

The (morpho)phonology of oral stop consonants in Proto-Tupi-Guarani: open issues, closed issues and new issues

A (morfo)fonologia das consoantes oclusivas orais em Proto-Tupi-Guarani: problemas em aberto, problemas resolvidos e novos problemas

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Abstract: This paper provides an account of certain alternations that characterize all conservative Tupi-Guarani (TG) languages. Three processes are reconstructed for Proto-Tupi-Guarani (PTG): pre-vocalic oral stop lenition, pre-consonantal stop deletion, and glottal stop metathesis. Both oral stop lenition and glottal metathesis are singled out for more extensive discussion, as previous research has overlooked important issues. I argue that PTG must be reconstructed with the whole series of oral stops **p*, **t* and **k* undergoing lenition, thus implying that languages such as Old Tupi, where **k* does not lenite, are innovative. The traditional reconstruction of word-final/pre-pausal /enes/ or continuant consonants is also questioned, and interpreted as resulting from an overreliance on Old Tupi, and PTG is reconstructed instead with final oral stops as attested in Kamayurá, Kayabí and Xingu Asuriní. Finally, the view that glottal metathesis, as attested in Kayabí and Kagwahiva, must be reconstructed for PTG is scrutinized. Its reconstruction does in fact explain the exceptional behavior of the glottal stop in relation to the deletion rule, but a paradox arises regarding the status of this segment at PTG. Several tentative solutions are proposed, but is ultimately rejected Schleicher's (1998) reconstruction of 'pre-glottalized obstruents' to Pre-PTG.

Keywords: Tupi-Guarani languages. Historical linguistics. Comparative reconstruction. (Morpho)phonology.

Resumo: Este trabalho aborda um conjunto de alternâncias que caracterizam todas as línguas Tupi-Guarani (TG) conservadoras. Três processos são reconstruídos para o Proto-Tupi-Guarani (PTG): a lenição pré-vocalica das oclusivas, a síncope pré-consonantal das oclusivas e a metátese da oclusiva glotal. A lenição e a metátese são mais extensamente discutidas, já que a literatura prévia falhou ao não reconhecer certos problemas. Argumento que o PTG deve ser reconstruído com um processo de lenição que afeta toda a série **p*, **t* e **k* de oclusivas, o que faz de línguas como o Tupi Antigo, em que **k* não sofre lenição, inovadoras. A reconstrução tradicional de oclusivas lenes ou contínuas em posição final absoluta é questionada, interpretada como resultado de uma influência injustificada dos padrões atestados para o Tupi Antigo em parte da literatura. Quanto à metátese da glotal, embora concluamos que a sua reconstrução para o PTG de fato explica o comportamento errático da oclusiva glotal quanto à regra de síncope, ela também levanta um paradoxo quanto ao estatuto deste segmento no PTG. Algumas soluções são sugeridas, e rejeitam-se os argumentos de Schleicher's (1998) em favor da reconstrução de 'obstruentes' pré-glotalizadas para um estágio pré-PTG.

Palavras-chave: Línguas Tupi-Guarani. Linguística histórica. Reconstrução comparativa. (Morfo)fonologia.

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INTRODUCTION

The Tupi-Guarani (TG) family is the most internally diversified and geographically widespread of the 10 low-level branches recognized for the Tupian language family, in turn one of the main phylogenetic units of lowland South America (see e.g., Jensen, 1998, 1999; Rodrigues & Cabral, 2012). This paper offers a reconstruction, at the level of the shared ancestor of the TG languages, Proto-Tupi-Guarani (PTG), of certain (morpho)phonological processes affecting oral stop consonants.¹ Some of these have been tacitly or explicitly accepted as part of the phonology of PTG in the past, but one could make the case that the necessary argumentation — as well as an evaluation of many of the most important implications — have never been properly presented in print. As I hope to show, there are at least two additional issues related to the reconstruction of PTG consonantal (morpho)phonology that have not been identified, let alone resolved, in the published literature. These are the gaps that this paper seeks to fill.

The paper is organized as follows: I will start by presenting an overview of Tupi-Guarani phonology incorporating both established knowledge and certain recent proposals (“Background on Tupi-Guarani phonology”). The next section, “Proto-Tupi-Guarani stop consonant (morpho)phonology: A fresh look” forms the core of the paper, and each of its sub-sections tackles one of the (morpho)phonological processes here reconstructed for PTG. The process of lenition of morpheme-final oral stops when followed by an heteromorphemic vowel is tackled in the section “Stop consonant lenition,” while the sub-section “Pre-consonantal stop deletion” discusses the loss of the same class of consonantal segments triggered by heteromorphemic consonant clusters. On the lenition change, PTG is argued to be reconstructible with the whole series of oral voiceless stops undergoing this process, and not just **-p* and **-t*, as is the case in some noteworthy members of the family such as Old Tupi and Kamayurá (*contra* Schleicher, 1998, pp. 32-34). The main arguments for reconstructing morpheme-final **-p*, **-t* and **-k* loss in PTG in C + C (that is, Consonant + Consonant) encounters are presented as well, and three main types of TG languages are recognized as a function of the outcomes of these morpheme-final stop consonants in the relevant languages. Next, section “Glottal metathesis” addresses the process that inverts the relative order of a root-final stop and a following heteromorphemic glottal stop. Though said process is synchronically attested in Kayabí and Kagwahiva alone, it has been traditionally accepted in TG comparative linguistics that reconstruction of metathesis to PTG is justified by its role in accounting for some (otherwise) exceptional patterns of oral stop (morpho)phonology in the other languages of the family. This assumption is shown to be problematic, in particular the claim that pre-consonantal deletion would be responsible for the loss of the metathesized glottal stop in languages other than Kayabí and Kagwahiva. I argue that pre-consonantal deletion is irrelevant in this case, and that some other, later process eliminated the glottal elements (whether segmental or not) from the TG languages which lack any reflexes of them. An additional implication of the renewed, combined look at these (morpho)phonological processes is that it removes any motivation for Schleicher’s (1998) postulation of Pre-PTG set of ‘pre-glottalized obstruents,’ as the restriction of PTG ‘glottal clusters’ to sequences having sonorants as second members is neatly accounted for by its interaction with the stop lenition process.

¹ My use of parentheses in the expression ‘(morpho)phonology’ is motivated by the fact that, of the patterns discussed in this text, some, like final stop consonant deletion, are purely phonological, while others, such as lenition, are, in my view, a matter of morphophonology. Relevant theoretical considerations will be briefly discussed in the two coming sections: “Proto-Tupi-Guarani stop consonant (morpho)phonology: a fresh look” and “Stop consonant lenition”.

BACKGROUND ON TUPI-GUARANI PHONOLOGY

The view of PTG phonology presented in this section is based to a large extent on the cumulative understanding provided by past work in comparative Tupi-Guarani linguistics (in particular: Lemle, 1971, Schleicher, 1998 and Mello, 2000), but, based on more recent work, derives important corrections and modifications of earlier claims.² The newer contributions will be discussed as the need arises — either pointing to the relevant literature or, in the case of unpublished hypotheses — by explicitly discussing the relevant evidence and presenting the required argumentation. Finally, it should be stressed that PTG etyma used for illustrative purposes in this section, when not explicitly justified by comparative data, have been taken from Lemle (1971), Schleicher (1998) or Mello (2000), with the necessary adaptations in view both of transcription differences and of changes in our understanding of PTG phonology (some of which are briefly discussed below).

The inventory of consonantal segments assumed here for PTG, and taken essentially from Carvalho (2022a), is given in Table 1.

Table 1. Proto-Tupi-Guarani consonants.

	Labial	Alveolar	Palatal	Velar	Glottal
Oral stops	*p	*t		*k	*ʔ
	*pʷ			*kʷ	
	*pʲ				
Fricative	*β				
Affricates		*ts̺	*tʃ̺		
Nasal stops	*m	*n		*ŋ	
	*mʷ			*ŋʷ	
Approximants	*w		*j		

PTG was originally reconstructed in Lemle (1971) with a single affricate obstruent, then symbolized as <c>, and interpreted as equivalent to IPA ts. Later on, Jensen (1984) accepted the need to include two affricates, though this proposal was later examined and rejected by Schleicher (1998). As recently shown by Carvalho (2022a), however, Schleicher’s critiques do not stand, and the need for reconstructing two such segments, tentatively symbolized as PTG *ts̺ and *tʃ̺, remains (as this is not crucial to the present paper, the reader is referred to the discussion in Carvalho, 2022a, section 5, for qualifications on the reconstruction of the two affricates).³ Another modification in relation to the ‘orthodox’ view on the PTG consonantal inventory (equivalent to that of review works such as Jensen, 1998, 1999) was the elimination of the palatalized velar stop *kʲ (see Carvalho, 2023), since the relevant segmental correspondences can be better explained as involving language-specific developments in a subset of the daughter languages.

² A basic and essentially correct broad outline of PTG phonology can be derived from early studies such as Lemle (1971), Schleicher (1998) and Mello (2000). Many gaps remain, however, in relation not only to the diachronic development of individual languages, and on the reconstruction of PTG itself. These can be amply improved, in particular by addressing problems in the etymologies amassed in these comparative works, methodological issues in phonological reconstruction, and by rectifying the over-reliance on a few influential languages, such as Old Tupi or Avañe'ê. The author of the present paper is currently involved in writing a monograph-length reconstruction of PTG and of the historical phonology of individual languages, tackling many of the limitations of past work (Carvalho, in press).

³ It should be noted that the very existence of the controversy reveals problems in the original formulation of the two-segment solution of Jensen (1984) and, later, Jensen (1998, 1999). Only with the work of Carvalho (2022a) was the necessary evidence and argumentation presented to support adding another affricate segment to the system of Lemle (1971).

The inventory of vowels reconstructed for PTG (shown in Table 2) involves much less controversy,⁴ at least in terms of inventory composition, despite being related non-trivially to the problem of the proper phonological analysis of nasalization (discussed below).

Table 2. Proto-Tupi-Guarani vowels.

