems without inherently nasal segments;

[ntɛ̃] – occurring before stems (or other prefixes) with inherently nasal segments, and only if before /te/ there is at least one other prefix;

[tɛ̃] – occurring usually at the very beginning of words that have stems or other prefixes containing inherently nasal segments.

4. A DECLARATIVE ANALYSIS OF NASAL HARMONY IN AWETÍ 2: ‘RULES’ (RELATIONS AND FUNCTIONS)

4.1. THE FORMAL COMPONENTS OF THE LANGUAGE SYSTEM

In the model used here, there are only three major formal components of language systems related to the phonetic and phonological level which have to be identified in a declarative (ideally axiomatic) description:

a) The relation “is a variant of” (this has to be identified exhaustively at least for the minimal units, that is, vocalic and consonantal units), as explained above. Any phonetic

structured sequence is variant of at least one phonological one, and each phonological structured sequence has at least one phonetic variant.

b) A function “phonological connection” which takes pairs of structured sequences as arguments and assigns to them a third structured sequence the first component of which often is a simple concatenation of the segment sequences of the two initial structured sequences. The result of the connection of the constituent and intonation structures captures phonological resyllabifications and phonological tone sandhi (in the case of tone languages) and the like.

c) A function “phonetic connection” which is analogous to the phonological connection but has as its result *sets* of phonetic structured sequences. This last function is the most complex one, it accounts for all phonetic assimilations, sandhi phenomena etc. Crucially, in the identification of this function can refer to *phonological* properties.

As usual for relations, the identification of both connection functions starts with the identification of *admitted* arguments (pairs). For other pairs the functions are “not defined” (this captures combinatorial restrictions and the like).

4.2. The phonetic connection of Awetí and nasal harmony

The phonetic connection of Awetí has to account for nasal harmony as described above. This is achieved by identifying restrictions on ‘non-harmonic’ phonetic variants – usually, sequences which end in a segment with the feature “oral” do not connect with sequences which begin with a segment containing the feature “nasal”, and vice versa. Some cases (such as the pre-nasalized plosives) present a complication which has to be treated in additional declarative statements.

So, for example, in the case of the connection of “a”-vowels and plosive alveolar consonants, on the phonological level all combinations of /a/, /a/ and /ã/ with each of /t/, /T/ and /n/ are possible.¹⁶ On the phonetic level, only ‘harmonic’ variants of these phonological units do combine (i.e., are allowed as arguments for the phonetic connection), as is demonstrated in Table 2.

¹⁶ There is one exception, the case of /a/ with /T/, for the neutral vowels do not occur in final syllables of morphemes which, however, is the only place where the archiphonemes like /T/ occur. This probably does not have to be covered by the phonological connection, but by statements on the phonological structure of morphemes and words.

<i>0</i>	/a/	/ã/	/ã/		/t/	/T/	/n/	<i>result</i>
<i>1</i>	[a]		○		[t]			⊃ [at]
<i>2</i>		[ã]	○		[t]			: <i>n.d.</i>
<i>3</i>	[a]		○		[nt]			: <i>n.d.</i>
<i>4</i>		[ã]	○		[nt]			⊃ [ãnt]
<i>5</i>	[a]		○				[n]	: <i>n.d.</i>
<i>6</i>		[ã]	○				[n]	⊃ [ãn]
<i>7</i>	[a]		○				[r]	⊃ [ar]
<i>8</i>		[ã]	○				[r]	: <i>n.d.</i>

Table 2: Examples of ‘harmony’ in phonetic connections of vowels and stops

In Table 2, all phonetic units in lines *1–8* are variants of the phonological units in line *0* directly above them. (If a phonetic unit is variant of two phonological units, it is given only once in the middle of both cells; shading indicates that a phonetic unit is not variant of the above phonological one.) We here do not concentrate on the constituent structure and abstract from the intonation structure, but these are always part of all the phonetic and phonological units (as indicated by the upright font).

The last column gives the result of the phonetic connection – or “*n.d.*”, if the phonetic connection is “not defined”. The symbol “⊃” reads “contains as an element” (usually there is only one such element, i.e., one structured sequence being the result of phonetic connection; minor free phonetic variation, for instance, is neglected here).

So, for example in line *1*, [a], which is a variant of both /a/ and /ã/, connects with [t], which in turn can be a variant of both /t/ and /T/. The result is [at], independently of the underlying phonological units. The connection is possible ‘because’ both [a] and [t] are oral segments.

In line *2*, in turn, we see that the nasal [ã] (a variant of both /ã/ and /ã/) cannot be combined with the oral [t]. The same holds for the reversed case (line *3*): the oral [a] cannot

be connected with the phonetic unit [nt] (variant of /t/, as explained above), basically because the first segment of the latter unit is nasal.

The phonetic connection covers also more complex phonetic sequences. Consider for instance the following tables where possible connections are specified that involve morphemes occurring in the form /atəkĩj/ [ãntẽŋkĩj] ‘I hurt myself’ (see (6b) above). First we show which variants of the prefix *a-* ‘1sg’ (first singular) combine with which variants of the prefix *te-* ‘reflexive’ (cf. also (16) and (23), above).

