

On Glottal Stop and Laryngealization in Tukanoan
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I. Introduction

- In this talk I will survey the literature on glottal stop in Tukanoan languages in an effort to elucidate its origins, development, and synchronic status in the family.
- In particular, I will ask what the distribution of glottal stop/laryngealization among modern Tukanoan languages can tell us about:
 - its interactions with suprasegmental features like tone and nasalization
 - its status as either a segment or a suprasegment in the languages in which it appears
 - the history of Tukanoan
- This is the first systematic investigation of the distribution of this segment (or suprasegment) across Tukanoan languages.
 - Most work on glottal stop in Tukanoan has centered on its phonemic status in individual languages.
 - Most reconstructions of Proto-Tukanoan consonants have not considered glottal stop thoroughly, or have stopped at declaring its distribution 'idiosyncratic'.

1. Outline

- I will start with background on the Tukanoan languages and proposed internal classifications of the family.
- I will then review the analyses of glottal stop in Tukanoan languages, and provide summary of proposed reconstructions.
- I will conclude that synchronic glottal stop/laryngealization likely has two sources:
 - It was a feature of Proto-Tukanoan.
 - It developed in Eastern Tukanoan preceding voiced medial consonants.

II. Background: The Tukanoan languages

- Tukanoan is a family of languages spoken in Northwestern Amazonia (Peru, Brazil, Colombia, and Ecuador).
- In the table below, languages with abbreviations are those for which data appear in this talk. Languages in grayed cells are those that show a reflex of *ʔ.

Abbreviation	Language	Alternate names	Spoken in/along	Source(s)
	Bará	Waimajã		
BAS	Barasana		Pirá-Paraná	Jones and Jones 2009
SIO	Colombian Siona		Putumayo	Wheeler 1987
SEK	Colombian Sekoya		Aguarico, Cuyabeno	Piaguaje, Piaguaje, Johnson and Johnson 1992.
DES	Desano		Brazil: Papurí	Miller 1999; Silva 2012; Alemán, López and Miller 2000
	Ecuadorian Siona		Aguarico, Cuyabeno	
KOR	Koreguaje		Colombia: Ortegúaza, Caquetá	Cook and Galow 2001
KUB	Kubeo	Cubeo	Brazil, Colombia: Vaupés, Cuduyarí, Querarí	Morse and Maxwell 1999; Chacon 2012
	Pisamira			
	Karapana	Carapana		Metzger 2000
	Eduria	Taiwano, Eduuria	Pirá-Paraná, Cananarí	

Abbreviation	Language	Alternate names	Spoken in/along	Source(s)
MAI	Máihĩkĩ	Orejón, Coto	Peru: Napo, Putumayo	personal fieldwork; Michael et al. 2011
MAK	Makuna	Macuna	Colombia: Mirití-Paraná, Pirá-Paraná	Smothermon and Smothermon 1993
	Peruvian Sekoya		Putumayo	
PIR	Pira-Tapuyo	Piratapuyo, Wa'ikhana	Brazil: Rio Negro; Colombia: Papurí	Waltz 2012
SIR	Siriano		Papurí, Vaupés	Trujillo, Delgaty de Osorio, Carlson de Reed, Morse 1980
TAN	Tanimuka	Retuarã, Letuama, Tanimuca	Colombia: Mirití, Apaporis	Eraso 2015, Strom 1995
	Tatuyo			
TUK	Tukano	Tucano	Brazil, Amazonas State	Ramirez 1997
TUY	Tuyuka	Tuyuca		Barnes 2012
WAN	Wanano	Kortiria	Brazil, Colombia: Vaupés	Stenzel 2011
	Yuruti			

Table 1: the Tukanoan languages

III. Proposed Tukanoan internal classifications

- Mason (1950)
 - Divided Tukanoan into two major branches (Eastern and Western)
 - Eastern consists of the languages of the Vaupés and Apaporis River basins.
 - Tuyuka, Bará, Makuna, Barasana, Kubeo, Tatuyo, Desano, Siriano, Letuama, Wanano, Tukano, Piratapuyo, Karapana.

