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Two grammars of A'ingae glottalization

A case for Cophonologies by Phase

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introduction

abstract

language: A'ingae, or Cofán, an Amazonian isolate, ISO 639-3: **con**

data: phonological effects specific to

(i) morphological domains (strata)

(ii) idiosyncratic morphemes

⟩ (iii) they interact

implications: architecture of the morphology-phonology interface

model: Cophonologies by Phase (Sande et al., 2020)

glottal stop: the basics

(1) ʔ AS CONTRASTIVE IN ROOTS

a. *ûkha*
break.INTR

b. *ûʔkha*
break.TR

(2) ʔ AS CONTRASTIVE IN FUNCTIONAL MORPHEMES

a. *tsá =ma*
ANA =ACC

b. *tsá -ʔma*
ANA -FRST

two morphophonological parameters

A'ingae suffixes:

1. belong to one of two domains ← organized stratally
   - either *inner*: assign (óσʔ) stress
   - or *outer*: ʔ has no effect on stress

$$\underbrace{[\ \textit{root} + \textit{inner suffixes}\ ]}_{\text{inner domain}}\ \underbrace{+\ \textit{outer suffixes}}_{\text{outer domain}}$$

2. belong to one of two dominance classes ← unpredictable
   - either *recessive*: preserve underlying stress
   - or *dominant*: delete input stress

2 × 2 = 4 emergent suffix types

	INNER	*OUTER*
RECESSIVE	*inner recessive*	*outer recessive*
DOMINANT	*inner dominant*	*outer dominant*

table 1: 2 × 2 = 4 emergent suffix types

inner dominant: delete stress and glottal stops

outer dominant: delete stress

the main takeaway

different phonological grammars associated with

(i) ordered morphological domains (strata)

