LARYNGEAL FEET IN A'INGAE. IMPLICATIONS FOR METRICAL THEORY

MAKSYMILIAN DĄBKOWSKI
WCCFL 39
APRIL 9, 2021

PROPOSAL. In this paper, I argue that glottalization in A'ingae (or Cofán, an understudied Amazonian isolate, ISO 639-3: `con`) is a laryngeal feature of the metrical foot, which I will represent as $(\acute{\sigma}\sigma)^{ʔ}$. My proposal entails that traditional structures available to metrical theory (Hayes, 1995) must be enriched by allowing to associate features such as glottalization to metrical constituents.

1 INTRODUCTION

Glottal constriction has received a number of treatments in the phonological literature. Hawaiian (Austronesian), for example, is analyzed as having a segmental glottal stop (Parker Jones, 2018). In many languages, however, the glottal stop does not perfectly pattern with other consonantal segments. For instance, in Cayapa (Barbacoan), the glottal stop displays exceptional behavior: CVʔ syllables are light, while all other CVC syllables are heavy (Lindskoog and Brend, 1962).[1]

In yet other languages, glottalization has a more clearly prosodic character. Silva (2016), for example, argues that glottalization in Desano (Tucanoan) is best understood as a suprasegmental laryngeal feature of the root.[2] And

1 Similarly, in Capanahua (Panoan), CVʔ syllables are open, while all other CVC syllables are closed (Safir, 1979).

2 Similarly, the Danish stød has been variously referred to as laryngeal accent (Itô and Mester, 2015) or a prosodic feature (Staun, 2012).

Harley and Harvey (in press) advance the proposal that Yaqui (or Hiaki, Uto-Aztecan) utilizes both underlying representations: an ordinary segmental glottal stop as well as a floating glottal feature realized on vowels.

In this talk, I will focus on glottalization in A'ingae. A'ingae (or Cofán, ISO 639-3: con) is an endangered Amazonian isolate spoken by the Cofán people in northeast Ecuador and southern Colombia (Figure 1, Curnow and Liddicoat, 1998).

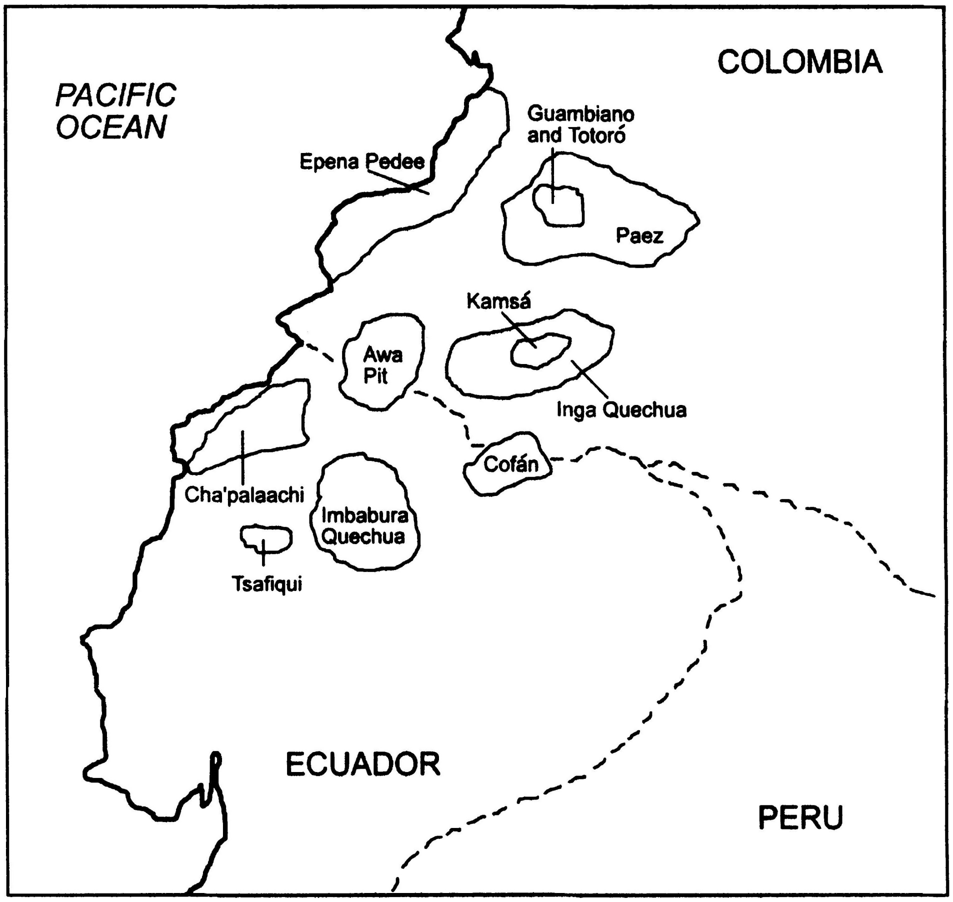

Figure 1: Indigenous languages of southern Colombia and northern Ecuador.

