

TWO GRAMMARS OF A'INGAE GLOTTALIZATION: A CASE FOR COPHONOLOGIES BY PHASE

MAKSYMILIAN DĄBKOWSKI

UNIVERSITY OF CALIFORNIA, BERKELEY

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1	INTRODUCTION	2
2	LANGUAGE BACKGROUND	3
3	DESCRIPTION	4
3.1	Verbal roots	5
3.2	Inner suffixes	6
3.3	Outer suffixes	8
3.4	Central generalizations	11
4	ANALYSIS	11
4.1	Cophonologies by Phase	12
4.2	The structure of a verb	13
4.3	The <i>inner</i> cophonology	16
4.4	The <i>dominant</i> cophonology	20
4.5	The <i>outer</i> cophonology	23
5	REJECTED ALTERNATIVES	27
5.1	Representational analyses	28
5.2	ALIGNMENT-only analysis	29
5.3	*STRUCTURE analysis	32
5.4	Phase-based spell-out	33
6	CONCLUSION	34

ABSTRACT A'ingae (or Cofán, ISO 639-3: con) is an Amazonian isolate spoken in northeast Ecuador and southern Colombia. This paper describes and analyzes phonological processes pertinent to the glottal stop in A'ingae morphologically complex verbs. A'ingae verbal suffixes are organized in two morphophonological domains, or strata. Within the inner domain, glottal stops assign stress to the syllable which contains the second mora to the left of the glottal stop. In the outer domain, glottal stops do not have any effect on stress. In addition, some verbal suffixes delete stress (i. e. they are dominant). Dominance is unpredictable and independent of the suffix's morphophonological domain, but dominance and the phonological domain interact in a non-trivial way: Stress-deleting suffixes of the inner domain also delete glottalization, but stress-deleting suffixes of the outer domain leave glottalization intact.

The main theoretical import of the study resides in the architecture of the A'ingae grammar, which requires a phonological formalism capable of (i) modeling phonological stratification while (ii) allowing for morpheme-specific phonological idiosyncrasies which (iii) interact with the phonological grammar of their stratum. The formalism I adopt is Cophonologies by Phase (henceforth CbP; e. g. Sande, Jenks, and Inkelas, 2020). CbP fulfills the three desiderata by associating *cophonologies*, or morphologically-specific phonological grammars, with (i) phase heads as well as (ii) individual morphosyntactic features, which (iii) compile together to yield the phonological ranking applied at spell-out.

Secondary theoretical implications pertain to Goldsmith's (1990) notion of autosegmental licensing and Alderete's (1999, 2001) ANTI-FAITHFULNESS. To model the relationship between glottalization and stress, I propose that within the inner (but not the outer) domain, the glottal stop is licensed by a metrical foot. I model stress deletion as antifaithfulness to input stress. Finally, I propose that antifaithfulness to a licenser entails antifaithfulness to its licensees, which captures the fact that only the inner dominant suffixes delete glottalization.

1 INTRODUCTION

This paper presents and analyzes data from A'ingae (or Cofán, an Amazonian isolate, iso 639-3: con), whose phonological grammar shows effects specific to (i) morphological domains as well as (ii) idiosyncratic morphemes, which (iii) interact with each other. The organization of the A'ingae morphology-phonology interface considerably restricts the space of viable formalisms. I show that Cophonologies by Phase (e. g. Sande, Jenks, and Inkelas, 2020) has the requisite architectural properties to model the A'ingae patterns.

To support my claim, I focus on the grammar of the A'ingae glottal stop. The glottal stop most often appears in syllabic rimes; onset glottal stops are rare. The presence of the glottal stop is contrastive in roots (1a-b) as well as functional morphemes (1c-d).¹ The position of glottalization is contrastive in morphologically complex forms (1e-f). Stress is marked with the acute accent (´) and **boldface**.

(1) GLOTTAL STOP AS A CONTRASTIVE SEGMENT

a. <i>séje</i>	b. <i>séʔje</i>	c. <i>tsá =ma</i>	d. <i>tsá -ʔma</i>	e. <i>séʔje -pa</i>	f. <i>séje -ʔpa</i>
paint	cure	ANA =ACC	ANA -FRST	cure -SS	cure -N

More narrowly, I focus on the phonological processes pertinent to the glottal stop in A'ingae morphologically complex verbs. In addition to the presence or absence of preglottalization (1c-d), A'ingae suffixes vary along two dimensions. First, there are two morphophonological domains, or strata, which I refer to as *inner* (closer to the root) and *outer* (farther away from the root). Glottal stops in roots and suffixes of the inner domain are associated with stress which falls on the syllable which contains the second mora to the left of the glottal stop. Glottal stops introduced in the outer domain do not have any effect on stress.

Second, A'ingae suffixes can be categorized as *recessive*, which preserve underlying stress, or *dominant*, which delete input stress (Dąbkowski, 2021c). Whether a suffix is recessive (i. e. stress-preserving) or dominant (i. e. stress-deleting) is unpredictable and independent of the morphophonological domain. As a consequence, there are *inner recessive*, *outer recessive*, *inner dominant*, and *outer dominant* suffixes. Notably, the parameter of dominance interacts with the morphological domain in a non-trivial way: If there is an underlying glottal stop, the inner dominant suffixes delete the glottal stop along with stress, but the outer dominant suffixes leave the glottal stop intact.

The main theoretical import of this study resides in the architecture of the A'ingae morphophonological grammar as revealed by the phonological processes related to glottalization: Different phonological grammars within one language may correspond to ordered morphological domains or strata (as is the case with the effect A'ingae glottalization has on stress) but may also be unpredictably associated with individual morphemes (as is the case with A'ingae dominance effects), which further interact with the grammar of their stratum. Thus, a phonological formalism that does justice to the A'ingae data pattern must be able to fulfill the triple desideratum of (i) modeling phonological stratification while (ii) allowing for morpheme-specific phonological idiosyncrasies which (iii) interact with the phonological grammar of their stratum.

To model the A'ingae data, I adopt Cophonologies by Phase (henceforth CbP; Sande, 2017, 2019; Sande and Jenks, 2018; Sande, Jenks, and Inkelas, 2020). CbP allows for associating *cophonologies*, or morphologically-specific phonological grammars, with phase heads as well as individual morphosyntactic features. In my proposal, lower phase heads are associated with a cophonology where glottalization triggers stress assignment and higher phase heads with a cophonology where the glottalization has no effect on stress (i). Morphosyntactic features which are spelled out by dominant suffixes are associated with a cophonology which requires stress deletion (ii). Lastly, the cophonologies of the all the features within a phase jointly determine the

¹ The following glossing abbreviations are used: 1 = first person, 2 = second person, 3 = third person, ACC = accusative, ACC2 = accusative 2, ANA = anaphoric, AND = andative, APPR = apprehensional, CAUS = causative, CNTR = contrastive topic, DS = different subject, FRST = frustrative, IF = conditional, IF2 = conditional 2, IMP = imperative, IMP2 = imperative 2, IMP3 = imperative 3, INF = infinitive, IPFV = imperfective, IRR = irrealis, LOC = locative, MANN = manner, N = nominalizer, NEG = negative, NEW = new topic, PASS = passive, PAUC = verbal paucal, PLS = plural subject, PRCL = preculminative, PRHB = prohibitive, RCPR = reciprocal, ROOT = verbal root, RPRT = reportative, SBRD = subordinator, SG = singular, SH.DLM = delimited space shape, SMFC = semelfactive, SS = same subject, VEN = venitive, VER = veridical, YNQ = polar interrogative.

phonological ranking at each spell-out, so phase head and morpheme-specific cophonologies may interact (iii). Thus, Cophonologies by Phase fulfils the above triple desideratum, whereas alternatives which, for example, rely to a greater extent on representational means fail to fulfill some or all of its parts.

The secondary theoretical implications of the study pertain to two other formal tools necessary to model the A'ingae data. To capture the relationship between glottalization and stress, I adopt Goldsmith's (1990) notion of autosegmental licensing. Specifically, I propose that within the inner domain the glottal stop is licensed by the metrical foot. (In the outer morphological domain, glottalization is licensed by the syllabic node.) To capture the behavior of stress-deleting suffixes, I adopt Alderete's (1999, 2001) notion of ANTI-FAITHFULNESS. This is to say, stress-deleting suffixes penalize retention of input stress. Finally, I propose that antifaithfulness to a licenser entails antifaithfulness to its licensees. This captures the fact that dominant suffixes delete glottalization only within the inner domain (where glottal stops are licensed by metrical structure). Thus, the study contributes new arguments in favor of autosegmental licensing as well as the controversial family of ANTI-FAITHFULNESS constraints, and makes a novel proposal about the interaction between the two.

The rest of the paper is structured as follows. Section 2 gives background on the A'ingae language and its speakers. Section 3 describes the distribution of the A'ingae glottal stop and the morphophonological processes relevant to it. Section 4 presents a formal analysis of the data couched in Cophonologies by Phase (Sande, 2019; Sande, Jenks, and Inkelas, 2020; others). Section 5 considers and rejects alternative analyses. Section 6 concludes.

2 LANGUAGE BACKGROUND

A'ingae (or Cofán, ISO 639-3: con) is an Amazonian language isolate spoken by ca. 1,500 Cofán people in the province of Sucumbíos (northeast Ecuador) and the department of Putumayo (southern Colombia). The language is endangered and highly underdocumented. In Ecuador, A'ingae is spoken robustly and transmitted to children. Bilingualism with Spanish is prevalent, especially among younger generations. Despite economic, ecological, and political pressures experienced by the Cofán, their language attitudes towards A'ingae are uniformly positive (Dąbkowski, 2021a).

Previous work on the phonetics and phonology of A'ingae includes Borman's (1962) phonological sketch, Fischer and Hengeveld's (to appear) grammatical sketch, Repetti-Ludlow et al.'s (2019) phonetic study, Sanker and AnderBois's (2021) reconstruction of nasality, and Dąbkowski's (2021c) argument against a representational treatment of stress dominance.

	LABIAL		ALVEOLAR		PALATAL		VELAR		GLOTTAL	
PLAIN STOPS	<i>p</i>	p	<i>t</i>	t			<i>k</i>	k	<i>ʔ</i>	ʔ
ASPIRATED STOPS	<i>ph</i>	p^h	<i>th</i>	t^h			<i>kh</i>	k^h		
PRENASAL STOPS	<i>mb</i>	m^b	<i>nd</i>	n^d			<i>ng</i>	ŋ^g		
NASAL SONORANTS	<i>m</i>	m	<i>n</i>	n	<i>ɲ</i>	ɲ				
PLAIN FRICATIVES	<i>f</i>	f	<i>s</i>	s	<i>ʃ</i>	ʃ			<i>j</i>	h
PLAIN AFFRICATES			<i>ts</i>	ts	<i>ch</i>	tʃ				
ASPIRATED AFFRICATES			<i>tsh</i>	ts^h	<i>chh</i>	tʃ^h				
PRENASAL AFFRICATES			<i>nz</i>	n^{dʒ}	<i>ndy</i>	n^{dʒ}				
ORAL SONORANTS	<i>v</i>	v	<i>r</i>	r	<i>y</i>	j	<i>g</i>	ɰ		

Table 1: Consonantal inventory.

	ORAL				NASAL			
	FRONT		BACK		FRONT		BACK	
CLOSE	<i>i</i>	<i>ɪ</i>	<i>û</i>	<i>ɨ</i>	<i>in</i>	<i>ĩ</i>	<i>ûn</i>	<i>ĩ</i>
ROUND			<i>u</i>	<i>o</i>			<i>un</i>	<i>õ</i>
OPEN	<i>e</i>	<i>ɛ</i>	<i>a</i>	<i>a</i>	<i>en</i>	<i>ẽ</i>	<i>an</i>	<i>ã</i>

ORAL	<i>ua</i>	<i>oa</i>	<i>ia</i>	<i>ia</i>	<i>ui</i>	<i>oi</i>	<i>ue</i>	<i>oe</i>
	<i>au</i>	<i>ao</i>	<i>ai</i>	<i>ai</i>	<i>ûi</i>	<i>ii</i>	(<i>ae</i>)	<i>ae</i>)
NASAL	<i>uan</i>	<i>õã</i>	<i>ian</i>	<i>ĩã</i>	<i>uĩn</i>	<i>õĩ</i>	<i>uen</i>	<i>õẽ</i>
	<i>aun</i>	<i>ãõ</i>	<i>ain</i>	<i>ãĩ</i>	<i>ûin</i>	<i>ĩĩ</i>		

Table 2: Vocalic inventory.

The phonemic inventory of A'ingae is moderately large, totaling twenty-seven consonants, five simple vowels, and seven diphthongs² (plus twelve nasal counterparts of the latter two).³ It is given in [Tables 1 and 2](#), with each phoneme listed to the right of its default grapheme.⁴ This paper adopts the practical orthography with one exception: the glottal stop is represented as in the IPA (ʔ), and not with an apostrophe (as in the practical orthography). A'ingae syllable structure is (C)V(V)(ʔ). A'ingae has robust progressive nasalization, which gives rise to extensive nasal allomorphy (see Sanker and AnderBois, 2021).

All the data were collected by author between 2021 and 2022 and reflect the judgements reported by two native speaker consultants from the community of Dureno, Sucumbíos, Ecuador.

3 DESCRIPTION

This section describes the interaction of stress, glottalization, and stress deletion. A'ingae is a heavily agglutinating language, with many inflectional categories expounded with suffixes and enclitics on the verbal head. Within a complex verb, two morphophonological domains, or strata, can be distinguished (2): The inner domain includes the root and the exponents of voice, aspect, and associated motion. The inner suffixes may attach only to verbal predicates. The outer domain includes exponents of subject plurality, reality, polarity, subject person, and others. Many of the outer suffixes may attach to verbal as well as nominal predicates. The inner domain is delimited with square brackets [].

(2) STRATAL ORGANIZATION OF THE A'INGAE VERB

[*kufi* -*án* -*ʔjen* -*ngi*] -*ʔfa* -*ya* -*mbi* -*tsû*
 play -CAUS -IPFV -VEN -PLS -IRR -NEG =3

“they_{3,PLS} will_{IRR} not_{NEG} come_{VEN} to be_{IPFV} making_{CAUS} play”

The rest of this section is organized as follows. [Section 3.1](#) focuses on the distribution of stress and glottalization in verbal roots. [Section 3.2](#) focuses on the interaction of stress, glottalization, and stress deletion in forms with suffixes of the inner domain. [Section 3.3](#) focuses on the outer domain. [Section 3.4](#) summarizes the central generalizations about the A'ingae data.

² The phoneme inventory proposed here deviates from Repetti-Ludlow et al.'s (2019) in that it includes *ia* /ia/ (and *ian* /ĩã/) among the language's legal diphthongs. For further justification of this decision, see Dąbkowski (2021c).

³ The marginal diphthong *ae* transcribed broadly as /æ/ appears only in the manner case clitic -*ngae* MANN. Its phonetic realization is unstable and ranges from [əæ] to [ɛ].

⁴ The orthographic *n* and *m* between a vowel and a glottal stop play a double role: they represent both the nasality of the vowel and the prenasalization of the stop. E. g., the sequence *and* represents [ãⁿd]. Word initial prenasalization has shorter duration and lower intensity (Repetti-Ludlow et al., 2019). This is reflected orthographically with word-initial *b* [ʙⁿ], *d* [dⁿ], *z* [zⁿ], *dy* [dⁿɟ], and *g* [gⁿ].

3.1 Verbal roots

The inner morphophonological domain consists of the verbal root and, optionally, suffixes expounding voice, aspect, and associated motion. In this section, I will focus on verbal roots, which fall in one of three categories: stressless (3-4), stressed (5-6), and glottalized (7-12).

Underlyingly stressless roots can be monosyllabic (3a-b), disyllabic (3c-d), or trisyllabic (3e-f). On the surface, penultimate stress is assigned to disyllabic and trisyllabic roots. This is the default stress assigned to underlyingly stressless forms, as evidenced by stress shift in the presence of inflectional morphology (4).

(3) STRESSLESS ROOTS

a. / <i>phi</i> / [<i>phí</i>] sit	b. / <i>tsun</i> / [<i>tsún</i>] do	c. / <i>panza</i> / [<i>pánza</i>] hunt	d. / <i>afe</i> / [<i>áfe</i>] give	e. / <i>atapa</i> / [<i>atápa</i>] breed	f. / <i>utishi</i> / [<i>utíshi</i>] wash
--	---	---	---	--	---

(4) STRESSLESS ROOTS WITH SUFFIXES

a. / <i>phi</i> -ji / [<i>phi</i> - <i>jí</i>] sit -PRCL -PLS	b. / <i>tsun</i> -ji / [<i>tsun</i> - <i>jín</i>] do -PRCL -PLS	c. / <i>panza</i> -ji / [<i>panzá</i> -ji] hunt -PRCL	d. / <i>afe</i> -ji / [<i>afé</i> -ji] give -PRCL	e. / <i>atapa</i> -ji / [<i>atapá</i> -ji] breed -PRCL	f. / <i>utishi</i> -ji / [<i>utíshi</i> -ji] wash -PRCL
---	---	---	---	--	---

Underlyingly stressed roots are mostly disyllabic (5a-d); a few are trisyllabic (5e-f). All underlyingly stressed roots have word-initial stress. This lexically-specified first-syllable stress does not shift when most inflectional suffixes are added (6).

(5) STRESSED ROOTS

a. / <i>áfa</i> / [<i>áfa</i>] speak	b. / <i>ána</i> / [<i>ána</i>] sleep	c. / <i>káti</i> / [<i>káti</i>] cast	d. / <i>fúndu</i> / [<i>fúndu</i>] shout	e. / <i>áfase</i> / [<i>áfase</i>] offend	f. / <i>kúndase</i> / [<i>kúndase</i>] tell
--	--	---	--	---	---

(6) STRESSED ROOTS WITH SUFFIXES

a. / <i>áfa</i> -ji / [<i>áfa</i> -ji] speak -PRCL	b. / <i>ána</i> -ji / [<i>ána</i> - <i>jín</i>] sleep -PRCL	c. / <i>káti</i> -ji / [<i>káti</i> -ji] cast -PRCL	d. / <i>fúndu</i> -ji / [<i>fúndu</i> -ji] shout -PRCL	e. / <i>áfase</i> -ji / [<i>áfase</i> -ji] offend -PRCL	f. / <i>kúndase</i> -ji / [<i>kúndase</i> -ji] tell -PRCL
--	---	---	--	---	---

Finally, some roots have an underlying glottal stop. All underlyingly glottalized roots have word-initial stress. In disyllabic glottalized roots, the glottal stop surfaces in the rime of the first syllable (7a-c). (I remain agnostic whether the glottal stop is part of the nucleus or a coda.) In trisyllabic glottalized roots, the glottal stop surfaces in the rime of the second syllable (7d-f). Thus, within a glottalized root, the position of the glottal stop, the presence of stress, and the position of stress are entirely predictable. Glottalized roots do not undergo stress shift when most inflectional suffixes are added (8). For more examples of stressless, stressed, and glottalized roots with and without affixes, see (111-124) in the Appendix.