	Front	Central	Back
High	* <i>i</i>	* <i>i</i>	* <i>u</i>
Mid	* <i>e</i>		* <i>o</i>
Low		* <i>a</i>	

In terms of the distribution (or phonotactic organization) it seems that a few changes in relation to established views are in order as well. The patterns of distribution characteristic of PTG phonological segmental units are here stated in terms of morphological constituents and in terms of phonological domains, in particular that of the syllable. TG languages, and PTG itself, have the following kinds of formatives: Roots and affixes.⁵ A root is here understood as a morpheme (hence, a minimal form-meaning association) which realizes a lexeme, a lexical item that usually refers to an entity, an event, an state or an attribute. Roots are typically of the CV (*-*po* 'hand'), CVC (*-*tīm*, 'to plant'), CVCV (*-*katu* 'to be good'), and CVCVC (*-*petek* 'to slap') shapes, more rarely with trisyllabic format (*-*potiʔa* 'chest'). Roots of four or more syllables are almost never found in more basic layers of the vocabulary, but are found in greater frequency among zoonyms and phytonyms (e.g., *-*tamanu(w)a* 'anteater', *-*marakaja* 'wild cat'). An affix is also a morpheme in the above sense, but it differs from a root in that it realizes a grammatical or functional notion, adding, specifying or modifying the meaning or class membership of a root it occurs affixed to.⁶

The syllable structure of PTG is, just like that of most daughter languages, rather simple: CV syllables are by far the most common, though onsets are optional and onsetless syllables occur both word-initially (e.g., *-*aβati* 'maize', *-*ita* 'stone') and word-medially (e.g., *-*iat* 'canoe'; *-*eit* 'honey'). Codas are allowed, but with strong distributional and licensing limitations.⁷ TG phonotactics is usually described as allowing for closed syllables (i.e., VC and CVC) in word-final position only (see e.g., Schleicher, 1998, p. 25; Jensen, 1999, p. 133), though, as discussed below, this view is in need of revision.⁸ Table 3 offers examples of the distribution of syllable types in roots.

⁴ A reviewer notes that the mid vowels could be perhaps reconstructed with the IPA symbols ϵ and ɔ for mid-open vowels, as opposed to those for mid-close vowels, e and o , respectively. This is certainly a possibility, and one that would make sense in terms of developments in daughter languages that have merged **e* and **a*, or **o* and **a*. In any case, this is not further pursued, or justified here, and I have kept the traditional reconstruction of **e* and **o*, which does not impinge on any of the issues directly addressed here.

⁵ Clitics can be posited as well, and have been described for individual languages, usually as bound grammatical morphemes which are invisible as far as the distribution of accent is concerned. This is arguably the case of the typical 'case markers' of TG languages (Jensen, 1999, pp. 148-149). These will not concern us here, as they seem to involve alternative morphophonological phenomena undoing potential consonantal sequences.

⁶ An additional morphological level with stems could be possibly motivated by reference to roots having one of the 'linking consonants' or 'relational morphemes' characteristic of TG languages (see e.g., Jensen, 1998, 1999). We leave this possibility aside, however, as it is not vital for any of the issues under discussion here.

⁷ The term 'licensing' here refers to the constraints on the classes of segments that are allowed in a given structural position.

⁸ A possibility not discussed here is advanced in Drude (in press) for Awetí, the closest relative of PTG within the Tupian language family. The author in question analyzes word-final/pre-pausal consonants as extra-syllabic, though these may be resyllabified as syllable onsets when followed by vowels that belong either to thematic or contentful suffixes.

Table 3. Proto-Tupi-Guarani syllable types.

Syllable type	Root-initial	Root-final
V	*-ike 'side (of the body)'	-
CV	*-nupā 'to hit'	*-iβira 'tree/wood'
VC	*-(j)ajtse 'father's sister'	*-peũm 'son-in-law'
CVC	*wajwĩ 'old woman'	*tapiʔit 'tapir'

In order to describe the licensing constraints for syllable codas it is necessary to distinguish between final (i.e., pre-pausal) and medial (i.e., pre-consonantal) codas. Word-final codas can be filled by two groups of segments: the stops **p*, **t*, **k*, **m*, **n*, **ŋ*, and the approximants **j* and **w*. The first group can be reduced to a single set of stop consonants without any specification for nasality/orality (**P*, **T* and **K*; see Galucio, 2005, pp. 171-172; Nikulin & Carvalho, 2022) depending on one's view on PTG nasality (see below for more details, and Drude, 2020, in press, for the discussion of a similar pattern in Awetí). As to the approximants, the proper statement of their distribution — as well as a more coherent view of PTG syllable structure — depends on addressing the ambiguous nature of the term 'consonant'. In one sense it can refer to 'true consonants' or contoids, that is, a phonetic sense in which a consonant is a phone produced with a critical level of articulatory stricture in central region of the oral cavity (see e.g., Laver, 1994). In this first sense, approximants such as *j* and *w* are not consonants (= contoids), but vocoids. In another, more abstract or phonological sense, consonant refers to a position, usually symbolized as C, either in syllable structure or in a timing/segmental tier.⁹ PTG **j* and **w* should be considered consonants in the second sense, a proposal which explains why syllable rhymes of the kind *-VjC* or *-VwC*, where V stands for the syllable nucleus and C for a consonantal contoid, are unattested in any TG language (including, of course, PTG itself). This would not follow if post-vocalic **-j* and **-w*, and their reflexes, were analyzed instead as members of diphthongs (hence, of branching syllable nuclei).¹⁰ Another consequence of this analysis is that the traditional description of PTG, and most of its daughter languages, as allowing closed syllables word-finally only must be rejected: Word-medial syllables with *-Vj* rhymes are, in fact, closed syllables (this view is already adopted in Table 3 above). The absence of medial syllables having stop consonants as codas would follow, in turn, from a syllable contact generalization requiring optimal sonority transitions between syllables (see Carvalho, 2021) for further details and argumentation). The PTG approximants **j* and **w* occur both as consonantal onsets (e.g., **-juru* 'mouth'; **ts-uwĩ* 'blood') and as final codas (e.g., **-kaj* 'burn (intr.)'; **-pew* 'pus').¹¹ The palatal approximant **j* seems to be the sole consonant that can occur forming an internal or medial coda (e.g., **ts-ajti* 'nest').

⁹ In the descriptive literature on individual TG languages, sequences of a vowel followed by an approximant are analyzed differently depending on the specific TG language under discussion and on theoretical preferences of the researcher, being sometimes described as forming a diphthong (see Dobson, 1997 on Kayabí; Almeida et al., 1983 on Tapirapé), and sometimes as a closed syllable of the form (C)V (see Seki, 2000 on Kamayurá; Bendor-Samuel, 1972; Harrison & Harrison, 2013 on Tenetehára).

¹⁰ A reviewer notes that this conclusion would not follow necessarily if, for instance, a restriction on the occurrence of morae could be postulated. Note, however, that morae are not obviously universal (in the sense of being present in all languages), and that, to the best of my knowledge, none of the typical phenomena that motivate the postulation of a moraic layer in phonological representations (e.g., weight-sensitive prosody, compensatory lengthening) is attested in any TG language. The reasoning expressed in the text is tailored to a specific set of assumptions, for instance, about the existence of a CV-layer, the parsing of diphthongs, and so on, and must be evaluated in these terms alone.

¹¹ Note, however, that while **-j* is very commonly attested as a coda, **-w* is not, being attested in **-pew* 'pus' alone.

The reader already familiar with the TG comparative literature — and, in particular, with existing reconstructions of PTG — will notice that word-final oral voiceless stops (which one could describe as *fortes*) appear in the PTG etyma presented here (as in **tapiʔit* ‘tapir’, or **kap* ‘wasp’), thus differing from published reconstructions where *lenes* consonants are given instead (thus: **tapiʔir* ‘tapir’, **kaβ* ‘wasp’). Evidence for the reconstruction of final *fortes* consonants will be discussed below in section “Stop consonant lenition.”

As to nasalization, a conspicuous element in the sound structure of most TG languages, I accept it here that nasality is associated to underlying phonological representations in two ways: First, in the nasal stops (**m*, **n*, **ŋ*) that appear in onset position; second by means of a ‘prosodic’ nasalization that is associated with specific morphemes, and whose realization is tied to the word-level primary accentuation. The distributional pattern illustrated in Table 4 is essential for understanding PTG nasalization (‘N.A.’ = Not attested).

Table 4. Restrictions on the distribution of nasal vowels and stop consonant nasality in PTG.

	-Ø	-C	-N
ĩ	<i>ĩs-akã</i> ‘branch’	N.A.	<i>*-kãm</i> ‘breast’
u	<i>-juka</i> ‘to kill’	<i>*kap</i> ‘wasp’	N.A.

The core generalization is the agreement in terms of nasality among the elements composing a syllable rhyme, that is, the nucleus and the coda (see Galucio, 2005, pp. 171-172, and Nikulin & Carvalho, 2022, for a wider Tupian perspective on this issue). Configurations where this agreement does not occur — that is, where an oral vowel is followed by a nasal coda, or a nasal vowel by an oral coda — are not attested in any TG language and, hence, not reconstructed for PTG either.¹² In a more comprehensive approach to TG nasalization, this constraint also plays out crucially in the explanation of nasal harmony/spread in TG languages, though this will not be discussed here, as it is not relevant to the issues at hand (see Carvalho, in press for details).¹³

PROTO-TUPI-GUARANI STOP CONSONANT (MORPHO)PHONOLOGY: A FRESH LOOK

The morphological concatenation of roots ending in a stop consonant and suffixes, either vowel-initial or stop consonant-initial ones, triggers some (morpho)phonological adjustments in every TG language. First, there is the process that consists of the lenition of morpheme-final oral stops when followed by heteromorphemic vowels (i.e., targeting -C_i + V structures; where ‘+’ stands for a morpheme boundary). Though the details will be clarified and exemplified ahead, ‘lenition’ should be understood here as a process that yields voiced continuant segments from underlying (or

¹² The basic, surface generalization is the need for having a syllable nucleus and a coda that agree in terms of nasality. Whether the best way of coding this generalization in a more abstract phonological level appeals to unspecified, archiphoneme-like consonantal codas (as suggested above in relation to Table 3), or to some other formal device, is another matter, one that I opt to eschew here. Note that I am working here mostly under a ‘Jonesian’, or American Structuralist, conception of phonemes as ‘families of allophones in complementary distribution.’ As noted a long time ago, this specific approach to phonemes is not particularly compatible with the use of archiphonemes (see e.g., Martinet, 1968, p. 2). In any case, choices on these matters do not affect the main, basic claims advanced here.