(ii) lexically idiosyncratic morphemes

↖↘↙ (iii) they interact

a phonological formalism needs to model

(i) phonological stratification

(ii) morpheme-specific idiosyncrasies

↖↘↙ (iii) which interact

Cophonologies by Phase (Sande et al., 2020) lives up to the task

talk: the road map

1. introduction

2. language background

3. description

4. central generalizations

5. analysis

6. conclusion

language background

A’ingae (or Cofán): geography

Amazonian isolate, ISO 639-3: **con**

spoken by ca. 1,500 Cofán people in

- Sucumbíos, northeast Ecuador
- Putumayo, southern Colombia

A’ingae (or Cofán): geography

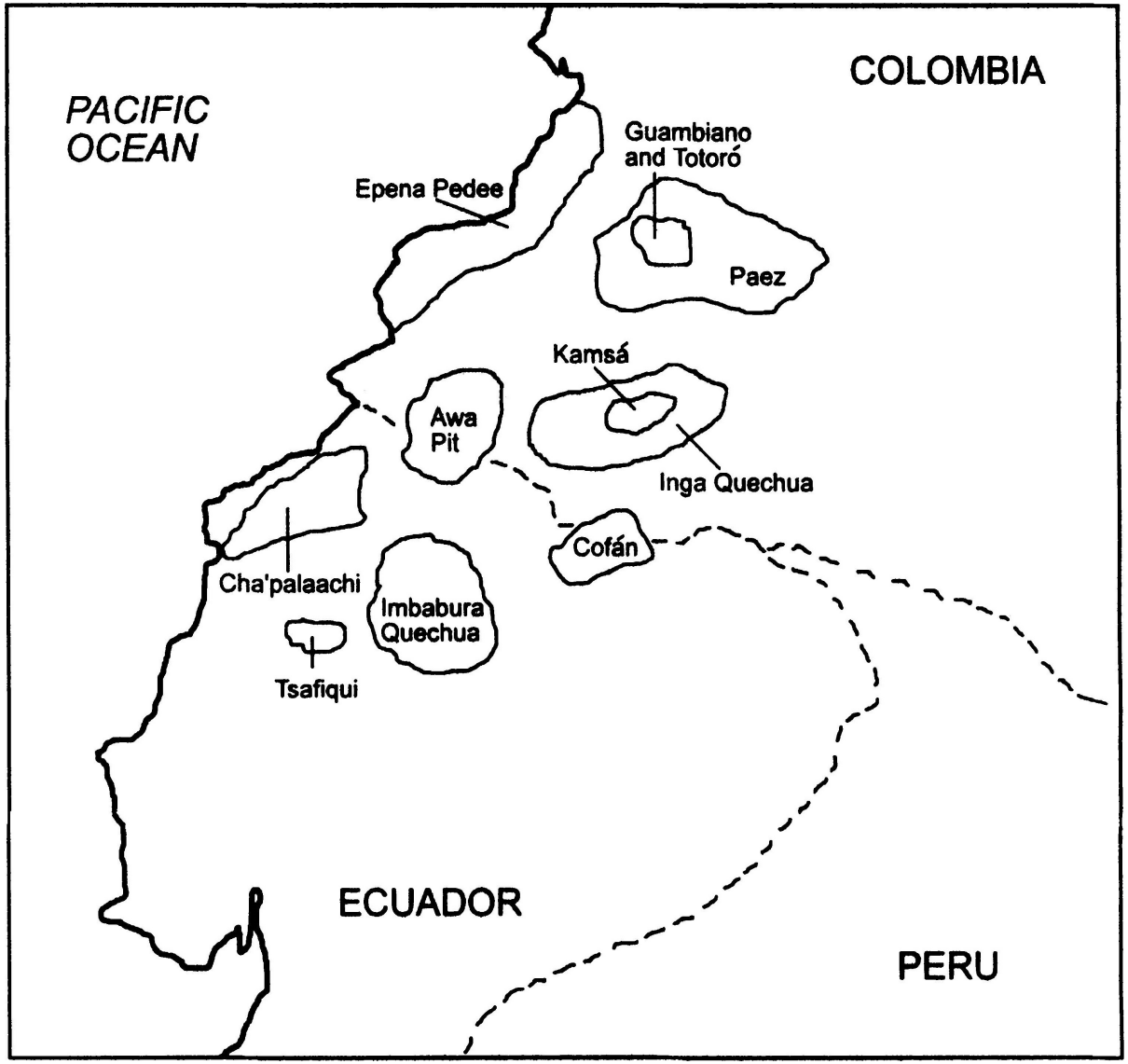

figure 1: indigenous languages of southern Colombia and northern Ecuador (Curnow and Liddicoat, 1998)

A’ingae (or Cofán): sociolinguistics

endangered and highly underdocumented

under economic, ecological, and political pressures

uniformly positive language attitudes (Dąbkowski, 2021)

data

- collected by author
- in 2021–2022
- with two consultants from Dureno, Sucumbíos, Ecuador

phonemic inventory

	LABIAL		ALVEOLAR		PALATAL		VELAR		GLOTTAL	
PLAIN STOPS	*p*	p	*t*	t			*k*	k	*ʔ*	ʔ
ASPIRATED STOPS	*ph*	p^h	*th*	t^h			*kh*	k^h		
PRENASAL STOPS	*mb*	$^m b$	*nd*	$^n d$			*ng*	$^ŋ g$		
NASAL SONORANTS	*m*	m	*n*	n	*ñ*	ɲ				
PLAIN FRICATIVES	*f*	f	*s*	s	*sh*	ʃ			*j*	h
PLAIN AFFRICATES			*ts*	ʦ	*ch*	ʧ				
ASPIRATED AFFRICATES			*tsh*	$ʦ^h$	*chh*	$ʧ^h$				
PRENASAL AFFRICATES			*nz*	$^n ʣ$	*ndy*	$^n ʤ$				
ORAL SONORANTS	*v*	ʋ	*r*	ɾ	*y*	j	*g*	ɰ		

table 2: consonantal inventory

	ORAL				NASAL			
	FRONT		BACK		FRONT		BACK	
CLOSE	*i*	i	*û*	ɨ	*in*	ĩ	*ûn*	ɨ̃
ROUND			*u*	o			*un*	õ
OPEN	*e*	e	*a*	a	*en*	ẽ	*an*	ã

ORAL	*ua*	oa	*ia*	ia	*ui*	oi	*ue*	oe
	au	ao	*ai*	ai	*ûi*	ɨi	(*ae*	ae)
NASAL	*uan*	õã	*ian*	ĩã	*uin*	õĩ	*uen*	õẽ
	aun	ãõ	*ain*	ãĩ	*ûin*	ɨĩ		

table 3: vocalic inventory

description

morphological structure of the A'ingae verb

heavily agglutinating language

two morphophonological domains, or strata

- *inner* domain: root, voice, aspect, associated motion
- *outer* domain: number, reality, polarity, subject person, etc.

