

**CORONAL CODAS AND PHONOTACTICS IN TUPI-GUARANI LANGUAGES***CODAS CORONAIS E FONOTÁTICA EM LÍNGUAS TUPI-GUARANI**Fernando Orphão de Carvalho<sup>1</sup>***ABSTRACT**

This paper discusses the phonotactic organization of conservative Tupi-Guarani languages, and of Proto-Tupi-Guarani, by focusing on the analysis of the word-final/pre-pausal coronal approximant [j]. After illustrating how confusion prevails in currently accepted analyses of this segment, which is often considered *both* a consonant *and* a member of a diphthong, I argue that the analysis of [j] as a consonant is preferable. This claim, coupled with the auxiliary hypothesis that Proto-Tupi-Guarani phonotactics was subject to a version of the Syllable Contact Constraint, helps explain two otherwise disparate facts about Tupi-Guarani phonotactics: The impossibility of having complex *-jC* final codas, and the limitation of medial codas to *-j*.

**KEYWORDS:** Tupi-Guarani languages. Phonotactics. Syllable structure.

**RESUMO**

O presente artigo aborda a questão mais ampla da organização fonotática do Proto-Tupi-Guarani, e das línguas Tupi-Guarani mais conservadoras, através da consideração de um tema específico: A análise da aproximante coronal [j] em posição final de palavra. Este segmento é, nas análises existentes sobre as línguas da família, tratado, ora como parte de um ditongo, ora como uma coda consonantal. Argumentaremos que uma análise da aproximante coronal como um segmento consonantal em posição de coda silábica é preferível à análise via ditongos, e que, em conjunção com a hipótese auxiliar de que a fonotática do Proto-Tupi-Guarani estaria sujeita à uma versão da Restrição de Contato Silábico, essa proposta permite tratar de forma unificada dois fatos aparentemente não-relacionados da fonotática Tupi-Guarani: A não-ocorrência de codas complexas finais de tipo *-jC*, e a limitação das codas mediais àquelas que possuem *-j* como seu elemento.

**PALAVRAS-CHAVE:** Línguas Tupi-Guarani. Fonotática. Estrutura silábica.

**Introduction**

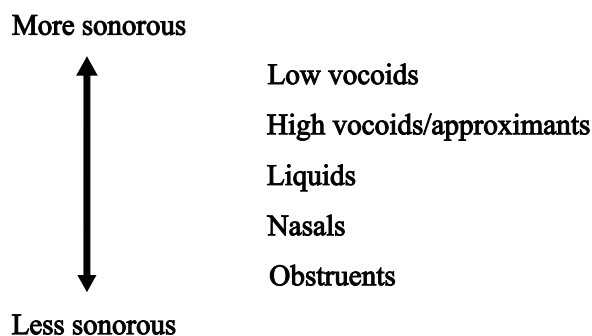
This paper addresses one the least explored subjects in the phonology of Tupi-Guarani (henceforth, TG) languages: Phonotactics. I will discuss the diverse analyses proposed in the literature on TG languages for the coronal coda, that is, the post-vocalic and, mostly, word-final/pre-pausal approximant [j],<sup>2</sup> as a privileged point of entry for discussing more general issues on how TG languages organize segments into larger domains.

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<sup>2</sup> As will become clear in the remainder of the paper, I use IPA [j] to denote a segment which is essentially identical to [i] in terms of its phonetic substance, but I use the symbol [j] as a way to underscore the fact that this segment occurs, in the cases under discussion, adjacent to higher sonority segments, that is, mid or low vocoids.

Since discussions of phonotactic organization are often marred by terminological imprecisions, some clarification is in order before proceeding to the core of the paper. I will refer to a *contoid* in Laver's (1994, pp. 147-8) sense, adopted and slightly altered from Kenneth Pike's original definition, as any phonetic segment which is not a central resonant, thus subsuming stops, fricatives and laterals. That is, every phone produced with a degree of approximation between active and passive articulators in the central area of the vocal tract that is equal or more extreme than that of a fricative is a contoid. A contoid is also often known as a 'true consonant', or a 'phonetic consonant' (that is, a consonant *from the phonetic point of view*). For the complement set of *contoids*, I will deviate slightly from Laver's (1994) terminology. I use the term *vocoid* (also 'phonetic vowel') for phones produced with maximum opening of the vocal tract, thus setting aside other resonant consonants, such as rhotics,<sup>3</sup> which involve transitory contact or at least a closer stricture between an active articulator (usually coronal) and a passive articulator. Within the class of vocoids I will refer to what other authors call 'glides' as *approximants*. Approximants are vocoids that stand adjacent to a more sonorant/resonant vocoid (a more open vocoid) and are commonly identified with the non-syllabic variants of high vowels: [j] and [w]. For sonority, I admit the following version of the widely assumed sonority hierarchy:

(1) *Sonority hierarchy*

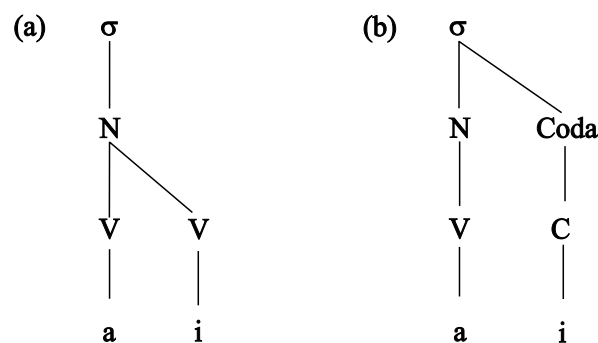


It is of fundamental importance for us to recognize the ambiguous nature of the term *consonant*. In one sense it is identical to *contoid* as defined above, and I have introduced the notion of contoid exactly to avoid this overlapping. *Consonant* will be used here as a structural category, not a substantive one (such as *contoid*). A consonant refers either to a *position* (= non-syllabic), or as denoting a class of segments which behave in a similar way in relation to phonological patterns in a language. A well-known fact is that elements in this class are not necessarily *contoids* (that is, phonetic consonants), and approximants such as *j* and *w* often feature in this class of non-contoid consonants, hence making the distinction of critical importance. As discussed in section 1, some studies of TG languages, notably Jensen (1998), have properly distinguished between the two notions of *consonantal*, but even in these cases the relations between this notion and the concept of *diphthong* have not been carefully exposed.