¹³ That the floating nasalization is associated with the realization of accent is most obviously demonstrated in those languages that were subjected to accentual shifts. Thus, in Chiriguano and Guaraní, for instance, word-final nasalization shifts one syllable to the left along with the general accentual retraction that took place in these languages. Thus, for PTG **ĩs-atã* ‘hard,’ **ĩs-akã* ‘branch,’ **pitã* ‘red,’ Chiriguano has *hãta*, *hãka* and *pĩta*, respectively (see Dietrich, 1986, pp. 46-49).

etymological) voiceless oral stops.¹⁴ Second comes the elimination or deletion of morpheme-final stop consonants, $-C_1$, in $-C_1 + C_2$ consonant clusters.¹⁵ One should note from the outset that this rule does not apply when C_2 is a glottal stop ʔ (glottal stops are never found in $-C_1$ position). It is commonly assumed in overviews of the family (e.g., Jensen, 1998, 1999) that this process of morpheme-final deletion targeting stop consonants can be reconstructed for PTG itself, and, for this reason, we will devote relatively less attention to it in the present piece. Finally, a third process concerns the fate of $-C_1 + C_2$ consonant clusters when C_2 is a glottal stop ʔ. These and other rules have been discussed and examined on the basis of comparative material in Jensen (1984) and Schleicher (1998). Schleicher (1998) largely follows the discussion of Jensen (1984), adding a few comments of his own but being, generally, less explicit than Jensen was. Schleicher (1998) compares Ka'apor, Kayabí, Parintintin (Kagwahiva), Wajãpi and Old Guarani, thus adding only Ka'apor to the group of languages compared in Jensen (1984). Wajãpi and Old Guarani are, however, of limited relevance for the reconstruction of these alternations to PTG (as noted by Jensen, 1984 for Wajãpi), since both languages have lost word-final stops, retaining only remnants of these segments in (morpho)phonological alternations (and for Wajãpi this is true only of the Amapari Wajãpi variety; see Carvalho, 2022b). What stands out as a somewhat surprising finding is that the lenition rule differs from the morpheme-final deletion rule in that it has not been reconstructed for PTG. The reasons for this will be discussed in the next section.

Before proceeding, however, it seems fit to discuss some of my decisions as to the use of descriptive or analytical terminology. The first concerns my treatment of the process of stop consonant lenition in the TG family as a matter of morphophonology, not of phonology pure and simple, which is seemingly polemic or unorthodox to some readers. In fact, my use follows the employment of this term (or, its closely related variant, 'morphophonemics') both in the post-Bloomfieldian practice of the American brand of Structuralism and in historical linguistics. Thus, Hockett (1958, pp. 271-283) discusses the palatalization of morpheme-final $-t$ in the Algonquian language Fox, where $-t$ in the base form surfaces as $-tʃ$ when followed by heteromorphemic $i(:)$ or j , as a matter of 'morphophonemics' and as involving 'allomorphs', even though the trigger for the process involves a natural class of phonological elements (front, high vocoids). His reason for doing so is that, elsewhere in the language, ti is an entirely legitimate and well-formed sequence of segments (Hockett, 1958, pp. 279-280). This makes the Fox $t \sim tʃ$ a non-automatic alternation, and thus not obviously reducible to purely phonological generalizations in the manner of the automatic kind of morphophonological alternations. This understanding of the divide between automatic and non-automatic alternations is standard, for instance, in treatments of internal reconstruction (see e.g., Chafe, 1959, pp. 481-482), is relevant to the categorization of processes as phonological or as morphophonological in European varieties of structuralism (see e.g., Martinet, 1965), and has been enshrined in textbooks, where morpheme variants characterized by alternations between independent

¹⁴ A clarification is in order, despite the collapsing of synchronic and diachronic dimensions intended by the phrasing: Synchronically speaking, of course, there would be no underlying (hence, phonologically) voiceless stops, as the feature of voicing is not contrastive for PTG, and for most TG daughter languages. What is intended here is more akin to a phonetic, surface statement that these segments are (or were) realized as voiceless stops before pause, and as voiced continuants in the lenition context. If a phonologically minimal statement is needed, voicing can be left unmentioned, as continuants are (in PTG) redundantly voiced, non-continuants being voiceless on the same grounds.

¹⁵ It is a well-known fact in TG comparative linguistics (at least since Anchieta, 1595, pp. 1-2) that this is not the sole way morphologically derived consonant clusters are avoided in the relevant languages. In particular, when the post-root syllable is unaccented, it may happen that epenthesis of a vowel (usually the high central vowel i) takes place instead of the apocope of the morpheme-final consonant (Jensen, 1998, p. 608, 1999, p. 136). Although relevant for a comprehensive understanding of PTG morphophonology, this rule will not be further discussed in the present study.

phonemes are described as ‘morphophonemically related allomorphs’ (see e.g., Fox, 1995, pp. 145-150). In the present case, lenition alternations like PTG **p* ~ **β* or **t* ~ **ɾ* involve, in each case, alternations between contrasting segments (i.e., independent phonemes). These segments stand in contrast even in intervocalic context, which implies that the selection of the lenited alternant is not phonologically automatic. In other words, nothing in the phonology of TG languages prevents the occurrence of intervocalic stops: since *-VpV-* and *-VtV-*, where *-V-* stands for any vowel, are well-formed phonological structures in TG languages (and in PTG), the processes *-VpV- → -VβV-* and *-VtV- → -VɾV-*, which are, moreover restricted to morphologically derived contexts, can be treated as a matter of morphophonology. Further reasons for treating this process as morphophonological in nature will be given below in the next section, including the existence of two homophonous (phonologically identical) suffixes *-a* which, nevertheless, differ as to triggering or not the lenition rule. The second, if minor issue concerns my use of what is arguably ‘too phonetic’ or surface labels for some of the segments under discussion, and my option for less abstract phonological solutions (as noted above for nasality and the alternative of employing consonantal archiphonemes). Even though voicing in PTG (and most TG daughter languages) is redundant, being predictable from the continuant feature (with **β* and all sonorants being [voiced]), I often describe stops as ‘voiceless’. It should be understood that I am in no way denying the predictable nature of voicing, only that I believe it is important to be as explicit as possible in the description of the realization of the relevant segments.

STOP CONSONANT LENITION

Oral stop consonant lenition works in a way that a morpheme-final stop consonant, either *-p*, *-t* and *-k*, or *-p* and *-t* only, shows up as a homorganic voiced continuant (*-β*, *-ɾ* and *-ɣ*, respectively, the latter only where *-k* lenites too) whenever a vowel follows, either within a word or across words. The most common pattern seems to have only *-p* and *-t* targeted, as seen below in (1-3) for Kamayurá (data from Seki, 2000, pp. 119, 428-429). In Kayabí, on the other hand, all three stops *-p*, *-t* and *-k* are subject to lenition (4-6); data from Dobson, 1997, p. 51).

- (1) *motap-a rehe* [motawə rehe] (Kamayurá)
 food-NF POST
 ‘because of the food’

- (2) *jawat-a rehe* [jawara rehe] (Kamayurá)
 jaguar-NF POST
 ‘because of the jaguar’

- (3) *iwak-a* [iwaka] (Kamayurá)
 sky-NF
 ‘sky’

- (4) *mani-?ip-a* [mani?iwa] (Kayabí)
 manioc.stalk-NF
 ‘manioc stalk’

- (5)

tapiʔit-a

[tapiʔira]

(Kayabí)

tapiir-NF

'tapiir'
- (6)

jetik-a

[jetixa]

(Kayabí)

sweet.potato-NF

'sweet potato'

Example (3) above shows that *-k* is not subjected to lenition in Kamayurá, while (6) illustrates the fact that it patterns with the other stops, also undergoing lenition, in Kayabí. Table 5 presents comparative evidence on the nature of the lenition alternations in five different languages of the family. Each cell with the form ‘-X ~ -Y-’ has -X as the consonant in word-final/pre-pausal contexts, and -Y- as the lenited variant when followed by a vowel. When a single consonant is given (as in the three upmost languages for *-k*), this means that no lenition is found and that the *fortis* consonant appears intervocally as well. I have added information on the phonetic implementation of the *fortis* (pre-pausal) variant, noted between square brackets, whenever this information is available in the relevant sources.

Table 5. Comparative evidence for oral stop lenition.

Language	-p	-t	-k	Source
Kamayurá	-p [pʰ] ~ -w-	-t [tʰ] ~ -r-	-k [kʰ]	Seki (2000, pp. 428-429)
Tapirapé	-p ~ -w-	-t ~ -r-	-k	Leite (1977, pp. 14-15)
Xingu Asuriní	-p [pʰ] ~ -β-	-t [tʰ] ~ -r-	-k [kʰ]	Pereira (2009, pp. 93-94)
Zo'é	∅	-t [tʰ] ~ -r-	-k [kʰ] ~ -g-	Cabral (2000, pp. 29, 41)
Kagwahiva	-∅ ~ -β-	-∅ ~ -r-	-∅ ~ -ɣ-	See below
Kayabí	-p [pʰ] ~ -w-	-t [tʰ] ~ -r-	-k [kʰ] ~ -ɣ	Dobson (1997, p. 28)

Setting aside the case of languages like Zo'é, which does not show an active (morpho)phonological rule of *-p* lenition because it has ∅ as the reflex for PTG **-p* (see Cabral, 1996), or Kagwahiva, where all word-final oral stops were lost (see below for details), there are two patterns: That seen in languages where only labial *-p* and coronal *-t* undergo lenition (Kamayurá, Tapirapé, Xingu Asuriní), and those that also lenite the velar stop *-k* (Kayabí, Kagwahiva). It is natural to ask then which pattern is derived and which is primitive (i.e., retained from PTG).¹⁶ Under one proposal, PTG is reconstructed with only **-p* and **-t* undergoing lenition. Later, in a few languages, the process was generalized to the whole set of oral stops, thus affecting the reflexes of root-final **-k* as well in the context of a following vowel. This is, in essence, what is proposed by Schleicher (1998, p. 34), but the status of PTG in relation to this rule is never addressed explicitly in his work. Under a second scenario, the whole series of PTG oral stops, **-p*, **-t*, **-k* was targeted by lenition. In some daughter languages — namely, those where only the reflexes of **-p* and **-t* undergo lenition — some formal development has placed the reflexes of **-k* outside of the influence of said process.

¹⁶ Note also that the difference between β in Xingu Asuriní and w as the lenited alternant in the other languages has a simple explanation in facts of historical phonology: Languages showing w matching β elsewhere underwent a merger **β, *w > w*, which is well-established in TG historical linguistics (see Jensen, 1998, p. 605, 1999, p. 137; Schleicher, 1998, p. 15).