(3) STRATAL ORGANIZATION OF THE A'INGAE VERB

[kufé -khu -ʔje -ngi] -ʔfa -ya -mbi =tsû
play -RCPR -IPFV -PROX -PLS -IRR -NEG =3

"they$_{3,PLS}$ will$_{IRR}$ not$_{NEG}$ come$_{PROX}$ to be$_{IPFV}$ playing with each other$_{RCPR}$"

description: the road map

1. roots

2. inner suffixes

3. outer suffixes

roots: stressless (4), stressed (5), and glottalized (6)

(4) Stressless roots

a. / *phi* /
[*phí*]
sit

b. / *panza* /
[*pánza*]
hunt

c. / *atapa* /
[*atápa*]
breed

a. / *phi -ji -ʔfa* /
[*phi -jí -ʔfa*]
sit -PRCL -PLS

b. / *panza -ji* /
[*panzá -ji*]
hunt -PRCL

c. / *atapa -ji* /
[*atapá -ji*]
breed -PRCL

(5) Stressed roots

a. / *áfa* /
[*áfa*]
speak

b. / *káti* /
[*káti*]
cast

c. / *áfase* /
[*áfase*]
offend

d. / *áfa -ji* /
[*áfa -ji*]
speak -PRCL

e. / *káti -ji* /
[*káti -ji*]
cast -PRCL

f. / *áfase -ji* /
[*áfase -ji*]
offend -PRCL

roots: stressless (4), stressed (5), and glottalized (6)

(5) Stressed roots

a. / *áfa* /
[*áfa*]
speak

b. / *káti* /
[*káti*]
cast

c. / *áfase* /
[*áfase*]
offend

d. / *áfa -ji* /
[*áfa -ji*]
speak -PRCL

e. / *káti -ji* /
[*káti -ji*]
cast -PRCL

f. / *áfase -ji* /
[*áfase -ji*]
offend -PRCL

(6) Glottalized roots

a. / *séʔje* /
[*séʔje*]
cure

b. / *fíʔthi* /
[*fíʔthi*]
kill

c. / *ánsaʔnge* /
[*ánsaʔnge*]
be shy

d. / *séʔje -ji* /
[*séʔje -ji*]
cure -PRCL

e. / *fíʔthi -ji* /
[*fíʔthi -ji*]
kill -PRCL

f. / *ánsaʔnge -ji* /
[*ánsaʔnge -ji*]
be shy -PRCL

alternating glottalized roots

(7) ALTERNATING GLOTTALIZED ROOTS: (C)V.ʔV

a. *kú́.ʔi*
drink

b. *tsá.ʔu*
house

c. *á.ʔi*
person

(8) ... WITH AN INFLECTIONAL SUFFIX: (C)V.ʔV

a. *kú́.ʔi -ji*
drink -PRCL

b. *tsá.ʔu -mbi*
house -NEG

c. *á.ʔi -mbi*
person -NEG

(9) ... WITH A DERIVATIONAL SUFFIX: (C)VVʔ

a. *kúiʔ. -khû*
drink -SH.DLM
"chucula"

b. *tsáu -ʔ.pa*
house -N
"nest"

c. *ái -ʔ.vu*
person -ʔ
"body"

(10) ... WITH THE INNER *-ÑA* CAUS: (C)VVʔ

a. *kúiʔ. -ña*
drink -CAUS

b. *tsáuʔ. -ña*
house -CAUS

inner suffixes

(v)	ASSOCIATED MOTION: *-ʔngi* PROX, *-ʔnga* DIST
(iv)	ASPECT: *-ʔje* IPFV, *-ji* PRCL, *-kha* PAUC, *-ʔñakha* SMFC
(iii)	PASSIVE: *-ye* PASS
(ii)	RECIPROCAL: *-khu* RCPR
(i)	CAUSATIVE: *-ña*/*-an*/*-en* CAUS
(o)	VERBAL ROOT: $\sqrt{}$

table 4: inner suffixes (a fragment of the template)