- Western consists of the languages of the Caquetá, Putumayo, and Napo river basins.
 - Máihiki, Koreguaje, and the languages of the Siona-Sekoya dialect continuum
- Waltz and Wheeler (1972)
 - Proposed a third “Middle Tukanoan” branch consisting of Kubeo only
 - Used lexicostatistical methods as well as (somewhat inconsistent) phonological correspondences
 - Only considered one Western Tukanoan language (Colombian Siona)
- Barnes (1999)
 - Proposes a “Central Tukanoan” branch containing Kubeo and Tanimuka
- Chacon (2014):

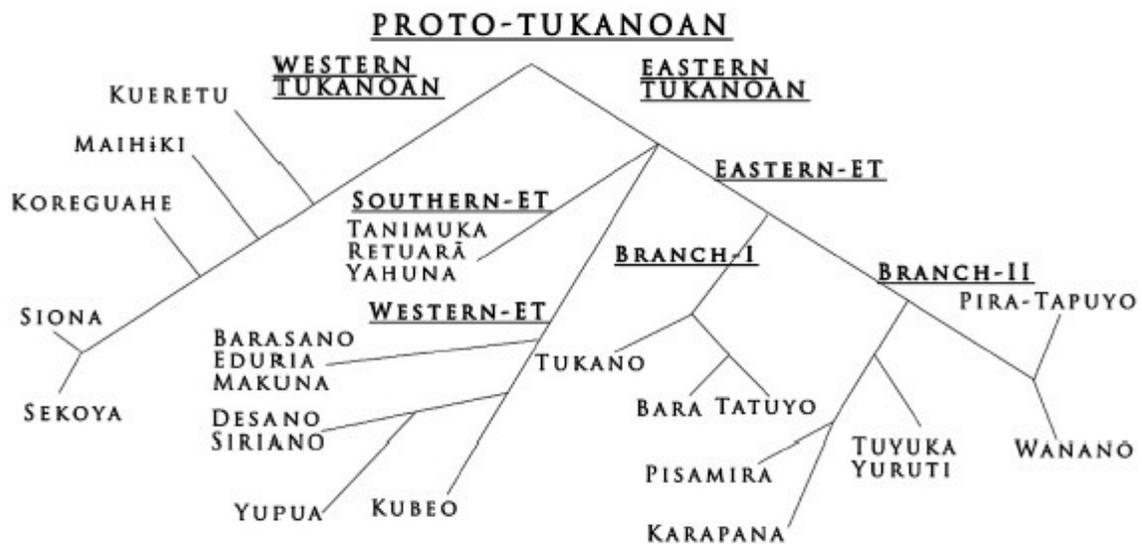


Figure 1: Tukanoan internal classification (reproduced from Chacon 2014)

IV. Features of Tukanoan languages

- Most modern Tukanoan languages have tone, although it is often not represented orthographically except when contrastive.
- Most Tukanoan languages permit maximally bimoraic roots of the shape (C)V(C)V.
- In (C)VCV words, many Tukanoan languages exhibit either preaspiration or a glottal stop before all medial voiceless stops.
 - Ecuadorian Siona (Bruil 2014)
 - Wanano (Stenzel 2013)

- Most Tukanoan languages exhibit morpheme-level nasality and nasal spreading. Proto-Tukanoan is reconstructed as having nasal segments *m and *n (Wheeler 1972, Malone 1987, Chacon 2014). In some modern Tukanoan languages, /~b/ and /~d/ are distinguishable from /m/ and /n/, while in others, they appear to have merged.

V. The phonemic status of glottal stop

- Discussions of glottal stop in Tukanoan languages have centered around its phonemic status.
 - Because glottal stop contrasts with other consonants word-internally, it is sometimes argued to be a phoneme.
- But the restricted distribution of ʔ and its violation of the phonotactics of syllable structure in all languages in which it appears lead others to argue that it is a suprasegmental feature.
 - If ʔ is a segment, it is the only segment in all of the languages in which it is present that may appear as a syllable coda (i.e. in (C)VʔCV sequences).

1. ʔ as a segment

- / ʔ / is included in the segmental inventories of:
 - Piratapuyo (Klumpp and Klumpp 1973, Ardila 2000, Waltz 2012)
 - Tukano (Welch and West 2000)
 - Barasana, Eduria (Gomez-Imbert 2000, Jones and Jones 2009)
 - Colombian Sekoya (Piaguaje, Piaguaje, Johnson and Johnson 1992)
 - Colombian Siona (Wheeler 1987)
 - Koreguaje (Cook, Gralow and Muller de Young 2001)
 - Tanimuka (Strom 1995)
 - Desano (Kaye 1965, 1979, Miller 1999)
- Waltz and Wheeler (1972) propose a proto-segment *ʔ that is retained to varying degrees in both major branches of Tukanoan (Eastern and Western).
 - They argue that the pervasive synchronic (C)VʔCV root shape is the result of the reduction of trisyllabic roots of the shape (C)V₁ʔV₂CV₃.
 - V₂ was lost, leaving behind a glottal segment.
- Chacon (2014) also proposes a proto-segment ʔ that is retained intervocalically in both WT and ET, and a ʔ that emerged in ET in the context of root-medial preglottalized stops.