Before proceeding with an evaluation of these alternatives, some comments are in order on Kagwahiva, one of the languages included in the comparison above.¹⁷ There seems to be some confusion in the primary literature on Kagwahiva in relation to the morphophonology of root-final stop consonants, and some clarification is in order. Although Kagwahiva has no *fortis* ~ *lenis* alternation as a (morpho)phonologically transparent rule, the fact that the reflexes of root-final **-p*, **-t*, and **-k* are consistently *lenes* when followed by a vowel shows that the language once had such alternations as well. According to our main lexical source on the language, Kagwahiva has open syllables only, that is, V and CV (Betts, 2012). Betts (2012, p. 4) notes explicitly that root-final consonants are lost before pause, but restored anytime a suffix follows. This would explain inconsistencies in certain entries found in Betts' dictionary, where the examples given as part of each entry are, many times, not enough to make this point clear. Thus, the reflex PTG **-kutuk* 'to pierce' is lemmatized as *-kutug* in Betts (2012, p. 148), and yet, all the examples show only *-kutu* as an existing form. Elsewhere, however, the necessary evidence for the correct analysis is provided by the examples: the reflex of PTG **-apik* 'to sit' is lemmatized as *-'apyg*, with the following example forms: *aapy* 'I sat', *oapy* 'he sat', but: *Erëi nde eapyga* 'you sit sitting' (Betts, 2012, p. 46).¹⁸

Even if improved descriptions show that the different Kagwahiva lects differ in relation to how well final consonants are preserved (a possibility suggested by the data in Sampaio, 1998), it is relatively easy to show that Kagwahiva was once subjected to the same lenition alternations as noted for Kayabí, the difference being that the *fortis* (pre-pausal) alternant has been lost in most or all Kagwahiva varieties. Table 6 below presents such evidence: One column presents the forms of roots before pause (where **-C* > Ø), and the other column has the form of the root when followed by a suffix (with a lenited *-C-*).

Table 6. Evidence for loss of pre-pausal oral stops in Kagwahiva and the past operation of lenition.

Meaning	Pre-pausal variant	Pre-vocalic variant	Source
'listen'	<i>-endu</i>	<i>-enduβ-</i>	Betts (2012, p. 75)
'finished, all'	<i>-pa</i>	<i>-paβ-</i>	Betts (2012, p. 204)
'fall down'	<i>-ʔa</i>	<i>-ʔar-</i>	Betts (2012, p. 50)
'search for'	<i>-eka</i>	<i>-ekar-</i>	Betts (2012, p. 71)
'pierce'	<i>-kutu</i>	<i>-kutug-</i>	Betts (2012, p. 148)
'secure'	<i>-pihi</i>	<i>-pihig-</i>	Betts (2012, p. 234)

¹⁷ As noted in other points throughout the paper, Kagwahiva is, in fact, a dialect cluster. Most of the data in the dictionary of Betts (2012) comes from the Parintintin variety, but forms from Amondawa, Tenharim, Karipuna and Uru-eu-wau-wau are included as well in many of the entries. Even so, some varieties were not included in the present paper at all, such as those described in recent work of Santos (2024), a study diffused only after the completion of the present study. In any case, these varieties are more conservative than Parintintin seems to be. Thus, while many of the statements 'about Kagwahiva' should be qualified in view of this evidence, this changes little to the claims about PTG being advanced here.

¹⁸ The picture presented by the earlier literature on Kagwahiva is, however, unclear on these matters. In the comparative wordlist for the Juma and Parintintin varieties given in Pease (1977), nouns are never given with final consonants, appearing instead either as vowel-final roots (e.g., *-jyva* 'chin') or with a final nominal function suffix *-a* (e.g., *-evega* 'belly'). For verbs one finds either vowel-final words (e.g., *-juka* 'to kill'), or, in the case of consonant-final roots, the consonant-final form is given, though a hyphen is found in every case after the final consonant, indicating that this is not a word-final position (e.g., *-hem-* 'to exit', *-kahuv* 'to hunt'). But, at the end of their comparative study, the occurrence of word-final stop consonants is explicitly noted, and forms such as [okath] ~ [okar] 'village plaza' and [ahereβek] ~ [ahereβeg] 'a person's belly'. Now, while the initial impression is confirmed by the statements in Pease and Bett's description of Parintintin phonology, where it is explicitly claimed that word-final (pre-pausal) consonants are never found in the language (Pease & Betts, 1971, p. 4), it is again contradicted in the brief description of Juma phonology given in Abrahamson and Abrahamson (1984), where *-p*, *-t* and *-k* are said to occur in word-final position, in which context they are realized either unreleased or with slight aspiration.

Returning now to the main diachronic issue of which system of stop consonant lenition should one reconstruct for PTG, there is evidence, in fact, in favor of the derived character of the systems where only the labial and coronal stops undergo lenition — or, to put it differently, there is evidence for the reconstruction of a system similar to that of Kayabí for PTG. There are two sorts of arguments: One based on the treatment of other sequences of morpheme-final stop followed by heteromorphemic vowel in the languages where *-p*, *-t* and *-k* lenite, and the external evidence from Awetí, though the first one arguably carries more force. Both points are considered in tandem below.

As a necessary background to the discussion I will introduce a couple of facts about Awetí — the closest relative of the TG languages within the Tupian language family (that is, PTG's sister branch; Meira & Drude, 2015). While Awetí oral stops are realized without an audible release burst word-finally (*p*, *t*, *k* → [p'], [t'], [k']; see Reiter, 2011, pp. 87-88; Drude, 2020, in press), the language is subject to a lenition process like that described for Kayabí, that is, one that targets the entire series of oral stops (examples adapted from Drude et al., 2019, pp. 7-8 and Drude, 2020, p. 189):

- (7) *e-up-ok* [ɛuβɔk'] (Awetí)
2.SG-father-house
“your father’s house”
- (8) *e-iwit o-ut* [ɛiwiɾut'] (Awetí)
2.SG-brother 3-come
“your brother came”
- (9) *o-atuk-oko* [watuχɔkɔ] (Awetí)
3-bathe-IMPF
“he/she was bathing”

Back in the TG domain, several commentators and reference works accept that PTG can be reconstructed with three allomorphs of a suffix deriving a ‘Gerund’ form for dependent verbs (Jensen, 1998, 1999; Meira & Drude, 2013, pp. 15-17). The suffix allomorphs and their respective distributions are: **-a* occurring after a root-final stop consonant (other than **-t*); **(a)βo* after a root-final vowel, and **-ta* occurring after **-Vj* root-final rhymes (Jensen, 1998, pp. 529-530). Now, the crucial fact here is that the allomorph **-a* of the Gerund suffix does not trigger the lenition of a root-final **-p* or **-k*. This is the case even though the suffix in question is homophonous with the nominal function marker **-a* which does trigger lenition, as noted in the examples in (1-2, 4-6). It is also vital to insist on the fact that both suffixes are not only segmentally identical but prosodically identical as well: the allomorph **-a* of the GER suffix is unaccented, as explicitly noted by sources on individual languages, like Old Tupi (Barbosa, 1956, pp. 158-167; Rodrigues, 2010, p. 37; Navarro, 2013, pp. 172-173), Tapirapé (Leite, 1977, pp. 10-11), and in more general statements on both Old Tupi and in Tupi-Guarani languages in general (Schleicher, 1998, pp. 222-223; Cabral & Rodrigues, 2005, p. 55), and on PTG itself (Jensen, 1998, pp. 529-530, 1999, p. 157; Meira & Drude, 2013, pp. 15-17). The absence of lenition is attested in all languages where the relevant patterns are found (see e.g., Tapirapé, in Leite, 1977), and is exemplified below with examples from Kayabí (adapted from Dobson, 1997, p. 86):¹⁹

¹⁹ The ‘Gerund’ verb forms of most of the literature on TG languages is called ‘narrative verb form’ in Dobson’s description of Kayabí (Dobson, 1997). I have adapted the glosses according to the more widespread usage.

- (10) **te-jauk-a** [tejauka] (Kayabí)
 1.REFL-bathe-GER
 “for my bathing”

- (11) **o-ka?aup-a** [oka?aupə] (Kayabí)
 3.REFL-hunt-GER
 “for his/her hunting”

Since we have seen evidence above that Awetí does share the lenition of root-final stops with PTG, it is significant to know that it also shares the exceptional behavior of the vowel-initial ‘Gerund’ allomorph (see e.g., Meira & Drude, 2015). The cognate morpheme exhibits the allomorphs **-aw** (after vowels and oral stops), **-paw** (after **-m** and **-w**), **-taw** (after **-n** and **-j**) and **-kaw** (after **-ŋ**). As in the Kayabí examples above, the vowel-initial morph, **-aw**, fails to trigger the otherwise expected lenition (examples adapted from Drude, 2008):

- (12) **a-to it-atuk-aw** [atɔ itatukaw] (Awetí)
 1SG-go 1SG.REFL-bathe-GER
 “I went to take my bath”

- (13) **e?i-tup-aw ozo-ut** [e?itupaw ɔʒɔutʰ] (Awetí)
 2PL-see-GER 1/3-come
 “We (exl.) came to see you (pl.)”

As far as the reconstruction of PTG is concerned, the importance of the comparative evidence from Awetí resides in showing that this vowel-initial suffix that fails to trigger the lenition of root-final stops likely predates PTG itself. The significant implication is that, at the PTG level, where we find, in addition to the Gerund allomorph ***-a**, the nominal function marker ***-a**, we have a pattern whereby two phonologically identical suffixes are nevertheless morphophonologically distinct: While the nominal function suffix ***-a** triggers the lenition of a preceding stop, Gerund ***-a** does not.²⁰

The relevance of these facts for the adjudication between the two alternatives — reconstructing PTG with either partial or complete lenition of the oral stop series ***-p**, ***-t**, ***-k** — is evidenced by the following reasoning: As a premise, we assume, based on the comparative TG evidence as well as on the external evidence from Awetí, that PTG displayed

²⁰ The case of these two homophonous suffixes that are associated with different phonological behavior is, of course, a recurrent effect of the merger of phonological contrasts, either between once contrastive elements (e.g., in the merger of Proto-Eskimo ***i** and ***ə** as **i** in Eskimo; see Compton & Drescher, 2011) or of a merger with zero, that is, loss (see e.g., the case of the Celtic mutations, where homophonous elements, such as Modern Welsh **ei** ‘his’ and **ei** ‘her’ have different phonological effects; see Awbery, 1993, p. 377). Based on the discussion in Meira and Drude (2015), this situation is explainable in terms of a past phonological regularity that became a morphological regularity after a series of reductive sound changes: the ‘Gerund’ suffix (but not the nominal function suffix) had a form ***-Taβ-βo**, thus with an initial consonant, but this segment (either unspecified ***T** or ***tj**), was lost in these contexts (see Meira & Drude, 2015 for details, and Meira & Drude, 2013 as well). Drude (in press) offers, for Awetí, an abstract analysis positing an ‘abstract consonant’ as the first segment in those morphs that do not trigger lenition. In my view, these hyper-abstract approaches are misguided (see e.g., Vago, 1973 for a classic discussion in relation to vowel harmony; Janda, 2003, pp. 405-406 for the Celtic mutation case), and I see cases like this one, of the two TG suffixes, as an ordinary case of morphologized phonology (see, again, Janda, 2003).

lenition of root-final oral stops (at least **-p* and **-t*) when a root was followed by the nominal function suffix **-a*, but not when these were followed by the **-a* allomorph of the Gerund suffix. Now, if PTG is reconstructed with a lenition process targeting **-p* and **-t* only, the lenition of the reflexes of **-k* attested in languages like Kayabí must be attributed to a secondary extension of the pattern so as to affect *-k* too — maybe by structural/systemic considerations, as this would make the whole oral stop series, in this respect, symmetric. However, as noted in the examples above, Kayabí retains the distinction between lenition-triggering *-a* (the nominal function marker) and non-lenition-triggering *-a* (the Gerund suffix). Since the two suffixes are phonologically (and phonetically) non-distinct, any extension of the lenition pattern along purely phonological lines²¹ in Kayabí would have carried the lenition over to the Gerund suffix too. Since this is not the case, it makes more sense to reconstruct back to PTG a pattern identical to that of Kayabí and Awetí, with all root-final oral stop **-p*, **-t*, **-k* showing lenition before **-a* ‘nominal function’, but not before **-a* ‘Gerund’.