<sup>3</sup> The class of 'rhotics' is well-known for its heterogeneous phonetic composition and for the fact that segments in this class can be phonologically aligned in specific languages either with 'true consonants' or with 'true vowels' (see e.g., LADEFOGED & MADDIESON, 1996: CHAPTER, 7; LAVER, 1994, p. 218). Nothing crucial here hinges on this, but I will assume, with Laver (1994), that tapped sounds like [ɾ] should be classed along with stop consonants, while rhotic approximants, like [ɹ] are non-contoids or approximants.

*Diphthong* is a difficult notion in linguistics (see e.g., LASS, 1984; MIRET, 1998). Most of the time, diphthongs raise problems in relation to their exact differentiation from *monophthongs*, that is, the main issue is in these cases whether diphthongs (phonetically defined either as vocoid clusters or as a ‘dynamic’ vocoid of changing quality) behave like single segments or like double segments (see, again, MIRET, 1998 for extensive discussion and references). What is vital here is the assumption that diphthongs are not only necessarily *tautosyllabic* (thus differing from configurations of hiatus) but that a vocoid sequence [VV] (two adjacent phonetic vowels) differs from a vowel-consonant sequence. Here, *consonant* is obviously understood in the structural sense above, as a phone cannot be both a vocoid (= phonetic vowel) and a contoid (= phonetic consonant) at the same time. In terms of syllable structure, I will accept that diphthongs are *nuclear* elements of the syllable and that no element of a diphthong occupies the coda (post-nuclear consonantal margin). In (2) I present what I take to be the minimal differentiation between diphthongs and vowel-consonant sequences.

(2) *Assumptions about the structural nature of diphthongs*



Diphthongs (in 2a) do not involve any coda elements and are entirely contained within the syllable ( $\sigma$ ) nucleus. See, also, that below the layer of intra-syllabic constituents (reduced to the Nucleus (N) and the Coda in these images), there is a layer where structural, phonological notions of vowel (V) and consonant (C) are presented. The bottom layer identifies the phonetic substance of segments, that is, this is the level at which the notions of *contoid* and *vocoid* are defined. The fact that [i] is present above, at this level, for both diphthongs and -VC sequences, serves simply to underscore the fact that they are both vocoids, being possibly identical as to their feature content, yet this is not crucial to the present discussion. In the remainder of the paper, as has been the case up to this point, I will use [j] to represent this element (as in 2(b)), underscoring the fact that it is always flanked by adjacent segments of greater or equal sonority levels.

The paper is organized as follows: Section 1 will discuss how greater clarity and explicitness is needed in our understanding of TG phonotactics. I will suggest that there are two main issues here both related to a loose or imprecise understanding of two notions: *consonant* and *diphthong*. Section 2 will introduce the issue of coronal codas in TG languages, contrasting two of the most popular, and competing, phonological analyses of these elements. I will end up concluding that although one of the views is clearly preferable in historical terms, synchronically both are, in principle, equivalent.

In section 3 I will consider a third possible analysis for these final, coronal codas: As members of (falling) diphthongs. Although these are sometimes treated as such, no clear argumentation has ever been presented in the existing literature for or against this analysis for TG languages as a group (and, presumably, for Proto-Tupi-Guarani). Moreover, final *-j* is treated *both* as a consonant *and* a diphthong member in some descriptions. I will argue that conservative TG languages, and PTG, conform to a phonotactic restriction that speaks decisively against the diphthong analysis, favoring, instead, an analysis of post-vocalic *-j* as consonantal codas. In attempting to account for both the word-final and word-medial phonotactic limitations of TG closed syllables, I propose that PTG was subject to a *syllable contact* effect, and this notion is consistent not only with the distributional facts but with the common hardening/fortition of approximants in many daughter languages. Section 4 is devoted to conclusions of the paper.

## 1. TG phonotactics: The current view

According to the overview of the TG language family in Jensen (1999, p. 133), PTG had “a predominantly CV syllable pattern in non-final syllables. The final syllable could be CV or CVC”. The statement is obviously vague, notably due to the unclear implications that ‘predominantly’ might carry in this context.<sup>4</sup> Of particular importance, however, for the present paper, is the statement that the final syllable (and it alone, one infers) could have a coda consonant. Schleicher (1998), a comparative reconstruction of PTG phonology and morphology, is likewise imprecise when it comes to PTG phonotactics. Schleicher (1998, p. 25) speaks of a “very strict CV syllable structure” in PTG and at least for some of its daughter languages. He also notes the exception of ‘word-final consonants’, as, in his view, medial syllables were always CV in TG languages.

One wonders, however, what are the implications of this basic view of PTG syllable structure for the analysis of the following PTG forms from the same sources (see SCHLEICHER, 1998, pp. 144-50 for discussion of the same patterns):<sup>5</sup>

<sup>4</sup> I will not deal here with the topic of hiatus (that is, heterosyllabic vowel sequences V.V), which was certainly present in PTG and would, therefore, force the inclusion of V(C) as another syllable type in the language. Syllabic parsing is most clearly established in TG languages at the right margin of words, by appeal to the placement of the main accentual prominence at the word level. In cases like *\*okáj* ‘it burns’ vs. *\*kaʔi* ‘monkey’ there is no syllabification contrast, as the glottal stop *\*-ʔ-* provides the onset for the final syllable in the latter form. However, hiatus seems to have been tolerated in forms like *\*-peúm* ‘son-in-law’ or *\*-kwaáp* ‘to know’.