A'ingae is a bit like Yaqui in that glottalization sometimes appears to be suprasegmental and sometimes segmental. However, I will propose that there is only one underlying representation which accounts for both surface realizations. Specifically, I will argue that glottalization is a feature of the A'ingae metrical foot, which is variably realized on the surface as a consequence of phonological optimization.

All the data in this paper come from my own fieldwork conducted over the course of the past three years[3] and Borman's (1976) dictionary.

The rest of the paper is organized as follows. In Section 2, I identify the distributional restrictions on glottalization, mention its phonetic realization, describe its interactions with stress, and present cases of apparent glottal metathesis. In Section 3, I flesh out the proposal that glottalization is a feature of the metrical foot, and demonstrate that its distributional properties follow from the proposal. In Section 4, I conclude.

2 DISTRIBUTION

The glottal stop is contrastive in A'ingae, as is demonstrated by the existence of numerous minimal pairs. Some of the minimal pairs involve lexical roots, such as (1-3a-b). The examples use the practical orthography, except the glottal is represented as in the IPA. Postvocalic *n*s and *m*s, as in (2), represent vowel nasality or prenasalization of the of the following consonant; they are not codas.

(1)	a.	*chíga*	god	"god"
	b.	*chíʔga*	not want	"not want"
(2)	a.	*úmba*	up	"up"
	b.	*úʔmba*	fill up	"fill up"
(3)	a.	*káni*	yesterday	"yesterday"
	b.	*káʔni*	enter	"enter"

Still, most minimal pairs in the language are morphologically complex, like (4-6a-b). This is a result of the fact many of the language's functional morphemes begin with glottal stops.

(4)	a.	*án-mba*	eat-SS	"having eaten"
	b.	*án-ʔmba*	eat-N	"yuca"
(5)	a.	*tsá=ma*	that=ACC	"that"
	b.	*tsá-ʔma*	that-FRST	"but"
(6)	a.	*í=ngi*	bring=1	"I brought"
	b.	*í-ʔngi*	bring-VEN	"come to bring"

3 For my previous work on A'ingae stress and glottalization, see Dąbkowski (2019a,b, in press).

2.1 *Phonetic properties*

The phonetic realization of glottalization is variable. It ranges from glottal closure to creakiness. In Figure 2, the glottal stop is realized as a glottal closure and followed by an aspirated alveolar stop /ʔtʰ/. The two together can be seen on the spectrogram as a long pause.

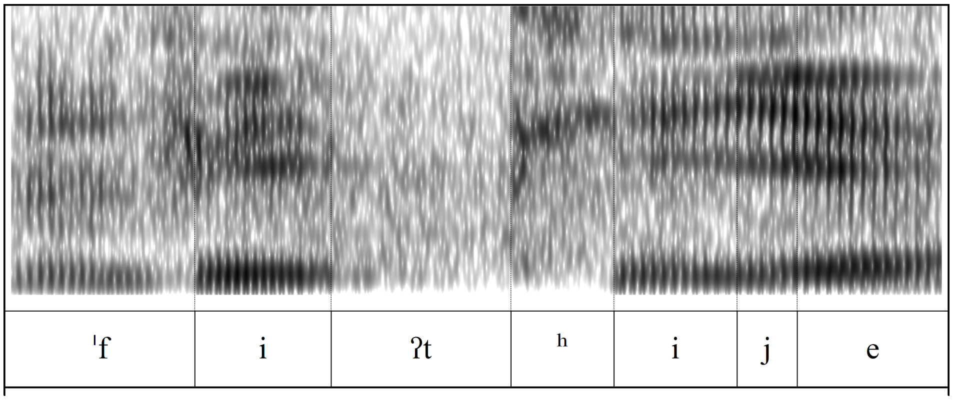

Figure 2: Spectrogram for *fíʔthi-ye* ‘kill-INF.’

In Figure 3, the glottalization is realized with creaky voice. The creaky realization is not restricted to the glottalized syllable; it can extend across the rest of the word.