As to the languages where only **-p* and **-t* are subjected to lenition, the explanation as to why **k ~ *-ɣ-* has been lost (or, in other terms, why the lenition of **k* has been suspended or eliminated) is possibly tied to its isolated status: While **-p ~ *-β-* and **-t ~ *-r-* were (morpho)phonological alternations (that is, involving the alternation between two independent phonemes of the language), **-k ~ *-ɣ-* was a purely allophonic process, as there was no **ɣ* as an independent phoneme in the PTG inventory.²² TG languages that do not display *-k* lenition have therefore simply lost an allophonic rule. A summary of what I will assume as the correct reconstruction, at the PTG level, of the phonology, morphophonology and (aspects of) the phonetics of root-final oral stops is summarized in Table 7.²³

Table 7. Realization of PTG root-final oral stops.

Root-final stop	___#	___ + <i>*-a</i> (NF)	___ + <i>*-a</i> (GER)
<i>*-p</i>	<i>*-[p']</i>	<i>*-β-</i>	<i>*-p-</i>
<i>*-t</i>	<i>*-[t']</i>	<i>*-r-</i>	<i>*-t- (?)</i>
<i>*-k</i>	<i>*-[k']</i>	<i>*-[ɣ]-</i>	<i>*-k-</i>

Before proceeding we should note that the patterns considered so far cast doubt on yet another assumption about word-final stop consonants in PTG that has been commonly accepted in reference works on this language family. With a few exceptions such as Meira and Drude (2015, p. 278), past reconstructions of morpheme-final consonants in PTG assume a *lenis* realization before pause and after oral vowels, that is, **-β* and **-r*, as opposed to **-p* and **-t* (see, for instance, the etyma with final **-β* and **-r* in the comparative sets presented in Schleicher, 1998, pp. 328-353 and in Mello, 2000, pp. 150-210). One of the implications of this proposal is that it has motivated the postulation of a diachronic process of ‘devoicing’ in the root-final consonants in some languages (Jensen, 1999, pp. 142-143). It is clearly

²¹ Note that I am assuming here that the change of system where **p* and **t* alone undergo lenition to one where the entire series of voiceless stops is affected would be a kind of across-the-board phonological generalization (or analogy in Kiparsky’s sense; see Fertig, 2015, pp. 210-211), essentially a way to make the input of the rule simpler by removing one condition for its application (that is, the specification that non-velar stops undergo it).

²² Note that this is a difference between Kayabí and PTG as here reconstructed: The velar continuant *ɣ* is an independent phoneme in Kayabí.

²³ Note that some details remain to be established by careful reconstructive work. Examples include: The distribution of the Nominal function suffix **-a* and the morphological realization of the Gerund in roots ending in **-t*. On the former issue, there is a difference between TG languages where **-a* is only found after consonant-final roots, while in other languages it is also found after vowels. As to the expression of the Gerund, some important TG languages, notably Old Tupi, display an isolated pattern with **-t-* final roots: Rather than adding a suffix, the final consonant is lost in these cases. There is, at the moment, no proper historical account of these divergences.

the case, however, that the development in question, which maps, for instance, **t-uβ > t-up* ‘father’, requires not only devoicing, as asserted by Jensen (1999), but occlusivization as well, which is a fortition change and, therefore, an intrinsically unlikely development, in particular in these contexts (Mowrey & Pagliuca, 1995; Bybee & Easterday, 2019). The reconstruction of these pre-pausal lenited stops for PTG seems to be based only on the facts of Old Tupi, where *-β* and *-r* seem to be found in absolute final position. The comparative patterns in Table 5 show that, before pause, languages such as Kayabí, Kamayurá and Xingu Asuriní have full stops, either with or without a release burst. Moreover, as seen above, Awetí shows the exact same pattern, with root-final oral stops simply losing their release bursts before pause (Reiter, 2011, pp. 87-88). I consider it more likely, then, that PTG itself showed the same pattern, which is represented in Table 7 above.

PRE-CONSONANTAL STOP DELETION

Whenever morphological concatenation brings a morpheme-final contoid (that is, either an oral or nasal stop) to immediate adjacency with a following contoid, the morpheme-final consonant is lost, or, in formulaic terms: $-VC_1 + C_2 V \rightarrow -VC_2V-$. The process is exemplified below with data from Kamayurá (Seki, 2000, p. 430), targeted segments being highlighted in bold font, and limited to oral stops which are the focus of this paper:

- | | | | |
|------|---------------------------|-------------|------------|
| (14) | <i>ʔanup-katu</i> | [ʔanukatu] | (Kamayurá) |
| | listen-good | | |
| | ‘to understand’ | | |
| (15) | <i>aikwat-kitā</i> | [aikwakitā] | (Kamayurá) |
| | throat-knot | | |
| | ‘Adam’s apple’ | | |
| (16) | <i>jetik-tsin</i> | [jetitsin] | (Kamayurá) |
| | potato-white | | |
| | ‘white potato’ | | |

The general absence of word-medial contoid clusters among TG languages, noted in every comparative synthesis on the family (e.g., Jensen, 1998, 1999), is consistent with the phonotactic profile that results from this phonological regularity. Another direct consequence of this process is the existence of shortened variants for consonant-final stems in the language (e.g., *jetik ~ jeti-* ‘potato’). Table 8 offers a comparative view of the patterns of pre-consonantal stop deletion in different TG languages, with examples of the consequent alternations offered in each case. A hyphen ‘-’ indicates that the language in question offers no relevant evidence on the process, given that the consonant in question has been diachronically lost (this is the case with some languages that have lost only PTG **-p* among final stops). A question mark ‘?’ indicates that no example was found in the primary sources. This is used below for the loss of final *-k* in Xingu Asuriní, even though both sources consulted (Montserrat & Jesus, 1998; Pereira, 2009) either claim or imply that *-k* is lost as well in these conditions. In each data-filled cell, the leftmost variant occurs before pause, the rightmost one in the deletion-triggering context of a following consonant (that is: pre-pausal variant ~ pre-consonantal variant).²⁴

²⁴ The data in Table 8 comes from the following sources: Old Tupi (Barbosa, 1956, p. 35); Kamayurá (Seki, 2000, p. 430); Tapirapé (Leite, 1977, p. 16; Almeida et al., 1983, p. 16); Xingu Asuriní (Montserrat & Jesus, 1998; Pereira, 2009); Zo’é (Cabral, 2000); Kayabí (Weiss, 2005, pp. 6, 27, 28).

Table 8. Patterns of pre-consonantal stop deletion.

Language	<i>-p ~ Ø</i>	<i>-t ~ Ø</i>	<i>-k ~ Ø</i>
Old Tupi	<i>pindoβ ~ pindo-</i> 'palm tree sp.'	<i>jawaɽ ~ jawa-</i> 'jaguar'	<i>-ep'ak ~ -ep'a-</i> 'to see'
Kamayurá	<i>?anup ~ ?anu-</i> 'to hear'	<i>-aikwat ~ -aikwa-</i> 'throat'	<i>jetik ~ jeti-</i> 'potato'
Tapirapé	<i>?ip ~ ?i-</i> 'leg'	<i>āwit ~ āwi-</i> 'house'	<i>-t̪f̪aok ~ -t̪f̪ao-</i> 'to bathe'
Xingu Asuriní	<i>-enup ~ -enu-</i> 'to hear'	<i>-kit ~ -ki-</i> 'to sleep'	?
Zo'é	-	<i>-jut ~ -ju-</i> 'to come'	<i>-esak ~ -esa-</i> 'to see'
Kayabí	<i>-akup ~ -aku-</i> 'hot'	<i>-eit ~ -ei-</i> 'to roast'	<i>-ewek ~ -ewe-</i> 'belly'

Given the current status of documentation on the languages of the TG family, it is difficult to have complete cognate sets, with wide distribution in the family, and for which both the long and the shortened (i.e., consonant-less) variants are attested (the exception above is the equation of Old Tupi *-epjak ~ -epja* and Zo'é *-esak ~ -esa*, both meaning 'to see').²⁵ Very few if any dictionaries or sources of lexical information include adequate exemplification of (morpho)phonological phenomena. However, in all languages for which descriptions are available, the process is described as phonologically general, and never as a matter of a lexical or morphemically-conditioned formal alternation (that is, allomorphy in the strict sense of the term). In terms of distribution, although restricted to six different languages, the sample in Table 8 is arguably representative of the internal diversity of the family: it includes languages from all major subgroups of the Rodrigues and Cabral (2002) classification, with the exception of subgroups I and II.²⁶ In terms of the classification of Michael et al. (2015), the Kamayurá cognates represent one of the two main or basal branches, in addition to the other languages belonging to 'nuclear TG'. Finally, in the classification of Gerardi and Reichert (2021), the languages sampled here represent all their major clades (identified by colours in the output, best supported tree from their Bayesian analysis): The yellow (Kayabí), red (Kamayurá), green (Old Tupi) and Tapirapé (purple) group. Zo'é is not classified in Gerardi and Reichert (2021), but is known to be rather closely related to Wajãpi and Teko/Emerillon (in a separate clade of the red group, not that of Kamayurá; see also Sousa, 2013). The only absence is the blue group of Gerardi and Reichert (2021), which agrees in all essential aspects to the subgroups I and II of Rodrigues and Cabral (2002).