(7) GLOTTALIZED ROOTS

a. / <i>séʔje</i> / [<i>séʔje</i>] cure	b. / <i>iʔna</i> / [<i>iʔna</i>] cry	c. / <i>fiʔthi</i> / [<i>fiʔthi</i>] kill	d. / <i>ákheʔpa</i> / [<i>ákheʔpa</i>] forget	e. / <i>ánsaʔnge</i> / [<i>ánsaʔnge</i>] be shy	f. / <i>ákhusha</i> / [<i>ákhusha</i>] chop
---	--	---	---	---	---

(8) GLOTTALIZED ROOTS WITH SUFFIXES

a. / <i>séʔje</i> -ji / [<i>séʔje</i> -ji] cure -PRCL	b. / <i>iʔna</i> -ji / [<i>iʔna</i> - <i>jín</i>] cry -PRCL	c. / <i>fiʔthi</i> -ji / [<i>fiʔthi</i> -ji] kill -PRCL	d. / <i>ákheʔpa</i> -ji / [<i>ákheʔpa</i> -ji] forget -PRCL	e. / <i>ánsaʔnge</i> -ji / [<i>ánsaʔnge</i> -ji] be shy -PRCL	f. / <i>ákhusha</i> -ji / [<i>ákhusha</i> -ji] chop -PRCL
---	---	---	---	---	---

A few glottalized roots alternate between disyllabic (C)V.ʔV and monosyllabic (C)VVʔ, depending on the morphological context. The dot (.) represents syllable breaks. The disyllabic (C)V.ʔV forms of the alternating

glottalized roots are the only cases of onset glottal stops in A'ingae. In most contexts, including uninflected forms (9) and forms with an inflectional suffix (10), these roots surface as disyllabic (C)V.ʔV. When followed by a derivational suffix (11) or the inner causative -*ñā* CAUS (12), they surface as monosyllabic (C)VVʔ.

- (9) ALTERNATING GLOTTALIZED ROOTS
- | | | | | |
|--------------------------|---------------------------|--------------------------|-----------------------------|--------------------------|
| a. <i>kú.ʔi</i>
drink | b. <i>tsá.ʔu</i>
house | c. <i>á.ʔi</i>
person | d. <i>tú.ʔi</i>
tomorrow | e. <i>já.ʔi</i>
later |
|--------------------------|---------------------------|--------------------------|-----------------------------|--------------------------|
- (10) ALTERNATING GLOTTALIZED ROOTS WITH AN INFLECTIONAL SUFFIX
- | | | | | |
|------------------------------------|-------------------------------------|------------------------------------|---------------------------------------|------------------------------------|
| a. <i>kú.ʔi -ji</i>
drink -PRCL | b. <i>tsá.ʔu -mbi</i>
house -NEG | c. <i>á.ʔi -mbi</i>
person -NEG | d. <i>tú.ʔi -mbi</i>
tomorrow -NEG | e. <i>já.ʔi -mbi</i>
later -NEG |
|------------------------------------|-------------------------------------|------------------------------------|---------------------------------------|------------------------------------|
- (11) ALTERNATING GLOTTALIZED ROOTS WITH A DERIVATIONAL SUFFIX
- | | | | | |
|--|--|---|--|--|
| a. <i>kúíʔ. -khû</i>
drink -SH.DLM
“chucula” | b. <i>tsáu -ʔ.pa⁵</i>
house -N
“nest” | c. <i>áiʔ. -vu</i>
person -?
“body” | d. <i>túíʔ. -ve</i>
tomorrow -ACC2
“overmorrow” ⁶ | e. <i>jáiʔ. -ngae</i>
later -MANN
“eventually” |
|--|--|---|--|--|
- (12) ALTERNATING GLOTTALIZED ROOTS WITH THE INNER -*ÑA* CAUS
- | | |
|------------------------------------|-------------------------------------|
| a. <i>kúíʔ. -ñā</i>
drink -CAUS | b. <i>tsáuʔ. -ñā</i>
house -CAUS |
|------------------------------------|-------------------------------------|

3.2 Inner suffixes

The inner suffixes expone the categories of voice, aspect, and associated motion. There are three voice suffixes: the causative -*ñā*/-*an*/-*en* CAUS, the reciprocal -*khu*⁰ RCPR, and the passive -*ye*⁰ PASS. The suffix which attaches the closest to the root is the causative. The causative has three phonologically-conditioned allomorphs: -*ñā* CAUS attaches to monosyllabic roots (13a); -*an* CAUS attaches to polysyllabic roots which end in *e*, *i*, or *û* (13b-d); -*en* CAUS attaches to polysyllabic roots which end in *a* or *u* (13e-f). Root vowel alternations seen in the surface forms of (13b,d) are due to a regular phonological process aimed at creating legal diphthongs. For more on A'ingae diphthongs, see Dąbkowski (subm.).

- (13) ALLOMORPHS OF -*ÑA*/-*AN*/-*EN* CAUS
- | | | | | | |
|--|--|---|--|---|--|
| a. <i>phí.ñā</i>
<i>phí. -ñā</i>
sit -CAUS | b. <i>á.thian</i>
<i>á.the -an</i>
see -CAUS | c. <i>ká.tian</i>
<i>ká.ti -an</i>
cast -CAUS | d. <i>áʔ.jian</i>
<i>áʔ.jû -an</i>
vomit -CAUS | e. <i>pá.nzaen</i>
<i>pá.nza -en</i>
hunt -CAUS | f. <i>bú.thuen</i>
<i>bú.thu -en</i>
run -CAUS |
|--|--|---|--|---|--|

The causative suffix is recessive; it does not have any effect on stress (regardless of which allomorph is chosen): If the causative attaches to a stressless root, stress is assigned to the penultimate syllable by default (14). Lexically-listed stress and glottalization are preserved if present (15).

- (14) STRESSLESS ROOTS WITH -*ÑA*/-*AN*/-*EN* CAUS
- | | | | |
|--|---|--|---|
| a. / <i>phí. -ñā</i> /
[<i>phí. -ñā</i>]
sit -CAUS | b. / <i>pa.nza -en</i> /
[<i>pá.nza -en</i>]
hunt -CAUS | c. / <i>a.ta.pa -en</i> /
[<i>a.tá.pa -en</i>]
breed -CAUS | d. / <i>u.ti.shi -an</i> /
[<i>u.tí.shi -an</i>]
wash -CAUS |
|--|---|--|---|
- (15) STRESSED AND GLOTTALIZED ROOTS WITH -*ÑA*/-*AN*/-*EN* CAUS
- | | | | |
|--|---|---|---|
| a. / <i>á.fa -en</i> /
[<i>á.fa -en</i>]
speak -CAUS | b. / <i>kú.nda.se -an</i> /
[<i>kú.nda.si -an</i>]
tell -CAUS | c. / <i>séʔ.je -an</i> /
[<i>séʔ.ji -an</i>]
cure -CAUS | d. / <i>á.kheʔ.pa -en</i> /
[<i>á.kheʔ.pa -en</i>]
forget -CAUS |
|--|---|---|---|

⁵ The glottal stop in the surface form of (11b) comes from the preglottalized nominalizer -*ʔpa* N; the glottalization of the root is deleted. For analogous behavior in the domain of verbal morphology, see preglottalized inner dominant suffixes (26).

⁶ “the day after tomorrow”

The causative is followed by the reciprocal $-khu^{\emptyset}$ RCPR and the passive $-ye^{\emptyset}$ PASS. These two suffixes are dominant, which means that they delete input stress. Dominance is notated with the superscripted empty set ($^{\emptyset}$). When a dominant suffix attaches to a stressless root, stress deletion triggered by a dominant suffix is vacuous; the output surfaces with the expected default penultimate stress (16-17a). When $-khu^{\emptyset}$ RCPR or $-ye^{\emptyset}$ PASS attaches to a stressed root, the underlying stress is deleted, feeding penultimate stress assignment (16-17b). Finally, when $-khu^{\emptyset}$ RCPR or $-ye^{\emptyset}$ PASS attaches to a glottalized root, both stress and glottalization are deleted, again feeding penultimate stress assignment (16-17c-d). The same pattern of deletion of stress and glottalization followed by penultimate stress assignment is seen across the causative $-an$ CAUS (18a-b) and with multiple dominant suffixes (18c-d).

(16) VARIOUS ROOTS WITH $-khu^{\emptyset}$ RCPR

- | | | | |
|--|---|---|--|
| a. / <i>atapa</i> - khu^{\emptyset} /
[<i>atapá</i> - khu]
breed -RCPR | b. / <i>áfase</i> - khu^{\emptyset} /
[<i>afasé</i> - khu]
offend -RCPR | c. / <i>í?na</i> - khu^{\emptyset} /
[<i>iná</i> - khu]
cry -RCPR | d. / <i>ákhe?pa</i> - khu^{\emptyset} /
[<i>akhepá</i> - khu]
forget -RCPR |
|--|---|---|--|

(17) VARIOUS ROOTS WITH $-ye^{\emptyset}$ PASS

- | | | | |
|--|---|--|--|
| a. / <i>upathú</i> - ye^{\emptyset} /
[<i>upathú</i> - ye]
cut -PASS | b. / <i>áfase</i> - ye^{\emptyset} /
[<i>afasé</i> - ye]
offend -PASS | c. / <i>sé?je</i> - ye^{\emptyset} /
[<i>sejé</i> - ye]
cure -PASS | d. / <i>ákhe?pa</i> - ye^{\emptyset} /
[<i>akhepá</i> - ye]
forget -PASS |
|--|---|--|--|

(18) STRESSED AND GLOTTALIZED ROOTS WITH COMBINATIONS OF $-AN/-EN$ CAUS, $-khu^{\emptyset}$ RCPR, AND $-ye^{\emptyset}$ PASS

- | | | | |
|---|--|---|---|
| a. / <i>áfase</i> - an - ye^{\emptyset} /
[<i>afasi</i> - <i>án</i> - <i>ñe</i>]
offend -CAUS -PASS | b. / <i>sé?je</i> - an - ye^{\emptyset} /
[<i>seji</i> - <i>án</i> - <i>ñe</i>]
cure -CAUS -PASS | c. / <i>áfá</i> - khu^{\emptyset} - ye^{\emptyset} /
[<i>afa</i> - <i>khu</i> - ye]
speak -RCPR -PASS | d. / <i>ákhe?pa</i> - en - khu^{\emptyset} - ye^{\emptyset} /
[<i>akhepa</i> - en - <i>khu</i> - ye]
forget -CAUS -RCPR -PASS |
|---|--|---|---|

The voice suffixes are followed by aspectual suffixes. There are four aspectual suffixes: the preculminative $-ji$ PRCL, the paucal $-kha^{\emptyset}$ PAUC, the imperfective $-?je^{\emptyset}$ IPFV, and the semelfactive $-?ñakha^{\emptyset}$ SMFC. When the preculminative $-ji$ PRCL attaches to a stressless base, default penultimate stress is assigned. Note that a base may be stressless because there is no stress (or glottalization) in the input (19a-c) or because input stress (and glottalization) have been deleted by a preceding dominant suffix (19d-e). If the underlying stress (and glottalization) have not been previously deleted, forms with $-ji$ PRCL retain them in the output (20). Thus, the preculminative $-ji$ PRCL is a recessive suffix.

(19) STRESSLESS BASES WITH $-ji$ PRCL

- | | | | | |
|---|--|---|--|---|
| a. / <i>panza</i> - ji /
[<i>panzá</i> - ji]
hunt -PRCL | b. / <i>atapa</i> - ji /
[<i>atapá</i> - ji]
breed -PRCL | c. / <i>phi</i> - <i>ña</i> - ji /
[<i>phi</i> - <i>ñá</i> - jin]
sit -CAUS -PRCL | d. / <i>káti</i> - ye^{\emptyset} - ji /
[<i>kati</i> - <i>yé</i> - ji]
cast -PASS -PRCL | e. / <i>sé?je</i> - ye^{\emptyset} - ji /
[<i>seje</i> - <i>yé</i> - ji]
cure -PASS -PRCL |
|---|--|---|--|---|

(20) STRESSED AND GLOTTALIZED BASES WITH $-ji$ PRCL

- | | | | | |
|---|---|---|---|--|
| a. / <i>káti</i> - ji /
[<i>káti</i> - ji]
cast -PRCL | b. / <i>áfase</i> - ji /
[<i>áfase</i> - ji]
offend -PRCL | c. / <i>sé?je</i> - ji /
[<i>sé?je</i> - ji]
cure -PRCL | d. / <i>ákhe?pa</i> - ji /
[<i>ákhe?pa</i> - ji]
forget -PRCL | e. / <i>ákhe?pa</i> - en - ji /
[<i>ákhe?pa</i> - en - jin]
forget -CAUS -PRCL |
|---|---|---|---|--|

The paucal $-kha^{\emptyset}$ PAUC is dominant, so it deletes preceding stress and glottalization. The output surfaces with the default penultimate stress, regardless of whether the base is a stressless root (21a), a stressed root (21b), a glottalized root (21c-d), contains a recessive suffix (21e), or another dominant suffix (21f).

(21) VARIOUS BASES WITH $-kha^{\emptyset}$ PAUC

- | | | |
|--|--|---|
| a. / <i>atapa</i> - kha^{\emptyset} /
[<i>atapá</i> - kha]
breed -PAUC | b. / <i>áfase</i> - kha^{\emptyset} /
[<i>afasé</i> - kha]
offend -PAUC | c. / <i>sé?je</i> - kha^{\emptyset} /
[<i>sejé</i> - kha]
cure -PAUC |
| d. / <i>ákhe?pa</i> - kha^{\emptyset} /
[<i>akhepá</i> - kha]
forget -PAUC | e. / <i>ákhe?pa</i> - en - kha^{\emptyset} /
[<i>akhepá</i> - en - kha]
forget -CAUS -PAUC | f. / <i>ákhe?pa</i> - ye^{\emptyset} - kha^{\emptyset} /
[<i>akhepa</i> - <i>yé</i> - kha]
forget -PASS -PAUC |

The aspectual suffixes are followed by associated motion suffixes: the venitive $-ʔngi^{\emptyset}$ VEN and the andative $-ʔnga^{\emptyset}$ AND. The aspectual suffixes $-ʔje^{\emptyset}$ IPFV and $-ʔñakha^{\emptyset}$ SMFC and the associated motion suffixes $-ʔngi^{\emptyset}$ VEN and $-ʔnga^{\emptyset}$ AND begin with glottal stops (i. e. they are preglottalized). The preglottalized suffixes trigger special stress assignment: If the base to which they attach ends with a light syllable (a monophthong), stress falls two syllables to the left of the preglottalized suffix (22-25a-b). If the base ends with a heavy syllable (a diphthong), stress falls on the syllable which immediately precedes the preglottalized suffix (22-25c). This shows that in the presence of glottalization, stress assignment is weight-sensitive. Specifically, stress falls on the syllable which contains the second mora to the left of the glottal stop.

WEIGHT-SENSITIVE STRESS ASSIGNMENT WITH PREGLOTTALIZED SUFFIXES

		<i>fetha</i> ‘open’	<i>fúite</i> ‘help’	<i>fùndúi</i> ‘sweep’
(22)	$-ʔje^{\emptyset}$ IPFV	a. <i>féth-a-ʔje</i>	b. <i>fúite-ʔje</i>	c. <i>fùndúi-ʔje</i>
(23)	$-ʔñakha^{\emptyset}$ SMFC	a. <i>féth-a-ʔñakha</i>	b. <i>fúite-ʔñakha</i>	c. <i>fùndúi-ʔñakha</i>
(24)	$-ʔngi^{\emptyset}$ VEN	a. <i>féth-a-ʔngi</i>	b. <i>fúite-ʔngi</i>	c. <i>fùndúi-ʔngi</i>
(25)	$-ʔnga^{\emptyset}$ AND	a. <i>féth-a-ʔnga</i>	b. <i>fúite-ʔnga</i>	c. <i>fùndúi-ʔnga</i>

The preglottalized suffixes are dominant, which means that they delete input stress and glottalization. In the output, only the glottal stop introduced by the preglottalized suffix is retained. Stress is assigned to the syllable which contains the second mora to the left of that glottal stop, regardless of whether the base is a stressless root (26a), a stressed root (26b), a glottalized root (26c-d), contains a recessive suffix (26e), or another dominant suffix (26f).

(26) VARIOUS BASES WITH $-ʔje^{\emptyset}$ IPFV, $-ʔñakha^{\emptyset}$ SMFC, $-ʔngi^{\emptyset}$ VEN, OR $-ʔnga^{\emptyset}$ AND					
a.	/ <i>atapa</i> - $ʔje^{\emptyset}$ / [<i>atápa</i> - $ʔje$] breed -IPFV	b.	/ <i>áfase</i> - $ʔñakha^{\emptyset}$ / [<i>afáse</i> - $ʔñakha$] offend -SMFC	c.	/ <i>séʔje</i> - $ʔngi^{\emptyset}$ / [<i>séje</i> - $ʔngi$] cure -VEN
d.	/ <i>ákheʔpa</i> - $ʔnga^{\emptyset}$ / [<i>akhépa</i> - $ʔnga$] forget -AND	e.	/ <i>ákheʔpa</i> - <i>en</i> - $ʔje^{\emptyset}$ / [<i>akhépá</i> - <i>en</i> - $ʔjen$] forget -CAUS -IPFV	f.	/ <i>ákheʔpa</i> - <i>ye</i> - $ʔñakha^{\emptyset}$ / [<i>akhépá</i> - <i>ye</i> - $ʔñakha$] forget -PASS -SMFC

The imperfective suffix $-ʔje^{\emptyset}$ IPFV may be followed by an associated motion suffix $-ʔngi^{\emptyset}$ VEN or $-ʔnga^{\emptyset}$ AND. In this configuration, the associated motion suffix loses its preglottalization and stress falls on the syllable which contains the second mora before the imperfective $-ʔje^{\emptyset}$ IPFV (27). For more examples with $-ʔje^{\emptyset}$ IPFV, $-ʔñakha^{\emptyset}$ SMFC, $-ʔngi^{\emptyset}$ VEN, and $-ʔnga^{\emptyset}$ AND, see (125-130) in the Appendix. A morphological template of the A'ingae verb listing all of the suffixes, their domain, and their dominance status is given in Table 3 (Section 4.2).

(27) VARIOUS ROOTS WITH $-ʔje^{\emptyset}$ IPFV AND $-ʔngi^{\emptyset}$ VEN OR $-ʔnga^{\emptyset}$ AND			
a.	/ <i>atapa</i> - $ʔje^{\emptyset}$ - $ʔngi^{\emptyset}$ / [<i>atápa</i> - $ʔje$ - <i>ngi</i>] breed -IPFV -VEN	b.	/ <i>áfase</i> - $ʔje^{\emptyset}$ - $ʔnga^{\emptyset}$ / [<i>afáse</i> - $ʔje$ - <i>nga</i>] offend -IPFV -AND
c.	/ <i>séʔje</i> - $ʔje^{\emptyset}$ - $ʔngi^{\emptyset}$ / [<i>séje</i> - $ʔje$ - <i>ngi</i>] cure -IPFV -VEN	d.	/ <i>ákheʔpa</i> - $ʔje^{\emptyset}$ - $ʔnga^{\emptyset}$ / [<i>akhépa</i> - $ʔje$ - <i>nga</i>] forget -IPFV -AND

3.3 Outer suffixes

The outer suffixes (and clitics) expone proposition- and clause-level categories. Proposition-level categories include subject number ($-ʔfa$ PLS), reality status ($-ya$ IRR), polarity ($-mbi$ NEG), and finiteness ($-ye$ INF). Clause-level categories include clause type (subordinate: $-ʔta$ IF.SS, $-ʔja$ IF2.SS, $-ʔni$ IF.DS, $-ʔma$ FRST, $-saʔne$ APPR, $-ni$ LOC; cosubordinate: $-pa$ SS, $-si$ DS; and matrix: $-ja$ IMP, $-kha^{\emptyset}$ IMP2, $-ʔse$ IMP3, $-jama^{\emptyset}$ PRHB, $-ʔya$ VER), information

structure (*-ta* NEW, *-ja* CNTR), evidentiality (*=te* RPRT), polar questions (*=ti* YNQ), and subject person agreement (*=ngi* 1, *=ki* 2, *=tsû* 3).