-ña/-an/-en CAUS

inner recessive

- if UR stressless, penultimate default stress
- preexisting stress and glottalization preserved

(11) STRESSLESS ROOTS WITH *-ÑA/-AN/-EN* CAUS

a.	b.	c.
/ *phi. -ña* /	/ *pa.nza -en* /	/ *a.ta.pa -en* /
[***phí***. *-ña*]	[***pá***.*nza -en*]	[*a.****tá***.*pa -en*]
sit -CAUS	hunt -CAUS	breed -CAUS

(12) STRESSED AND GLOTTALIZED ROOTS WITH *-ÑA/-AN/-EN* CAUS

a.	b.	c.
/ ***kú***.*nda.se -an* /	/ ***séʔ***.*je -an* /	/ ***á***.*kheʔ.pa -en* /
[***kú***.*nda.si -an*]	[***séʔ***.*ji -an*]	[***á***.*kheʔ.pa -en*]
tell -CAUS	cure -CAUS	forget -CAUS

-*khu*$^{\varnothing}$ RCPR and -*ye*$^{\varnothing}$ PASS

inner dominant

- stress and glottalization are deleted
- then, penultimate stress assigned by default

(13) VARIOUS ROOTS WITH -*KHU*$^{\varnothing}$ RCPR

a.	b.	c.
/ *atapa -khu*$^{\varnothing}$ /	/ *áfase -khu*$^{\varnothing}$ /	/ *ákheʔpa -khu*$^{\varnothing}$ /
[*atapá -khu*]	[*afasé -khu*]	[*akhepá -khu*]
breed -RCPR	offend -RCPR	forget -RCPR

(14) VARIOUS ROOTS WITH -*YE*$^{\varnothing}$ PASS

a.	b.	c.
/ *upathû -ye*$^{\varnothing}$ /	/ *áfase -ye*$^{\varnothing}$ /	/ *ákheʔpa -ye*$^{\varnothing}$ /
[*upathû -ye*]	[*afasé -ye*]	[*akhepá -ye*]
cut -PASS	offend -PASS	forget -PASS

(15) GLOTTALIZED ROOTS WITH -*AN*/-*EN* CAUS, -*KHU*$^{\varnothing}$ RCPR, AND -*YE*$^{\varnothing}$ PASS

a.	b.
/ *séʔje -an -ye*$^{\varnothing}$ /	/ *ákheʔpa -en -khu*$^{\varnothing}$ *-ye*$^{\varnothing}$ /
[*seji -án -ñe*]	[*akhepa -en -khú -ye*]
cure -CAUS -PASS	forget -CAUS -RCPR -PASS

-ji PRCL

inner recessive

- if UR stressless, penultimate default stress
- preexisting stress and glottalization preserved

(16) STRESSLESS BASES WITH *-JI* PRCL

b.	b.	c.
/ *atapa -ji* /	/ *phi -ña -ji* /	/ *séʔje -ye*$^{\varnothing}$ *-ji* /
[*atapá -ji*]	[*phi -ñá -jin*]	[*seje -yé -ji*]
breed -PRCL	sit -CAUS -PRCL	cure -PASS -PRCL

(17) STRESSED AND GLOTTALIZED BASES WITH *-JI* PRCL

a.	b.	c.
/ *áfase -ji* /	/ *séʔje -ji* /	/ *ákheʔpa -en -ji* /
[*áfase -ji*]	[*séʔje -ji*]	[*ákheʔpa -en -jin*]
offend -PRCL	cure -PRCL	forget -CAUS -PRCL

inner dominant

- stress and glottalization are deleted
- then, penultimate stress assigned by default

(18) VARIOUS BASES WITH -*KHA*$^{\varnothing}$ PAUC

a. / *atapa -kha*$^{\varnothing}$ /
[*atapá -kha*]
breed -PAUC

b. / *áfase -kha*$^{\varnothing}$ /
[*afasé -kha*]
offend -PAUC

c. / *séʔje -kha*$^{\varnothing}$ /
[*sejé -kha*]
cure -PAUC

d. / *ákheʔpa -kha*$^{\varnothing}$ /
[*akhepá -kha*]
forget -PAUC

e. / *ákheʔpa -en -kha*$^{\varnothing}$ /
[*akhepá -en -kha*]
forget -CAUS -PAUC

preglottalized suffixes

preglottalized *inner dominant*

- stress and glottalization are deleted
- then, penultimate stress assigned by default