Not included in Table 8 above are languages that have lost final consonants before pause (i.e., when word-final) — such is the case, precisely, of languages from subgroups I and II of the Rodrigues and Cabral (2002) classification.²⁷

²⁵ Kamayurá *-?anup ~ -?anu-* and Xingu Asuriní *-enup ~ -enu-*, both meaning 'to hear', are not exactly comparable because the Kamayurá form seems to derive from a cross between two independent, yet formally and semantically similar, PTG etyma whose reflexes include Avañe'ẽ *andú* 'to visit; to feel' and *endú* 'to hear, listen' (Peralta & Osuna, 1950, pp. 7, 63). Establishing this point, however, lies well beyond the focus of the present paper.

²⁶ Of the eight subgroups in the Rodrigues and Cabral (2002) classification, Old Tupi represents subgroup III, Kamayurá is the sole representative of subgroup VII, Tapirapé belongs to subgroup IV, Xingu Asuriní is a member of subgroup V, Zo'é is a member of subgroup VIII and Kayabí belongs to subgroup VI.

²⁷ Note that Guayay, of subgroup II, has retained PTG **-t > -r* only, and that Old Guaraní still retained lenited reflexes of PTG **-k*, although modern Guaranian varieties do not; see Lemle (1971), Schleicher (1998).

As is well-known in TG comparative linguistics, some of these languages have lost word-final stops (both oral and nasal), but retain these consonants when the reflex of the originally consonant-final root is followed by a vowel-initial suffix (see e.g., Jensen, 1984 on the case of some varieties of Wajãpi). In Montoya's "Tesoro", for instance, the main lexical source on Old Guarani, such alternating roots are explicitly indicated. Thus, the Old Guarani reflexes of PTG **-ʔat* 'to fall' and **-ts-endup* 'to hear, listen', are given, respectively, as <A.r>, <Hendú.b> (Montoya, 1639, pp. 4, 151-151v), the dot being Montoya's convention for noting a final consonant that alternates with Ø preceding pause. PTG **-k* was still not entirely lost in the language, so that reflexes of PTG roots such as **-kutuk* 'to pierce' were still noted as <Cutúg> (Montoya, 1639, p. 111).²⁸ Another language that patterns almost like Old Guarani — with the exception that the reflexes of PTG **-k* are lost as well before pause — is Kagwahiva, as discussed in the preceding section (see Table 6).

In another group of languages the erosion of final stops has been even more complete, and final stops are not retained as pre-vocalic phonological variants. This is the case, for instance, of Mbyá Guarani, where the reflexes of the PTG etyma mentioned in the preceding paragraph are, respectively: *-ʔa*, *-endu*, *-kutu* (Dooley, 1998, pp. 17, 33, 64). In such languages there is no motivation from (morpho)phonological patterns for positing underlying final consonants. Table 9 presents, in the form of a generalization, what is the reflex of a hypothetical word-final CVC syllable of PTG in a group of ten TG languages (adding Wajãpi, Old Guarani, Kagwahiva and Mbyá to the six appearing in Table 8). These appear divided in three groups, with Group 1 being the most conservative, where final stops are retained before pause, lost before another consonant, but kept (undergoing lenition or not, as discussed in the preceding section) before a vowel. While Mbyá alone stands for the most innovative system, Group 3, where final consonants are entirely lost; Wajãpi (Amapari variety), Kagwahiva (Parintintin variety) and Old Guarani represent the intermediate situation (Group 2) where final consonants are lost before pause but retained before a vowel.

Table 9. Outcomes of hypothetical CVC roots in each of the languages for three different contexts.

Groups	Languages	__ #	__ + C-	__ + V
Group 1	Old Tupi	CVC	CV	CVC
	Kamayurá	CVC	CV	CVC
	Tapirapé	CVC	CV	CVC
	Xingu Asuriní	CVC	CV	CVC
	Zo'é	CVC	CV	CVC
	Kayabí	CVC	CV	CVC
Group 2	Old Guarani	CV	CV	CVC
	Kagwahiva	CV	CV	CVC
	Wajãpi	CV	CV	CVC
Group 3	Mbyá	CV	CV	CV

²⁸ The standard interpretation of the phonetic value of <g> in Old Guarani is that of a voiced velar fricative [ɣ], which, as seen below, agrees with descriptions of the lenited alternant of *k* in other languages of the family. An approximant realization [ɰ] is also possible, however, in particular in view of modern descriptions of Guaranian varieties such as Ivo (2018) and Estigarribia (2020). It remains open, however, to what extent all previous descriptions of [ɣ] as the relevant phonetic realization should be seen as mistranscriptions of [ɰ]. Fricative realizations, in particular if conditioned by speaking rate and style, cannot be ruled out.

Table 10 gives examples across all ten languages of Table 9, one for each of the word-final oral stops reconstructed for PTG, illustrating the reflexes or outcomes for these segments in pre-pausal position.²⁹ This offers the main criterion for the opposition between languages in Group 1, on the one hand, and languages in the other two groups, on the other.

Table 10. Examples reflexes of PTG pre-pausal stop consonants

Languages	*-akup 'hot'	*-ket 'sleep'	*-pĩtsik 'hold'
Old Tupi	-akuβ	-keɾ	-pisiɿk
Kamayurá	-akup	-keɿ	-pihiɿk
Tapirapé	-ãkop	-keɿ	-piik
Xingu Asuriní	-akup	-kiɿ	-piʔiɿk
Kayabí	-akup	-seɿ	-piik
Zo'é	-aku	-kiɿ	-pihiɿk
Old Guarani	-aku	-ke	-pihi
Wajãpi	-aku	-ke	-pi
Kagwahiva	-aku	-ki	-pihi
Mbyá	-aku	-ke	-pi

As mentioned before, we do not happen to have attestations, for each of the relevant morphemes in each of the languages in Table 10, of their alternant forms in all relevant contexts. From the primary sources, however, where the (morpho)phonological processes of lenition and deletion are described as general, and not as quirks of specific classes of roots or stems, we know that lenited variants for the final stops are produced before heteromorphemic vowels for Group 1 languages, and that Group 2 also show these lenited variants before vowels, even though the relevant final consonants are phonologically deleted before pause (see the comments above on Old Guarani and Wajãpi, and in the preceding section on Kagwahiva).

Wrapping up the discussion of this section, the best account for the patterns examined so far is to reconstruct for PTG the situation attested in the most conservative Group 1 languages, that is, Old Tupi, Kamayurá, Tapirapé, Xingu Asuriní, Kayabí and Zo'é (except for the loss of final *-p): A final consonant was lost before a consonant-initial suffix or compounded root. Languages like Old Guarani, Kagwahiva and Wajãpi have lost root-final *-C when it was word-final as well (i.e., before pause), but retained the full or consonant-final variant before vowel-initial suffixes. Finally, languages like Mbyá have lost all traces of the once final stop consonants. This view is at least implicitly accepted in the current literature (Jensen, 1998, pp. 607-613, 1999, pp. 135-137).

GLOTTAL METATHESIS

Kayabí and Kagwahiva are unique among TG languages in showing an apparent contrast between glottal clusters and singleton consonants, or, alternatively, plain vs. pre-glottalized consonants, in intervocalic position, as in Kayabí *awara* 'fox; wild dog' vs. *jaʔwara* 'jaguar' (Weiss, 2005, pp. 17, 35). Moreover, the fact that Kayabí and Kagwahiva cognates

²⁹ Sources for the data in Table 10 are the following: Old Tupi (Drumond, 1952, p. 106, 1953, p. 30, 94); Kamayurá (Seki, 2000, pp. 67, 460, 464); Wajãpi (Grenand, 1989, pp. 52, 71, 226); Kayabí (Weiss, 2005, pp. 5, 97, 100); Old Guarani (Restivo, 1893 [1722], pp. 149, 255, 520; Montoya, 1639, p. 349); Kagwahiva (Betts, 2012, pp. 29, 137, 234); Mbyá (Dooley, 1998, pp. 20, 59, 96); Tapirapé (Almeida et al., 1983, pp. 79, 82, 85); Zo'é (Cabral, 1996, p. 55); Xingu Asuriní (Pereira, 2009, pp. 87, 166, 178, 288).

frequently agree in terms of these features has prompted Schleicher (1998) to propose that PTG had such glottal elements too — implying, therefore, that all other members of the family have lost this contrast. Table 11 shows one such instance of agreement between the two languages in a near-minimal pair, with a comparison to their cognates in Tenetehára (Guajajára variety as in Harrison & Harrison, 2013) and Paraguayan Guarani (Avañe'ẽ), the latter two being representative of the situation in the remaining TG languages (data from Betts, 2012, pp. 33, 137; Weiss, 2005, pp. 157, 169; Harrison & Harrison, 2013, pp. 156, 158; Peralta & Osuna, 1950, pp. 334, 390).³⁰

Table 11. Contrast *ʔ* vs. *Ø* in Kayabí and Kagwahiva.

	Kayabí	Kagwahiva	Tenetehára	Avañe'ẽ	Glosses
Glottal	<i>kaʔmu</i>	<i>kaʔmbu</i>	<i>-kamu</i>	<i>-kambu</i>	'to suckle'
Plain	<i>ser-amũ</i>	<i>kir-ambu</i>	<i>-ker-amu</i>	<i>-ker-ambu</i>	'to snore'

As seen in the exemplar forms in Table 11, the basic pattern consists in the contrast between *-ʔC-* and *C-*, where *C* is a sonorant consonant (this point will be further supported below). The contrast in question is found in Kayabí and Kagwahiva, but absent from the remaining languages of the family (see e.g., Schleicher, 1998). In order to make the discussion more concrete, and, more importantly, to tease apart likely PTG regularities from those that might have emerged later, possibly as branch- or language-specific innovations, Table 12 compares another set of cognate forms from the same languages. This time, however, the PTG etyma, analyzed in terms of their component morphemes, are given as well.³¹

Table 12. Glottal elements in Kayabí and Kagwahiva and their PTG provenance.