If stress has not been fixed within the inner domain (either due to the presence of lexical stress on the verb root or assigned because of a preglottalized suffix), and there is at least one outer recessive suffix, stress is assigned to the last syllable of the inner domain. The inner domain is delimited with square brackets []. This stress might be confused for the default penultimate stress if there is only one monosyllabic outer suffix (28-29), but it is not penultimate if the outer suffix is polysyllabic (30a) or if there are multiple outer suffixes (30b-f). Crucially, unlike the stress assignment in the inner domain, this stress assignment is completely insensitive to the presence or absence of preglottalization on the outer suffix.

(28) STRESSLESS BASES WITH PLAIN OUTER SUFFIXES

- | | | |
|---|--|--|
| a. / [<i>atapa</i>] - <i>ja</i> /
[<i>atapá</i> - <i>ja</i>]
breed -IMP | b. / [<i>phi</i> - <i>ña</i>] - <i>si</i> /
[<i>phi</i> - <i>ñá</i> - <i>si</i>]
sit -CAUS -DS | c. / [<i>afe</i> - <i>ji</i>] = <i>ngi</i> /
[<i>afe</i> - <i>jí</i> = <i>ngi</i>]
give -PRCL =1 |
|---|--|--|

(29) STRESSLESS BASES WITH PREGLOTTALIZED OUTER SUFFIXES

- | | | |
|---|--|--|
| a. / [<i>atapa</i>] - <i>ʔfa</i> /
[<i>atapá</i> - <i>ʔfa</i>]
breed -PLS | b. / [<i>phi</i> - <i>ña</i>] - <i>ʔse</i> /
[<i>phi</i> - <i>ñá</i> - <i>ʔse</i>]
sit -CAUS -IMP3 | c. / [<i>afe</i> - <i>ji</i>] - <i>ʔya</i> /
[<i>afe</i> - <i>jí</i> - <i>ʔya</i>]
give -PRCL -VER |
|---|--|--|

(30) STRESSLESS BASES WITH PLAIN AND PREGLOTTALIZED OUTER SUFFIXES

- | | | |
|---|--|--|
| a. / [<i>atapa</i>] - <i>saʔne</i> /
[<i>atapá</i> - <i>saʔne</i>]
breed -APPR | b. / [<i>phi</i> - <i>ña</i>] - <i>ya</i> = <i>tsû</i> /
[<i>phi</i> - <i>ñá</i> - <i>ña</i> = <i>tsû</i>]
sit -CAUS -IRR =3 | c. / [<i>afe</i> - <i>ji</i>] - <i>mbi</i> - <i>ʔma</i> /
[<i>afe</i> - <i>jí</i> - <i>mbi</i> - <i>ʔma</i>]
give -PRCL -NEG -FRST |
| d. / [<i>atapa</i>] - <i>ʔni</i> - <i>ta</i> /
[<i>atapá</i> - <i>ʔni</i> - <i>nda</i>]
breed -IF.DS -NEW | e. / [<i>phi</i> - <i>ña</i>] - <i>ʔfa</i> - <i>ʔta</i> /
[<i>phi</i> - <i>ñá</i> - <i>ʔfa</i> - <i>ʔta</i>]
sit -CAUS -PLS -IF.SS | f. / [<i>afe</i> - <i>ji</i>] - <i>ʔfa</i> - <i>ya</i> - <i>mbi</i> /
[<i>afe</i> - <i>jí</i> - <i>ʔfa</i> - <i>ya</i> - <i>mbi</i>]
give -PRCL -PLS -IRR -NEG |

Stress is assigned to the last syllable of the inner domain when the outer suffixes immediately follow the root (28-30a) as well as when inner suffixes intervene between the root and the outer suffixes (28-30b-c). Crucially, stress is assigned to the last syllable of the inner domain when the outer suffix is plain (i. e. non-preglottalized) (28), preglottalized (29), internally glottalized (30a), and with any combination of plain and (pre)glottalized suffixes (30b-f). To recapitulate, stress assignment in the outer domain is insensitive to glottalization.

Preexisting inner domain stress is retained. This is to say, if the verbal root has lexically specified stress (and glottalization) (31), or if stress has been assigned due to the presence of a preglottalized suffix within the inner domain (32), that stress (and glottalization) are preserved; stress is not reassigned to the last syllable of the inner domain.

(31) STRESSED ROOTS WITH OUTER SUFFIXES

- | | | |
|---|---|---|
| a. / [<i>káti</i>] - <i>ʔya</i> /
[<i>káti</i> - <i>ʔya</i>]
cast -VER | b. / [<i>séʔje</i> - <i>an</i>] - <i>mbi</i> /
[<i>séʔji</i> - <i>an</i> - <i>mbi</i>]
cure -CAUS -NEG | c. / [<i>ákheʔpa</i> - <i>ji</i>] - <i>ye</i> /
[<i>ákheʔpa</i> - <i>ji</i> - <i>ye</i>]
forget -PRCL -INF |
| d. / [<i>káti</i>] - <i>ya</i> - <i>mbi</i> /
[<i>káti</i> - <i>ya</i> - <i>mbi</i>]
cast -IRR -NEG | e. / [<i>séʔje</i> - <i>ji</i>] - <i>ʔfa</i> - <i>ye</i> /
[<i>séʔje</i> - <i>ji</i> - <i>ʔfa</i> - <i>ye</i>]
cure -PRCL -PLS -INF | f. / [<i>ákheʔpa</i> - <i>en</i>] - <i>ya</i> - <i>ʔya</i> /
[<i>ákheʔpa</i> - <i>en</i> - <i>ña</i> - <i>ʔña</i>]
forget -CAUS -IRR -VER |

(32) INNER PREGLOTTALIZED SUFFIXES WITH OUTER SUFFIXES

- | | | |
|---|--|---|
| a. / [<i>atapa</i> - <i>ʔngi</i> ⁰] - <i>ʔya</i> /
[<i>atápa</i> - <i>ʔngi</i> - <i>ʔya</i>]
breed -VEN -VER | b. / [<i>séʔje</i> - <i>ʔñakha</i> ⁰] - <i>mbi</i> /
[<i>seje</i> - <i>ʔñakha</i> - <i>mbi</i>]
cure -SMFC -NEG | c. / [<i>ákheʔpa</i> - <i>ʔnga</i> ⁰] - <i>ye</i> /
[<i>akhépa</i> - <i>ʔnga</i> - <i>ye</i>]
forget -AND -INF |
|---|--|---|

- d. / [*áfase* -ʔje⁰] -ya -mbi / e. / [*séʔje* -khu⁰ -ʔje⁰] -ʔfa / f. / [*ákheʔpa* -en -ʔje⁰] =tsû /
 [*afáse* -ʔje -ya -mbi] [*seje* -khu -ʔje -ʔfa] [*akhepá* -en -ʔjen =tsû]
 offend -IPFV -IRR -NEG cast -RCPR -IPFV -PLS forget -CAUS -IPFV =3

However, if stress (and glottalization) were deleted by a plain (i. e. non-preglottalized) dominant suffix within the inner domain, stress is assigned to the last syllable of the inner domain (33).

(33) INNER PLAIN DOMINANT SUFFIXES WITH OUTER SUFFIXES

- a. / [*káti* -an -ye⁰] =ki / b. / [*séʔje* -khu⁰ -ji] -ʔfa / c. / [*ákheʔpa* -ye⁰] -ye /
 [*kati* -an -ñé =ki] [*seje* -khu -jí -ʔfa] [*akhepa* -yé -ye]
 cast -CAUS -PASS =2 cure -RCPR -PRCL -PLS forget -PASS -INF
- d. / [*káti* -khu⁰] -pa =ti / e. / [*séʔje* -khu⁰] -ʔfa -ya / f. / [*ákheʔpa* -ye⁰ -ji] -ʔfa -saʔne /
 [*kati* -khú -pa =ti] [*seje* -khú -ʔfa -ya] [*akhepa* -ye -jí -ʔfa -saʔne]
 cast -RCPR -SS =YNQ cure -RCPR -PLS -IRR forget -PASS -PRCL -PLS -APPR

Lastly, there are two dominant clause-level suffixes in the outer domain: the prohibitive -jama⁰ PRHB and the imperative 2 -kha⁰ IMP2. The outer dominant suffixes delete preexisting stress and reassign it to the syllable which immediately precedes them (34). Crucially, the stress deletion triggered by these two suffixes does not affect glottalization. Thus, despite the stress shift, glottal stops introduced by glottalized roots (35, 37), inner preglottalized suffixes (36, 38), and outer preglottalized suffixes (37-38) are retained. Observe that stress is reassigned to the syllable which immediately precedes the suffix and need not fall within the inner domain (37-38). For more examples with -jama⁰ PRHB and -kha⁰ IMP2, see (131-140) in the Appendix.

(34) STRESSLESS AND STRESSED BASES WITH -JAMA⁰ PRHB OR -KHA⁰ IMP2

- a. / [*atapa*] -jama⁰ / b. / [*áfase*] -kha⁰ / c. / [*áfase* -an] -jama⁰ /
 [*atapá* -jama] [*afasé* -kha] [*afasi* -án -jama]
 breed -PRHB offend -IMP2 offend -CAUS -PRHB

(35) GLOTTALIZED ROOTS WITH -JAMA⁰ PRHB OR -KHA⁰ IMP2

- a. / [*séʔje*] -kha⁰ / b. / [*ákheʔpa*] -jama⁰ / c. / [*ákheʔpa* -en] -kha⁰ /
 [*seʔje* -kha] [*akheʔpá* -jama] [*akheʔpá* -en -kha]
 cure -IMP2 forget -PRHB forget -CAUS -IMP2

(36) INNER PREGLOTTALIZED SUFFIXES WITH -JAMA⁰ PRHB OR -KHA⁰ IMP2

- a. / [*áfase* -ʔje⁰] -jama⁰ / b. / [*séʔje* -ʔje⁰] -kha⁰ / c. / [*ákheʔpa* -ʔje⁰] -jama⁰ /
 [*afase* -ʔjé -jama] [*seje* -ʔjé -kha] [*akhepa* -ʔjé -jama]
 offend -IPFV -PRHB cure -IPFV -IMP2 forget -IPFV -PRHB

(37) (GLOTTALIZED ROOTS AND) OUTER PREGLOTTALIZED SUFFIXES WITH -JAMA⁰ PRHB OR -KHA⁰ IMP2

- a. / [*áfase*] -ʔfa -kha⁰ / b. / [*séʔje*] -ʔfa -jama⁰ / c. / [*ákheʔpa*] -ʔfa -kha⁰ /
 [*afase* -ʔfá -kha] [*seʔje* -ʔfá -jama] [*akheʔpa* -ʔfá -kha]
 offend -PLS -IMP2 cure -PLS -PRHB forget -PLS -IMP2

(38) INNER AND OUTER PREGLOTTALIZED SUFFIXES WITH -JAMA⁰ PRHB OR -KHA⁰ IMP2

- a. / [*áfase* -ʔje⁰] -ʔfa -jama⁰ / b. / [*séʔje* -ʔje⁰] -ʔfa -kha⁰ / c. / [*ákheʔpa* -ʔje⁰] -ʔfa -jama⁰ /
 [*afase* -ʔje -ʔfá -jama] [*seje* -ʔje -ʔfá -kha] [*akhepa* -ʔje -ʔfá -jama]
 offend -IPFV -PLS -PRHB cure -IPFV -PLS -IMP2 forget -IPFV -PLS -PRHB

As a final comment, secondary stress in A'ingae falls on every other syllable counting from the primary stress (39a). Secondary stress is marked with the grave accent (`) and **boldface**. If there is an odd number of posttonic syllables, stress clash is avoided in favor of a disyllabic immediately posttonic lapse (39b). If primary stress is later in the word, there is alternating secondary stress to the left as well (39c). Since secondary stress is entirely predictable and does not interact with the factors responsible for primary stress assignment, it will not be transcribed in the rest of the paper.

- (39) SECONDARY STRESS
- | | | |
|--|--|--|
| a. (<i>áfa</i>) (- <i>yà-mbi</i>) (=ti=ki)
speak -IRR-NEG =YNQ=2 | b. (<i>áfa-ʔ</i>) <i>fa</i> (- <i>yà-mbi</i>)
speak-PLS -IRR-NEG | c. (<i>àkheʔ</i>) (<i>pà-ʔje</i>) (-ʔ <i>fá-ja</i>) <i>ma</i>
forget -IPFV -PLS-PRHB |
|--|--|--|

3.4 Central generalizations

From the data presented above emerge two central generalizations which need to be captured by any successful account of A'ingae glottalization. In the following section, I argue that the architecture of Cophonologies by Phase (Sande, Jenks, and Inkelas, 2020) rises to the task. A summary table of all the A'ingae suffixes, their morphophonological domain, and their dominance status is given in Table 3 (Section 4.2).

First, whether glottalization triggers stress assignment correlates with whether stress-deleting suffixes also delete glottalization. Within the inner domain, glottalization has an effect on stress, i. e. stress is assigned to the syllable containing the second mora to the left of the glottal stop (7-8d-f, 22-27), and stress-deleting suffixes introduced within the inner domain also delete glottalization (16-18, 21). In the outer domain, glottalization has no effect on stress (28-33)—and neither does stress deletion have any effect on glottalization (34-38). This generalization is restated in (40).

- (40) STRESS ASSIGNMENT/DELETION × GLOTTALIZATION INTERACTION
For a given morphophonological domain, glottalization introduced in that domain interacts with stress if and only if stress-deletion interacts with glottalization.

Second, upon controlling for preglottalization and the morphophonological domain, variation among the phonological processes triggered by particular suffixes reduces to the parameter of dominance (i. e. whether a suffix is stress-preserving or stress-deleting). This is to say, despite the fact the inner plain dominant suffixes, the inner preglottalized dominant suffixes, and the outer dominant suffixes all have different effects on stress and glottalization, only one property is needed to fully characterize their behavior: they delete stress. The differences in their effects on stress assignment (or lack thereof) and glottalization follow from independent factors (i. e. preglottalization and their morphophonological domain). This generalization is restated in (41).

- (41) DOMINANCE AS THE ONLY LEXICAL PARAMETER
Upon controlling for preglottalization and the morphophonological domain, dominance is the only parameter needed to account for differences in the phonological processes triggered by particular suffixes.

If stress (and glottalization) are deleted by a plain dominant suffix introduced in the inner domain, the output form is stressless. Later, stress is assigned in accordance with a generalization independently attested in that domain, i. e. to the right edge of the inner domain if there are outer suffixes (33), or to the penultimate syllable of the word if there are no outer suffixes (16-18, 21). If stress (and glottalization) are deleted by a preglottalized dominant suffix introduced in the inner domain, stress is reassigned in accordance with a generalization independently attested in that domain, i. e. to the syllable which contains the second mora to the left of the glottal stop (in this case, of the preglottalized dominant suffix) (26-27). If stress is deleted by a dominant suffix introduced in the outer domain, stress is reassigned in accordance with a generalization independently attested in that domain, i. e. to the immediate left of the outer domain suffix (34-38).

Thus, the only morpheme-specific property of dominant suffixes is that they delete stress. Whether glottalization also undergoes deletion and whether and where stress is reassigned after it is deleted depends on the phonological grammar of their domain and the presence or absence of preglottalization.

4 ANALYSIS

In this section, I analyze the A'ingae data in Cophonologies by Phase (henceforth CbP; Sande, 2017, 2019; Sande and Jenks, 2018; Sande, Jenks, and Inkelas, 2020), a generative model of the phonology-syntax interface.

Section 4.1 introduces the framework. Section 4.2 lays out the morphophonological structure of the A'ingae verb. Section 4.3 presents an analysis of the *inner* cophonology, which captures the phonological grammar of the A'ingae verbal roots and recessive suffixes in the inner morphological domain. Section 4.4 presents an analysis of the *dominant* cophonology and its interactions with the *inner* cophonology, which captures the phonological operations triggered by inner dominant suffixes, including the preglottalized ones. Section 4.5 presents an analysis of the *outer* cophonology and its interactions with the *dominant* cophonology, which captures the phonological grammar of the outer suffixes, both recessive and dominant.

4.1 Cophonologies by Phase

Cophonologies by Phase (Sande, 2017, 2019; Sande and Jenks, 2018; Sande, Jenks, and Inkelas, 2020) is a model of the phonology-syntax interface which combines *cophonologies*, or morpheme-specific phonological grammars (Anttila, 1997, 2002, 2009; Inkelas, 1998; Inkelas, Orgun, and Zoll, 1997; Orgun, 1996), with cyclic syntactic architecture (Abels, 2012; Bošković, 2014; Chomsky, 2001).

Following Distributed Morphology (Halle and Marantz, 1994), Cophonologies by Phase assumes that vocabulary items are mappings between morphosyntactic features and phonological features. Furthermore, CbP proposes an enriched representation of the phonological component: In addition to segmental content and prosodic subcategorization frame, vocabulary items may specify a subranking of constraints which partially overrides the language's default phonological grammar (Sande, Jenks, and Inkelas, 2020).⁷

Cophonologies by Phase proposes that phonological evaluation applies to morphological constituents, or phases. Thus, CbP departs from the assumptions of classic Cophonology Theory (Anttila, 1997; Inkelas, 1998; Inkelas, Orgun, and Zoll, 1997; Orgun, 1996), where every affix triggers a phonological cycle. The cophonologies of all the morphosyntactic features within a phase are compiled and added to the default phonology of the language (the *master* ranking; Anttila, 2002; Inkelas and Zoll, 2005, 2007), forming a cumulative ranking specific to that phase. Upon merging a phase head, spell-out is triggered and the phase is phonologically evaluated against that cumulative ranking. After spell-out, the phonology resets to the default (*master*) ranking. Thus, phonological rankings associated with morphosyntactic features scope at most over the phase in which they are introduced (Sande, Jenks, and Inkelas, 2020).

For example, the default (*master*) phonology of a toy language ranks the constraint A above B and B above C (42a). Phonological rankings are introduced with a fraktur font \mathfrak{R} . Asp, the head of the functional Aspectual Projection (AspP), ranks B above A (42b). The imperfective morphosyntactic feature IPFV ranks C above A (42c). The preculminative feature PRCL does not call for a deviation from the *master* ranking (42d).