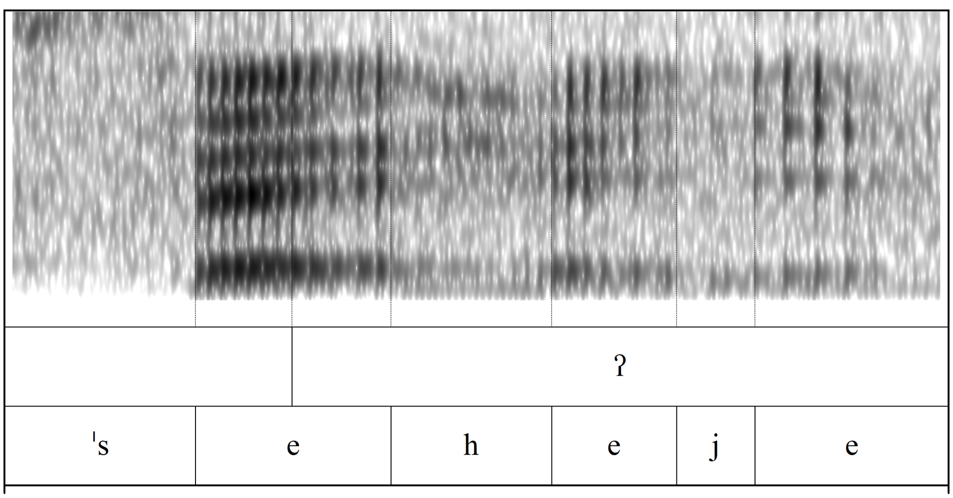

Figure 3: Spectrogram for *séʔje-ye* ‘cure-INF.’

2.2 *Prosodic character*

Previous literature treats the glottal stop as a regular segment (Fischer and Hengeveld, in press; Repetti-Ludlow et al., 2019). Yet, the glottal stop has many properties which make the analysis implausible. I will argue that the glottal stop is best understood as a prosodic feature.

First, the glottal stop is associated with the syllabic nucleus (1-6). If it were treated segmentally, it would have to be analyzed as a coda. This is undesirable as the analysis would make the glottal stop the only coda in a language which otherwise lacks codas altogether. Moreover, the glottal stop appears in the onset position only in a very small class of words (to be considered in Section 2.3). If the glottal stop is treated as a segment, this restriction is unexpected.

Second, within a morphological stem of the relevant size,[4] the glottal stop is culminative. This is to say, there can be only one glottal stop per a morphological stem. While the property of culminativity is not restricted to metrical structure (Hyman, 2006), it is expected of it.

Third, the glottal stop is never word-final. The glottal stop can surface in the penultimate syllable (7-9a), antepenultimate syllable (7-9b), or earlier, but it can never surface in the final syllable (7-9c).[5] The orthographic *û* represents /ɨ/.

		$\sigma ʔ\ \sigma\ ]_\omega$		$\sigma ʔ\ \sigma\ \sigma\ ]_\omega$		$*\sigma ʔ\ ]_\omega$
(7)	a.	*û́ʔkha*	b.	*áʔta-ye*	c.	———
		break		dawn-INF		
(8)	a.	*áʔtse*	b.	*cháʔndi-tshi*	c.	———
		hummingbird		cold-ADJ		
(9)	a.	*áfe-ʔnga*	b.	*kasára-ʔje-mbi*	c.	———
		give-AND		marry-IMPV-NEG		

4 The analysis presented in this paper pertains only to a relatively narrow morphosyntactic domain, which corresponds roughly to roots for nouns and roots inflected with verb-specific inflectional morphology for verbs. This verb-specific inflectional morphology includes valence-changing suffixes such as the reciprocal *-khu* 'RCPR' and the passive *-ye* 'PASS,' aspectual suffixes such as the precumulative *-ji* 'PRCM,' as well as associated motion suffixes. In (i), the verbal inflectional stem is given in parentheses [ ].

(i) [*panza -khu -ye -jí*] *-ʔfa -ya -mbi*
hunt -RCPR -PASS -PRCM -PLS -IRR -NEG
"They$_{\text{PLS}}$ will$_{\text{IRR}}$ not$_{\text{NEG}}$ be about$_{\text{PRCM}}$ to be$_{\text{PASS}}$ hunted by each other$_{\text{RCPR}}$."

The suffixes within the verbal inflectional stem can appear only on verbs. The suffixes outside of that domain, such as the plural subject *-ʔfa* 'PLS,' and the negation *-mbi* 'NEG' are more promiscuous in that they can appear on verbal and nominal predicates. The observations below pertain only to the inner morphosyntactic domain.