2. Laryngealization is a suprasegment

- Ramirez (1997): In Tukano, glottal stop is the realization of a laryngealized tone, which attaches to the first syllable of a morpheme.
- Stenzel (2007, 2011): Nasalization, tone, and laryngealization are all suprasegmental features in Wanano.
 - A laryngeal feature [constricted glottis] operates independently from other suprasegmental features in Wanano, and is present in approximately one quarter of roots.
 - This feature associates at the right edge of the first mora.
- Wilson (2012) argues that glottal stop in Desano “is better understood as a prosodic feature of the root morpheme, occurring on the first vowel, rather than a full consonant segment” (53).
- Eraso (2015) considers an analysis for Tanimuka in which glottal stop is the phonetic realization of a glottalized vowel series, and another analysis in which Tanimuka exhibits a suprasegmental [constricted glottis] feature.
- Malone (1987): glottalization developed from a suprasegmental in the proto-language
 - ? was a proto-suprasegmental, surfacing between like vowels in CV.V morphemes.
 - ? was inserted as an onset to fulfill the requirement that syllables be CV.
- Gomez-Imbert (2011):
 - Tukanoan languages are of two basic types:
 - Those with strict CV structure tend to have glottal stops
 - Those without strict CV structure

VI. The phonetic realization of glottal stop across the Tukanoan languages

1. Wanano (Stenzel 2007: 335)

- glottal stop has single closure

- this closure is sometimes accompanied by laryngealization on the preceding vowel, but never the following vowel
- the glottal closure is phonemic: it is consistently produced and creates lexical contrasts.
- Stenzel (2004: 60) shows that glottal stop in Wanano CVV sequences conditions high tone on the second vowel:

a.	soʔá	'make wet'	sóá	'grind'
b.	k ^h iʔá	'lice'	k ^h íá	'have'

2) Siriano

- “It's worth noting that it seems the glottal stop was more commonly articulated in the Siriano of bygone days. It's currently turning into laryngealization and vowel lengthening, and it often disappears completely in everyday speech, so that it's only perceptible in careful speech”¹ (Criswell, Brandup 398-399).

3) Desano

- Glottal stop (and preaspiration) shorten the preceding vowel (Silva 2012).
- Miller (1999) states that glottal stop only occurs intervocalically; an “echo vowel” follows it.
- “Over the years glottal stop has been lost and replaced with only high pitch on some noun roots. The word *waʔí* fish is rendered *wái* by the younger people of the *boreka* dialect. These changes are on nouns and verbs that sometimes carry stress on the first syllable and sometimes lose the stress and add a glottal stop. On the nouns and verbs where the glottal stop stays in place no matter which suffixes are added, no change has been observed” (Miller 1999: 17).

4) Máhiki

- Does not exhibit glottal stop, but has low tone where Western Tukanoan cognates have

¹“Es de notarse que la oclusiva glotal parecía pronunciarse más en la lengua siriana antiguamente. En la actualidad está convirtiéndose en la laringalización y la prolongación de vocale, y, muchas veces, ha deaparecido por completo en el habla normal, de manera que únicamente se nota en el habla cuidadosa.”

glottal stop.

5) **Ecuadorian Siona**

- Bruil (2014: 96): “The glottal stop in Ecuadorian Siona often lacks complete closure as in many languages of the world. . .Especially, in intervocalic position it tends to be realized as a creaky voice on the vocalic stream. Before a consonant, glottal stops are more often articulated as a full closure.”