	Kayabí	Kagwahiva	Tenetehára	Avañe'ẽ	PTG
'fruit'	<i>iʔwa</i>	<i>iʔβa</i>	<i>maʔiwa</i>	<i>iβa</i>	*ʔip - *ʔa
'comb'	<i>kiʔwap</i>	<i>kiʔwaβa</i>	<i>kiwaw</i>	<i>kiɣwa</i>	*kip - ʔu - ap
'to name'	<i>-eʔɾok</i>	<i>-eʔɾoɣ</i>	<i>-eɾok</i>	<i>h-eɾo</i>	*-et - ʔok
'to skin'	<i>-piʔɾok</i>	<i>-piʔɾoɣ</i>	<i>piɾok</i>	<i>piɾo</i>	*-pit - ʔok
'to suckle'	<i>-kaʔmu</i>	<i>-kaʔmbu</i>	<i>-kamu</i>	<i>-kambu</i>	*-kām - ʔu

All the PTG morphemes indicated in the rightmost column have been reconstructed in one or more of the published comparative studies on the family (see e.g., Jensen, 1984, 1998; Schleicher, 1998; Mello, 2000). On the basis of the relevant PTG morphemes, the glottal elements present in Kayabí and Kagwahiva, but absent from their Tenetehára and Avañe'ẽ cognates, are entirely motivated as retentions from PTG, as opposed to being innovations in Kayabí and Kagwahiva. In each and every case the polymorphemic cognates can be reconstructed for PTG. Starting at the upmost row, the term for 'fruit' is everywhere a compound of the root *ʔip 'tree' and the root *ʔa 'round' (the latter likely

³⁰ Note that *-mb* in Kagwahiva and Avañe'ẽ are post-oralized nasal stops, and not nasal-oral clusters. The forms meaning 'to snore' are compounds from the verbal root PTG *-ket 'to sleep', and the root *-amu 'to make noise' (see Carvalho, 2023).

³¹ Data sources: Harrison and Harrison (2013, pp. 61, 186, 212, 274) on Tenetehára; Peralta and Osuna (1950, pp. 72, 115, 296, 349) on Avañe'ẽ; Weiss (2005, pp. 25, 54, 87, 119) on Kayabí; Betts (2012, pp. 80, 155, 215, 287) on Kagwahiva.

present as well in *ʔakãŋ* 'head' (< **ʔa-kãŋ* 'round-bone')).³² That for 'comb' is an instrument nominalization, with the allomorph **-ap* of the nominalizing suffix, affixed to the base **kip-ʔu* 'louse-ingest'.³³ The next two are compounds with **-ʔok* 'to remove, withdraw, take away', and an incorporated noun, either a reflex of **-et* 'name' or **-pit* 'skin, cover'. Finally, the set meaning 'to suckle', present in Table 11 and Table 12, arguably derives from the incorporation of the stem **-kām* 'breast' to the verb **-ʔu* 'to ingest'.³⁴

General reference works on the TG language family and on the structure of PTG state that the best way to account for the relation between the PTG etyma in Table 12 and the attested reflexes involves reconstructing, for PTG, a rule of glottal stop metathesis, even though this rule is attested only in Kayabí and Kagwahiva (e.g., Jensen, 1984, pp. 61-62, 1998, p. 609, 1999, p. 136). This rule would apply whenever a morpheme-final stop consonant comes to be adjacent to glottal stop, the later being the first segment either of a suffix or of another root (see e.g., Jensen, 1998, p. 609). In formulaic terms: $C + ʔ \rightarrow ʔC$. The operation of glottal metathesis is illustrated below with two examples from Kayabí (data from Weiss & Dobson 1975, p. 10; Weiss, 2005, p. 87):

- (17) *moap-ʔi* [moaʔwi] (Kayabí)
war.club-DIM
'small war club'

- (18) *-pit-ʔok* [piʔrok] (Kayabí)
skin-remove
'to skin'

A fact of critical importance for the discussion to come is illustrated above: *-p* and *-t* in the Kayabí examples above show up in their lenited alternants, *-w* and *-r*, respectively, after the operation of the metathesis rule (this also applies, of course, to the data in Table 12). Since, as noted in the section "Stop consonant lenition," the lenition rule applies in intervocalic contexts only, one could assume that some process of reanalysis of the glottal stop, either as a prosodic feature or as a feature of the preceding vowel, took place, resulting in a glottal element that is best analyzed either as a prosodic feature or as a feature of the vowel itself (see e.g., Schleicher, 1998 for a similar view). These and other factors will be of critical relevance below.

³² It is relatively easy to show that this fact is not generally recognized, or at least expressed, in the comparative Tupi-Guarani literature. Schleicher (1998, pp. 328-330) nor Mello (2000, pp. 152, 209-210) indicate these etymological/morphological associations. See that Schleicher (1998), for instance, gives **ʔa* as having the concrete meaning 'fruit,' and not as a general, classifier-like element with the more abstract meaning 'round' (the same is found in Mello, 2000, p. 209). As one reviewer notes, it is also significant that many names for fruits in TG languages end in *-a*, and this can often be assigned to etymological **-ʔa* compounded after a nominal stem. Finally, note that the Tenetehára form likely derives from **maʔe-ʔip-ʔa*, with **maʔe* usually glosses as 'thing' and often used as an 'absolutivizer' when prefixed to bound roots or stems denoting inanimates.

³³ See that a restricted, *ad hoc* yet phonetically unsurprising effect is needed in the derivation of the form for 'comb': **kiʔβuap* or **kiʔβwap* would be expected after metathesis and the lenition of **p* as *β*. Apparently, the sequence **-βw-* was undone by the loss of **-β-*, and, indeed, **-βw-* seems to be unattested as a cluster (though a more systematic assessment of this is needed).

³⁴ It would certainly make more (semantic) sense to assume that the compound noun **-kām-ʔi* 'breast-liquid' (i.e., 'milk'), and not only **-kām* 'breast', was incorporated to derive the verb word in question. At least from a consideration of the comparanda in Table 12, however, there is very little evidence that this is the case.

For now one must face the fact that, since the rule of glottal metathesis is attested in only two of the close to 30 lects recognized as forming the TG language family, Kayabí and Kagwahiva, the reasons for reconstructing this rule at the PTG level are far from obvious. The best evidence for the reconstruction of this rule is twofold: Evidence from its past operation in languages where the rule is not synchronically operative, and, as in the preceding sections, evidence from Awetí. Here, as in the discussion of the lenition rule, the former type of evidence carries the strongest support, since the reconstruction of the glottal metathesis rule at the PTG level helps account for an otherwise odd pattern in the (morpho)phonology of the remaining languages of the family. Still, since it is exactly this evidence that calls for discussion, I will first address the evidence from Awetí, which is merely suggestive of the existence of a similar rule in PTG.

Examples below, from Drude et al. (2019, p. 9), illustrate the operation, in Awetí, of a glottal metathesis rule that is similar to that illustrated above for Kayabí:

- (19) Glottal metathesis in Awetí
 (a) [kwaɽʔip' ~ kwaɽip'] 'Kuarup festival'
 (b) [õkãmʔũ ~ õjkãmũ] 'he/she/they suckle'

There are, in fact, certain crucial differences in the way glottal metathesis operates in Kayabí and in Awetí. First, as shown above in (19a-b), the rule is optional in Awetí. Second, if one assumes with Drude et al. (2019, p. 9), that [kwaɽʔip'] is segmentable as *kwat* and *ʔip*,³⁵ (19a) suggests that whether the glottal is subject to metathesis or not is immaterial as far as the rule of lenition is concerned: Both variants show *t* → *ɽ* lenition. However, other evidence from the same language suggests that a non-metathesized *ʔ* does block the rule. Drude et al. (2019, p. 10) discuss a contrast between two similar prefixes: the second person singular prefix *ʔe-*, which has an initial glottal, and the alienable possession prefix *e-* which does not. The authors show that the presence of a glottal stop is discernible exactly by its blocking effect on the lenition of a preceding stop consonant, which takes place only before the alienable possession prefix.³⁶

As suggested by Jensen (1984, pp. 61-62, 1999, p. 136), the claim that the glottal metathesis rule was once active in TG languages other than Kayabí and Kagwahiva can be motivated by the fact that this accounts for certain apparent exceptions to the rule of final consonant deletion discussed in the preceding section, even though these exceptions are seldom recognized as such in primary descriptive sources. This proposal, although included in reference works on TG languages, has never been argued for in detail and in an explicit manner. Consider, first, the nature of the patterns seemingly indicative of this rule's past operation in languages no longer showing its effects, illustrated below with examples from Kamayurá (adapted from Seki, 2000, p. 384):

- (20) *-ape-ʔok* [apeʔok'] (Kamayurá)
 bark-remove
 'to peel off'

³⁵ The suggestion is eminently plausible, as the ritual in question involves tree trunks (*ʔip* in Awetí), and is related to certain myths involving the figure of the sun (*kwat*). See Vanzolini (2015, pp. 46-55).

³⁶ There are, of course, other factors that could be at play, such as phonetic effects associated with different kinds of boundaries (internal vs. external sandhi effects).

- (21)

-aʔij-ʔok

[aʔijʔokʔ]

(Kamayurá)

seed/kernel-remove

'to remove seed or kernel'
- (22)

iwirapaʔ-ʔok

[iwirapaʔokʔ]

(Kamayurá)

bow-remove

'to take one's weapons'
- (23)

kiʔsiŋ-ʔok

[kiʔsiŋok]

(Kamayurá)

dirty-remove

'to clean'

As shown in the first two examples above (19-20), Kamayurá *-ʔok* — this language’s cognate of the verb *-ʔok* ‘remove’ in the Kayabí example in (18), and its reflex of PTG **-ʔok* in Table 12 — retains its initial consonant, the glottal stop ʔ, when morphological concatenation brings it into immediate adjacency to a preceding non-contoid segment. In the last two examples (21-22), however, the glottal stop ʔ does not surface. Now, the expected outcome in these two examples, where a root-final consonant (*-t* and *-ŋ*) is followed by another consonant, in this case, the glottal stop in *-ʔok* ‘remove’, would be for the first consonant to delete, according to the pre-consonant stop deletion rule. This is in fact amply illustrated by other synchronic patterns in Kamayurá, some of which were presented in examples (14-16). Though illustrated above with data from Kamayurá, the apparent failure of the final deletion rule to apply in cases of *-C + ʔ-* sequences is in fact attested in all languages where the deletion rule operates (see Jensen, 1999, p. 136). While this can be stated as a specific pattern in the synchronic phonologies of these languages, one that singles out ʔ among the other oral stops, the reasoning goes, diachronically speaking the exception is explained by ordering the rule of metathesis before the rule of pre-consonantal deletion. The diachronic analysis is presented in Table 13, with the Kamayurá example from (21) used for illustrative purposes. Note that the topmost row includes only the concatenation of two morphemes reconstructed for PTG, while the second and third row indicate the operation of (morpho)phonological adjustments following this concatenation.

Table 13. Metathesis and pre-consonant deletion Kamayurá diachrony.