<sup>5</sup> The following glossing conventions will be used here: In a gloss like ‘1SG.I’, 1 = first person, SG = singular and the roman numeral identifies one of the four sets of person markers typical of TG languages, as described in Jensen (1998). The conventions for other persons and number feature values are obvious. GER = Gerund suffixes (called Serial Verb suffixes by Jensen), AG = Agent Nominalizer, CIRC = Circumstantial Nominalizer and NEG = Negation.

(3) *Examples of -jC- clusters in PTG*

\*o -có o -poracéj -ta (based on JENSEN 1998, p. 530)

3.I -go 3.III -dance -GER

‘He/she went to dance’

\*i -pwáj -tar (based on JENSEN 1998, p. 540)

3.II -order -AG

‘The one who orders it’

\*i -pwáj -tap (based on JENSEN 1998, p. 540)

3.II -order -CIRC

‘the place or circumstance of (its) being ordered’

Note that, since all researchers agree in recognizing PTG *\*j* as a member of the PTG inventory of *consonants* (see e.g., SCHLEICHER, 1998, p. 50; JENSEN, 1998, p. 607, 1999, p. 134), there are two options for analyzing the examples above, where medial *\*-j.t-* clusters are derived from suffixation: On one view, syllables like *\*-poracej-* ‘dance’, in (3a), have a CVV structure, with *-ej-* being, therefore, analyzed as a diphthong. This is consistent with the view that medial syllables are all open syllables and only *final* syllables can be closed, that is, CVC. This view is, however, inconsistent with the idea that *-j* is a consonant (see section the Introduction above), as this analysis is excluded once [-Vj] is treated as a diphthong. On the second view, *-j* is accepted as a consonant and *-ej-* is parsed as -VC. This would create no problems as far as the status of *-j* is concerned, but it demands an amendment to the statement on phonotactics, as CVC syllables must be accepted as occurring in medial position after all (cf. *\*-poracejta* in 2a), a conclusion which is at odds with the supposed ‘strictly CV’ phonotactics of TG languages and of PTG. In conclusion, both analyses face problems in relation to other standard assumptions about TG phonotactics.

This lack of clarity has not benefited from the fact that other comparative work on the phonology of PTG languages, both before and after Jensen (1998, 1999) and Schleicher (1998), such as Lemle (1971) and Mello (2000), have dealt only with reconstructed segmental inventories and their reflexes in selected daughter languages, offering no generalizations at all on larger domains or sequential constraints.<sup>6</sup>

In fact, even the classification of *\*j* and its reflexes in individual TG languages as consonants is a confuse matter, both in descriptions of individual languages and in the reconstruction of PTG. Thus, a series of proposed generalizations about TG consonants, either synchronic or diachronic, do not apply, in fact, to *\*j* and its reflexes. Take for instance the well-known ‘loss of final consonants’ in Guarani (e.g., JENSEN, 1999, p. 143-4). A comparison of PTG etyma with their Guarani reflexes (table 1) shows that *\*-j* and other consonants are treated differently, with only the latter being subject to loss (modern Guarani forms from PERALTA & OSUNA, 1950).<sup>7</sup>

<sup>6</sup> Lemle (1971) does take a stand, however, on the analysis of surface [pw] and [kw] sequences, favoring a bi-segmental analysis. This view has been subsequently rejected by almost everyone working on the phonology of TG languages, in favor of an analysis in terms of complex consonants *k<sup>w</sup>* and *p<sup>w</sup>* (see e.g., SCHLEICHER, 1998: 34-36).

<sup>7</sup> The orthographic conventions of the source are retained: <c> = k, <i> = i, <j̃> = ï.

**Table 1:** Reflexes of PTG final consonants in Guarani

	PTG	Guarani
*-j > -i	*-poj ‘to feed’	poi (PO50:116)
*-j > -i	*-kaj ‘to burn (int.)’	caí (PO50:37)
*-j > -i	*-potsij ‘heavy’	pohĩ (PO50:366)
*-k > Ø	*-pitsik ‘grab’	pihi (PO50: 122)
*-p > Ø	*-kip ‘louse’	ki (PO50:71)
*-t > Ø	*-ʔat ‘fall’	á (PO50:1)
*-m > Ø	*-petim ‘tobacco’	petỹ (PO50: 112)
*-ŋ > Ø	*-kaj ‘bone’	caĩ (PO50: 34)
*-n > Ø	*-men ‘husband’	me (PO50:76)

Clearly, what is needed here is greater terminological precision, distinguishing between contoids, such as *p*, *k* or *m*, and vocoids, such as *j*, which may be consonants despite not being contoids (but this is yet to be established, as we will see in short). Jensen (1998, pp. 607-11) is, in fact, more precise than Schleicher (1998) and most other accounts of TG phonology, as she distinguishes between a *phonetic consonant* (for which she uses the feature [+consonantal]) and a *positional consonant* (for which she uses the feature [-syllabic]). However, Jensen (1998, p. 612) is less precise than expected when she treats the derivation of surface [j] as a case of diphthong formation, as this implies that *-j* is both a consonant and part of a diphthong, which, as we have just noted, is problematic too. That is, although the need for distinguishing between contoids and consonants (as in section 1) was clearly noted by Jensen (1998), the implications of having this differentiation have not been addressed in full.

Table 2 below offers a selective overview of the analysis of the vocoid sequences [-Vj] in some descriptions of TG languages (where ‘closed syllable’ means that -Vj is analyzed as a -VC sequence).<sup>8</sup>

<sup>8</sup> Our restriction to *final* [-Vj] sequences is understandable since the strongest syllabicity criterion available for most TG languages - the placement of main, word-level accent - is applicable at the right margin of phonological words, as most languages have word-final accent, the exception being a few extra-metrical enclitics. Hence, it is in this context that tautosyllabic and heterosyllabic parsings of vocoid sequences can be more clearly distinguished. Nevertheless, as discussed in section 3, the claims advanced here on the phonotactics of TG languages are also relevant to the the distribution of word-medial [Vj] sequences.