(19) VARIOUS BASES WITH *-ʔJE*$^{\varnothing}$ IPFV, *-ʔÑAKHA*$^{\varnothing}$ SMFC, *-ʔNGI*$^{\varnothing}$ PROX, OR *-ʔNGA*$^{\varnothing}$ DIST

a. / *atapa -ʔje*$^{\varnothing}$ /
[*atápa -ʔje*]
breed -IPFV

b. / *áfase -ʔñakha*$^{\varnothing}$ /
[*afáse -ʔñakha*]
offend -SMFC

c. / *séʔje -ʔngi*$^{\varnothing}$ /
[*séje -ʔngi*]
cure -PROX

d. / *ákheʔpa -ʔnga*$^{\varnothing}$ /
[*akhépa -ʔnga*]
forget -DIST

e. / *ákheʔpa -ye*$^{\varnothing}$ *-ʔñakha*$^{\varnothing}$ /
[*akhepá -ye -ʔñakha*]
forget -PASS -SMFC

inner suffixes: a recap

inner recessive: *-ña/-an/-en* CAUS, *-ji* PRCL

- retain stress and ʔ

inner dominant: *-khu*$^{\varnothing}$ RCPR, *-ye*$^{\varnothing}$ PASS, *-kha*$^{\varnothing}$ PAUC

- delete stress and ʔ

preglottalized *inner dominant*: *-ʔje*$^{\varnothing}$ IPFV, *-ʔñakha*$^{\varnothing}$ SMFC, *-ʔngi*$^{\varnothing}$ PROX, *-ʔnga*$^{\varnothing}$ DIST

- delete stress and ʔ
- assign (óσʔ) stress

no correlation between phonological operation and template slot

outer suffixes

(xii)	SUBJECT PERSON: *=ngi* 1, *=ki* 2, *=tsû* 3
(xi)	SENTENCE-LEVEL: *=te* RPRT, *=ti* YNQ
(x)	CLAUSE TYPE
	SUBORDINATE: *-ʔta* IF.SS, *-ʔja* IF2.SS, *-ʔni* IF.DS, *-ʔma* FRST, *-saʔne* APPR
	COSUBORDINATE: *-pa* SS, *-si* DS
	MATRIX: *-ja* IMP, *-kha*$^{\varnothing}$ IMP2, *-ʔse* IMP3, *-jama*$^{\varnothing}$ PRHB, *-ʔya* VER
(ix)	FINITENESS: *-ye* INF
(viii)	POLARITY: *-mbi* NEG
(vii)	REALITY: *-ya* IRR
(vi)	SUBJECT NUMBER: *-ʔfa* PLS

table 5: outer suffixes (the rest of the template)

stressless base + *outer recessive*

outer recessive

- if UR stressless, stress right edge of inner domain
- ʔ irrelevant to stress assignment