Rule	Diachrony
Concatenation	<i>*iwiɾapaʔ - ʔok</i>
Metathesis	<i>*[iwiɾapaʔrok]</i>
Pre-consonant deletion	<i>[iwiɾapaʔok]</i>

Thus, while a synchronic analysis would simply posit a rule deleting a morpheme-initial glottal stop when preceded by a stop consonant (in this case, *-t*), in diachronic terms the very existence of this otherwise unexpected rule can be made sense of by ordering: After metathesis produced the sequence *ʔ - t*, stop consonant deletion applied regularly and deleted the glottal stop. Although languages like Kamayurá have no evidence for the operation of glottal metathesis as a synchronic rule, the historical derivation in Table 13 would show that assuming that these languages once had such

rule helps explain the apparently surprising behavior of C - ʔ clusters. This is an explicit formulation of the approach to the reconstruction of PTG glottal metathesis that has been presented as a suggestion in previous publications on the family. It is now time to see why it is problematic.

As the attentive reader may have noticed, the diachronic scenario in Table 13 has silently included a stage where stop consonant lenition applies. This was done purposefully, since the standard account of the way metathesis and deletion would have interacted does not consider the role of lenition. This silent operation of the rule in Table 13 is a feature of the account assumed so far in the published literature on comparative TG, and, by making it explicit, we can consider some of its implications.

Once lenition is explicitly brought into the picture, an apparent paradox arises: while ʔ must be a segment in order for it to be affected by the pre-consonantal deletion rule, it must be non-segmental for the rule of stop lenition to apply. This was seen in (17-18) with the attested Kayabí examples, and is suggested to be the case too in the history of languages that lack the glottal metathesis rule, as in Kamayurá (where one has [iwiɾapaɾok], with lenition of *t*, and not *[iwiɾapaɬok], without lenition; see Table 13). In sum, the first takeaway from this initial discussion of the traditional view of glottal metathesis in TG history is that any consideration of the interaction between metathesis and deletion must take into account as well the action of the lenition rule. One way to accomplish this is shown in Table 14. Here, the lenition rule is added to the diachronic derivation in Table 13; but so is another process, here called ‘Delinking’, which causes the etymological glottal stop to lose its segmental status and hence feeds the operation of the lenition rule (cell shading indicates that a rule does not apply).

Table 14. Diachronic scenario yielding attested forms with lenition operative.

Rule	Diachrony
Concatenation	*iwiɾapat - ʔok
Metathesis	*[iwiɾapaʔtok]
Delinking	*[iwiɾapaʔtok]
Lenition	*[iwiɾapaʔrok]
Pre-consonant deletion	

The scenario in Table 14 could, in fact, work both as a diachronic sequence of changes and as a synchronic rule-ordered statement for the two languages retaining these glottal elements: Kayabí and Kagwahiva (in which case the final stage, [iwiɾapaʔrok], would not need an asterisk, as it is actually attested). For it to describe the emergence of forms such as Kamayurá [iwiɾapaɾok], or the Tenetehára and Avañe'ẽ forms in Table 12, however, it would be necessary to add yet another rule to the end, a rule removing the glottal element (of which no trace remains in any of the languages other than Kayabí and Kagwahiva). What is interesting here is that, in this case, the deletion rule does not apply, and its interaction with the glottal metathesis rule ends up being irrelevant to explain the behavior of C + ʔ in languages like Kamayurá.

I propose, therefore, that the traditional account of the interaction between glottal metathesis and pre-consonantal deletion is untenable: It does not consider the interaction with lenition, and therefore fails to note the need for a delinking rule (which is needed even in languages other than Kayabí and Kagwahiva, since the effects of intervocalic lenition are attested in these languages too), a rule which, in the end, removes the context for the operation of

pre-consonantal deletion, as the erstwhile glottal stop has lost its segmental status.³⁷ I agree with it, however, to the extent that metathesis can in fact be reconstructed as rule targetting *C - ʔ clusters only, these being later modified by a rule of delinking, which then feeds the lenition rule. The picture of (morpho)phonological derivations proposed for PTG is given in summary form in Table 15, with the three contexts discussed in the present paper being illustrated (again, cell shading indicates that the relevant rule does not apply). Note that these are conceived of as synchronic derivations within the phonology of PTG itself.

Table 15. PTG (morpho)phonological rules in derivations.

Rule	*VC - ʔ	*VC - C	*VC - V
Concatenation	* <i>iwirapat</i> - ʔok	*- <i>enup-katu</i>	* <i>ket</i> - a
Metathesis	*[<i>iwirapaʔtok</i>]		
Delinking	*[<i>iwirapaʔtok</i>]		
Lenition	*[<i>iwirapaʔrok</i>]		* <i>ker</i> - a
deletion		*- <i>enu-katu</i>	

Next, to the basic structure of PTG morphophonology laid down in Table 15, all TG languages other than Kayabí and Kagwahiva have simply eliminated the (non-segmental) glottal element still retained in the first two languages.

Before ending the discussion we must comment on one further consequence of the interaction between glottal metathesis and the stop lenition rule. The interaction between these two rules, examined above in detail, eliminates any motivation for Schleicher's (1998) internal reconstruction of a whole series of 'pre-glottalized stops' for Pre-PTG. He finds it 'interesting' that the only segments to never occur pre-glottalized in Kayabí and Kagwahiva, and, therefore, at the PTG level as well, are stop consonants (Schleicher, 1998, pp. 25-26). Later on, he deems this 'an anomaly,' which can be removed by the reconstruction of a set of 'pre-glottalized stops' at the Pre-PTG level. As it is clear from the preceding discussion, however, the explanation for said 'anomaly' is much more trivial. Glottal metathesis operates in morpheme boundaries between a morpheme ending in a stop consonant and another morpheme starting with a glottal stop. The delinking rule, which Schleicher also recognizes as necessary (see Schleicher's, 1998, pp. 24-26, extensive discussion of the non-segmental status of the glottal stop), feeds the lenition rule, whose effect is, in fact, that of changing stop consonants (*fortes*) into continuant (*lenes*) consonants. That is: The action of the stop lenition rule targetting the second (rightmost) element of metathesized clusters of the *ʔC type is all that is needed to account for the fact that stop consonants are never found preceded by the glottal elements.

However, apparent counterevidence for any claim that glottal metathesis would account for all the 'glottal clusters' of Kayabí and Kagwahiva does exist. It comes, in particular, from a set of forms for which the metathesis

³⁷ Based on the behavior of lenition *vis-à-vis* glottal metathesis in Awetí, and on the observation that glottal consonants are often 'transparent' to phonological processes (Stemberger, 1993), one could argue that, in any of the derivations in Table 14 and Table 15, glottal metathesis and lenition could apply in any relative order, including one where lenition applies first, the glottal being, thus, transparent. One should note, however, that coronals as a class have also been associated with transparency effects (see e.g., Paradis & Prunet, 1989), and that the range of 'guttural' consonants subjected to transparency effects varies from language to language (see e.g., Van der Hulst & Mous, 1992), a set of findings that removes some of the presumed typological appeal of this solution in the absence of independent, language-internal evidence for transparency effects. Moreover, in all arguments presented here, comparative evidence from Awetí has carried relatively less weight than other, Tupi-Guarani-internal considerations.

account cannot apply in any obvious way. These include, for instance, Kayabí *-ʔwít* ‘down, below,’ *ʔɾip* ‘young women party’ and *ʔɲa* ‘he’ (Weiss, 2005, pp. 99, 115). Although some of the forms in question, notably *-ʔwít* ‘down, below’ among the examples cited, do have cognates elsewhere among TG languages, I would still insist that some account for these as secondary innovations of Kayabí (and Kagwahiva) is likely. One particularly interesting case is that of Kayabí *jaʔwat*, Kagwahiva *jaʔɣwara* (Betts, 2012, p. 114). Although *taʔwat* is attested in Awetí, the constant mention of folk etymologies like ‘the eater of us’ (see Rose, 2011, p. 124), or ‘fat-eater’ (see Hoeller, 1932, p. 119, on Guarayu) for the term, whose frequent occurrence makes sense in terms of the cultural salience of jaguars among many TG-speaking groups, makes it at least a credible hypothesis that the glottal element derives, in this case, from a folk etymological association with forms where *-(ʔ)wara* does in fact stand for an agent nominalization of the verb *-ʔu* ‘to eat’. In any case, glottal metathesis can explain large set of forms with ʔC clusters, yet others call for alternative explanations.

CONCLUSION

This paper has addressed the diachrony of stop consonant (morpho)phonology in Tupi-Guarani (TG) languages, both in terms of their development in daughter languages, and of the best reconstruction for Proto-Tupi-Guarani (PTG) itself. The study has attempted to offer a comprehensive view of the relevant patterns, and it has sought to establish a connection to the published comparative TG literature, by critically examining claims contained within it, as well as raising questions that were missed by it.

We have reconstructed PTG with three (morpho)phonological processes targeting stop consonants: intervocalic lenition, pre-consonantal deletion, and glottal metathesis. Final stop consonants **-p*, **-t* and **-k* were realized at the PTG level as unreleased stops, and were lenited, realized as **-β*, **-ɾ* and **-ɣ*, respectively, when followed by an heteromorphemic vowel. Later, in some languages of the family, systems where only **-p* ~ **-β*- and **-t* ~ **-ɾ*- (or reflexes thereof) are attested evolved, essentially by losing the **-k* ~ **-ɣ*- rule. The latter was, in fact, a simple matter of allophonic specification, not a (morpho)phonological alternation, since **ɣ* was not an independent phoneme of PTG. The same final stops, if followed by another stop consonant, would be elided or syncopated, the exception being, however, when the following consonant was a glottal stop **ʔ*. Published accounts in the comparative TG literature have proposed that the interaction between glottal metathesis and pre-consonantal deletion offered the correct account for the fact that C + ʔ clusters behave exceptionally: In this case, the rightmost consonant, ʔ, is deleted, not the leftmost one, as is generally the case. We showed that this account becomes problematic once the action of other rules, in particular oral stop lenition, is taken into account. We suggest that PTG did in fact have the three (morpho)phonological rules of stop consonant lenition, pre-consonant deletion and glottal metathesis, but that the interaction between deletion and metathesis does not work: another rule eliminating the glottal elements resulting from metathesis is needed for the history of all TG languages other than Kayabí and Kagwahiva.

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ABBREVIATIONS

1	first person
2	second person
3	third person
DIM	diminutive
GER	gerund suffix
IMPF	imperfective
NF	nominal function suffix
PL	plural
POST	postposition
REFL	reflexive
SG	singular

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RESEARCH DATA

The data have not been deposited in a repository.

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