**Table 2:** Analysis of [Vj] sequences in selected TG languages

Language	Analysis of [-Vj]	Source
Tapirapé	Diphthongs	Almeida <i>et al.</i> (1983)
Tocantins Asurini	Closed syllable	Harrison (1962)
Tenetehára	Closed syllable	Bendor-Samuel (1962), Harrison & Harrison (2013)
Parakanã	Closed syllable	Silva (1999)
Zo'é	Closed syllable	Cabral (1996)
Kamayurá	Closed syllable	Seki (2000)
Ka'apor	Closed syllable	Kakumasu (1968)
Ka'apor	Diphthongs	Kakumasu (1964)
Kayabi	Diphthongs	Dobson (1997)
Kayabi	Closed syllable	Dobson & Weiss (1975)

The middle column indicates whether the source mentioned in the column to the right analyzes the language in question as having diphthongs of -VC sequences (closed syllables) for the final vocoids [-Vj]. Setting aside the fact that for some languages (such as Ka'apor and Kayabi) in table 2 analyses have changed, with no clear and explicit argumentation being presented for the relevant decisions, note that the same uncertainties identified for comparative work on TG phonology also arise in the description of individual languages. In her description of Zo'é, for instance, Cabral (1996, p. 41), who considers *-j* to be a final consonant (CABRAL, 1996, pp. 33-4), also describes *-j* as resulting from a rule forming 'diphthongs', in examples such as (CABRAL, 1996, p. 42)

(4) 'Diphthongization' in Zo'é (based on CABRAL, 1996)

*n*     *-a*     *-kuha*     *-i*     [nakuhaj]

NEG 1SG.I know NEG

'I don't know'

*a*     *-inu*     [ajnu]

1SG.I -hear

'I hear (it)'

As in other TG languages, consonants are said to be elided in final position when followed, in composition or suffixation, by a consonant-initial morpheme (CABRAL, 1996, p. 41), even though *-j* is consistently exempt from this rule. In another language, Kamayurá, on which more extensive data is available, the same rule banning consonant clusters is often presented as a phonological regularity of the language (SEKI, 2000, p. 430), and although true that *contoids* are targeted by this rule, clusters with *-j* as the initial segment are widespread (e.g., *-e'yj* 'companion, fellow' → *-e'yjhet* 'companions, fellows'; *-porahaj* 'dance' → *-porahajtap* 'party'; (cf. SEKI, 2000, pp. 373-4). We will come back to this in section 3 in greater detail.

After reviewing, in the next section, the approaches that have treated final approximants as consonants, not as diphthong members, I will return, in section 3, to the diphthongal analysis, suggesting a resolution to apparent conflicts or inconsistencies as these noted in the present section and offering a unified treatment to TG phonotactics.

## 2. Coronal codas in Tupi-Guarani languages

At a surface, phonetic level, the following structures are found in several TG languages (C = any consonant; V = vowel; T = a coronal obstruent; # = pause/word-final position; *j* = palatal approximant):<sup>9</sup>

(5) *Basic surface patterns*

- (a) [CV*j*#]
- (b) [TV]
- (c) ¬ [CVT#]
- (d) ¬ [*j*V]

The schema in (a) denotes the occurrence of a palatal approximant [*j*] in word-final position; (b) is a syllable whose onset segment is a coronal obstruent which has any of the values [d ʒ dʒ ð z tʃ s] depending on the language/variety<sup>10</sup> under consideration, and (c) states that these coronal obstruents cannot occur in the same context as [*j*] in (a), that is, in word-final or pre-pausal position.<sup>11</sup> Finally, (d) expresses the fact that [*j*] *does not* occur as a syllable onset.<sup>12</sup> These structures are particularly noticeable in a cluster of northern (or Amazonian) TG languages that were subject to a process of diachronic fortition targeting Proto-Tupi-Guarani \**j* in onset position: Tenetehára, Tocantins Asurini, Parakanã and Tapirapé (see DIETRICH, 1990, pp. 20-1).

Most descriptions of TG languages advance phonological analyses where -*j* and T (a coronal obstruent whose distribution is limited to onsets) are collapsed as co-allophones of a single phoneme, which is understandable in view of the distributional facts in (5) above. A known exception is Harrison (1962, p. 19), in an earlier work on the phonology of Tocantins Asurini, who regarded *j* as an underlying consonant distinct from *c* (his symbol for the affricate), thus making *j* a segment which is basically restricted to word-final coda position. This also seems to be implicitly accepted by Praça (2007, p. 243-4), on Tapirapé, as the author presents both *tʃ* and *j* as separate phonemes of the language.

<sup>9</sup> I employ the negation operator ‘¬’ for indicating that certain structures are unattested or ungrammatical. I have avoided the use of the asterisk ‘\*’ as it is used later in the paper in its established use in historical linguistics for identifying reconstructed elements of proto-languages.

<sup>10</sup> In some languages, such as Kayabí (DOBSON & WEISS, 1975) and Wajãpi (author field data), the ‘strong’ consonant occurring in onset position is only slightly spirantized, closer to [*j*], and approximant realizations may be possible as well in this position. Even in these languages, however, the approximant [*j*] occurs exclusively in final position.

<sup>11</sup> The only exception to this phonotactic generalization seems to be Teko (also known as Emerillon), which has final [tʃ], as in [tapiʃ] ‘house’ (ROSE, 2008: 439), where other languages show a form closer to PTG \**tapij* ‘hut, makeshift house’.