(20) STRESSLESS BASES WITH PLAIN OUTER SUFFIXES

a. / [atapa] -ja /
[atapá -ja]
breed -IMP

b. / [phi -ña] -si /
[phi -ñá -si]
sit -CAUS -DS

c. / [afe -ji] =ngi /
[afe -jí =ngi]
give -PRCL =1

(21) STRESSLESS BASES WITH PREGLOTTALIZED OUTER SUFFIXES

a. / [atapa] -ʔfa /
[atapá -ʔfa]
breed -PLS

b. / [phi -ña] -ʔse /
[phi -ñá -ʔse]
sit -CAUS -IMP3

c. / [afe -ji] -ʔya /
[afe -jí -ʔya]
give -PRCL -VER

(22) STRESSLESS BASES WITH PLAIN AND PREGLOTTALIZED OUTER SUFFIXES

a. / [atapa] -saʔne /
[atapá -saʔne]
breed -APPR

b. / [afe -ji] -mbi -ʔma /
[afe -jí -mbi -ʔma]
give -PRCL -NEG -FRST

c. / [atapa] -ʔni =te /
[atapá -ʔni =nde]
breed -IF.DS =RPRT

d. / [afe -ji] -ʔfa -ya -mbi /
[afe -jí -ʔfa -ya -mbi]
give -PRCL -PLS -IRR -NEG

stressed base + *outer recessive*

outer recessive

- underlying stress and ʔ retained

(23) Stressed roots with outer suffixes

a. / [**ká**ti] -ʔya /
[**ká**ti -ʔya]
cast -VER

b. / [**á**kheʔpa -ji] -ye /
[**á**kheʔpa -ji -ye]
forget -PRCL -INF

c. / [**ká**ti] -ya -mbi /
[**ká**ti -ya -mbi]
cast -IRR -NEG

d. / [**séʔ**je -ji] -ʔfa -ye /
[**séʔ**je -ji -ʔfa -ye]
cure -PRCL -PLS -INF

(24) Inner preglottalized suffixes with outer suffixes

a. / [atapa -ʔngi$^{\varnothing}$] -ʔya /
[a**tá**pa -ʔngi -ʔya]
breed -PROX -VER

b. / [**á**kheʔpa -ʔnga$^{\varnothing}$] -ye /
[a**khé**pa -ʔnga -ye]
forget -DIST -INF

d. / [**á**fase -ʔje$^{\varnothing}$] -ya -mbi /
[a**fá**se -ʔje -ya -mbi]
offend -IPFV -IRR -NEG

e. / [**séʔ**je -khu$^{\varnothing}$ -ʔje$^{\varnothing}$] -ʔfa /
[se**jé** -khu -ʔje -ʔfa]
cast -RCPR -IPFV -PLS

destressed base + *outer recessive*

outer recessive

- if stress deleted, stress right edge of inner domain
- ʔ irrelevant to stress assignment

(25) INNER DOMINANT SUFFIXES WITH OUTER SUFFIXES

a. / [**ká**ti -an -ye$^{\varnothing}$] =ki /
[kati -an -**ñé** =ki]
cast -CAUS -PASS =2

b. / [**séʔ**je -khu$^{\varnothing}$ -ji] -ʔfa /
[seje -khu -**jí** -ʔfa]
cure -RCPR -PRCL -PLS

c. / [**á**kheʔpa -ye$^{\varnothing}$] -ye /
[akhepa -**yé** -ye]
forget -PASS -INF

d. / [**ká**ti -khu$^{\varnothing}$] -pa =ti /
[kati -**khú** -pa =ti]
cast -RCPR -SS =YNQ

e. / [**séʔ**je -khu$^{\varnothing}$] -ʔfa -ya /
[seje -**khú** -ʔfa -ya]
cure -RCPR -PLS -IRR

f. / [**á**kheʔpa -ye$^{\varnothing}$ -ji] -ʔfa -saʔne /
[akhepa -ye -**jí** -ʔfa -saʔne]
forget -PASS -PRCL -PLS -APPR

any base + *outer dominant* i

outer dominant

- previous stress deleted, ʔ preserved
- stress assigned to the left of the suffix

(26) STRESSLESS AND STRESSED BASES WITH *-JAMA*$^{\varnothing}$ PRHB OR *-KHA*$^{\varnothing}$ IMP2

a. / [*atapa*] *-jama*$^{\varnothing}$ /
[*atapá* *-jama*]
breed -PRHB

b. / [*áfase*] *-kha*$^{\varnothing}$ /
[*afasé* *-kha*]
offend -IMP2

c. / [*áfase* *-an*] *-jama*$^{\varnothing}$ /
[*afasi* *-án* *-jama*]
offend -CAUS -PRHB

(27) GLOTTALIZED ROOTS WITH *-JAMA*$^{\varnothing}$ PRHB OR *-KHA*$^{\varnothing}$ IMP2

a. / [*séʔje*] *-kha*$^{\varnothing}$ /
[*seʔjé* *-kha*]
cure -IMP2

b. / [*ákheʔpa*] *-jama*$^{\varnothing}$ /
[*akheʔpá* *-jama*]
forget -PRHB

(28) INNER PREGLOTTALIZED SUFFIXES WITH *-JAMA*$^{\varnothing}$ PRHB OR *-KHA*$^{\varnothing}$ IMP2

a. / [*áfase* *-ʔje*$^{\varnothing}$] *-jama*$^{\varnothing}$ /
[*afase* *-ʔjé* *-jama*]
offend -IPFV -PRHB

b. / [*séʔje* *-ʔje*$^{\varnothing}$] *-kha*$^{\varnothing}$ /
[*seje* *-ʔjé* *-kha*]
cure -IPFV -IMP2

any base + *outer dominant* ii

outer dominant

- previous stress deleted, ʔ preserved
- stress assigned to the left of the suffix