(42) PHONOLOGICAL RANKINGS IN A TOY LANGUAGE

- a. *master* $\longleftrightarrow \{ \mathfrak{R}: A \gg B \gg C \}$
- b. Asp $\longleftrightarrow \{ \mathfrak{R}: B \gg A \}$
- c. IPFV $\longleftrightarrow \{ \mathfrak{R}: C \gg A \}$
- d. PRCL $\longleftrightarrow \{ \mathfrak{R}: \text{n/a} \}$

Following Bošković (2016), I assume that phase heads are spelled-out together with their complements. In the toy language, Asp is a phase head. Thus, it triggers the spell-out and phonological evaluation of AspP (43). F stands for a generic Feature head and FP for a Feature Projection. Domains of phonological evaluation are represented with arcs.

⁷ Constraint rankings potentially lead to paradoxes or unresolvable conflicts if different morphosyntactic features specify different cophonologies. For this reason, Sande, Jenks, and Inkelas (2020) adopt a weighted constraint grammar, with morpheme-specific weight adjustments, rather than rankings. Since this problem does not arise in the fragment of the A'ingae grammar I analyze, I adopt rankings for simplicity.

(43) CUMULATIVE RANKINGS WITH PHASE-BASED SPELL-OUT



The constraint ranking during the phonological evaluation of a phase depends on the features present in that phase. I assume that when the default *master* ranking and a feature-specific ranking are in conflict, the feature-specific ranking overrides the *master* ranking. Thus, in (43a), the phase head Asp reranks B above A. The preculminative feature PRCL does not alter the phonological ranking in any way. Thus, the phonological ranking at the spell-out of (43a) is B » A » C. In (43b), the phase head Asp ranks B above A and the imperfective feature IPFV reranks C above A. Thus, the phonological ranking at the spell-out of (43b) is { B, C } » A.⁸

4.2 The structure of a verb

Cophonologies by Phase allows for the association of different phonological rankings to phase heads as well as individual morphosyntactic features. As such, CbP naturally captures the stratal organization of A'ingae morphophonological domains, while allowing for morpheme-specific dominance effects. I propose that the phonological grammar of the inner morphophonological domain is modeled by associating lower phrase heads with an *inner* cophonology. The phonological grammar of the outer morphophonological domain is modeled by associating higher phase heads with an *outer* cophonology. Finally, the deletion of stress (and glottalization) triggered by dominant suffixes is modeled by associating individual dominant suffixes with a *dominant* cophonology.

Specifically, I propose that there are four phase heads along the verbal spine which may be spelled out during the derivation. The projections of those heads do not correlate in any obvious way to prosodic categories, such as a word or a phrase. The first two heads are the verbal categorizing head *v* and the aspectual head Asp. (Note that AspP hosts verbal deixis in addition to aspectual features.) The heads *v* and Asp are associated with the *inner* cophonology. The *v*P projection (the first phase) contains only the verbal root and optionally the causative suffix *-ñā/-an/-en* CAUS (for analyses of *v* as a phase head, see Chomsky, 2001; Embick, 2010). I treat the causative *-ñā/-an/-en* CAUS as a verbalizing head because it is the only suffix capable of deriving verbs from nouns (and precategorial roots) (44).

(44) VERBS DERIVED WITH *-ñā/-an/-en* CAUS

a. <i>tsáu?ñā</i>	b. <i>síñā</i>	c. <i>sápian</i>	d. <i>tsáu?paen</i>
<i>tsáu?</i> -ñā	<i>sín</i> -ñā	<i>sápe</i> -an	<i>tsáu?pa</i> -en
house -CAUS	black -CAUS	flat -CAUS	nest -CAUS
“build a house”	“blacken”	“smash”	“nestle”

The AspP projection constitutes the second phase—it contains all of the verbal inflectional morphology, including other voice suffixes, associated motion suffixes, and aspectual suffixes. The treatment of the aspectual projection as a phase is non-standard. However, aspect has been proposed to be a phase head in, for example, Nez Perce (Deal and Wolf, 2017) and Muskogee (Guekguezian, 2021). Furthermore, there is

⁸ In a ranked-constraint grammar, there may be more than one way to resolve two partial constraint rerankings. For example, given a *master* ranking A » B » C, the rerankings B » A and C » A could yield either B » C » A or C » B » A. The problem does not arise if one adopts a weighted-constraint model of the grammar instead, as in Sande, Jenks, and Inkelas (2020). Since partial ranking indeterminacy does not affect the analysis proposed in this paper, I adopt ranked constraints for simplicity. If desired, the analysis could be straightforwardly recast with weighted constraints.

clear evidence for AspP as a morphosyntactic constituent in the grammar of A'ingae: The suffixes within the AspP can attach only to morphological verbs (45a-b), while suffixes outside of the AspP (e. g. in TP) can also attach to nominal predicates (45c-d).

(45) ASPP SUFFIXES LICIT ON VERBS, NOT NOUNS

- | | | | |
|--|--|--|--|
| a. <i>panzá</i> -ji
hunt -PRCL
“about to hunt” | b. * <i>tsándie</i> -ji
man -PRCL
intended:
“about to be a man” | c. <i>panzá</i> -ʔfa
hunt -PLS
“(they) hunted” | d. <i>tsándie</i> -ʔfa
man -PLS
“(they) are men” |
|--|--|--|--|

The heads T and C are associated with the *outer* cophology. The TP projection constitutes the third phase—it contains morphology typically associated with the inflected predicate, including subject plurality, reality status, polarity, and finiteness. The treatment of T as a phase head is non-standard. However, it has been argued for—again—in, e. g., Nez Perce (Deal, 2016). Moreover, A'ingae TPs can undergo pied-piping (Dąbkowski, to appear), passing Abels's (2012, p. 73) diagnostic for phasehood. The CP projection (the last phase) contains morphology typically associated with full clauses, including clause type, information structure, evidentiality, interrogative force, mood, etc.

Diagnostics for distinguishing the TP-internal morphemes from CP-internal morphemes include (i) infinitival complements, (ii) infinitival matrix clauses, and (iii) nominalizations formed with the subordinating -ʔchu SBRD. First, CP morphology, such as the new topic suffix -ta NEW, may attach to a conditional antecedent CP (46a), but not an infinitival TP complement, for example of the verb *inʔjan* ‘want’ (46b).

(46) CP SUFFIXES LICIT IN CPs, NOT TPs

- | | |
|--|--|
| a. <i>panzá</i> -ʔni(-nda) <i>avujátshi</i> -ya
hunt-IF.DS-NEW happy-IRR
“If x hunts, y will be happy.” ⁹ | b. <i>inʔjan</i> =ngi <i>panzá</i> -ye(*-ta)
want=1 hunt-INF-NEW
“I want to hunt.” |
|--|--|

Second, A'ingae matrix clauses may be either TP or CP projections (Dąbkowski, to appear). The second-position clitics (xii-xiii in Table 3) may appear in finite (47a), but not infinitival matrix clauses (47b). Assuming that finite matrix clauses may project CP, but infinitival matrix clauses lack the CP layer, this shows that A'ingae second-position clitics are licensed only in matrix CPs.

(47) CP CLITICS LICIT IN FINITE, NOT INFINITIVAL, MATRIX CLAUSES

- | | |
|---|--|
| a. <i>ñá</i> (=ngi) <i>panzá</i> -ya
1SG=1 hunt-IRR
“I will hunt.” (distant/uncertain future) | b. <i>ñá</i> (*=ngi) <i>panzá</i> -ye
1SG=1 hunt-INF
“I will hunt.” (proximate/certain future) |
|---|--|

Third, the subordinating nominalizer -ʔchu SBRD takes TPs as its complements. Thus, it may co-occur with TP-internal (48a-b), but not CP-internal (48a-b), morphology.

(48) TP, NOT CP, SUFFIXES LICIT IN ʔCHU-NOMINALIZATIONS

- | | | | |
|--|---|--|---|
| a. <i>panzá</i> -ya -ʔchu
hunt -IRR -SBRD | b. <i>panzá</i> -ʔfa -ʔchu
hunt -PLS -SBRD | c. * <i>panzá</i> -ta -ʔchu
hunt -NEW -SBRD | d. * <i>panzá</i> -jama -ʔchu
hunt -PRHB -SBRD |
|--|---|--|---|

Across the four phases (*vP*, AspP, TP, CP), certain suffixes are stress-deleting—these are associated with the *dominant* cophology. There is no predictor of which suffixes are dominant. The mappings between phase heads and morphosyntactic features on one hand, and cophologies on the other, are summarized in (49). The complete morphological template of the A'ingae verb is given in Table 3. The verbal root is at the bottom; the closer a suffix is to the root, the lower it is in the template, mimicking the orientation of a syntactic tree.

⁹ For a discussion of conditional semantics, see Dąbkowski (2021b).

- (49) FEATURE-COPHONOLOGY MAPPINGS IN A'INGAE
- $v, \text{Asp} \leftrightarrow \{ \mathfrak{R}: \text{inner} \}$
 - $T, C \leftrightarrow \{ \mathfrak{R}: \text{outer} \}$
 - $\text{RCPR}, \text{IPFV}, \text{PRHB}, \dots \leftrightarrow \{ \mathfrak{R}: \text{dominant} \}$

$\text{CP} \leftrightarrow \{ \mathfrak{R}: \text{outer} \}$

- (xiii) SUBJECT PERSON: $=\text{ngi } 1, =\text{ki } 2, =\text{tsû } 3$
- (xii) SENTENCE-LEVEL: $=\text{te RPRT}, =\text{ti YNQ}$
- (xi) INFORMATION STRUCTURE: $=\text{ta NEW}, =\text{ja CNTR}$
- (x) CLAUSE TYPE
 - SUBORDINATE: $=\text{ta IF.SS}, =\text{ja IF2.SS}, =\text{ni IF.DS}, =\text{ma FRST},$
 $=\text{sa?ne APPR}, =\text{ni LOC}$
 - COSUBORDINATE: $=\text{pa SS}, =\text{si DS}$
 - MATRIX: $=\text{ja IMP}, =\text{kha}^\emptyset \text{ IMP2}, =\text{se IMP3}, =\text{jama}^\emptyset \text{ PRHB}, =\text{ya VER}$

$(\text{TP} \leftrightarrow \{ \mathfrak{R}: \text{outer} \})$

- (ix) FINITENESS: $=\text{ye INF}$
- (viii) POLARITY: $=\text{mbi NEG}$
- (vii) REALITY: $=\text{ya IRR}$
- (vi) SUBJECT NUMBER: $=\text{fa PLS}$

$(\text{AspP} \leftrightarrow \{ \mathfrak{R}: \text{inner} \})$

- (v) ASSOCIATED MOTION: $=\text{ngi}^\emptyset \text{ VEN}, =\text{nga}^\emptyset \text{ AND}$
- (iv) ASPECT: $=\text{je}^\emptyset \text{ IPFV}, =\text{ji PRCL}, =\text{kha}^\emptyset \text{ PAUC}, =\text{ñakha}^\emptyset \text{ SMFC}$
- (iii) PASSIVE: $=\text{ye}^\emptyset \text{ PASS}$
- (ii) RECIPROCAL: $=\text{khu}^\emptyset \text{ RCPR}$

$vP \leftrightarrow \{ \mathfrak{R}: \text{inner} \}$

- (i) CAUSATIVE: $=\text{ña/-an/-en CAUS}$
- (o) VERBAL ROOT: \checkmark

LEGEND
 $\emptyset \leftrightarrow \{ \mathfrak{R}: \text{dominant} \}$

Table 3: Morphophonological template of the A'ingae verb (building on Dąbkowski, 2021c).

I assume that vP and CP are always spelled out. AspP and TP undergo spell-out only when their content is not phonologically empty (*pruning* in Embick, 2015). In Table 3, this is represented by parenthesizing the AspP and TP phases. Thus, at maximum, one verb may undergo up to four phonological evaluations. This happens when each of the four phases introduces new segmental material (50a). At minimum, each verb undergoes two phonological evaluations. This happens even if the verb consists only of a bare root (50b).

- (50) a. AT MOST FOUR PHONOLOGICAL EVALUATIONS PER VERB
- $[[[[\text{kufi} \text{ -án }]_{vP} \text{ -khu} \text{ -?je} \text{ -ngi}]_{\text{AspP}} \text{ -?fa} \text{ -ya}]_{TP} \text{ -?ni} \text{ -nda}]_{CP}$
 play -CAUS -RCPR -IPFV -VEN -PLS -IRR -IF.DS -NEW
 “if_{IF.DS,NEW} (they_{PLS}) will_{IRR} come_{VEN} to be_{IPFV} making_{CAUS} each other_{RCPR} play”

b. AT LEAST TWO PHONOLOGICAL EVALUATIONS PER VERB

[[*kúʔfe*]_{vP}]_{CP}
 play
 “played”

I assume that morphologically complex verbs are created via head-movement. Thus, syntax and phonology must proceed cyclically: The verbal head of each phase undergoes phonological evaluation before further movement up the verbal spine. This marks a departure from the assumptions of Sande, Jenks, and Inkelas (2020), where head movement strictly precedes phonological evaluation.

4.3 The inner cophonology

In this section, I analyze the *inner* cophonology, which captures the phonological grammar of the A’ingae verbal roots and recessive suffixes in the inner morphological domain. The *inner* cophonology is active at the spell-out of *vP*, which contains the root and the causative suffix, as well as *AspP*, which contains other voice, aspectual, and associated motion morphology.

Recall from Section 3.1 that A’ingae verb roots can be divided into three broad classes: stressed, glottalized, and stressless. I propose that the underlying form of stressed roots contains metrical structure. Faithfulness to input metrical structure is modeled with MAXIMALITY(FOOT) (51).

(51) MAXIMALITY(FOOT), or: MAXf

For every metrical foot in the input, there is a corresponding metrical foot in the output.

MAXIMALITY(FOOT) ensures that underlying metrical structure is retained in the output (52). Metrical feet are delimited with parentheses (). In the tableaux, the first row states which phase is being spelled out and lists the cophonologies present during its phonological evaluation. Roots are first subject to spell-out in the *vP* phase associated with the *inner* cophonology, hence *vP*: *inner*. MAXIMALITY(FOOT) outranks all constraints which favor candidates deviating from input stress (e. g. ANTIMAXIMALITY(FOOT₁) (71) to be introduced in Section 4.4). In the tableaux below, these constraints are shown schematically with ellipsis (...). Finally, A’ingae footing is trochaic. Hence, the tableaux do not explicitly consider candidates with iambic feet.

<i>vP</i> : <i>inner</i>				<i>vP</i> : <i>inner</i>			
(52)	a.	(<i>áfa</i>)	MAXf » ...	b.	(<i>kúnda</i>) <i>se</i>	MAXf » ...	
	i.	<i>afa</i>	*		i. <i>kundase</i>	*	
	ii.	(<i>áfa</i>)	*		ii. (<i>kúnda</i>) <i>se</i>		*
	iii.	<i>a(fá)</i>	*		iii. <i>ku(ndáse)</i>	*	
		Speak			Tell		

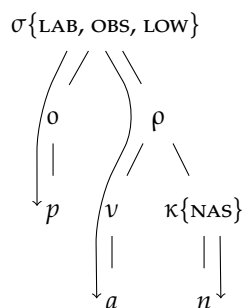
In glottalized roots, the position of glottalization is predictable. In disyllabic glottalized roots, glottalization surfaces in the rime of the first syllable. In trisyllabic glottalized roots, glottalization surfaces in the rime of the second syllable. Moreover, all glottalized roots have word-initial stress.

To model the A’ingae glottal stop data, I adopt Goldsmith’s (1990) notion of prosodic licensing. In Goldsmith’s original proposal, every segment needs to be licensed by a prosodic unit. In the toy example (53a), the syllable node licenses the features of the onset [*p*] (LAB, OBS) and the nucleus [*a*] (LOW). The coda node licenses the features of the coda [*n*] (NAS). Autosegments licensed by a given prosodic node are given in curly brackets { }. A licenser can license at most one occurrence of an autosegment. Thus, licensing can be represented as a non-branching path from a licenser to the licensed autosegment (Goldsmith, 1990, pp. 123–4).

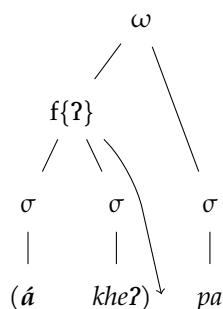
I adopt the notion of prosodic licensing and propose that in the inner morphophonological domain in A'ingae, the glottal stop [ʔ] is licensed by the metrical foot node (53b). The constraint which captures this licensing requirement is FOOT{ʔ} (54). FOOT{ʔ} captures the requirement that glottalization needs to appear within a metrical foot. Its exact position is determined through a ranking of different constraints.

(53) PROSODIC LICENSING

a. IN A TOY LANGUAGE



b. OF ʔ IN THE INNER DOMAIN OF A'INGAE



(54) FOOT{ʔ}, or: f{ʔ}

Glottal stops are licensed by metrical feet. Assign a violation mark for every glottal stop not licensed by a metrical foot.

Assuming that stress is an obligatory correlate of metrical structure in A'ingae, then if glottalization is licensed by metrical structure, it will always coocur with stress. Thus, FOOT{ʔ} captures the fact that all glottalized roots are stressed. Since stress and the position of glottalization are fully predictable in roots, I propose that neither need be underlyingly specified. As such, the underlying forms of glottalized roots will be represented simply as /root,ʔ/.

The position of glottalization and stress in glottalized roots is derived through the interaction of several constraints: MAXIMALITY(ʔ) (55) ranks above DEPENDENCE(FOOT) (56), which ensures that in order to comply with FOOT{ʔ}, supplying feet in the output is preferred to deleting the glottal stop. ALIGN(ʔ-R, FOOT-R) (57) favors the right-alignment of metrical feet with glottal stops. However, ALIGN(ʔ-R, FOOT-R) is outranked by NONFINALITY(ʔ) (58), which ensures that glottal stops never appear word-finally.

(55) MAXIMALITY(ʔ), or: MAXʔ

For every glottal stop in the input, there is a corresponding glottal stop in the output.

(56) DEPENDENCE(FOOT), or: DEFʔ

For every metrical foot in the output, there is a metrical foot in the input.

(57) ALIGN(ʔ-R, FOOT-R), or: ALʔ

Every glottal stop is right-aligned with a metrical foot.

(58) NONFINALITY(ʔ), or: NFʔ

A glottal stop is not final in a prosodic word.

This ranking correctly derives the position of stress and glottalization in disyllabic (59) and trisyllabic (60) glottalized roots. In the tableaux, licensing is represented with an underbrace which spans the licenser and encloses the licensee. Thus, when glottalization is licensed by a metrical foot, the underbrace spans the entire foot which contains glottalization.