<sup>12</sup> As far as I know, only Pereira (2009), for Xingu Asurini, seems to assume that the palatal approximant *j* and the obstruent *dʒ* stand as independent phonemes contrasting in onset position.



For those who see *-j* as a co-allophone of onset obstruents, there are basically two phonological analyses of the patterns in (5) in the published literature on TG languages, what I call the ‘coda lenition’ analysis and the ‘onset fortition’ analysis, and these are sketched in (6) and (7), respectively (where, as usual, square brackets indicate surface/phonetic representations and slanted lines indicate underlying/phonological analyses):

- (6) *The coda lenition analysis*
- (a) [CVj#] ← /CVT/#  
 (b) [TV] ← /TV/
- (7) *The onset fortition analysis*
- (a) [CVj#] ← /CVj/#  
 (b) [TV] ← /jV/

Under the analysis in (6), an underlying obstruent T is *lenited* to *j* in final position, but surfaces with its characteristic allophone in onset position. An example of this approach is Silva (1999a, b) and Silva (2003) on Parakanã.

- (8) *Parakanã coda lenition* (based on Silva 1999a: 25, 69)
- [mo'koj] ← /mokoʃ/ ‘two’  
 [pora'haj] ← /porahaʃ/ ‘to dance’  
 [ko'ʃoʌ] ← /koʃo-a/ ‘woman’<sup>13</sup>  
 [ʃa'ta] ← /ʃata/ ‘banana’

This analysis has been incorporated into the practical orthography devised for the language, which is used, for instance, in bilingual dictionaries (e.g., SILVA, 2003). Soares (1979, p. 115, nota 48), who bases herself on Carl Harrison’s primary descriptive work, assumes an underlying obstruent coda, *ʃ*, for Tocantins Asurini codas, thus implying coda lenition, [j] ← *ʃ*, in this language as well.<sup>14</sup> We mentioned already that Harrison (1962) analyzed final *-j* as an underlying consonant independent from *c* and having a limited distribution. In his later work, however, Harrison (1963, p. 3) explicitly states that underlying *ʃ* (his <č>) appears as [j] when closing syllables and as [ʃ] elsewhere. The affricate, represented as <*c*> in his practical orthography, appears not only in onsets, as in <*wáca*> ‘tail’ and <*hóca*> ‘tooth’, but also in codas, whether final, as in <*hé?ic*> ‘many’, or internal, as in <*íwa okácpam*> ‘the tree is burning’.

Another TG language for which this analysis has had great currency is Tenetehára (in its two varieties: Tembé and Guajajára). For Guajajára, Bendor-Samuel (1972, p. 67) explicitly states that [z] (a voiced alveolar/palato-alveolar fricative; BENDOR-SAMUEL 1972, p. 63) never occurs before pause or a consonant, while [j] (a voiced palatal frictionless continuant; BENDOR-SAMUEL, 1972,

<sup>13</sup> The suffix *-a* is the ‘argument case marker’ or nominal function suffix characteristic of TG languages.

<sup>14</sup> Tocantins Asurini and Parakanã are very closely related lects.

p. 64) never occurs before a vowel, but only before a consonant or pause (that is, the same pattern as in (5) above). This complementary distribution seems to be enough to motivate Bendor-Samuel (1972, pp. 74-5) to analyze surface [j] and [z] as allophones of *z*. This decision is, as in the case of Parakanã, incorporated into the practical orthography devised for Guajajára; the later dictionary of Harrison & Harrison (2013), for instance, use <z> for a single element that can occur as [i] in codas and as [z] elsewhere. The analysis was adopted in the widely cited study of Harrison (1986) and made its way into general reference work on TG languages as the standard way to represent Guajajára forms (see e.g., JENSEN, 1998, p. 540).

The analysis in (7), however, posits the approximant *j* as the underlying segment, which is *strengthened* or subjected to *fortition* in onset position, where it appears as one of the members of the T set. Examples of this analysis are Harrison (1962) on Asurini, and Leite (1977) on Tapirapé (see 9 below), and it also seems to be assumed for PTG by Jensen (1999, p. 135).

(9) *Tapirapé onset fortition* (based on LEITE, 1977, p. 9)<sup>15</sup>

(a)	[ã'ʧat]	←	/ã-jat/	'I come'
(b)	[ 'majã]	←	/maj-a/	'snake'
(c)	[a'hij]	←	/a-hij/	'he/she runs'

A comparison of (a) and (b) shows that in Tapirapé the fortition rule is subject to prosodic conditioning and takes place in *accented* onsets only.

Aside of purely static or distributional patterns, there is one pattern of the dynamic phonology of these languages that is potentially significant in view of these analytical alternatives. The examples in (10) below, from Cabral & Rodrigues' (2003) Tocantins Asurini dictionary, illustrate a process which yields an alternation between the final approximant *j* and the onset obstruent with which it is associated under both analyses in (6) and (7). This obstruent has affricate and fricative realizations according to Harrison (1962), but which is here symbolized simply as *s*.

(10) *Synchronic j ~ s in Tocantins Asurini:*

-akój	'penis'	→	ha-kós-a	'his penis'	(CABRAL & RODRIGUES, 2003, p. 33)
ýj	'mud'	→	ýs-a	'mud'	(CABRAL & RODRIGUES, 2003, p. 125)
máj	'snake'	→	más-a	'snake'	(CABRAL & RODRIGUES, 2003, p. 127)
mokój	'two'	→	mokós-a	'two'	(CABRAL & RODRIGUES, 2003, p. 142)
-áj	'goiter'	→	sé 'ás-a	'my goiter'	(CABRAL & RODRIGUES, 2003, p. 120)

The alternation between *j* and *s* is also observed in derivatives of the same basic root/lexeme: as in *masohóa* 'boa snake' (CABRAL & RODRIGUES 2003, p. 133) and *majtinínga* 'jararaca snake, *Bothrops sp.*' (CABRAL & RODRIGUES 2003, p. 127), analyzable, respectively, as *máj-oho-a* (where *-oho* is the augmentative suffix), and *maj-tiníng-a* (where *-tiníng* means 'to shake').<sup>16</sup>

<sup>15</sup> I have adapted some of the symbols used by Leite (1977): <y> = *j*, <č> = *ʧ*,

<sup>16</sup> Although Cabral & Rodrigues (2003, p. 127) translate *majtinínga* as 'Jararaca' (that is, a snake of the Genus *Bothrops*), given that *-tiníng* means 'to shake (about)' (CABRAL & RODRIGUES, 2003, p. 241), it is more likely that *majtinínga* refers to the rattlesnake instead.