VII. The Distribution of Glottal Stop in the Tukanoan languages

- There are three basic patterns in the distribution of glottal stop/laryngealization:

A. ? is present both the Eastern and Western branches of Tukanoan

B. ? is present in only the Western branch of Tukanoan

C. ? is present in only the Eastern branch of Tukanoan

- Pattern A:

CV?V										
	MAI	Sto	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
path	màà	maʔa	maʔa	maʔa	bāʔã	maʔa	maʔa	maʔa	maʔa	maʔa
house	wèè	wiʔe	wiʔe	viʔe	wiʔí	wiʔi	wiʔi	wiʔí	wiʔí	wiʔí
fish	bài	waʔi	waʔi	vaʔí	waʔí	waʔi	waʔi	waʔi	waʔí	waʔi
you	mìì	miʔi	miʔi	miʔi	miʔí	miʔi	miʔí	míʔí	míʔí	miʔi
I	jìì	jiʔí								
monkey sp.²	bàò		waʔo	vaʔo	waʔú	waʔú		waʔu	waʔu	waʔú
get dark	nài		naʔi	naʔi	dāʔí			naʔi	naʔi	naʔi
rat				pēʔe				biʔí	biʔí	biʔí
moriche palm³	nèè	neʔe	neʔe	neʔe	dēʔē		neʔe	neʔe		neʔe

2 *Callicebus torquatus*

(C)V?CV										
	MAI	SIO	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
soursop ⁴	mìkà	miʔka	miʔka	miʔka		piʔka, miʔka	mika	piʔka	piʔtʃa	piʔka
sticky	bitò		wiʔta	viʔto		wĩʔtã	wĩtã	wĩʔtá	wiʔtã	wiʔtã
sneeze	èsi		ẽʔsi	ẽʔsi		ãʔsiã	ãĩsiã	ãʔsiá	aʔsiã	aʔsiã
green			jaʔho	raʔso		jaʔsa	jasá	jáʔsá	jaʔsa	jaʔsa
smooth			jaʔi	kaʔi		jaʔpi		jáʔpí	jaʔpi	jaʔpi

Table 2: ʔ in cognates from both Eastern and Western Tukanoan

- Pattern B:

	MAI	SIO	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
crab	kàmì	kaʔmi	k ^h aʔmi	kaʔmi		gami	gami	ãpĩ	píká	apĩ
acouchy	màsò	wãʔso	wãʔso	põʔso		boso	bosó	bósó	bosó	
shrimp	nàsò		naʔso	naʔso		nasika	nasiká	dasi	dasíróá	dasiro
Garden; outdoors	bèsè	weʔse	weʔse	veʔse				wese	wesé	wese
kingfisher ⁵			sãʔsa	sãʔsa		sãrã			saná	saná
mother	hàkò	haʔko	haʔko	haʔko	ɸákò	pago	pago	pako	piko	pako

Table 3: ʔ present only in WT

- Pattern C:

	MAI	SIO	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
bathe			kuja	kuja	úʔja	guʔa	guʔa	uʔá	kuʔsi	kuʔsa
urinate	gónè		kõne	kone		gõʔrẽ		õʔré		

3 *Mauritia flexuosa*

4 *Annona muricata*

5 *Chloroceryle amazona*

	MAI	SIO	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
liver	jémè	s'eme	tsēme	jème		jeʔme	jeʔme	jeʔme	jaʔmá	jeʔme
sweep	júà	jua	jua	jua		oʔa, goʔa		oʔá	koʔá	koʔá
bone		k'õã			ũʔá	gõã				
earth	jíhà	jiha	jeha	jeha		jeʔba, jéba	jeʔba	jeʔpá	jaʔpá	jeʔpa
tobacco	mítò	mito	mito	mito	~biʔró	muʔru, múru	muʔru	miʔno	miʔnó	miʔno
yam	jàhò		nahò	nahò	~jaʔbũ	naʔmu	naʔbũ	naʔbũ	naʔbũ	naʔbũ
ear	gáhò	k'ãho	kãho	kãho	~àʔbũ	gãʔmi, gámi	gãʔmí	oʔme	kãʔmó	kãʔmo
nose	úkwè, úkè	ũkwe	ũkwe	ĩke	óbé		ĩʔgĩ	éʔké	kē	eʔkē

Table 4: ʔ present only in ET

- Chacon's reconstruction of Proto-Tukanoan consonant segments (2014) proposes three stop series: plain voiceless / p t k /; geminate voiceless / tt kk / and glottalized / p' t' k' /.
- He proposes that glottal stop, where present in both ET and WT branches, is a retention from Proto-Tukanoan, although he only considers forms of the shape *(C)VʔV.
- Chacon proposes that in Eastern Tukanoan languages TUK, WAN, and PIR, glottal stop is the reflex of glottalized medial stops / p' t' k' /.
 - In other words, *(C)VC'V → (C)VʔCV.
- This process is apparent in forms like 'earth, land, territory' below:

MAI	SIO	SEK	KOR	DES	SIR	TUK	WAN	PIR
jíhà	jiha	jeha	jeha	jeʔba, jéba	jeʔba	jeʔpá	jaʔpá	jeʔpa

Table 5: the reflexes of PT *jep'a

- But this cannot be the whole story for at least three reasons.
 - First, there are forms (such as 'navel' below) for which Chacon posits a proto-glottalized segment, but that do not exhibit medial / ʔ / synchronically.