		<i>vP: inner</i>				
(59)	<i>seje,ʔ</i>	<i>f{ʔ},</i>	<i>MAxʔ,</i>	<i>NFʔ »</i>	<i>DEP_f,</i>	<i>ALʔ</i>
i.	<i>seje</i>		*			
ii.	<i>seje,ʔ</i>	*				*
iii.	<i>(séʔje)</i>				*	*
iv.	<i>(séjeʔ)</i>			*	*	
cure						

		<i>vP: inner</i>				
(60)	<i>akhepa,ʔ</i>	<i>f{ʔ},</i>	<i>MAxʔ,</i>	<i>NFʔ »</i>	<i>DEP_f,</i>	<i>ALʔ</i>
i.	<i>akhepa</i>		*			
ii.	<i>akhepa,ʔ</i>	*				*
iii.	<i>(áʔkhe)pa</i>				*	*
iv.	<i>(ákheʔ)pa</i>				*	
v.	<i>a(khéʔpa)</i>				*	*
vi.	<i>a(khépaʔ)</i>			*	*	
forget						

The position of glottalization in the glottalized roots which alternate between disyllabic (C)V.ʔV and monosyllabic (C)V.Vʔ is a matter of cyclic phonological evaluation. When an alternating root is uninflected, it undergoes phonological evaluation by itself. The output is a disyllabic (C)V.ʔV, which avoids violating the high-ranking NONFINALITY(ʔ) (61).¹⁰ The following tableaux are abbreviated, showing only the constraints and candidates relevant to the discussion at hand.

		<i>vP: inner</i>		
(61)	<i>kûi,ʔ</i>	<i>f{ʔ},</i>	<i>NFʔ »</i>	<i>ALʔ</i>
i.	<i>kûi,ʔ</i>	*		*
ii.	<i>(kûiʔ)</i>		*	
iii.	<i>(kû.ʔi)</i>			*
iv.	<i>(kû.iʔ)</i>		*	
drink				

A root is not spelled out before the attachment of derivational morphemes. For example, when the causative *-ñā/-an/-en* CAUS undergoes phonological evaluation at *vP* spell-out, this is the first time that the root undergoes phonological evaluation as well. Since the root was not spelled out previously, the glottal stop in the input is not linearized. PARSESYLLABLES (62) outranks ALIGN(ʔ-R, FOOT-R), favoring candidates with fewer unparsed syllables. Thus, the form of the root in the output, where the glottal stop is linearized, is the monosyllabic (C)V.Vʔ (63).

- (62) PARSESYLLABLES, OR: PSE₀
Assign a violation mark for each unfooted syllable in the output.

¹⁰ This analysis builds on Repetti-Ludlow et al.'s (2019), who propose that glottalization is underlyingly word-final and undergoes metathesis to avoid non-finality, e.g. /tsauʔ/ → [tsaʔu] 'house.'

		<i>vP: inner</i>			
(63)	<i>kûi.ʔ-ñā</i>	<i>f{ʔ},</i>	<i>NFʔ,</i>	<i>P_{SE}σ</i> »	<i>ALʔ</i>
i.	<i>kûi.ñā.ʔ</i>	*		**	
ii.	<i>(kû.ʔi)ñā</i>			*	*
iii.	<i>(kû.iʔ)ñā</i>			*	
iv.	<i>(kûiʔ.ñā)</i>				*
v.	<i>(kûi.ñāʔ)</i>	*			
drink-CAUS					

Other morphemes attach after the root's phonological evaluation at *vP* spell-out. Thus, their base contains glottalization which has previously been linearized. Previously spelled-out material in the input is represented with square brackets []. *LINEARITY(ʔ)* (64) outranks *PARSESYLLABLES*, preventing glottal metathesis.¹¹ Thus, alternating roots suffixed with *vP*-external morphology surface as disyllabic (C)V.ʔV (65).

- (64) *LINEARITY(ʔ), or: LINʔ*
For every precedence relationship of a glottal stop in the input, there is corresponding precedence relationship of that glottal stop in the output.

		<i>AspP: inner</i>			
(65)	<i>[(kû.ʔi)]-ji</i>	<i>f{ʔ},</i>	<i>LINʔ</i> »	<i>P_{SE}σ</i> »	<i>ALʔ</i>
i.	<i>kûi.ji.ʔ</i>	*	*	**	*
ii.	<i>(kû.ʔi)ji</i>			*	*
iii.	<i>(kû.iʔ)ji</i>		*	*	
iv.	<i>(kûiʔ.ji)</i>		*		*
drink-PRCL					

Finally, some A'ingae roots are stressless—they do not have underlying stress or glottalization. I propose that stress is not assigned to stressless roots within the inner morphophonological domain (66). Thus, stressless roots remain stressless even after spell-out. This is modeled with *DEPENDENCE(FOOT)*, which prevents the construction of new metrical structure. *DEPENDENCE(FOOT)* outranks all constraints favoring candidates which innovate stress, including *PARSESYLLABLES*.

<i>vP: inner</i>				<i>vP: inner</i>			
(66)	a.	<i>afe</i>	DEPF » P _{SE} σ		b.	<i>atapa</i>	DEPF » P _{SE} σ
	☞ i.	<i>afe</i>	**		☞ i.	<i>atapa</i>	***
	ii.	(<i>áfe</i>)	*		ii.	(<i>áta</i>) <i>pa</i>	* *
give				breed			

Observe that the outputs of (66) differ from the surface forms given in Section 3, which showed that stressless bases have stress assigned to the right edge of the inner domain if there are outer suffixes, or to the penultimate syllable of the word if there are no outer suffixes. I propose that this stress assignment takes place in the outer domain, targeting the stressless outputs of the inner domain.

¹¹ I assume that non-linearized glottal stops do not have precedence relationships. Thus, the winning candidate in (63) does not incur any violations of *LINEARITY(ʔ)*.

Recessive suffixes introduced in the inner morphological domain are subject to the same phonological grammar as roots, including a high ranking of MAXIMALITY(FOOT), MAXIMALITY(?) » DEPENDENCE(FOOT). As such, when a stressless root is spelled out with a recessive suffix, the output is stressless (67-68a). When a stressed (or glottalized) root is spelled out with a recessive suffix, the output is stressed (and glottalized) (67-68b). This generalization holds true of suffixes introduced in *vP* (67) as well as *AspP* (68).

<i>vP: inner</i>				<i>vP: inner</i>			
(67)	a.	<i>afe-an</i>	MAXf, MAX? » DEPf	b.	<i>seje,ʔ-an</i>	MAXf, MAX? » DEPf	
	i.	<i>afian</i>		i.	<i>sejian</i>	*	
	ii.	<i>(áfian)</i>	*	ii.	<i>(séʔjian)</i>		*
		give-CAUS			cure-CAUS		

<i>AspP: inner</i>				<i>AspP: inner</i>			
(68)	a.	<i>[atapa]-ji</i>	MAXf, MAX? » DEPf	b.	<i>[(kúnda)se]-ji</i>	MAXf, MAX? » DEPf	
	i.	<i>atapaji</i>		i.	<i>kundaseji</i>	*	
	ii.	<i>(áta)paji</i>	*	ii.	<i>(kúnda)seji</i>		
		breed-PRCL			tell-PRCL		

The constraint ranking seen in this section has been labeled *inner*. More precisely, it is a compilation of two rankings: *master* and *inner*. Unless there is positive evidence that the activity of a constraint is morphologically-restricted, I assume that it is part of the overarching (*master*) phonology of the language. Thus, the faithfulness constraints (MAXIMALITY, DEPENDENCE, LINEARITY) as well as the markedness constraints NONFINALITY(?) and PARSESYLLABLES belong in the *master* ranking.¹² The licensing constraint FOOT(?) and the alignment constraint ALIGN(?-R, FOOT-R) are active only in the inner morphophonological domain. As such, they belong in the *inner* cophonology. The phonological rankings motivated so far are given in (69).

- (69) PHONOLOGICAL RANKINGS IN A'INGAE, FIRST ITERATION
- a. *master*: { MAXf, MAX?, LIN? } » DEPf » PSE σ , NF?
 - b. *inner*: f{?}, { NF?, PSE σ } » AL?

The compilation of the *master* ranking and the *inner* ranking is given in (70). Ranking compilations are represented with the join symbol (\oplus), as in Sande, Jenks, and Inkelas (2020). Since the *master* ranking is a component of every phonological ranking in the language, *master* \oplus *inner* is abbreviated as *inner* in the preceding tableaux. In the tableaux to follow, “*master* \oplus ” will also be omitted from the ranking label.

- (70) MASTER RANKING COMPILED WITH INNER RANKING
- master* \oplus *inner*: f{?}, { MAXf, MAX?, LIN? } » DEPf » { NF?, PSE σ } » AL?

4.4 The dominant cophonology

In this section, I analyze the *dominant* cophonology, which captures the phonological grammar of the A'ingae dominant suffixes, including preglottalized dominant suffixes. Here, I focus on the dominant suffixes intro-

¹² Technically, all constraints are part of every cophonology. What differs among the cophonologies is the relative ranking of those constraints. Thus, the listing of various partial rankings should be understood as a convenient notation adopted for ease of exposition: When a constraint shows no activity, I do not explicitly represent it in a ranking. Formally, the constraint can still be thought of as present but ranked too low to influence the output.

duced in the inner morphological domain, i. e. on the interaction of the *inner* and *dominant* cophonologies. The analysis of the outer dominant suffixes is postponed until [Section 4.5](#).

Dominant suffixes delete stress and—if introduced in the inner morphophonological domain—also glottalization. I model dominance with an ANTI FAITHFULNESS constraint (Alderete, 1999, 2001). ANTI FAITHFULNESS constraints require that the input and the output differ along a certain dimension. For A'ingae dominant suffixes, this dimension is the metrical structure, as modeled with ANTI MAXIMALITY(FOOT_↓) (71), which ranks in the *dominant* cophonology above MAXIMALITY(FOOT), MAXIMALITY(?), and LINEARITY(?).

- (71) ANTI MAXIMALITY(FOOT_↓), or: $\neg \text{MAX}_f^{\downarrow}$
It is not the case that for every metrical foot in the input, there is a corresponding metrical foot or a segment licensed by that foot in the output. I. e., if there is one, delete (at least) one metrical foot, including its licensees, in the mapping from input to output.

The above formulation of ANTI MAXIMALITY(FOOT_↓) differs from Alderete's in an important way: I propose that the deletion of a licenser entails the deletion of its licensees. Thus, ANTI MAXIMALITY(FOOT_↓) is violated not only by faithfulness to input metrical structure, but also by faithfulness to input glottalization—if glottalization is licensed by metrical structure in the output. In the name of the constraint, this is represented with a subscripted down arrow (_↓). In short, ANTI MAXIMALITY(FOOT_↓) requires erasing (at least) one metrical foot and the glottalization it licenses. (I assume that ANTI MAXIMALITY(FOOT_↓) incurs one violation if the output is faithful to the metrical foot or glottalization, and two violations if the output is faithful to both. This detail does not affect any of the predictions of the analysis.)

Dominant suffixes are associated with the *dominant* cophonology. When introduced in the inner morphophonological domain, the phonological grammar at their spell-out combines the *inner* cophonology and the *dominant cophonology*. The output of the phonological evaluation is therefore determined by both.

When a dominant suffix attaches to a stressless base, stress deletion is vacuous. When a dominant suffix attaches to stressed base, input stress is deleted (72). The output form depends on the properties of the *dominant* and *inner* cophonologies. The fact the stress is deleted is due to the *dominant* cophonology. The fact that no new stress is assigned is due to the *inner* cophonology. (In a later phonological cycle, stress is assigned to the right edge of the inner domain if there are outer suffixes, or to the penultimate syllable of the word if there are no outer suffixes.)

		AspP: <i>inner</i> \oplus <i>dominant</i>		
(72)	$[(\acute{a}fa)se]-khu$	$\neg \text{MAX}_f^{\downarrow}$	$\gg \text{MAX}_f$	DEP _f
i. <i>afasekhu</i>			*	
ii. <i>(\acute{a}fa)sekhu</i>		*		
iii. <i>afa(sékhu)</i>			*	*
offend-RCPR				

Within the inner morphophonological domain, glottalization is licensed by metrical structure. Thus, it is targeted for deletion by ANTI MAXIMALITY(FOOT_↓) along with stress. As before, the output is stressless due to DEPENDENCE(FOOT) in the *inner* cophonology (73).

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(73)	$[(\acute{a}khe?)pa]-khu$	$f\{?\}, \neg \text{MAXf}_{\downarrow} \gg$	$\text{MAXf},$	$\text{MAX?} \gg$	DEPf	
	i. <i>akhepakhu</i>		*	*		
	ii. <i>akhe?pakhu</i>	*	*	*		
	iii. <i>(\acute{a}khe)pakhu</i>		*	*		
	iv. <i>(\acute{a}khe?)pakhu</i>	**				
	v. <i>akhe(p\acute{a}khu)</i>		*	*	*	
forget-RCPR						

In the inner domain, glottal stops are licensed by metrical structure. Thus, when a preglottalized suffix is attached, a metrical foot is constructed in order to license it. If the last syllable of the base to which a preglottalized dominant suffix attaches is light (monophthongal), $ALIGN(?-R, FOOT-R)$ yields stress two syllables to the left of the preglottalized suffix (74).

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(74)	$[atapa]-?je$	$f\{?\}, \neg MAXf_{\downarrow} \gg$	$MAXf,$	$MAX? \gg$	$DEFf,$	$AL?$
	i. <i>atapaje</i>			*		
	ii. <i>atapa?je</i>	*				*
	iii. <i>a(\acute{t}apa?)je</i>				*	
	iv. <i>ata(p\acute{a}?)je</i>				*	*
breed-IPFV						

If the last syllable of the base to which a preglottalized dominant suffix attaches is heavy (diphthongal), the higher-ranking $FOOTSHAPE = (\times\mu)$ (75) yields stress on the last syllable of the base (76). I assume that $FOOTSHAPE = (\times\mu)$ is not limited to a morphological context, and therefore belongs in the *master* ranking.

- (75) $FOOTSHAPE = (\times\mu)$, OR: $(\times\mu)$
The left branch of a foot is strong (i. e. feet are trochaic) and the right branch is a single mora (i. e. light; not a diphthong).

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(76)	<i>[fûndûi]-?je</i>	<i>f{?},</i>	<i>M_{AX}?,</i>	<i>(×µ) »</i>	<i>DEPf,</i>	<i>AL?</i>
	i. <i>fûndûije</i>		*			
	ii. <i>fûndûi?je</i>	*				*
	iii. <i>(<u>fûndûi</u>?)je</i>			*	*	*
⌈	iv. <i>fû(<u>ndûi</u>?)e</i>				*	*
sweep-IPFV						

All preglottalized suffixes introduced in the inner domain are dominant. Thus, they delete stress and glottalization from the base to which they attach. The preglottalization on the suffix itself is not a target of $ANTI\text{MAXIMALITY}(FOOT_{\downarrow})$ because it is not licensed by a metrical foot in the input. However, a metrical foot is constructed to license the preglottalization in the output (77). The candidate (77v) incurs one violation of $FOOT\{?\}$ because a metrical foot may license at most one glottal stop.

		AspP: <i>inner</i> \oplus <i>dominant</i>					
(77)	$[(\acute{a}khe?)pa]-?je$	$f\{?\},$	$\neg \text{MAX}f_{\downarrow} \gg$	$\text{MAX}f,$	$\text{MAX?} \gg$	$\text{DEP}f,$	AL?
i.	<i>akhepaje</i>			*	**		
ii.	<i>akhepa?je</i>	*		*	*		
iii.	<i>(\acute{a}khe?)paje</i>		**		*		
iv.	<i>a(\underline{khe}pa?)je</i>			*	*	*	
v.	<i>a(\underline{khe}pa?)je</i>	*	*	*	**	*	*
vi.	<i>akhe(\underline{pa}?)je</i>			*	*	*	*
forget-IPFV							

When two preglottalized dominant suffixes attach within one phase, stress is assigned to the syllable which contains the second mora to the left of the first suffix (79). I take this to reveal the emergence of the low-ranked ALIGN(FOOT-L, WORD-L) (78). ALIGN(FOOT-L, WORD-L) shows activity only in the *inner* cophonology. I assume that the effect of two dominant suffixes on the phonological ranking of the phase in which they are evaluated is the same as the effect of one dominant suffix.

- (78) ALIGN(FOOT-L, WORD-L), or: $AL[\omega f]$
Every foot is aligned with the left edge of the word.

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(79)	$[atapa]-?je-?ngi$	$f\{?\},$	$MAX? \gg$	$DEPf,$	$AL?$,	$AL[\omega f]$
i.	<i>atapajengi</i>		**			
ii.	<i>atapa_?jengi</i>	*	*			
iii.	<i>a(tápa_?)jengi</i>		*	*		*
iv.	<i>a(tápa_?)je_?ngi</i>	*		*		*
v.	<i>ata(pa_?je)ngi</i>		*	*	*	**
vi.	<i>ata(pa_?je_?)ngi</i>		*	*		**
vii.	<i>ata(pa_?je_?)ngi</i>	*		*		**
viii.	<i>atapa(jé_?ngi)</i>		*	*	*	***

breed-IPFV-VEN

In interim summary, by proposing that the deletion of a licenser entails the deletion of its licensees, the account captures the fact that in A'ingae the deletion of stress triggered within the inner domain also deletes glottalization. The *dominant* cophonology and the revised *master* and *inner* rankings are given in (80).

- (80) PHONOLOGICAL RANKINGS IN A'INGAE, SECOND ITERATION
- master*: $\{ MAXf, MAX?, LIN?, (\times\mu) \} \gg DEPf \gg PSE\sigma, NF?$
 - inner*: $f\{?\}, \{ NF?, PSE\sigma \} \gg \{ AL?, AL[\omega f] \}$
 - dominant*: $\neg MAXf_l \gg \{ MAXf, MAX?, LIN? \}$

4.5 The outer cophonology

In this section, I analyze the *outer* cophonology, which characterizes the outer morphological domain. The *outer* cophonology is active at the spell-out of TP, which contains morphology typically associated with the

inflected predicate, as well as CP, which contains morphology associated with full clauses. First, I focus on the outer recessive suffixes, which are not associated with a suffix-specific cophonology. I conclude the analysis with outer dominant suffixes, which involve the interaction of the *outer* and *dominant* cophonologies.

When TP suffixes attach to a stressless base, stress is assigned to the last syllable of the inner domain (83). The base may be stressless because it originated as such or because its stress was deleted by a dominant suffix. The assignment of stress to the last syllable of the inner domain is modeled with $\text{LEXICALWORD} \approx \text{PROSODICWORD}$ (81), which requires stress on every word, and $\text{ALIGN}(\text{STRESS-R}, \text{PHASE-R})$ (82), which favors alignment of that stress with the right edge of the previously spelled-out phase. In the *outer* cophonology, $\text{LEXICALWORD} \approx \text{PROSODICWORD}$ ranks above $\text{ALIGN}(\text{STRESS-R}, \text{PHASE-R})$, and $\text{ALIGN}(\text{STRESS-R}, \text{PHASE-R})$ ranks above $\text{DEPENDENCE}(\text{FOOT})$. I assume that $\text{ALIGN}(\text{STRESS-R}, \text{PHASE-R})$ is evaluated gradiently, incurring one violation for each syllable separating stress from the right edge of previously spelled-out phase.