I will not address here all the assumptions (typological, phonetic, learning-theoretic) one might want to bring to the debate as to which of these alternatives is preferable. Since learners have no access to the underlying representations or rules of past generations of speakers - all they have at their disposal is the surface patterns of alternation - it is in principle possible that learners could infer either a coda lenition rule ( $s \rightarrow j$ ) or the onset fortition rule ( $j \rightarrow s$ ). If this assumption is correct, then both /maj/ and /mas/ are plausible as underlying representations for Asurini [maj ~ mas] ‘snake’.

From a historical point of view, however, Asurini  $s \sim j$  derives from a process of fortition that yielded (likely through intermediate stages) the diachronic correspondence PTG  $*j > s$ , as contextual development preceding vowels. The data in table 3 below pair off reconstructed PTG etyma with their reflexes in Asurini, showing, in the upper half, the reflexes for PTG  $*j$  in coda position and, in the bottom half, the reflexes for onset PTG  $*j-$ . The shaded cells highlight the diverging reflexes for the same morphemes when  $*j$  was in coda vs. when  $*j-$  was in onset position, the latter within complex (multi-morphemic) wordforms (note that I am using  $s$  throughout for Asurini onset obstruent, even where Harrison employs  $c$ ; and that CR03 stands for Cabral & Rodrigues (2003)).

**Table 3:** Asurini correspondences for PTG  $*j$

PTG	Asurini
*-kaj ‘burn’	-káj ‘burn’ (CR03:94)
*moj ‘snake’	máj ‘snake’ (CR03:127)
*-tsej ‘wash’	-héj ‘wash’ (CR03:85)
*jatsi ‘moon’	sahý ‘moon’ (CR03:206)
*ji ‘axe’	sý ‘axe’ (CR03:231)
*-juru ‘mouth’	i-soro-a ‘mouth’ (N82:33)
*moj-a ‘snake (arg.)’	mása ‘snake’ (CR03:127)
*-tsej-eʔim ‘does not wash’	-hesiʔim ‘does not wash’ (H62:5)

The simplest, most straightforward account of these patterns is to postulate a diachronic development  $*j- > s / \_ V$  for Asurini. Since this is a conditioned development, it introduced the surface alternation seen, for instance, in *maj ~ mas-*, which provides a learner with the evidence to postulate a single underlying form and a rule. Although a synchronic fortition rule  $j \rightarrow s$  would mirror the diachronic correspondence  $*j > s$ , the fact remains that both the coda lenition and the onset fortition analyses are, in principle, acceptable, as learners have no direct access either to the rules or underlying representations of the speakers producing the data used in their task of learning the local language.

### 3. Diphthong members or consonants? A syllable contact solution

As seen in section 1, despite the popularity of analyses that describe the final approximant  $-j$  as a consonant in TG languages (and in PTG as well; section 2), some of the languages of this family are described as having *diphthongs* instead for the same vocoid sequences where  $-j$  features as the second, and less sonorant, element. Moreover, diphthong formation is deemed independently necessary by some researchers (e.g., JENSEN, 1998, p. 612), as with the punctual locative  $-i$  and the negative

suffix *-i*, even in those languages for which the *-VC* analysis of *-Vj* sequences is preferred. Given the known differences between diphthongs and *-VC*, or closed, syllable margins (section Introduction), one might legitimately ask what the proper analysis of *[Vj]* vocoid sequences is, and even wonder whether a unitary, consistent, and general approach to TG phonotactics is possible at all. Exposing such a view is the goal of the present section.

I propose that PTG, as well as relatively conservative (phonologically speaking) TG languages, have *Vj* sequences, whether final or medial, as *-VC* sequences.<sup>17</sup> That is, there are no diphthongs (in the sense of section Introduction) in these languages. In addition to this, I argue that PTG phonotactics was subject to a syllable contact constraint, for which the formulation (11) is accepted here, and that this explains a series of disparate patterns to be considered below (see SEO, 2011 for discussion of the phenomena that motivated the recognition of syllable contact constraints and for extensive literature on the matter).

(11) *Syllable Contact Constraint*

A syllable contact A.B is the more preferred, the greater the sonority of the coda A and the less the sonority of the onset B.

What a constraint such as the one in (11) tells us is that heterosyllabic clusters involving a high sonority coda followed by a low sonority onset are preferred in a language. TG languages are considered to have a particular aversion to consonant clusters, but it can be shown that they avoid only consonant clusters with sonority profiles that violate the constraint in (11).

In some contexts, as in the boundary between two roots in a compound, TG languages delete the first consonantal segment in a sequence (we touched briefly on this at the end of section 1).<sup>18</sup> This was established as a general phonological regularity for languages of the family by Rodrigues, based on Old Tupi material, and it was later generalized to the rest of the family by Cheryl Jensen (see JENSEN, 1998, 1999, p. 136). The rule is phrased in the following manner by Schleicher (1998, p. 61): “A root obligatorily loses its final consonant when the following compounding element is consonant-initial. A word-final consonant is optionally dropped when the following word or clitic is consonant-initial.”. Examples below from Kayabí, Xingu Asuriní and Old Tupi illustrate this process (elided consonants appear in bold):

(12) *Final consonant loss in Kayabí, Xingu Asuriní and Old Tupi*

(a) *moʔit*      *-pitaŋ*      →      [moʔipitaŋ]  
 beads      -red  
 ‘red beads’      (KAYABÍ; SOUZA, 2004, p. 28)

<sup>17</sup> By ‘phonologically conservative’ TG languages I mean languages that have retained the final contoids of PTG words (cf. section 1). The importance of this restriction will become clearer ahead, when certain phonotactic gaps are discussed.