5 A discussion of monosyllabic roots is postponed until Section 3.1.

The fact that the glottal stop is never word-final also supports the first observation that it is not a coda. We would first expect codas to be allowed in a word-final position before being allowed in word-medial position. Although languages which allow word-internal but ban word-final codas exist, they are typologically less common.

Fourth, the distribution of the glottal stop in morphological roots is entirely predictable. In disyllabic roots, the first syllable is glottalized (10-12a). In trisyllabic roots, the second syllable is glottalized (10-12b). The first syllable is never glottalized in trisyllabic roots (10-12c).

		$[\,\sigma ʔ\,\sigma\,]_{\surd}$		$[\,\sigma\,\sigma ʔ\,\sigma\,]_{\surd}$		$^{*}[\,\sigma ʔ\,\sigma\,\sigma\,]_{\surd}$
(10)	a.	*inʔjan*	b.	*ákheʔpa*	c.	———
		want		forget		
(11)	a.	*jáʔñu*	b.	*úmaʔndu*	c.	———
		now		macaw		
(12)	a.	*dû́ʔshû*	b.	*káseʔte*	c.	———
		child		hello		

Fifth, the glottal stop attracts stress in a way which cannot be reduced to syllabic weight. Specifically, stress is assigned to the syllable which contains the second mora to the left of the glottal stop. Since A'ingae has no long vowels or codas (as I argue that the glottal stop is not a coda), only diphthongs make for heavy syllables.

This special stress assignment triggered by the glottal stop is most easily seen by comparing stress on bare verbal roots with inflected verbs.

		◡◡] +		–◡] +		◡–] +
(13)	a.	*fétha*	b.	*fû́ite*	c.	*fû́ndûi*
		open		help		sweep
(14)	a.	*fethá-ji*	b.	*fûité-ji*	c.	*fûndû́i-ji*
		open-PRCM		help-PRCM		sweep-PRCM
(15)	a.	*fétha-ʔje*	b.	*fû́ite-ʔje*	c.	*fûndû́i-ʔje*
		open-IMPV		help-IMPV		sweep-IMPV

By default, stress falls on the penultimate syllable of the word. This is the pattern seen with bare, underlyingly stressless roots (13a-c). Observe that stress falls on the penultimate syllable regardless of whether the word contains two light syllables (13a), a heavy syllable followed by a light syllable (13b), or a light syllable followed by a heavy syllable (13c).

The precumulative aspect (14) *-ji* 'PRCM' does not assign stress but counts towards the phonological word, so stress is likewise penultimate in (14a-c). As in (13a-c), stress is assigned to the penultimate syllable of the word regardless of the prosodic shape of the stem.

A different, weight-sensitive, pattern emerges with a preglottalized suffix. The imperfective aspect (15) *-ʔje* 'IMPV' has an initial glottal stop, which means that stress is assigned to the penultimate syllable of the stem if both syllables of the stem are light (15a) and if the penultimate syllable is heavy but the last syllable is light (15b), but to the last syllable of the stem if the last syllable is heavy (15c).[6] To reiterate, the generalization about the interaction of glottalization and stress in A'ingae can be stated as in (16).

(16) GLOTTALIZATION-STRESS INTERACTION
Stress falls on the glottalized syllable if heavy and on the preceding syllable otherwise.

Sixth and last, the glottal stop is deleted whenever the lexical properties of a suffix require deletion of stress. I take this to mean that the glottal stop is treated by the phonological grammar of A'ingae as a prosodic feature, not a segment.

The passive suffix *-ye* 'PASS' has the idiosyncratic lexical property of deleting preceding stress. It does not assign morphological stress, so the output stress is assigned by default to the penultimate syllable.

For example, the verb *áfase* 'offend' has lexically specified word-initial stress (17a). When the passive suffix *-ye* 'PASS' attaches, it deletes the lexical stress and default stress is assigned to the penultimate syllable (17a).

(17) a. *áfase*
offend

b. *afasé-ye*
offend-PASS

Now, the glottalized verb *séʔje* 'cure' is stressed on the first syllable (18a). When passivized with *-ye* 'PASS,' that stress is deleted and default stressed is supplied to the penult (18b). Importantly, observe that stress deletion is accompanied by the deletion of glottalization.

6 Although (15a-c) are morphologically complex forms, the generalization holds of bare roots of all lexical classes as well. The antepenultimate stress in (10-12b), for example, results from the glottalization of the penultimate syllable. Were the penultimate syllable not glottalized, we would expect default stress on the penultimate syllable.