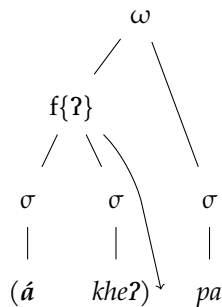
- (81) $\text{LEXICALWORD} \approx \text{PROSODICWORD}$, or: $\text{Lx} \approx \omega$
Every lexical word corresponds to a prosodic word.
- (82) $\text{ALIGN}(\text{STRESS-R}, \text{PHASE-R})$, or: $\text{AL}\sigma$
Primary stress is right-aligned with the right edge of the previously spelled-out phase.

TP: <i>outer</i>				
(83)	[afaseye]-ya	$\text{Lx} \approx \omega$ »	$\text{AL}\sigma$ »	DEP _f
i.	afaseyeya	*		
ii.	(áfa)seyeya		***	*
iii.	a(fáse)yeya		**	*
iv.	afa(séye)ya		*	*
v.	afase(yéya)			*
vi.	afaseye(yá)		*	*

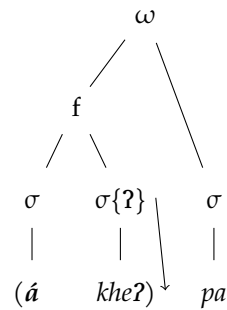
offend-PASS¹³-IRR

I propose that the licensing of the glottal stop in A'ingae differs between the two morphophonological domains. In the inner morphophonological domain, the glottal stop is licensed by the metrical foot node (84a). In the outer morphophonological domain, the glottal stop is licensed like any regular segment, i. e. by the syllabic node (84b). The constraint which captures the syllabic licensing of glottalization in the *outer* cophonology is $\text{SYLLABLE}\{\text{?}\}$ (85).

- (84) LICENSING OF THE GLOTTAL STOP
 a. IN THE INNER DOMAIN



- b. IN THE OUTER DOMAIN



13 The previously spelled-out phase in the input of (83) consists of the stressed root (áfa)se ‘offend,’ whose stress was deleted by the dominant suffix -ye⁰ PASS, yielding stressless afaseye ‘offend-PASS.’

- (85) SYLLABLE{?}, OR: $\sigma\{?\}$
Glottal stops are licensed by syllables. Assign a violation mark for every glottal stop not licensed by a syllable.

Since glottalization is licensed by the syllabic node in the outer domain, it does not have any effect on stress. Stress is assigned in a regular fashion, i. e. to the last syllable of the previously spelled out domain (86). When glottalization is licensed by a syllable, the underbrace spans the syllable which contains glottalization. Candidates (86i-ii) and (86iii-iv) have the same phonetic realization, but contrast in the licensing of the glottal stop. In (86i,iii), the glottal stop is licensed by a metrical foot. In (86ii,iv), it is licensed by a syllable. Thus, candidates (86i,iii) violate SYLLABLE{?}.

TP: <i>outer</i>				
(86)	[atapa]-ʔfa-ya	$\sigma\{?\}$,	AL $\acute{\sigma}$] »	DEP _f
i.	a(<u>tápaʔ</u>)faya	*	*	*
ii.	a(<u>tápaʔ</u>)faya		*	*
iii.	ata(<u>páʔfa</u>)ya	*		*
☞ iv.	ata(<u>páʔfa</u>)ya			*
v.	atapaʔ(fáya)		*	*

breed-PLS-IRR

MAXIMALITY(FOOT) ranks above ALIGN(STRESS-R, PHASE-R). Thus, stress from the previously spelled-out phase is retained. If glottalization is present, it is retained, but its licensing changes from metrical to syllabic (87).

TP: <i>outer</i>					
(87)	[a(<u>tápaʔ</u>)je]-ya-mbi	$\sigma\{?\}$,	MAX _f ,	MAX $\acute{\sigma}$] »	AL $\acute{\sigma}$]
i.	a(<u>tápa</u>)jeyambi			*	**
ii.	a(<u>tápaʔ</u>)jeyambi	*			**
☞ iii.	a(<u>tápaʔ</u>)jeyambi				**
iv.	atapa(<u>jéya</u>)mbi		*	*	
v.	atapaʔ(<u>jéya</u>)mbi		*		

breed-IPFV¹⁴-IRR-NEG

If there are no TP suffixes, TP does not undergo phonological evaluation. If there are CP suffixes and the previously spelled-out phase does not have stress, stress is assigned at CP spell-out to the last syllable of the previously spelled-out phase (i. e. AspP or *v*P if no suffixes were introduced in AspP) (88).

CP: <i>outer</i>				
(88)	[atapa]-saʔne	$\sigma\{?\}$,	MAX _f ,	MAX $\acute{\sigma}$] »
i.	a(<u>tápa</u>)saʔne			*
☞ ii.	ata(<u>pásaʔ</u>)ne			
iii.	atapa(<u>saʔne</u>)			*

breed-APPR

¹⁴ The spelled-out phase in the input of (87) consists of the stressless root *atapa* ‘breed’ and the preglottalized suffix *-ʔje*⁰ IPFV, which in the previous cycle triggered stress assignment, yielding *a(tápaʔ)je* ‘breed-IPFV.’

If there are both TP and CP suffixes and the inner domain does not have stress, stress is assigned to the last syllable of the previously spelled-out phase at TP spell-out (89a) and preserved at CP spell-out (89b).

TP: <i>outer</i>				CP: <i>outer</i>			
(89)	a.	[atapa]-ʔfa	$\sigma\{?\}, \text{MAXf} \gg \text{AL}\sigma$	b.	[ata(<u>páʔ</u> fa)]-ja	$\sigma\{?\}, \text{MAXf} \gg \text{AL}\sigma$	
	i.	a(<u>tá</u> paʔ)fa	*		i.	ata(<u>páʔ</u> fa)ja	*
	ii.	ata(<u>páʔ</u> fa)			ii.	atapaʔ(<u>fá</u> ja)	*
	iii.	atapaʔ(<u>fá</u>)	*		iii.	atapaʔfa(<u>já</u>)	*
breed-PLS				breed-PLS-IMP			

This derives the generalization that if the outer domain (TP and/or CP) suffixes are present and the inner domain was stressless, stress is assigned to the right edge of the inner domain.

If neither TP nor CP suffixes are present, TP does not undergo spell-out, but CP does. If the inner domain was stressless, stress is assigned to the penultimate syllable. Observe that stress in A'ingae is never final. To capture this fact, I propose that NONFINALITY(STRESS) (91) is ranked above ALIGN(STRESS-R, PHASE-R). Recall that ALIGN(STRESS-R, PHASE-R) is evaluated gradiently, incurring one violation for each syllable separating stress from the right edge of previously spelled-out phase. This derives the “default” penultimate stress assignment (92).

- (91) NONFINALITY(STRESS), or: NF σ
Primary stress is not final in a prosodic word.

CP: <i>outer</i>					
(92)	[akhepayeji]	$\sigma\{?\}, \text{MAXf}, \text{NF}\sigma, \text{Lx}\approx\omega \gg \text{AL}\sigma$			
	i.	akhepayeji	*		
	ii.	akhe(<u>pá</u> ye)ji		**	
	iii.	akhepa(<u>yé</u> ji)		*	
	iv.	akhepaye(<u>jí</u>)	*		
forget-PASS-PRCL ¹⁵					

Finally, there are two dominant CP suffixes: -jama^Ø PRHB and -kha^Ø IMP2. The outer dominant suffixes assign stress to the immediately preceding syllable regardless of preexisting stress but they keep preexisting glottal stops intact. These properties emerge from the interaction of the *outer* and *dominant* cophonologies. The *dominant* cophonology ranks ANTIMAXIMALITY(FOOT_l) high, which results in the erasure of preexisting stress, allowing ALIGN(STRESS-R, PHASE-R) of the *outer* cophonology to assign stress to the right edge of the previously spelled-out phase (i. e. immediately before the outer dominant suffix). Even though ANTIMAXIMALITY(FOOT_l) is ranked high by the *dominant* cophonology, in the *outer* cophonology glottal stops are licensed by syllables, not metrical feet (SYLLABLE{?}), so ANTIMAXIMALITY(FOOT_l) is not violated by the glottalization retained in the output (93).

¹⁵ The spelled-out phase in the input of (92) consists of the stressed and glottalized root (*ákheʔ*)pa ‘forget’ and two suffixes -ye^Ø PASS and -ji PRCL. In the earlier cycle, the inner dominant -ye^Ø PASS deleted the stress and glottalization of (*ákheʔ*)pa ‘forget,’ and the inner recessive -ji PRCL did not assign any. Thus, the input to the late CP spell-out is the stressless *akhepayeji* ‘forget-PASS-PRCL.’

CP: <i>outer</i> \oplus <i>dominant</i>					
(93)	$[a(\underline{tápa?})je]-jama$	$\sigma\{?\}$	$\neg\text{Maxf}_l \gg$	$\text{Maxf}, \text{Max?} \gg$	$\text{AL}\sigma$
i.	$a(\underline{tápa?})jejama$	*	**		**
ii.	$a(\underline{tápa?})jejama$		*		**
iii.	$atapa(jéja)ma$			*	*
iv.	$atapa?(jéja)ma$			*	
v.	$atapa?je(jáma)$			*	*
breed-IPFV ¹⁶ -PRHB					

In summary, by proposing that the licensing of the A'ingae glottal stops differs between the inner and the outer domain (metrically licensed in the former, but not the latter), the account captures the fact that stress deletion in the inner domain also deletes glottal stops, but stress deletion in the outer domain does not. The final *master* ranking as well as the *inner*, *outer*, and *dominant* cophonologies are given in (94).

- (94) PHONOLOGICAL RANKINGS IN A'INGAE, FINAL ITERATION
- a. *master*: $\{ \text{Maxf}, \text{Max?}, \text{Lin?}, (\times\mu) \} \gg \text{DEP} \gg \text{PSE}\sigma, \text{NF}\sigma, \text{NF?}$
 - b. *inner*: $f\{?\}, \{ \text{NF?}, \text{PSE}\sigma \} \gg \{ \text{AL?}, \text{AL}[\omega f] \}$
 - c. *outer*: $\sigma\{?\}, \{ \text{Maxf}, \text{NF}\sigma, \text{Lx}\approx\omega \} \gg \text{AL}\sigma \gg \text{DEP}f$
 - d. *dominant*: $\neg\text{Maxf}_l \gg \{ \text{Maxf}, \text{Max?}, \text{Lin?} \}$

5 REJECTED ALTERNATIVES

The CbP account of A'ingae glottalization is couched in a relatively powerful framework and uses a variety of formal devices. Specifically, the analysis posits (i) different phonological grammars associated with different morphological strata (*inner* vs. *outer*), (ii) different phonological grammars associated with individual morphosyntactic features (*dominant*), (iii) licensing as the relation between metrical feet and glottalization within the inner stratum, and (iv) ANTI-FAITHFULNESS as the mechanism for stress deletion. As such, one may reasonably wonder whether there is a less formally elaborate, but equally insightful, analysis available.

In this section, I examine three alternative accounts which do away with (i), (iii), and (iv). In Section 5.1, I consider a purely representational analysis where the preglottalized inner and outer suffixes have different underlying forms (i) and briefly comment on representational accounts of dominance. For an extended discussion of the latter, see Dąbkowski (2021c) (ii). In Section 5.2, I outline an analysis which retains cophonological rankings, but eschews the notion of licensing and models glottalization's effect on stress entirely as a matter of ALIGNMENT (iii). In Section 5.3, I sketch an analysis which dispenses with the ANTI-MAXIMALITY(FOOT_l), a member of the controversial family of ANTI-FAITHFULNESS constraints, in favor of *STRUCTURE (iv). I conclude that the alternative analyses make incorrect predictions or fall short of capturing the central generalizations about the A'ingae morphophonology stated in Section 3.4. Lastly, in Section 5.4, I bring explicit attention to two recalcitrant corners of the data (the alternating glottalized roots and forms with multiple inner preglottalized suffixes) which naturally fall out of CbP's architectural assumption of phase-based spell-out but are problematic for fully parallel and fully cyclic frameworks.

¹⁶ The spelled-out phase in the input of (93) consists of the stressless root *atapa* 'breed' and the preglottalized suffix $-?je^0$ IPFV, which in the previous cycle triggered assignment of stress to the syllable with the second mora to the left of the glottal stop, yielding $a(\underline{tápa?})je$ 'breed-IPFV.'

5.1 Representational analyses

In this section, I consider a representational analysis of the difference between the inner and the outer suffixes. For an extensive discussion of representational analyses of A'ingae dominance (stress deletion), see Dąbkowski (2021c).

Preglottalized suffixes introduced in the inner domain assign stress to the syllable which contains the second mora to the left of the glottal stop, while preglottalized suffixes of the outer domain have no such effect. To capture this pattern, the analysis presented in Section 4 posits two different phonological grammars for the inner and outer domains. In a purely representational account, where the phonological grammar of a language is taken to be fully uniform, this difference must be attributed to differing underlying forms.

A plausible proposal might model the difference between the inner and outer suffixes with partial metrical structure. Under this analysis, the glottal stop of the preglottalized inner suffixes is immediately followed by the right edge of metrical foot (95a). The outer suffixes do not have underlying metrical structure (95b).

(95) REPRESENTATIONAL ANALYSIS

- a. *inner*: -ʔje IPFV, -ʔngi VEN, -ʔnga AND, ...
 b. *outer*: -ʔfa PLS, -ya IRR, -ʔta IF.SS, -ja IMP, ...

When a suffix comes with a partial metrical foot, the rest of the foot is supplied in the output (96a-b). When a suffix has no underlying metrical structure, regular stress assignment takes place (96c-d). This captures the basic difference with respect to stress assignment between the preglottalized inner and outer suffixes.

(96) PREGLOTTALIZED INNER OR OUTER SUFFIXES, REPRESENTATIONAL ANALYSIS

- | | | | |
|--|---|---|---|
| a. / atapa -ʔje /
[a(tápa -ʔ)je]
breed -IPFV | b. / atapa -ʔngi /
[a(tápa -ʔ)ngi]
breed -VEN | c. / atapa -ʔfa /
[ata(pá -ʔfa)]
breed -PLS | d. / atapa -ya /
[ata(pá -ya)]
breed -IRR |
|--|---|---|---|

Nevertheless, the representational analysis is not adopted for four reasons. First, it predicts that the left edge of a preglottalized inner suffix is always aligned with the right edge of a metrical foot, even if it results in the construction of a degenerate head foot (e. g. on monosyllabic roots). This is unlike the CbP analysis, where the glottal stop of an inner suffix is always contained within a metrical foot, but is not required to be aligned with it (i. e. ALIGN(ʔ-R, FOOT-R) is a violable constraint). Assuming that A'ingae words are footed exhaustively (barring the construction of non-head degenerate feet, see 39), the representational analysis predicts that secondary stress should immediately follow the degenerate head foot if there is an even number of syllables to its right (97a). CbP predicts no secondary stress in the same position (97b). Given that the second syllable of (97b) is no greater in prominence than the second syllable of (97c), the prediction of the representational analysis (97a) is incorrect.¹⁷

(97) EXHAUSTIVE FOOTING

- | | | |
|---|---|--|
| a. WITH ʔ IN REPR. AN. | b. WITH INNER ʔ IN CbP | c. WITHOUT ʔ |
| / i -ʔje -ya /
*[(i -ʔ)(jè -ya)]
bring -IPFV -IRR | / i -ʔje ⁰ -ya /
[(i -ʔje) -ya]
bring -IPFV -IRR | / (áfa) -ya /
[(áfa) -ya]
speak -IRR |

Second, the representational analysis has no way of capturing the generalization that the preglottalized suffixes which assign stress to the syllable which contains the second mora to the left of the glottal stop all precede the preglottalized suffixes which have no effect on stress. In other words, under the representational analysis, nothing prevents the existence of suffixes such as *-ʔta IF.SS which follows -ʔfa PLS, or *-ʔje IPFV which

¹⁷ However, the problem of (97a) could be solved by allowing metrical structure to be shifted in the output by, for example, a markedness constraint which mitigates against monomoraic feet.

precedes $-ʔ$) *ngi* VEN. Under the CbP analysis, such orderings are ruled out by the phonological grammars of the suffixes' respective domains.

Third, the glottalization/stress generalization which holds of the inner suffixes (i. e. stress is assigned to the syllable which contains the second mora to the left of the glottal stop), also holds in roots. The CbP analysis reflects this by subjecting both roots and inner suffixes to the same *inner* cophonology. The representational analysis offers no insight into this patterning. For example, it provides no reason as to why glottalized but stressless roots such as **akheʔpa* 'forget' do not exist in A'ingae.

Fourth and last, the inner dominant suffixes delete stress and glottalization but the outer dominant suffixes delete only stress. So far, stress deletion has been left out of the discussion since deletion is not straightforwardly implemented using representational means (cf. Trommer and Zimmermann, 2014; Zimmermann, 2017). However, regardless of which account of deletion one might eventually adopt, the purely representational analysis does not capture the stratal (*inner* vs. *outer*) organization of the A'ingae grammar (see the second and third arguments) and does not posit a formal link between glottalization and metrical structure (unlike CbP, where metrical structure is the licenser of glottalization in the inner domain). Thus, it is difficult to imagine a non-stipulative representational account of why the inner, but not the outer, dominant suffixes delete glottalization. In brief, the representational analysis fails to capture the first central generalization about the A'ingae morphophonology (40).

Alternatively, one could flesh out a representational analysis of the A'ingae dominance while permitting different phonological rankings for the two different morphological domains. This would bring the A'ingae system into the fold of Stratal OT (Bermúdez-Otero, 1999, 2012; Jaker and Kiparsky, 2020; Kiparsky, 2000, 2008; others), where the inner and outer domain may be modeled essentially as in CbP (i. e. with different phonological rankings for the *inner* and *outer* strata), but the unpredictable suffix-specific dominance effects are attributed to the underlying representations of the dominant morphemes.

Dąbkowski (2021c) specifically considers representational treatments of A'ingae dominance and argues against four fleshed-out proposals. A Stratal OT and a standard Gradient Symbolic Representations (Rosen, 2016; Smolensky and Goldrick, 2016; Zimmermann, 2018a,b) analyses are found empirically inadequate. The simple reason for this is that A'ingae dominance involves genuine stress deletion, not stress overriding. A floating metrical structure (cf. floating negative tone in Kushnir, 2019) captures the data presented in Dąbkowski (2021c), but requires a spurious and implausible autosegmental representation of metrical structure, making a range incorrect typological predictions. An empty prosodic nodes analysis (Trommer and Zimmermann, 2014; Zimmermann, 2017) requires crossing association lines (typically assumed ill-formed) and incorrectly predicts the deletion of segmental material. Moreover, none of Dąbkowski's (2021c) rejected alternatives attempt to model the interaction of stress deletion with glottalization or capture either of the two generalizations (40-41), and none of them can be straightforwardly extended to do so.

5.2 ALIGNMENT-only analysis

Under the CbP analysis, there are two high-ranked constraints in the grammar of the inner phonological domain which relate metrical structure and glottalization: FOOT{?}, which penalizes glottal stops unlicensed by a metrical foot, and ALIGN(?-R, FOOT-R), which favors right-alignment of the metrical foot with the glottal stop. The functions of the two constraints are partially overlapping: Assuming that MAXIMALITY(?) and ALIGN(?-R, FOOT-R) rank above DEPENDENCE(FOOT), these two constraints are by themselves sufficient to trigger the construction of a metrical foot given an input glottal stop, making a recourse to licensing (FOOT{?}) ostensibly unnecessary (98).