<sup>18</sup> Elsewhere, as when a consonant-initial clitic attaches to a consonant-final root, vowel epenthesis, rather than consonant loss, is the preferred repair operation (e.g., JENSEN, 1998, p. 608; 1999, p. 136).

- (b) *tapiʔit -kuimaʔe* → [tapiʔikuimaʔe]  
 tapir -male  
 ‘male tapir’ (Kayabí; SOUZA, 2004, p. 28)
- (c) *a -kit -ʔutat* → [akiʔutat]  
 1SG.I -sleep -want  
 ‘I want to sleep’ (Xingu Asurini; MONSERRAT, 2002, p. 22)
- (d) *ere -mumik -ʔutat* → [eremumiʔutat]  
 2SG.I -sew -want  
 ‘You want to sew’ (Xingu Asurini; MONSERRAT, 2002, p. 22)
- (e) *a -s -epjak -potar* → [asepjapotar]  
 1SG.I -3.O -see -want  
 ‘I want to see’ (Old Tupi; based on ANCHIETA, 1595, p. 2)
- (f) *a -pap -katu* → [apakatu]  
 1SG.I -end/finish -good  
 ‘I finish (it/them) entirely’ (Old Tupi; based on ANCHIETA, 1595, p. 2)

As discussed in section 1, accounts like this are not particularly clear, as *-j.C-* clusters are allowed, despite *-j* being classified as a consonant too. Kayabí, for instance, allows for *-j.t-* clusters in the formation of the ‘narrative’ or ‘gerund’ forms of verbs, with the *-ta* allomorph selected by verbs ending in *-Vj* (e.g., *i-poej-ta* ‘his/her/its washing’; after DOBSON, 1997, p. 136).<sup>19</sup> To my knowledge, the exceptional character of *-j vis-à-vis* this regular consonant elision process was explicitly noted only by Harrison (1971) in relation to Tocantins Asurini. In formulating a morpho-phonological rule that deletes ‘true consonants’ in this context but spares *-j* (as in *o-kaj-pap* ‘it burns entirely’; HARRISON, 1971, p. 41) Harrison was, however, forced to a stipulation, adding to a general consonant-deleting rule the proviso “except if this consonant is *j*” (HARRISON, 1971, p. 41).

This same regularity is observed in allomorph selection for certain suffixes in particular languages, as in Kamayurá, where the distribution of the two allomorphs of the nominalizer *-tap ~ -ap* ‘circumstance, instrument’, also show *-j* behaving differently from ‘phonetic consonants’:

- (13) *Kamayurá circumstance nominalizer -tap ~ -ap* (after SEKI, 2000, pp. 121-4):
- (a) *juka-tap* ‘action of killing’  
*katu-tap* ‘goodness’  
*kytsi-tap* ‘action of cutting’  
*porahaj-tap* ‘dance’

<sup>19</sup> The gerund form of verbs is employed in some dependent or embedded predicates/clauses in TG languages, whenever the dependent clause has the same ‘subject’ as the main clause. The gerund form of transitive and active intransitive verbs is marked by suffixes, reconstructed to PTG by Jensen (1998, p. 529) as: *\*-a* after consonants, *\*-aβo* after vowels, and *\*-ta* after *\*-j* (plus a process *\*-t → ∅* for *\*-t*-final stems). Not all languages retain all allomorphs, as Old Tupi lacks *\*-ta* and Xingu Asurini seems to have retained only *\*-a*.

- (b) *apyk-ap* ‘stool’  
*etsak-ap* ‘action of seeing’

Note that in *porahaj-tap* ‘dance’ above (13a), the cluster *-j.t-* is preserved, while potential clusters like *-k.t-* are avoided by selecting the vowel-initial allomorph *-ap* in (13b). Elsewhere too, Kamayurá morpho-phonology does not give any impression of having a constraint against *-j.C-* clusters (e.g., *o-kaj-pap* ‘to burn completely’, SEKI, 2000, p. 321; *karãj-tap* ‘scarifier’, SEKI, 2000, p. 404; *tãia rekyj-tat* ‘dentist’, SEKI, 2000, p. 405).<sup>20</sup>

On the one hand, distributional and dynamic facts such as these are consistent with the idea that a syllable contact constraint is operative in the languages, since a heterosyllabic cluster having an approximant *-j* as the first element is optimal in terms of (11), while one having an obstruent as first member is not. However, these generalizations are *also* consistent with the analysis of *-Vj* sequences as diphthongs, since, in cases such as that of Kamayurá above, final *-j* behaves just like nuclear vocoids (i.e. simple vowels) do. Two other facts about TG phonotactics (14) help tilt the scales in favor of the analysis advanced here, and against the proposal of diphthongs.

(14) *Two phonotactic generalizations on Tupi-Guarani languages*

- (a)  $\neg$  [CVjC#]  
 (b)  $\neg$  [CVC.CV]  
 [CVj.CV]

The statement in (14a) is an expression of the fact that although word-final *-Vj* and *-VC* syllables are attested in conservative TG languages, *-VjC* is not. In no attested TG language can a syllable of this structure be found. If *-Vj* is a diphthong, *-VjC* syllables should be possible, as the diphthong is contained entirely within the syllable nucleus and the final *-C* would be a simple coda.<sup>21</sup> The non-existence of *-VjC* syllables in any TG language, would, however, follow straightforwardly from the analysis of *-Vj* as a *-VC* structure, because there is no independent evidence for complex codas in TG languages.