	GLOSS	TUK	WAN	PIR
*tʃõp'i	navel	~subu	~sibi	~sibi
*jãp'o	yam	~jaʔbu	~jaʔbu	~jaʔbu
*k'ãp'o	ear	~oʔbe	~kaʔbo	~kaʔbo
*jep'a	land	jeʔpa	jaʔpa	jeʔpa
*k'ip'o	foot	diʔpo	daʔpo	

~Table 6: proposed reflexes of *p' in TUK, WAN, AND PIR (Chacon 2014)

- Second, Chacon does not propose an origin for (oral) ʔb, ʔr ~ ʔd, or ʔg sequences in TUK, WAN, and PIR, but these sequences do appear (e.g. Wanano *saʔba* 'muddy place'; Tukano *kaʔra* 'to be slack, loose-fitting').
- Interestingly, where TUK, WAN, and PIR have voiced segments after glottal stop, Western Tukanoan cognates also exhibit glottal stop, as shown below.

	MAI	SEK	SEK	KOR	DES	SIR	~TUK	WAN	PIR
twin	sàrì					sìro	siʔri	siʔidi	siʔdi
to flash	jèbè	jeʔwe					jaʔbá		
to be loose	kàrà			kaʔra			kaʔrá		

Table 7: ʔ followed by a voiced consonant in both ET and WT

	MAI	SEK	SEK	KOR	DES	SIR	~TUK	WAN	PIR
earth	jíhà	jiha	jeha	jeha	jeʔba	jeʔba	jéʔpá	jaʔpá	jeʔpa
to flash	jèbè	jeʔwe					jaʔbá		
to be smooth			jaʔi	kaʔi		jaʔpi	jáʔpí	jaʔpí	jaʔpi

Table 8: correspondence sets for three ʔC patterns

- Third, not all voiceless ʔC sequences in TUK, WAN, and PIR correspond with medial segments that Chacon reconstructs as glottalized.
- Some of these sequences are cognate with words in other ET languages that have medial

voiceless stops (proposed by Chacon to be the reflex of geminate stops in the the proto-language.)

- In these cases, Western Tukanoan cognates retain ʔ, as shown again below:

	MAI	SIO	SEK	KOR	TAN	DES	SIR	TUK	WAN	PIR
soursop ⁶	mikà	miʔka	miʔka	miʔka		piʔka, miʔka	mika	piʔka	piʔtʃa	piʔka
sticky	bitò		wiʔta	viʔto		wĩʔtã	wĩtã	wĩʔtá	wiʔtá	wiʔtã
sneeze	èsi		ẽʔsi	ẽʔsi		ãʔsiã	ãĩsíã	ãʔsiá	aʔsiã	aʔsiã
green			jaʔho	raʔso		jaʔsa	jasã	jáʔsá	jaʔsa	jaʔsa
smooth			jaʔi	kaʔi		jaʔpi		jáʔpí	jaʔpi	jaʔpi

Table 2: ʔ in cognates from both Eastern and Western Tukanoan

VIII. Conclusions and outstanding questions

- “Glottal stop” has diverse phonetic realizations in the languages that retain it (and/or have innovated it), ranging from a single closure to creaky voice to low tone.
- While in most languages that retain ʔ it seems to have interacted historically with tone, there is evidence that ʔ is synchronically perhaps an independent suprasegmental feature.
- Previous reconstructions of Proto-Tukanoan have not looked systematically at the distribution of glottal stop in the modern languages.
- Comparative data suggest that ʔ was present in Proto-Tukanoan, and was also innovated at least once in the development of Eastern Tukanoan before voiced medial segments (Chacon's glottalized series).
 - The precise history of this segment/suprasegment is still a mystery.
 - Interactions with nasalization, voicing, and tone will be key to a complete reconstruction.

6 *Annona muricata*

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