AspP: <i>inner</i>				
(98)	[atapa]-?je	MAX?, AL?) »	DEP	f
i.	atapaje	*		
ii.	atapa?je	*		
iii.	a(<u>tápa?</u>)je		*	
iv.	ata(<u>pá?</u> je)	*	*	
forget-IPFV				

The above observation might lead one to propose an ALIGNMENT-only analysis, where the inner and the outer morphological domains differ in the ranking of ALIGN(?-R, FOOT-R), but the mechanism of licensing is never invoked (99).

- (99) ALIGNMENT-ONLY ANALYSIS, FIRST ITERATION
- a. *master*: NF?, NF?, ($\times\mu$), MAXf, MAX? » DEP
 - b. *inner*: { NF?, MAX?, AL? } » { DEP, ($\times\mu$) } » AL_[ω f]
 - c. *outer*: { MAXf, NF?, Lx $\approx\omega$ } » AL? » { DEP, AL? }
 - d. *dominant*: \neg MAXf » { MAXf, MAX? }

Nonetheless, the ALIGNMENT-only analysis is not adopted for two reasons. First, despite their partial functional overlap, the motivations for FOOT{?} and ALIGN(?-R, FOOT-R) in the the CbP analysis of Section 4 are fundamentally distinct: FOOT{?} captures the fact that inner glottal stops trigger the construction of a metrical foot and ALIGN(?-R, FOOT-R) determines the position of that foot with respect to the glottal stop. FOOT{?} is undominated, which means that glottalization always triggers foot construction. ALIGN(?-R, FOOT-R), on the other hand, is dominated by FOOTSHAPE = ($\times\mu$), which means the alignment of the foot with glottalization is subject to the A'ingae optimal foot structure. The interaction of the three constraints means that when glottalization is present in the inner domain, a metrical foot will always be created, but it need not be right-aligned with the glottal stop.

In the ALIGNMENT-only analysis, there is no licensing constraint (FOOT{?}); the construction of metrical structure in the presence of inner glottal stops is modeled with ALIGN(?-R, FOOT-R). This means that ALIGN(?-R, FOOT-R) must rank above FOOTSHAPE = ($\times\mu$). As a result, in cases where the glottalization-triggered stress falls on the glottalized syllable, the head foot is degenerate (100).

vP: <i>inner</i>					
(100)	seje,?	NF?,	MAX?,	AL?) »	DEP, ($\times\mu$)
i.	seje		*		
ii.	seje,?			*	
iii.	(sé?)je				*
iv.	(sé?)je			*	*
v.	(séje?)	*			*
cure					

Therefore, assuming again that A'ingae words are footed exhaustively whenever possible, the ALIGNMENT-only analysis suffers from the same problem as the purely representational account: It incorrectly predicts that secondary stress should immediately follow the degenerate head foot if there is an even number of syllables to its right (97a).

Second, the ALIGNMENT-only analysis struggles with capturing the fact that the inner dominant suffixes also delete glottalization. If the analysis dispenses with the notion of licensing, the ANTIMAXIMALITY(FOOT_I) constraint cannot reference it and must be reformulated as ANTIMAXIMALITY(FOOT) (101).

(101) ANTIMAXIMALITY(FOOT), or: $\neg \text{MAXf}$

It is not the case that for every metrical foot in the input, there is a corresponding metrical foot in the output. I. e., if there is one, delete (at least) one metrical foot in the mapping from input to output.

The reformulated constraint triggers stress deletion, but it does not target the glottal stops. Given that MAXIMALITY(?) outranks DEPENDENCE(FOOT), as motivated above, the ALIGNMENT-only analysis predicts that the deleted metrical structure will be recreated in the output (102), even if ANTIMAXIMALITY(FOOT) ranks above both MAXIMALITY(FOOT) and MAXIMALITY(?) (99d). Metrical feet in the input and output are subscripted (_{*i, j*}) to indicate whether they are in a correspondence relation (McCarthy and Prince, 1995).

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(102)	$[(\acute{a}khe?)_i pa] -khu$	$\neg \text{MAXf} \gg$	$\text{MAXf},$	$\text{MAX?},$	$\text{AL?} \gg$	DEPf
☹ i.	<i>akhepakhu</i>		*	*		
ii.	<i>akhe?pakhu</i>		*		*	
iii.	$(\acute{a}khe)_i pakhu$	*		*		
iv.	$(\acute{a}khe?)_i pakhu$	*				
● v.	$(\acute{a}khe?)_j pakhu$		*			*
forget-RCPR						

One solution to the above problem would be to say that dominant suffixes reverse the ranking of MAXIMALITY(?) and DEPENDENCE(FOOT) (103d). However, this solution has two major downsides. First, it is stipulative. Under this analysis, it just so happens that the suffixes which delete stress also reverse rerank the two faithfulness constraints. Thus, it fails to capture the first central generalization about the A'ingae morphophonology (40).

(103) ALIGNMENT-ONLY ANALYSIS, SECOND ITERATION

d. *dominant*: $\neg \text{MAXf} \gg \{ \text{MAXf}, \text{MAX?} \}, \text{DEPf} \gg \text{MAX?}$

Second, postulating that the dominant suffixes rank DEPENDENCE(FOOT) above MAXIMALITY(?) incorrectly predicts the deletion of glottalization from inner preglottalized dominant suffixes (104).

		AspP: <i>inner</i> \oplus <i>dominant</i>				
(104)	$[atapa] -?je$	$\neg \text{MAXf} \gg$	$\text{MAXf},$	$\text{AL?},$	$\text{DEPf} \gg$	MAX?
● i.	<i>atapaje</i>					*
ii.	<i>atapa?je</i>		*			
☹ iii.	<i>a(tápa?)je</i>				*	
iv.	<i>ata(pá?je)</i>		*		*	
breed-IPFV						

To remedy this, one could posit special faithfulness to the glottal stops introduced by preglottalized suffixes. To formalize this analysis, one would need to formulate a morphologically-indexed MAXIMALITY(?_{sfx}) constraint (105), which is violated specifically by the deletion of suffix glottal stops and which ranks above DEPENDENCE(FOOT) (106a).

- (105) MAXIMALITY(?_{sfx}), or: MAX?_{sfx}
For every glottal stop in an input suffix, there is a corresponding glottal stop in the output.
- (106) ALIGNMENT-ONLY ANALYSIS, THIRD ITERATION
 a. *master*: $\text{NF}\sigma, \text{NF?}, \text{MAXf}, \{ \text{MAX?}, \text{MAX?}_{\text{sfx}} \} \gg \text{DEPf}, (\times\mu)$

Cophonologies by Phase is a strictly modular model of the grammar where the phonological and morphosyntactic components cannot access each other (morpheme-specific phonology is captured by means of indirect reference). This restriction imposed on the grammatical architecture aims to model the robust empirical generalizations known as phonology-free syntax (Pullum and Zwicky, 1988) and bracket erasure (morphosyntax-free phonology). The adoption of morphologically-indexed constraints such as MAXIMALITY(?_{sfx}) weakens the predictive power of a theory by permitting a variety of empirically unattested phenomena. Thus, the ALIGNMENT-only analysis is not adopted. For a survey of arguments against indexed-constraint approaches, see e. g. Inkelas and Zoll (2007), Orgun (1996), Orgun and Inkelas (2002), and Scheer (2012).

5.3 *STRUCTURE analysis

The second central insight about the A'ingae morphology states that stress deletion is the only unpredictable suffix-triggered phonological process (41). The deletion of stress may be accompanied by stress reassignment to the syllable which contains the second mora to the left of the suffix (if the stress-deleting suffix is inner and preglottalized), to the last syllable of the previously spelled-out domain (if the stress-deleting suffix is outer), or no stress reassignment (if the stress-deleting suffix is inner and plain, i. e. not preglottalized). Importantly, whether and where stress is reassigned is determined by the phonological grammar of the domain in which the stress-deleting suffix is introduced. As such, it need not be stipulated as an idiosyncratic property of the dominant suffix.

The Cophonologies by Phases analysis of Section 4 formalizes this insight by associating the stress-deleting suffixes with the *dominant* cophonology. The *dominant* cophonology is characterized by a high ranking of ANTIMAXIMALITY(FOOT_1), which ensures that the output will not be faithful to input stress. Stress reassignment (or its lack) follows from the *inner* and *outer* cophonologies which characterize the two respective morphophonological domains of A'ingae.

In an analysis which does not make a recourse to ANTIMAXIMALITY(FOOT_1), stress deletion must be captured via different means. A natural candidate is the *FOOT constraint (107), a member of the *STRUCTURE family of constraints, which penalizes metrical structure present in the output.

- (107) *FOOT, or: *f
Assign a violation mark for each metrical foot in the output.

A high ranking of *FOOT ensures that the output will be stressless. Thus, *FOOT is unlike ANTIMAXIMALITY(FOOT_1), which demands only that the output stress be different from the input stress, but does not by itself penalize stressed outputs. Since the plain inner dominant suffixes yield stressless outputs, an *inner dominant* cophonology which ranks *FOOT above both MAXIMALITY(FOOT) and MAXIMALITY(?) correctly models their behavior (108c). However, it does not model the behavior of preglottalized inner dominant or outer dominant suffixes, which reassign stress in the output. To model the preglottalized inner dominant suffixes, MAXIMALITY(?_{sfx}) must dominate MAXIMALITY(?) in the *master* ranking (108a). The outer dominant suffixes are modeled by ranking LEXICALWORD \approx PROSODICWORD and ALIGN(STRESS-R, PHASE-R) above MAXIMALITY(FOOT) in the *outer cophonology* (108e).

- (108) *STRUCTURE ANALYSIS
 a. *master*: $\text{MAX?}_{\text{sfx}} \gg \{ \text{MAXf}, \text{MAX?}, (\times\mu) \} \gg \text{DEPf}, \text{NF}\sigma, \text{NF?}$
 b. *inner*: $\text{f}\{?\}, \{ \text{NF?}, (\times\mu) \} \gg \{ \text{AL?}, \text{AL}[\omega\text{f}] \}$

- c. *inner dominant*: $*f \gg \{ \text{MAXf}, \text{MAX?} \}, f\{? \}, \{ \text{NF?}, (\times\mu) \} \gg \{ \text{AL?} \}, \text{AL}[\omega f]$
d. *outer*: $\sigma\{? \}, \{ \text{MAXf}, \text{NF?} \} \gg \text{LX} \approx \omega \gg \text{AL?} \gg \text{DEFf}$
e. *outer dominant*: $\sigma\{? \}, \text{LX} \approx \omega \gg \text{AL?} \gg \{ \text{MAXf}, \text{NF?} \} \gg \text{DEFf}$

An analysis along these lines is pursued by Dąbkowski (2021c). However, the *STRUCTURE analysis is not adopted here for two reasons. First, it requires invoking the morphologically-indexed constraint MAXIMALITY(?_{sfx}). Second, it fails to formally relate the phonological properties of (i) the *inner dominant* suffixes to the *inner* cophology, (ii) the *outer dominant* suffixes to the *outer* cophology, and (iii) the *inner dominant* suffixes to the *outer dominant* suffixes, and instead posits four unrelated cophological rankings. Thus, the *STRUCTURE analysis misses the second central generalization about the A'ingae morphophonology (41).

5.4 Phase-based spell-out

Finally, I would like to bring explicit attention to CbP's postulate of phase-based spell-out. Cophonologies by Phase proposes that phonological evaluation is cyclic and proceeds phase-by-phase. However, the morphosyntactic features present within one phrase are spelled out all at once and evaluated in parallel. This distinguishes CbP from other models of the phonology-morphosyntax interface, and naturally captures the behavior of alternating glottalized roots and forms with multiple inner preglottalized suffixes, which pose challenges for fully parallel (e.g. McCarthy and Prince, 1993a,b; Pater, 2009; Prince and Smolensky, 1993) and fully cyclic frameworks (e.g. Bobaljik, 2000; Caballero, 2011; Inkelas, 2008; Matushansky, 2006).

First, recall that a few glottalized roots alternate between monosyllabic (C)V.V? and disyllabic (C)V.?V, depending on the morphological context. When followed by the derivational suffix *-ña CAUS*, they surface as monosyllabic (12). When by themselves (9) or followed by an inflectional suffix, such as *-ji PRCL* (10), they surface as disyllabic (C)V.?V. In the CbP analysis of Section 4, this falls out directly from phase-based spell-out: The first phase to undergo phonological evaluation is *vP*, which includes the root (61) and the causative *-ña CAUS* (63), but excludes all other suffixes (65). This pattern is difficult to capture in a fully parallel framework. Any constraint ranking which correctly predicts (109a) and (109b) will fail to predict (109c), and vice versa.

(109)	a. <i>kûi,ʔ</i>	X » Y		b. <i>kûi,ʔ-ji</i>	X » Y		c. <i>kûi,ʔ-ña</i>	X » Y	
	i. (<i>kûiʔ</i>)	*		i. (<i>kûiʔji</i>)	*		⦿ i. (<i>kûiʔña</i>)	*	
	☞ ii. (<i>kû.ʔi</i>)	*		☞ ii. (<i>kû.ʔi</i>)ji	*		⊗ ii. (<i>kû.ʔi</i>)ña	*	
	drink			drink-PRCL			drink-CAUS		

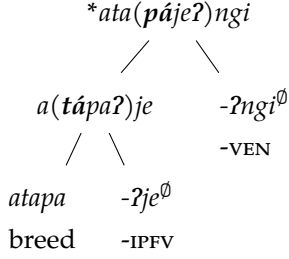
Likewise, the pattern is difficult to capture in a fully cyclic framework. If the root undergoes phonological evaluation by itself (before any suffixation), it is not clear why it surfaces either as monosyllabic (C)V.V? or as disyllabic (C)V.?V, depending on the morphological context.

Second, recall that stress in forms with two inner preglottalized dominant suffixes is assigned to the syllable which contains the second mora to the left of the first of those suffixes (27). If both suffixes are introduced in the same phase, they both contribute the same *dominant* cophology to the phonological ranking of their phase, which deletes stress from the previous phase. The assignment of stress to the syllable which contains the second mora to the left of the first suffix's glottal stop is taken to reveal the activity of the low ranked ALIGN(FOOT-L, WORD-L) (79). Importantly, there is no step in the derivation where the first suffix has undergone phonological evaluation but the second one has not.

In this way, CbP differs from classic Cophonology Theory, where it is often assumed that each suffix associated with its own cophological grammar undergoes phonological evaluation immediately upon combining with its base, before any further morphology takes place (Caballero, 2011; Inkelas, 2008). This fully cyclic

model incorrectly predicts that the stress assigned by the first preglottalized suffixes will be erased by the second preglottalized suffix (110).

(110) TWO PREGLOTTALIZED ASP_P SUFFIXES, CYCLIC EVALUATION



The same prediction is made by Alderete’s (1999, 2001) Transderivational Anti-Faithfulness, where given two dominant suffixes in a structure such as $/root-sfx^\emptyset-sfx^\emptyset/$, the second suffix always wins over the first one (Alderete, 1999, p. 181). Both frameworks predict that dominance effects are strictly cyclic, with the outermost dominant suffix dominating over all previous suffixes. The prediction is falsified by the A’ingae forms with multiple preglottalized inner dominant suffixes.

6 CONCLUSION

I formulated two generalization about A’ingae glottalization. First, the relationship of glottalization to stress depends on the morphophonological domain. In the inner domain, glottalization triggers stress assignment and undergoes deletion along with stress. In the outer domain, glottalization does not trigger assignment and is not affected by stress deletion. Second, when controlled for the morphophonological domain and segmental content, the variability in the phonological processes triggered by A’ingae suffixes reduces to one parameter: some suffixes preserve metrical structure, while others delete it.

To capture the first generalization, I proposed that glottalization is licensed by metrical structure within the inner domain and that the deletion of a licenser entails the deletion of its licensees. To capture the second generalization, I proposed that the division between two morphophonological domains crosscuts a distinction between recessive and dominant suffixes. I formalized this proposal by associating the two morphophonological domains with the *inner* and *outer* cophonologies and the dominant suffixes with the *dominant* cophonology. The interactions among the three cophonologies, summarized in Table 4, capture the characteristics of the phonological processes triggered by A’ingae suffixes.

	<i>inner</i>	<i>inner</i> \oplus <i>dominant</i>	<i>outer</i>	<i>outer</i> \oplus <i>dominant</i>
STRESS	preserved	deleted	preserved	deleted
GLOTTALIZATION	preserved	deleted	preserved	preserved
IF ABSENT OR DELETED, STRESS (RE)ASSIGNED	only due to glottalization: ($\times\mu?$)		to the R-edge of spelled-out phrase	

Table 4: Interactions of the *inner*, *outer*, and *dominant* cophonologies.

The organization of the A’ingae phonological grammar shows that strally organized morphological domains may be characterized by different phonological grammars (*inner* vs. *outer*), but also that individual affixes might be associated with phonological grammars of their own (*dominant*). This shows a need for a framework capable of capturing stratal morphophonology as well as morpheme-specific phonological effects.

I implemented my analysis in Cophonologies by Phase (Sande, 2019; Sande, Jenks, and Inkelas, 2020; others). CbP captures the organization of the A’ingae grammar, as it allows for associating different phonological

rankings to phase heads as well as individual morphosyntactic features. The first property models the stratal organization of the *inner* and *outer* cophonomies. The second property models the fact that individual morphemes may be unpredictably associated with the *dominant* cophonomy. Thus, Cophonologies by Phase succeeds at fully capturing the generalizations about the phonology of the A'ingae glottal stop.

Significantly, an affix-specific cophonomy may interact with the cophonomy of its domain in a non-trivial way: A dominant suffix deletes stress and glottalization if it is introduced in the inner domain (*inner* \oplus *dominant*), but only deletes stress if it is introduced in the outer domain (*outer* \oplus *dominant*). This is reminiscent of Sande's (2020) *morphologically-conditioned phonology with two triggers*, where a single phonological process is triggered by the presence of two morpheme-specific phonologies in the same phase. In the case of A'ingae, however, the two relevant cophonomies (phase head-specific *inner* or *outer* and morpheme-specific *dominant*) do not gang up to trigger a single process, but rather jointly define the characteristics of the process (deletion of stress and glottalization vs. deletion of stress alone). Thus, the A'ingae data show a new kind of phonological process with multiple triggers, bearing out yet another prediction of Cophonologies by Phase.

Finally, the typological profile of A'ingae and the phonological phenomena it exhibits are unlike those presented in previous CbP literature. There are very few case studies to date motivating the framework's architectural assumptions. Two of them come from Guébie (Sande, 2019) and Somali (Green and Lampitelli, *in prep.*). Sande (2019) leverages CbP to account for root-controlled ATR harmony, vowel replacement, and scalar tone shift phenomena across Guébie's oft-monomorphemic words. Green and Lampitelli (*in prep.*) use CbP to model Somali subject marking, expounded with subtractive tone, segmental content, both, or neither. The present study deals with stress assignment, stress deletion, and prosodic licensing within subword domains of A'ingae's highly agglutinative verbs. Thus, it contributes a new line of evidence for CbP by demonstrating the insight the framework affords and the utility it has in modeling formally different phenomena in typologically dissimilar languages.