The two statements in (14b) jointly assert that a medial coda with a phonetic consonant, in particular an obstruent such as *p*, *t* or *k*, is not attested anywhere among TG languages, and that the only medial coda possible is one with *-j*. This is an accepted generalization on TG phonotactics, as noted by Jensen (1999, p. 134), where we find the assertion that only *\*j*, and possibly *\*ʔ*, could occur

<sup>20</sup> Kamayurá *tãia rekyitat* ‘dentist’ is an interesting neologism derived from *tãj-a* ‘tooth’ and with an agentive nominalization of the verb *-t-ekyj* ‘to pull’, deriving a construction that literally means: “tooth puller”.

<sup>21</sup> A reviewer asks, cogently, whether this restriction could not be explained by assuming a diphthong analysis but invoking a trimoraic ban. Though several more general assumptions on the nature of the relevant phonological primes are involved, assumptions which cannot be neither discussed nor justified within the confines of this paper, I would say that invoking moras/morae in this case may seem somewhat *ad hoc*, as there is no independent evidence (from length alternations, accentual placement, prosodic morphology and the like) for the existence of weight scales and moraic structure in languages of the TG family.

closing a medial syllable. For the glottal stop this assertion seems to be grounded on the occurrence of glottal clusters such as  $-ʔw-$  in a few languages like Kayabí and some members of the Kagwahiva cluster. However, given that Kayabí intervocalic lenition operates across glottal stops (as in  $-ruʔwit$  ‘father’s brother’, transparently related to  $-rup$  ‘father’ and the modifier  $-ʔit$  via the process of glottal metathesis; (cf. SOUZA, 2004, pp. 29-30) these glottal elements are best analyzed as prosodic features of vowels, not as consonantal codas (see also SCHLEICHER, 1998 for the same view). And, in fact, Dobson & Weiss (1975, p. 24) note for Kayabí that only  $j$  and  $w$  can close a syllable that is not utterance final (i.e., that is not pre-pausal/final). This restriction, which effectively shows that *internal* or *medial* codas must be of high sonority, while *final* codas can be of low sonority, is indicative of the operation of a constraint as in (11), since medial codas with low sonority segments would create heterosyllabic clusters that lack a falling sonority profile.

Wrapping up the discussion, we have that if  $Vj$  sequences are treated as a vowel followed by a consonant, as opposed to a diphthong, and if PTG (and, arguably, many of its daughter languages) are seen as subject to a Syllable Contact Constraint like the one formulated in (11), the following phonotactic regularities can be explained:

(15) *Explanations for regularities in TG phonotactics*

- (a) **Final  $-j$  is not lost preceding a heteromorphemic obstruent:** There is no need to delete this consonant, as the resulting cluster  $-j.C-$  complies with the Syllable Contact Constraint.
- (b) **Syllables with a  $-VjC$  structure are unattested:** This follows directly from the fact that  $-j$  is a consonant, and complex codas are not allowed anywhere in any TG language.
- (c) **Syllables with obstruent codas are allowed only in pre-pausal/word-final position, while syllables with an approximant coda  $-j$  also occur in medial position:** This follows, again, from the Syllable Contact Constraint, as the constraint is not applicable in word-final position but allows only for high sonority coda consonants (i.e., approximants) in medial syllables.

We have, in this way, provided a unified account for the phonotactic generalizations in (14) while at the same time providing a uniform analysis for TG  $[Vj]$  vocoid sequences as  $-VC$ , excluding diphthongs. Moreover, the recognition that *consonants* behave differently from *contoids* in TG languages leads to a more (internally) consistent view of both synchronic and diachronic patterns. Diachronic processes involving, for instance, ‘consonant loss’ in traditional descriptions (section 1) can now be seen as applying to contoids only. Elsewhere, as in the selection of the  $-ta$  and  $-pota$  allomorphs of the desiderative/future marker of Tocantins Asurini (HARRISON, 1962, p. 6), the notion of *consonant* seems to be relevant, as  $-j$  and obstruents select the same allomorph.

## Conclusion and implications

This paper has advanced a more coherent, consistent, and unified approach to the phonotactic organization of TG languages. It proposed that falling sonority vocoid sequences, in particular  $[Vj]$ ,

are always parsed like vowel-consonant sequences, a view which is fundamentally dependent on the distinction between vowels and consonants at the phonetic level (vocooids vs. contoids) and at the phonological level (vowels/syllable nuclei vs. consonants/syllable margins). Coupled with a simple version of a constraint on the sonority profile of heterosyllabic clusters, this view of vocoid clusters is able to offer a neat account of two phonotactic regularities of TG languages - one of which is, apparently, recognized here for the first time - thus attaining a level of generality not met until now in published accounts of TG phonology.

An interesting implication of the proposals advanced here is that, *strictly speaking*, TG languages do not shun (heterosyllabic) consonant clusters, but only consonant clusters of raising sonority. Moreover, the fact that final *-j* can pattern *either* as a consonant (=syllable margin), or as a vocoid (=non-contoid), means that statements about phonological regularities in TG languages should, from now on, mind this difference, which was only unsystematically encompassed in earlier accounts such as Jensen (1998).

This work also opens the way for the consideration of the action of other ‘preference laws’ for syllable structure in TG languages, as well as for a refinement of the claims advanced here. It might be the case, for instance, that the Syllable Contact Constraint may be seen as imposing a *minimum* sonority difference, as this would explain why final nasal stops are also lost when followed by an obstruent. Finally, we gave disproportionate attention here to more conservative TG languages. A more comprehensive investigation would try to establish whether a re-organization of the phonotactic regularities of PTG, for instance, those dealing with vocoid clusters, followed from the loss of final contoids in the more innovative languages of the family.

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