(18) a. *séʔje* b. *sejé-ye*
cure cure-PASS

In interim summary, we saw that the glottal stop has many properties typical of prosodic structure, which makes segmental analysis implausible. Specifically, the glottal stop is associated with the nucleus, it is culminative, nonfinal, distributionally restricted in phonological words, and predictable in morphological roots. Moreover, the glottal stop is closely tied to stress: it attracts stress to the syllable containing the penultimate mora before it and undergoes deletion whenever stress undergoes deletion.

2.3 *Segmental realization*

I have argued that A'ingae glottalization is a prosodic feature typically realized in the syllabic nucleus. Nevertheless, the glottal stop can be realized as an onset as well in both morphological roots (19-23a) and morphologically complex forms (19-23b). Conspicuously, glottalization is realized as a segmental onset in the name of the language (19b). At first sight, this is a challenge to the proposal I have put forth.

Observe however, that whenever the glottal stop is realized as an onset (19-23a-b), it alternates in some morphologically related forms with the more expected nucleus realization as well (19-23c). I will refer to this alternation as apparent glottal metathesis, as my account will not propose actual metathesis.

(19)	a.	*áʔi*	person	"person"
	b.	*áʔi=ngae*	person=MANN	"like people," "A'ingae"
		áʔi=ma	person=ACC	"person"
		áʔi-nakhû	person-COLL	"people"
	c.	*áiʔ-ña*	person-CAUS	"domesticate"
		áiʔ-vu	person-?	"body"
		ái-ʔpa	person-N	"Secoya"
(20)	a.	*tū́ʔi*	tomorrow	"tomorrow"
	b.	*tū́ʔi=tsû*	tomorrow=3	"tomorrow"
	c.	*tū́iʔ=ve*	tomorrow=ACC2	"day after tomorrow"
(21)	a.	*kū́ʔi*	drink	"drink"
	b.	*kū́ʔi-mbi*	drink-NEG	"does not drink"
	c.	*kū́iʔ-ña*	drink-CAUS	"make drink"
(22)	a.	*jáʔi*	later	"later"
	c.	*jáiʔ=ngae*	later=MANN	"eventually"

(23) a. *tsá*ʔ*u* house "house"
b. *tsá*ʔ*u=ma* house=ACC "house"
*tsá*ʔ*u=ni* house=LOC "in a house"
c. *tsáu*ʔ*-ña* house-CAUS "build a house"
*tsáu-*ʔ*pa* house-N "nest"

Many of these forms are synchronically non-compositional. Nevertheless, the alternation is seen with productive morphology as well. For example, (23b) *tsá*ʔ*u=ma* 'house=ACC' shows productive inflectional case morphology and (23c) *tsáu*ʔ*-ña* 'house-CAUS' shows productive causativization. Thus, the apparent glottal metathesis is active in the language, not just a reflex of an erstwhile process.[7]

3 ANALYSIS

To capture the distributional facts of the A'ingae glottalization and its interaction with stress, I put forth the proposal in (24).

(24) THE CORE PROPOSAL: $(\acute{\sigma}\sigma)^{ʔ}$
Glottalization is a feature of the metrical foot. In the underlying representation of a morphological root, glottalization is not linearized.

Thus, the presence of glottalization can be optionally specified for a metrical foot. I will represent the underlying glottal feet with a superscripted glottal stop $(\acute{\sigma}\sigma)^{ʔ}$. This abstract representation captures the idea that at the level of a morphological root's underlying representation, glottalization is not associated with either of the glottal foot's syllables, so its surface position is a consequence of phonological optimization.

Now I will demonstrate how this accounts for the distributional properties of glottalization from Section 2. First, recall that glottalization is never word-final (7-9). This is captured with a GLOTTALNONFINALITY constraint.

GLOTTALNONFINALITY, or: NONFINʔ
Glottalization is not final in a prosodic word.

Also recall that in trisyllabic roots, glottalization appears not on the stressed syllable, but on the following one (10-12b). I take this to mean that glottalization prefers to surface in the second syllable (or the right edge) of the glottal foot, and capture the pattern with an ALIGNMENT constraint.

7 Note that whether a functional morpheme is a clitic or a suffix does not correlate with apparent glottal metathesis in any immediate manner. For example, the glottal stop appears in an onset position in both *â*ʔ*i=ma* 'person=ACC' and *â*ʔ*i-nakhû* 'person-COLL,' even though the accusative *=ma* 'ACC' is a clitic while the collective *-nakhû* 'COLL' is a suffix (19b).

ALIGN(ʔ, FOOT-R), or: ALIGNʔ)
Glottalization is right-aligned with a metrical foot.

Disyllabic words with glottalization violate ALIGN(ʔ, FOOT-R) but avoid glottalization at the end of the word, which shows that ALIGN(ʔ, FOOT-R) is outranked by GLOTTALNONFINALITY (25).