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A APPENDIX

(111) STRESSLESS MONOSYLLABIC ROOTS

- | | | | |
|--|---|--|---|
| a. / <i>phi</i> /
[<i>phí</i>]
sit | b. / <i>tsun</i> /
[<i>tsún</i>]
do | c. / <i>dyai</i> /
[<i>dyái</i>]
sit | d. / <i>kuen</i> /
[<i>kuén</i>]
grow |
|--|---|--|---|

(112) STRESSLESS MONOSYLLABIC ROOTS WITH SUFFIXES

- | | | | |
|---|---|---|---|
| a. / <i>phi</i> -ji / -ʔfa /
[<i>phi</i> - <i>jí</i> -ʔfa]
sit -PRCL -PLS | b. / <i>tsun</i> -ji / -ʔfa /
[<i>tsun</i> - <i>jín</i> -ʔfa]
do -PRCL -PLS | c. / <i>dyai</i> -ji / -ʔfa /
[<i>dyai</i> - <i>jí</i> -ʔfa]
sit -PRCL -PLS | d. / <i>kuen</i> -ji / -ʔfa /
[<i>kuen</i> - <i>jín</i> -ʔfa]
grow -PRCL -PLS |
|---|---|---|---|

(113) STRESSLESS DISYLLABIC ROOTS

- | | | | | | |
|---|---|---|---|---|--|
| a. / <i>panza</i> /
[<i>pánza</i>]
hunt | b. / <i>afe</i> /
[<i>áfe</i>]
give | c. / <i>sema</i> /
[<i>séma</i>]
work | d. / <i>fetha</i> /
[<i>féthá</i>]
open | e. / <i>fûite</i> /
[<i>fûíte</i>]
help | f. / <i>fûndûi</i> /
[<i>fûndûi</i>]
sweep |
|---|---|---|---|---|--|

(114) STRESSLESS DISYLLABIC ROOTS WITH SUFFIXES

- | | | | | | |
|---|---|--|---|---|--|
| a. / <i>panza</i> -ji /
[<i>panzá</i> -ji]
hunt -PRCL | b. / <i>afe</i> -ji /
[<i>afé</i> -ji]
give -PRCL | c. / <i>sema</i> -ji /
[<i>semá</i> -jín]
work -PRCL | d. / <i>fetha</i> -ji /
[<i>fethá</i> -ji]
open -PRCL | e. / <i>fûite</i> -ji /
[<i>fûité</i> -ji]
help -PRCL | f. / <i>fûndûi</i> -ji /
[<i>fûndûi</i> -ji]
sweep -PRCL |
|---|---|--|---|---|--|

(115) STRESSLESS TRISYLLABIC ROOTS

- | | | | | |
|--|---|---|--|--|
| a. / <i>atapa</i> /
[<i>atápa</i>]
breed | b. / <i>utishi</i> /
[<i>utíshi</i>]
wash | c. / <i>shukendi</i> /
[<i>shukéndi</i>]
turn | d. / <i>upathû</i> /
[<i>upáthû</i>]
cut | e. / <i>avûja</i> /
[<i>avûjá</i>]
rejoice |
|--|---|---|--|--|

(116) STRESSLESS TRISYLLABIC ROOTS WITH SUFFIXES

- | | | | | |
|--|---|---|--|--|
| a. / <i>atapa</i> -ji /
[<i>atapá</i> -ji]
breed -PRCL | b. / <i>utishi</i> -ji /
[<i>utishí</i> -ji]
wash -PRCL | c. / <i>shukendi</i> -ji /
[<i>shukéndi</i> -ji]
turn -PRCL | d. / <i>upathû</i> -ji /
[<i>upathû</i> -ji]
cut -PRCL | e. / <i>avûja</i> -ji /
[<i>avûjá</i> -ji]
rejoice -PRCL |
|--|---|---|--|--|

(117) STRESSED DISYLLABIC ROOTS

- | | | | | | |
|--|--|---|--|---|--|
| a. / <i>áfa</i> /
[<i>áfa</i>]
speak | b. / <i>ána</i> /
[<i>ána</i>]
sleep | c. / <i>káti</i> /
[<i>káti</i>]
cast | d. / <i>fúndu</i> /
[<i>fúndu</i>]
shout | e. / <i>ítsa</i> /
[<i>ítsa</i>]
remove | f. / <i>áthe</i> /
[<i>áthe</i>]
see |
|--|--|---|--|---|--|

(118) STRESSED DISYLLABIC ROOTS WITH SUFFIXES

- | | | | | | |
|--|---|---|--|---|--|
| a. / <i>áfa</i> -ji /
[<i>áfa</i> -ji]
speak -PRCL | b. / <i>ána</i> -ji /
[<i>ána</i> -jin]
sleep -PRCL | c. / <i>káti</i> -ji /
[<i>káti</i> -ji]
cast -PRCL | d. / <i>fúndu</i> -ji /
[<i>fúndu</i> -ji]
shout -PRCL | e. / <i>ítsa</i> -ji /
[<i>ítsa</i> -ji]
remove -PRCL | f. / <i>áthe</i> -ji /
[<i>áthe</i> -ji]
see -PRCL |
|--|---|---|--|---|--|

(119) STRESSED TRISYLLABIC ROOTS

- | | |
|---|---|
| a. / <i>áfase</i> /
[<i>áfase</i>]
offend | b. / <i>kúndase</i> /
[<i>kúndase</i>]
tell |
|---|---|

(120) STRESSED TRISYLLABIC ROOTS WITH SUFFIXES

- | | |
|---|---|
| a. / <i>áfase</i> -ji /
[<i>áfase</i> -ji]
offend -PRCL | b. / <i>kúndase</i> -ji /
[<i>kúndase</i> -ji]
tell -PRCL |
|---|---|

(121) GLOTTALIZED DISYLLABIC ROOTS

- | | | | | | |
|---|--|---|---|---|---|
| a. / <i>séʔje</i> /
[<i>séʔje</i>]
cure | b. / <i>iʔna</i> /
[<i>iʔna</i>]
cry | c. / <i>fiʔthi</i> /
[<i>fiʔthi</i>]
kill | d. * / <i>σʔσ</i> /
[<i>σʔσ</i>]
ROOT | e. * / <i>ʔσσ</i> /
[<i>ʔσσ</i>]
ROOT | f. * / <i>σʔʔ</i> /
[<i>σʔʔ</i>]
ROOT |
|---|--|---|---|---|---|

(122) GLOTTALIZED DISYLLABIC ROOTS WITH SUFFIXES

- | | | | | | |
|---|---|---|---|---|---|
| a. / <i>séʔje</i> -ji /
[<i>séʔje</i> -ji]
cure -PRCL | b. / <i>iʔna</i> -ji /
[<i>iʔna</i> -jin]
cry -PRCL | c. / <i>fiʔthi</i> -ji /
[<i>fiʔthi</i> -ji]
kill -PRCL | d. * / <i>σʔσ</i> -ji /
[<i>σʔσ</i> -ji]
ROOT -PRCL | e. * / <i>ʔσσ</i> -ji /
[<i>ʔσσ</i> -ji]
ROOT -PRCL | f. * / <i>σʔʔ</i> -ji /
[<i>σʔʔ</i> -ji]
ROOT -PRCL |
|---|---|---|---|---|---|

(123) GLOTTALIZED TRISYLLABIC ROOTS

- | | | | | |
|---|---|---|---|---|
| a. / <i>ákheʔpa</i> /
[<i>ákheʔpa</i>]
forget | b. / <i>ánsaʔnge</i> /
[<i>ánsaʔnge</i>]
be shy | c. / <i>ákhuʔsha</i> /
[<i>ákhuʔsha</i>]
chop | d. * / <i>σσʔσ</i> /
[<i>σσʔσ</i>]
ROOT | e. * / <i>σʔσσ</i> /
[<i>σʔσσ</i>]
ROOT |
|---|---|---|---|---|

(124) GLOTTALIZED TRISYLLABIC ROOTS WITH SUFFIXES

- | | | | | |
|---|---|---|---|---|
| a. / <i>ákheʔpa</i> -ji /
[<i>ákheʔpa</i> -ji]
forget -PRCL | b. / <i>ánsaʔnge</i> -ji /
[<i>ánsaʔnge</i> -ji]
be shy -PRCL | c. / <i>ákhuʔsha</i> -ji /
[<i>ákhuʔsha</i> -ji]
chop -PRCL | d. * / <i>σσʔσ</i> -ji /
[<i>σσʔσ</i> -ji]
ROOT -PRCL | e. * / <i>σʔσσ</i> -ji /
[<i>σʔσσ</i> -ji]
ROOT -PRCL |
|---|---|---|---|---|

(125) VARIOUS BASES WITH -ʔje⁰ IPFV

- | | | |
|---|--|--|
| a. / <i>atapa</i> -ʔje ⁰ /
[<i>atápa</i> -ʔje]
breed -IPFV | b. / <i>áfase</i> -ʔje ⁰ /
[<i>afáse</i> -ʔje]
offend -IPFV | c. / <i>séʔje</i> -ʔje ⁰ /
[<i>séje</i> -ʔje]
cure -IPFV |
| d. / <i>ákheʔpa</i> -ʔje ⁰ /
[<i>akhépa</i> -ʔje]
forget -IPFV | e. / <i>ákheʔpa</i> -en -ʔje ⁰ /
[<i>akhepá</i> -en -ʔjen]
forget -CAUS -IPFV | f. / <i>ákheʔpa</i> -ye ⁰ -ʔje ⁰ /
[<i>akhepá</i> -ye -ʔje]
forget -PASS -IPFV |

(126) VARIOUS BASES WITH -ʔñakha⁰ SMFC

- | | | |
|---|---|--|
| a. / <i>atapa</i> -ʔñakha ⁰ /
[<i>atápa</i> -ʔñakha]
breed -SMFC | b. / <i>áfase</i> -ʔñakha ⁰ /
[<i>afáse</i> -ʔñakha]
offend -SMFC | c. / <i>séʔje</i> -ʔñakha ⁰ /
[<i>séje</i> -ʔñakha]
cure -SMFC |
| d. / <i>ákheʔpa</i> -ʔñakha ⁰ /
[<i>akhépa</i> -ʔñakha]
forget -SMFC | e. / <i>ákheʔpa</i> -en -ʔñakha ⁰ /
[<i>akhepá</i> -en -ʔñakha]
forget -CAUS -SMFC | f. / <i>ákheʔpa</i> -ye ⁰ -ʔñakha ⁰ /
[<i>akhepá</i> -ye -ʔñakha]
forget -PASS -SMFC |

(127) VARIOUS BASES WITH -ŋŋi⁰ VEN

- a. / *atapa* -ŋŋi⁰ /
[*atápa* -ŋŋi]
breed -VEN
- b. / *áfase* -ŋŋi⁰ /
[*afáse* -ŋŋi]
offend -VEN
- c. / *séŋje* -ŋŋi⁰ /
[*séje* -ŋŋi]
cure -VEN
- d. / *ákheŋpa* -ŋŋi⁰ /
[*akhépa* -ŋŋi]
forget -VEN
- e. / *ákheŋpa* -en -ŋŋi⁰ /
[*akhépá* -en -ŋŋi]
forget -CAUS -VEN
- f. / *ákheŋpa* -ye⁰ -ŋŋi⁰ /
[*akhépá* -ye -ŋŋi]
forget -PASS -VEN

(128) VARIOUS BASES WITH -ŋŋa⁰ AND

- a. / *atapa* -ŋŋa⁰ /
[*atápa* -ŋŋa]
breed -AND
- b. / *áfase* -ŋŋa⁰ /
[*afáse* -ŋŋa]
offend -AND
- c. / *séŋje* -ŋŋa⁰ /
[*séje* -ŋŋa]
cure -AND
- d. / *ákheŋpa* -ŋŋa⁰ /
[*akhépa* -ŋŋa]
forget -AND
- e. / *ákheŋpa* -en -ŋŋa⁰ /
[*akhépá* -en -ŋŋa]
forget -CAUS -AND
- f. / *ákheŋpa* -ye⁰ -ŋŋa⁰ /
[*akhépá* -ye -ŋŋa]
forget -PASS -AND

(129) VARIOUS ROOTS WITH -ŋje⁰ IPFV AND -ŋŋi⁰ VEN

- a. / *atapa* -ŋje⁰ -ŋŋi⁰ /
[*atápa* -ŋje -ŋŋi]
breed -IPFV -VEN
- b. / *áfase* -ŋje⁰ -ŋŋi⁰ /
[*afáse* -ŋje -ŋŋi]
offend -IPFV -VEN
- c. / *séŋje* -ŋje⁰ -ŋŋi⁰ /
[*séje* -ŋje -ŋŋi]
cure -IPFV -VEN
- d. / *ákheŋpa* -ŋje⁰ -ŋŋi⁰ /
[*akhépa* -ŋje -ŋŋi]
forget -IPFV -VEN

(130) VARIOUS ROOTS WITH -ŋje⁰ IPFV AND -ŋŋa⁰ AND

- a. / *atapa* -ŋje⁰ -ŋŋa⁰ /
[*atápa* -ŋje -ŋŋa]
breed -IPFV -AND
- b. / *áfase* -ŋje⁰ -ŋŋa⁰ /
[*afáse* -ŋje -ŋŋa]
offend -IPFV -AND
- c. / *séŋje* -ŋje⁰ -ŋŋa⁰ /
[*séje* -ŋje -ŋŋa]
cure -IPFV -AND
- d. / *ákheŋpa* -ŋje⁰ -ŋŋa⁰ /
[*akhépa* -ŋje -ŋŋa]
forget -IPFV -AND

(131) STRESSLESS AND STRESSED BASES WITH -jama⁰ PRHB

- a. / [*atapa*] -jama⁰ /
[*atapá* -jama]
breed -PRHB
- b. / [*áfase*] -jama⁰ /
[*afasé* -jama]
offend -PRHB
- c. / [*áfase* -an] -jama⁰ /
[*afasi* -án -jama]
offend -CAUS -PRHB

(132) GLOTTALIZED ROOTS WITH -jama⁰ PRHB

- a. / [*séŋje*] -jama⁰ /
[*seŋjé* -jama]
cure -PRHB
- b. / [*ákheŋpa*] -jama⁰ /
[*akhépá* -jama]
forget -PRHB
- c. / [*ákheŋpa* -en] -jama⁰ /
[*akhépá* -en -jama]
forget -CAUS -PRHB

(133) INNER PREGLOTTALIZED SUFFIXES WITH -jama⁰ PRHB

- a. / [*áfase* -ŋje⁰] -jama⁰ /
[*afase* -ŋjé -jama]
offend -IPFV -PRHB
- b. / [*séŋje* -ŋje⁰] -jama⁰ /
[*seje* -ŋjé -jama]
cure -IPFV -PRHB
- c. / [*ákheŋpa* -ŋje⁰] -jama⁰ /
[*akhépa* -ŋjé -jama]
forget -IPFV -PRHB

(134) (GLOTTALIZED ROOTS AND) OUTER PREGLOTTALIZED SUFFIXES WITH -jama⁰ PRHB

- a. / [*áfase*] -ŋfa -jama⁰ /
[*afase* -ŋfá -jama]
offend -PLS -PRHB
- b. / [*séŋje*] -ŋfa -jama⁰ /
[*seŋje* -ŋfá -jama]
cure -PLS -PRHB
- c. / [*ákheŋpa*] -ŋfa -jama⁰ /
[*akhépa* -ŋfá -jama]
forget -PLS -PRHB

(135) INNER AND OUTER PREGLOTTALIZED SUFFIXES WITH -jama⁰ PRHB

- a. / [*áfase* -ŋje⁰] -ŋfa -jama⁰ /
[*afase* -ŋje -ŋfá -jama]
offend -IPFV -PLS -PRHB
- b. / [*séŋje* -ŋje⁰] -ŋfa -jama⁰ /
[*seje* -ŋje -ŋfá -jama]
cure -IPFV -PLS -PRHB
- c. / [*ákheŋpa* -ŋje⁰] -ŋfa -jama⁰ /
[*akhépa* -ŋje -ŋfá -jama]
forget -IPFV -PLS -PRHB

(136) STRESSLESS AND STRESSED BASES WITH -kha⁰ IMP2

- a. / [*atapa*] -kha⁰ /
[*atapá* -kha]
breed -IMP2
- b. / [*áfase*] -kha⁰ /
[*afasé* -kha]
offend -IMP2
- c. / [*áfase* -an] -kha⁰ /
[*afasi* -án -kha]
offend -CAUS -IMP2

(137) GLOTTALIZED ROOTS WITH $-kha^{\emptyset}$ IMP2

- a. / [*séʔje*] $-kha^{\emptyset}$ /
 [*seʔjé* *-kha*]
 cure -IMP2
- b. / [*ákheʔpa*] $-kha^{\emptyset}$ /
 [*akheʔpá* *-kha*]
 forget -IMP2
- c. / [*ákheʔpa -en*] $-kha^{\emptyset}$ /
 [*akheʔpá -en* *-kha*]
 forget -CAUS -IMP2

(138) INNER PREGLOTTALIZED SUFFIXES WITH $-kha^{\emptyset}$ IMP2

- a. / [*áfase -ʔje^{\emptyset}*] $-kha^{\emptyset}$ /
 [*afase -ʔjé* *-kha*]
 offend -IPFV -IMP2
- b. / [*séʔje -ʔje^{\emptyset}*] $-kha^{\emptyset}$ /
 [*seje -ʔjé* *-kha*]
 cure -IPFV -IMP2
- c. / [*ákheʔpa -ʔje^{\emptyset}*] $-kha^{\emptyset}$ /
 [*akhepa -ʔjé* *-kha*]
 forget -IPFV -IMP2

(139) (GLOTTALIZED ROOTS AND) OUTER PREGLOTTALIZED SUFFIXES WITH $-kha^{\emptyset}$ IMP2

- a. / [*áfase*] $-ʔfa -kha^{\emptyset}$ /
 [*afase -ʔfá* *-kha*]
 offend -PLS -IMP2
- b. / [*séʔje*] $-ʔfa -kha^{\emptyset}$ /
 [*seʔje -ʔfá* *-kha*]
 cure -PLS -IMP2
- c. / [*ákheʔpa*] $-ʔfa -kha^{\emptyset}$ /
 [*akheʔpa -ʔfá* *-kha*]
 forget -PLS -IMP2

(140) INNER AND OUTER PREGLOTTALIZED SUFFIXES WITH $-kha^{\emptyset}$ IMP2

- a. / [*áfase -ʔje^{\emptyset}*] $-ʔfa -kha^{\emptyset}$ /
 [*afase -ʔje -ʔfá* *-kha*]
 offend -IPFV -PLS -IMP2
- b. / [*séʔje -ʔje^{\emptyset}*] $-ʔfa -kha^{\emptyset}$ /
 [*seje -ʔje -ʔfá* *-kha*]
 cure -IPFV -PLS -IMP2
- c. / [*ákheʔpa -ʔje^{\emptyset}*] $-ʔfa -kha^{\emptyset}$ /
 [*akhepa -ʔje -ʔfá* *-kha*]
 forget -IPFV -PLS -IMP2