0	/a/ • /te/ /ate/
1	[a] ◦ [tɛ] ⇒ [atɛ]
2	[a] ◦ [ntẽ] : <i>n.d.</i>
3	[a] ◦ [tẽ] : <i>n.d.</i>
4	[ã] ◦ [tɛ] : <i>n.d.</i>
5	[ã] ◦ [ntẽ] ⇒ [ãntẽ]
6	[ã] ◦ [tẽ] : <i>n.d.</i>

Table 3: connection of phonetic variants of *a-* ‘1sg’ with *te-* ‘reflexive’

The variants in lines 2, 4 and 6 are not permitted as arguments for the phonetic connection for the very reasons of ‘harmony’ that rule out lines 3 and 2 in Table 2. Additionally, the connection of the variants in line 3 in Table 3 has no defined result because no sequence A may combine with a sequence B if the last vowel of A is an oral variant of a neutral vowel and the first vowel of B is phonetically nasal.¹⁷ What remains are (at least) two sequences, one of which is oral throughout ([atɛ], in line 1), and one which is nasal, in line 5, [ãntẽ] (so to say, true, the pre-nasalized plosive has an oral part, but still this is the most ‘nasal’ variant a plosive may have).

¹⁷ This is a case where the identification of the phonetic connection makes use of a phonological property (to be “variant of a neutral vowel”). The connection [a] ◦ [tẽ] in itself is principally possible if the [a] is a variant of a phonologically oral vowel (this usually occurs only in cases of composition as almost no prefix contains inherently oral vowels).

Similarly, a stem like /kĩj/ has two main phonetic variants, [kĩj] and [ŋkĩj]. The first can occur after stops, and theoretically at the beginning of utterances or after oral vowels¹⁸ while the second occurs after phonetically nasal vowels (or glides?), in particular after prefixes. This is correctly rendered by the phonetic connection: the result of the phonetic connection of the variants of kĩj with the two possible variants of ate- (the connection of a- ‘1sg’ with te- ‘reflexive’, shown above), is only one phonetic structured sequence, as is shown in Table 4.

0	/ate/ • /kĩj/ /atekĩj/
1	[ate] ○ [kĩj] : <i>n.d.</i>
2	[ate] ○ [ŋkĩj] : <i>n.d.</i>
3	[ãntẽ] ○ [kĩj] : <i>n.d.</i>
4	[ãntẽ] ○ [ŋkĩj] ⇒ [ãntẽŋkĩj]

Table 4: connection of phonetic variants of *ate-* with variants of *kĩj* ‘hurt.sb’

Again, the combination of the variants in line 2 and 3 of Table 4 are ruled out already because the adjacent segments do not agree in nasality / orality (see above lines 3 and 2 in Table 2), and those in line 1 cannot be connected for the same reason as those in line 3 of Table 3.

4.3. FORMULATING THE IDENTIFICATION OF THE PHONETIC CONNECTION IN AWETÍ

A first attempt at formulating the conditions for the phonetic connection of Awetí, as far as nasal harmony is concerned, can be resumed in the declarative statements in (24). Here, “nasal” or “nasal variant” refers to a variant with at least one segment containing the feature “nasal” (this covers the pre-nasalized variants in the case of plosives).

¹⁸ In Awetí, a transitive stem like *kĩj* has to have some morpheme or syntactic constituent in its front for morpho-syntactic reasons.

(24) Declarative statements to identify the phonetic connection in Awetí.

1. A phonetic s.s. A that ends in a nasal vowel can only be connected to a s.s. B that is a variant of a phonological s.s. B₁ which begins with a neutral consonant C if in B the consonant C is represented by its nasal variant.
2. A phonetic s.s. A that ends in an oral vowel can only be connected to a s.s. B that is a variant of a phonological s.s. B₁ which begins with a neutral consonant C if in B the consonant C is represented by its oral variant.
3. A phonetic s.s. A that ends in an oral vowel V can only be connected to a s.s. B that begins with a nasal consonant¹⁹ if A is variant of a phonological s.s. A₁ and V a variant of V₁ which occurs in A₁, and A₁ has no variants in which V₁ is represented by a nasal variant (mostly in the case of composition).
4. A phonetic s.s. A that ends in a nasal consonant C can only be connected to a s.s. B that begins with an oral vowel if A is variant of a phonological s.s. A₁ and C a variant of C₁ which occurs in A₁, and A₁ has no variants in which C₁ is represented by an oral variant.
5. A phonetic s.s. A that ends in (usually: consist only of) an oral consonant C can only be connected to a s.s. B that begins with a nasal vowel if the C is a plosive (the result occurs at the beginning of words or after oral stops).
6. A phonetic s.s. A the last vowel V of which is oral can only be connected to a s.s. B the first vowel B of which is nasal if A is variant of a phonological s.s. A₁ and V a variant of V₁ which occurs in A₁, and A₁ has no variants in which V₁ is represented by a nasal variant.
7. A phonetic s.s. A the last vowel V of which is nasal can only be connected to a s.s. B the first vowel V₂ of which is oral if there is a nasal consonant between V and V₂, or if A is variant of a phonological s.s. A₁ and V a variant of V₁ which occurs in A₁, and A₁ has no variants in which V₁ is represented by an oral variant.