(25)		*(injan)*ˀ:	NONFINʔ »	ALIGNʔ)
☞	i.	(*ín̲ʔjan*)		*
	ii.	(*ín̲janʔ*)	*	——

want

Trisyllabic words have enough syllables for violations of GLOTTALNONFINALITY not to be a problem. Thus, the surface position of glottalization is governed by ALIGN(ʔ, FOOT-R), as demonstrated in (26).

(26)		*(uma)*ˀ*ndu*:	NONFINʔ »	ALIGNʔ)
	i.	(*ú̲ʔma*)*ndu*		*
☞	ii.	(*ú̲maʔ*)*ndu*		
	iii.	*u*(*má̲ʔndu*)		*
	iv.	*u*(*má̲nduʔ*)	*	——

macaw

Now, recall the interaction of glottalization and stress in A'ingae. Namely, stress falls two syllables before the glottal stop, unless the final syllable is heavy, in which case stress falls on the final syllable (15).

	⌣⌣] +	–⌣] +	⌣–] +
(15)	a. *fé̲tha-ʔje*	b. *fû̲́ite-ʔje*	c. *fûndû̲i-ʔje*
	open-IMPV	help-IMPV	sweep-IMPV

Preglottalized suffixes, such as the imperfective aspect (15) *-ʔje* 'IMPV,' require glottalization immediately to their left. To capture this fact, I propose that glottalization is linearized in suffixes, but not in roots. Accordingly, I will represent glottalization in suffixes with a regular type glottal stop -ʔσ.[8]

8 Since glottalization is a property of a metrical foot, a regular type glottal stop -ʔσ is a partial representation of a metrical foot: It represents the position of glottalization, but not the foot's left or right boundary. To create a well-formed metrical representation, the rest of the foot is supplied in the output.

Given the above assumption about the underlying representation of glottalization in functional morphemes, ALIGN(ʔ, FOOT-R) captures the stress as attracted by preglottalized suffixes in (15a-b), shown in (27-28).

(27)	*fetha-ʔje*:	NONFINʔ »	ALIGNʔ)
☞ i.	*(fétha ʔ)je*		
ii.	*fe(tháʔje)*		*
	open-IMPV		

(28)	*fûite-ʔje*:	NONFINʔ »	ALIGNʔ)
☞ i.	*(fû́iteʔ)je*		
ii.	*fûi(téʔje)*		*
	help-IMPV		

To capture the presence of the glottal stop in the stressed syllable of (15c), I propose that a MARKEDNESS constraint which prohibits the cross-linguistically dispreferred light-heavy trochee (◡–) is active in A'ingae.

> *LIGHTHEAVY, or: *(◡–)
> The right branch of a trochee is light.

*LIGHTHEAVY ranks above ALIGN(ʔ, FOOT-R), which correctly predicts (15c), the winner of (29).

(29)	*fûndûi-ʔje*:	*(◡–),	NONFINʔ »	ALIGNʔ)
i.	*(fû́ndûiʔ)je*	*		———
☞ ii.	*fû(ndû́iʔje)*			*
	sweep-IMPV			

Finally, the current proposal naturally captures the fact that stress-deleting suffixes delete glottalization as well. If glottalization is a property of the metrical foot, it follows naturally that it will also be targeted by a deletion mechanism which targets stress.

In interim summary, I have proposed that A'ingae glottalization is a nonlinearized property of the metrical foot $(\acute{\sigma}\sigma)^{ʔ}$. Its distribution and effects on stress emerge from a ranking of GLOTTALNONFINALITY, ALIGN(ʔ, FOOT-R), and *LIGHTHEAVY. Finally, treating glottalization is a property of the metrical foot naturally captures the fact that stress-deleting suffixes delete glottalization as well.

3.1 *Glottal monosyllables*

Now I will turn the final puzzle which pertains to the appearance of segmental glottal stops in the onset position.

I proposed that glottalization is a property of trochaic foot. The examples I have given so far were minimally disyllabic, but all that is needed to host a trochee are two morae, not two syllables. Thus, my account predicts the existence of roots which consist of one diphthong (a heavy syllable) and are listed in the lexicon with a glottalized metrical foot. This is to say, roots of the following metrical shape are predicted to exist: $(\sigma_{\mu\mu})^{ʔ}$.