(29) Outer preglottalized suffixes with -*JAMA*$^{\varnothing}$ prhb or -*KHA*$^{\varnothing}$ imp2

a. / [*áfase*] -ʔfa -*kha*$^{\varnothing}$ /
[*afase* -ʔ*fá* -*kha*]
offend -pls -imp2

b. / [*séʔje*] -ʔfa -*jama*$^{\varnothing}$ /
[*seʔje* -ʔ*fá* -*jama*]
cure -pls -prhb

(30) Inner and outer preglottalized suffixes with -*JAMA*$^{\varnothing}$ prhb or -*KHA*$^{\varnothing}$ imp2

a. / [*áfase* -ʔje$^{\varnothing}$] -ʔfa -*jama*$^{\varnothing}$ /
[*afase* -ʔje -ʔ*fá* -*jama*]
offend -ipfv -pls -prhb

b. / [*séʔje* -ʔje$^{\varnothing}$] -ʔfa -*kha*$^{\varnothing}$ /
[*seje* -ʔje -ʔ*fá* -*kha*]
cure -ipfv -pls -imp2

c. / [*ákheʔpa* -ʔje$^{\varnothing}$] -ʔfa -*jama*$^{\varnothing}$ /
[*akhepa* -ʔje -ʔ*fá* -*jama*]
forget -ipfv -pls -prhb

outer suffixes: a recap

outer recessive: *-ʔfa* PLS, *-ye* INF, *-ʔta* IF.SS, *-ja* IMP, *=ngi* 1, . . .

- if UR stressless, stress right edge of inner domain
- ʔ irrelevant to stress assignment

outer dominant: *-jama*$^{\varnothing}$ PRHB, *-kha*$^{\varnothing}$ IMP2

- previous stress deleted, ʔ preserved
- stress assigned to the left of the suffix

central generalizations

first central generalization

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.

inner domain:

- assign (σ́σʔ) stress
- stress deleting suffixes also delete ʔ

outer domain:

- ʔ has no effect on stress
- stress deleting suffixes do not delete ʔ

second central generalization

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.

dominant suffixes delete stress

- *inner dominant* suffixes
  - also delete ʔ — in the *inner* domain, stress interacts with ʔ
  - in the absence of ʔ, do not assign stress — true of the *inner* domain
  - otherwise, assign (σσʔ) stress — true of *inner* domain, including roots
- *outer dominant* suffixes
  - do not delete ʔ — in the *outer* domain, stress does not interact with ʔ
  - assign stress to their left — again, true of *outer* suffixes in general

analysis

model: Cophonologies by Phase (or CbP)

Cophonologies by Phase (or CbP) (Sande, 2017, 2019; Sande and Jenks, 2018; Sande, Jenks, and Inkelas, 2020)

cophonology $\stackrel{def}{=}$ a morphologically-specific phonological grammar

- a phase head $\longleftrightarrow$ a cophonology ($\mathfrak{R}$)
- a morphosyntactic feature bundle $\longleftrightarrow$ a cophonology ($\mathfrak{R}$)

phonological evaluation applies to morphological constituents, or phases

all cophonologies within a phase are compiled and added to the *master* ranking (Anttila, 2002)

after spell-out, the phonology resets to the (*master*) ranking

implementation

(i) lower phase heads $\longleftrightarrow$ *inner* cophonology:
? is a feature of the foot – assigns (σσ?) stress

higher phase heads $\longleftrightarrow$ *outer* cophonology:
? is a regular segment – no effect of glottalization on stress

(ii) dominant suffixes $\longleftrightarrow$ *dominant* cophonology:
requires stress deletion