To some, these statements may seem exaggeratedly formal or rigorous. They are certainly are not meant to figure as such in a general grammar or phonology of Awetí. But they are the most explicit reference point (including for comparison with other languages), and should be formulated and verified before a more elegant and informal description for a broader audience is attempted. This has been done in this paper.

¹⁹ This nasal consonant is variant of a phonologically nasal consonant due to the previous statement 2.

It is also well possible that the statements in (24) can be stated in a more general way without losing their exactness; this is nothing more than a first attempt. Indeed, the ‘rules’ in (15) may be understood as a reformulation of (24) or of logical consequences following from (24), if “is realized nasal” and similar expressions are defined as terms that abbreviate recurring conditions in (24). Ultimately, the more general statements in (13) can be derived from the identification of the phonetic connection in (15), too.

Besides this, the rules given in (24) still need refinement and minor additions in order to cover cases of encounters of consonants (involving glides or final stops being combined with other consonants in the case of composition). Of course a more complete formulation of the identification of the phonetic connection must also describe the result of the concatenation (as to the segment sequences, this is usually simply their concatenation, but for instance elisions may occur) and also cover the outcome of the combination of the syllable and intonation structures. Yet, as they are formulated in (24) above, we believe that the statements cover already more than 90% of the connection resulting in simple or composed word forms and even sentences.

With these comments we conclude our formal more explicit account of nasal harmony in Awetí.

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RESUMO: Este artigo descreve e analisa a harmonia nasal ou espalhamento da nasalidade em Awetí. Mostra primeiro em termos gerais como os sons em prefixos se adaptam à nasalidade ou oralidade dos temas, e como dentro de temas também nasalidade se ‘estende’ à esquerda. Com representações abstratas é demonstrado quais seqüências de sons foneticamente nasais e orais são possíveis em Awetí (focalizando as oclusivas, oclusivas pré-nasalizadas e nasais) e qual análise fonológica é apropriado para dar conta destas regularidades. Em Awetí, temos vogais intrinsecamente orais e nasais, e vogais neutras que se adaptam foneticamente à vogal (ou consoante) seguinte, como é o caso das consoantes sonoras. As oclusivas pré-nasalizadas como “nt” são variantes nasalizadas das oclusivas, não variantes pós-oralizadas das consoantes nasais, como acontece em línguas Tupí-Guaraní. Para as oclusivas e nasais em coda de sílaba (final de morfema), postulamos fonologicamente arqui-fonemas que se adaptam à vogal anterior ou a uma consoante que segue. Finalmente, usando uma abordagem declarativa, a análise postula ‘regras’ (constatações) que capturam o comportamento da nasalidade em palavras Awetí, lançando mão de “seqüências estruturadas” tanto no nível fonético como no nível fonológico. Assim, cada unidade (sílaba, morfema, palavra etc.) em um dos dois níveis tem três componentes, uma seqüência de segmentos, uma estrutura de constituintes (assim que oclusivas pré-nasalizadas, como ditongos, correspondem a dois segmentos), e uma estrutura intonacional. As regras descrevem quais variantes fonéticas podem ser combinadas (concatenadas) com quais outras variantes fonéticas, dependendo de sua nasalidade ou oralidade.

PALAVRAS-CHAVE: Harmonia nasal; Awetí; fonologia declarativa; consoantes pré-nasalizadas.

ABSTRACT: This article describes and analyses nasal harmony (or spreading of nasality) in Awetí. It first shows generally how sounds in prefixes adapt to nasality or orality of stems, and how nasality in stems also ‘extends’ to the left. With abstract templates we show which phonetically nasal or oral sequences are possible in Awetí (focusing on stops, pre-nasalized stops and nasals) and which phonological analysis is appropriate for account for this regularities. In Awetí, there are intrinsically nasal and oral vowels and ‘neutral’ vowels which adapt phonetically to a following vowel or consonant, as is the case of sonorant consonants. Pre-nasalized stops such as “nt” are nasalized variants of stops, not post-oralized variants of nasals as in Tupí-Guaranian languages. For nasals and stops in syllable coda (end of morphemes), we postulate arqui-phonemes which adapt to the preceding vowel or a following consonant. Finally, using a declarative approach, the analysis formulates ‘rules’ (statements) which account for the ‘behavior’ of nasality in Awetí words, making use of “structured sequences” on both the phonetic and phonological levels. So, each unit (syllable, morpheme, word etc.) on any level has three components, a sequence of segments, a constituent structure (where pre-nasalized stops, like diphthongs, correspond to two segments), and an intonation structure. The statements describe which phonetic variants can be combined (concatenated) with which other variants, depending on their nasality or orality.

KEYWORDS: Nasal harmony; Awetí; declarative phonology; pré-nasalized consonants.