I argue that this prediction is also borne out. Specifically, I propose that words where the glottal stop surfaces between two vowels in an onset position are underlyingly such roots (19-23a) and glottalization surfaces between the two vowels to avoid a violation of GlottalNonFinality.[9]

(19)	a.	*áʔi*	person	“person”
(20)	a.	*tú̂ʔi*	tomorrow	“tomorrow”
(21)	a.	*kú̂ʔi*	drink	“drink”
(22)	a.	*jáʔi*	later	“later”
(23)	a.	*tsáʔu*	house	“house”

This analysis receives support from the fact that the two vowels in each case constitute a legal diphthong of the language.[10] The seven regular diphthongs of the language are given in Figure 4.[11] The diphthongs which I propose appear in the underlying forms of (19-23a) are underlined.

9 My analysis is draws on Repetti-Ludlow et al.’s (2019), who also propose that roots such as (19-23a) are underlyingly diphthongal. Repetti-Ludlow et al. (2019) propose that glottalization is underlying word-final and undergoes metathesis to avoid non-finality (ii).

(ii) /*tsauʔ*/ → [*tsaʔu*] house “house”

10 Exceptions include *váʔû* ‘deadly nightshade,’ *áyuʔu* ‘dream,’ and *íyûʔû* ‘scold.’

11 The three marginal diphthongs are given in parentheses ( ).

	*a*V	*i*V	*û*V	*e*V	*u*V
V*a*		*ia*			*ua*
V*i*	*ai*		*ûi*		*ui*
V*û*					
V*e*	(*ae*)	(*ie*)			*ue*
V*u*	*au*	(*iu*)			

Figure 4: A'ingae diphthongs.

Thus, the underlying form of (21a) is one bimoraic syllable with an associated glottal foot. The glottal stop surfaces wedged between the two vowels because of the high-ranked GlottalNonFinality (30).

(30)	(*kûi*)ˀ:	NonFinʔ »	Alignʔ)
☞ i.	(*kú̂ʔi*)		*
ii.	(*kú̂iʔ*)	*	

drink

Of course, additional support for this analysis comes from the fact that the proposed underlying diphthongs do indeed sometimes surface as diphthongs (21c). The final question I address is what is what is responsible for the apparent glottal metathesis observed in (21b-c).

(21)
a. *kú̂ʔi* — drink — "drink"
b. *kú̂ʔi-mbi* — drink-NEG — "does not drink"
c. *kú̂iʔ-ña* — drink-CAUS — "make drink"

I propose that the difference between (23b) and (23c) can be understood as consequence of cyclic phonological evaluation. Specifically, I propose that derivational suffixes such as the causative *-ña* 'CAUS' are phonologically evaluated with the root, whereas inflectional suffixes and clitics are not.

(31)

a.	b.	c.
[(*kûi*)ˀ]	[(*kûi*)ˀ *-ña*]	[[(*kûi*)ˀ] *-mbi*]
(*kú̂ʔi*)	(*kú̂iʔ*)*ña*	[(*kú̂ʔi*) *-mbi*]
		(*kú̂ʔi*)*mbi*
drink	drink-CAUS	drink-NEG

When the root spells out by itself, the glottal stop ends up between the two vowels because of the high-ranked GlottalNonFinality (31a). The derivational *-ña* 'caus' is spelled out with the root, so foot-final glottalization does not violate GlottalNonFinality in (31b). The inflectional *-mbi* 'neg' attaches after the root's spell-out, i. e. after GlottalNonFinality already had a chance to apply. Thus, glottalization's position is resolved to be intervocalic and it remains so even after the attachment of the inflectional suffix (31c).

4 conclusion

In conclusion, I proposed that A'ingae glottalization plays a typologically novel role in grammar of A'ingae: It is not a segment, a feature of the vowel, the root, or the word, but rather a feature of a metrical constituent.

My analysis proposed that the surface position of glottalization is determined by GlottalNonFinality, Align(ʔ, Foot-R), and *LightHeavy. Thus, I accounted for the limited distribution of glottalization, its interaction with stress, and its susceptibility to deletion by dominant suffixes.

Finally, I proposed that derivational—but not inflectional—morphemes undergo phonological evaluation with the root, thus accounting for the cases of apparent glottal metathesis.

acknowledgements

I would like to thank Larry Hyman, Hannah Sande, Scott AnderBois, Peter Jenks, Lev Michael, Myriam Lapierre, John Starr, Sam Liff, Wilson Silva, Uriel Cohen Priva, Roman Feiman, Chelsea Sanker, the audiences at CILLA IX, WCCFL 38, Zoom Phonology, Syntax/Semantics Circle, and the reviewers for WCCFL 39 for invaluable feedback. I would also like to express my gratitude to my consultants Hugo Lucitante, Shen Aguinda, and Leidy Quenamá and all of my Cofán collaborators for the kindness and generosity they treated me with.

My research was supported in part by a Royce Fellowship grant for "A'ingae Language Preservation" and an Oswalt Endangered Language Grant for "Phonology-syntax interface in A'ingae."

bibliography

Borman, Marlytte Bub (1976). *Vocabulario cofán: Cofán–castellano, castellano–cofán*. Vocabularios indígenas 19. Quito, Ecuador: Instituto Lingüístico de Verano (Summer Institute of Linguistics).

Curnow, Timothy Jowan and Anthony Liddicoat (1998). “The Barbacoan languages of Colombia and Ecuador.” In: *Anthropological Linguistics* 40, pp. 384–408.

Dąbkowski, Maksymilian (2019a). “Heavy feet and glottal stops in A’ingae, or The morphophonology of A’ingae lexical stress.” Paper presented at the 9th Conference on Indigenous Languages of Latin America. Austin, Texas: University of Texas at Austin. URL: https://maksymilian-dabkowski.github.io/research/Glottal_stops_and_heavy_feet_in_A_ingae__presentation.pdf.

Dąbkowski, Maksymilian (2019b). “The morphophonology of A’ingae verbal stress.” Honors thesis. Providence, RI: Brown University. URL: https://maksymilian-dabkowski.github.io/research/The_morphophonology_of_A_ingae_verbal_stress__thesis.pdf.

Dąbkowski, Maksymilian (in press). “The morphophonology of A’ingae verbal stress.” In: *Proceedings of the 38th West Coast Conference on Formal Linguistics*. Ed. by Rachel Soo, Daniel Reisinger, and Katie Martin. Cascadilla Press. URL: https://maksymilian-dabkowski.github.io/research/The_morphophonology_of_A_ingae_verbal_stress__proceedings.pdf.

Fischer, Rafael and Kees Hengeveld (in press). “A’ingae (Cofán/ Kofán).” In: *Amazonian Languages. An International Handbook*. Vol. 1: *Smaller Language Families and Isolates*. Ed. by Patience Epps and Lev Michael. Handbooks of Linguistics and Communication Science (HSK) 44. Berlin: De Gruyter Mouton.

Harley, Heidi and Meg Harvey (in press). “Some Hiaki ’echo vowels’ result from a floating glottal feature.” In: *Proceedings of the 37th West Coast Conference on Formal Linguistics*. Ed. by Rachel Soo, Daniel Reisinger, and Katie Martin. Cascadilla Press.

Hayes, Bruce (1995). *Metrical stress theory: Principles and case studies*. University of Chicago Press.

Hyman, Larry M. (2006). “Word-prosodic typology.” In: *Phonology* 23.2, pp. 225–257. URL: http://www.jstor.com/stable/4420274.

Itô, Junko and Armin Mester (2015). “The perfect prosodic word in Danish.” In: *Nordic Journal of Linguistics* 38.1, pp. 5–36. DOI: 10.1017/S0332586515000049.

Lindskoog, John N. and Ruth M. Brend (1962). “Cayapa phonemics.” In: *Studies in Ecuadorian Indian Languages*. Vol. I. Ed. by Benjamin F. Elson. Instituto Lingüístico de Verano (Summer Institute of Linguistics), pp. 31–44.

Parker Jones, ʻŌiwi (2018). “Hawaiian.” In: *Journal of the International Phonetic Association: Illustrations of the IPA* 48.1, pp. 103–115. DOI: 10.1017/S0025100316000438.

Repetti-Ludlow, Chiara, Haoru Zhang, Hugo Lucitante, Scott AnderBois, and Chelsea Sanker (2019). “A’ingae (Cofán).” In: *Journal of the Interna-*

tional Phonetic Association: Illustrations of the IPA, pp. 1–14. DOI: 10.1017/S0025100319000082.

Safir, Ken (1979). "Metrical structure in Capanahua." In: *MIT Working Papers in Linguistics*. Vol. 1: *Papers on Syllable Structure, Metrical Structure and Harmony Processes*, pp. 95–114.

Silva, Wilson (2016). "The status of the laryngeals 'ʔ' and 'h' in Desano." In: *The Phonetics and Phonology of Laryngeal Features in Native American Languages*. Ed. by Heriberto Avelino, Matt Coler, and W. Leo Wetzels. Brill's Studies in the Indigenous Languages of the Americas 12. Leiden and Boston: Brill, pp. 285–307.

Staun, Jørgen (2012). "On the representation of stød." In: *Explorations in Dependency Phonology*. Ed. by John Anderson and Jacques Durand. Vol. 26. Publications in Language Sciences. Dordrecht: Foris, pp. 169–198.