(iii) interaction: phase head cophonology × morpheme cophonology

Cophonologies by Phase captures the two central generalization

four phases

four phase heads: *v*, Asp, T, C

(31) Feature-cophonology mappings in A'ingae, first iteration

a. *v*, Asp $\longleftrightarrow$ { $\mathfrak{R}$: *inner* }

independent non-phonological evidence for *v*, Asp, T, C as morphosyntactic constituents

first phase: *v*P

(32) VERBS DERIVED WITH *-ÑA/-AN/-EN* CAUS

a. *tsáuʔña*
tsáuʔ -ña
house -CAUS
"build a house"

b. *síña*
sín -ña
black -CAUS
"blacken"

c. *sápian*
sápe -an
flat -CAUS
"smash"

d. *tsáuʔpaen*
tsáuʔpa -en
nest -CAUS
"nestle"

second phase: AspP

(33) AspP suffixes illicit on nouns

a. *panzá -ji*
hunt -PRCL
"about to hunt"

b. **tsándie -ji*
man -PRCL
int.: "about to be a man"

(34) Outer (TP) suffixes licit on nouns

c. *panzá -ʔfa*
hunt -PLS
"(they) hunted"

d. *tsándie -ʔfa*
man -PLS
"(they) are men"

third and fourth phase: TP and CP

(35) Feature-cophonology mappings in A'ingae, second iteration

a. *v*, Asp $\longleftrightarrow$ { $\mathfrak{R}$: *inner* }

b. T, C $\longleftrightarrow$ { $\mathfrak{R}$: *outer* }

(36) TP suffixes licit in *ʔchu*-nominalizations

a. *panzá -ya -ʔchu*
hunt -IRR -SBRD

b. *panzá -ʔfa -ʔchu*
hunt -PLS -SBRD

(37) CP suffixes illicit in *ʔchu*-nominalizations

a. **panzá -ʔta -ʔchu*
hunt -IF.SS -SBRD

b. **panzá -jama -ʔchu*
hunt -PRHB -SBRD

feature-cophonology mappings

(38) Feature-cophonology mappings in A'ingae, final iteration

a. *v*, Asp $\longleftrightarrow$ { $\mathfrak{R}$: *inner* }

b. T, C $\longleftrightarrow$ { $\mathfrak{R}$: *outer* }

c. RCPR, IPFV, PRHB, ... $\longleftrightarrow$ { $\mathfrak{R}$: *dominant* }

(CP ⟷ { 𝔑: *outer* })

(xii) SUBJECT PERSON: *=ngi* 1, *=ki* 2, *=tsû* 3

(xi) SENTENCE-LEVEL: *=te* RPRT, *=ti* YNQ

(x) CLAUSE TYPE

SUBORDINATE: *-ʔta* IF.SS, *-ʔja* IF2.SS, *-ʔni* IF.DS, *-ʔma* FRST, *-saʔne* APPR

COSUBORDINATE: *-pa* SS, *-si* DS

MATRIX: *-ja* IMP, *-kha*$^{\varnothing}$ IMP2, *-ʔse* IMP3, *-jama*$^{\varnothing}$ PRHB, *-ʔya* VER

(TP ⟷ { 𝔑: *outer* })

(ix) FINITENESS: *-ye* INF

(viii) POLARITY: *-mbi* NEG

(vii) REALITY: *-ya* IRR

(vi) SUBJECT NUMBER: *-ʔfa* PLS

(AspP ⟷ { 𝔑: *inner* })

(v) ASSOCIATED MOTION: *-ʔngi*$^{\varnothing}$ PROX, *-ʔnga*$^{\varnothing}$ DIST

(iv) ASPECT: *-ʔje*$^{\varnothing}$ IPFV, *-ji* PRCL, *-kha*$^{\varnothing}$ PAUC, *-ʔñakha*$^{\varnothing}$ SMFC

(iii) PASSIVE: *-ye*$^{\varnothing}$ PASS

(ii) RECIPROCAL: *-khu*$^{\varnothing}$ RCPR

vP ⟷ { 𝔑: *inner* }

(i) CAUSATIVE: *-ña*/*-an*/*-en* CAUS

(o) VERBAL ROOT: √

LEGEND

$^{\varnothing}$ ⟷ { 𝔑: *dominant* }

plain inner dominant

preglottalized inner dominant

outer dominant

table 6: morphophonological template of the A'ingae verb

2 to 4 spell-outs per verb

(39) a. At most four phonological evaluations per verb

[[[[indi -án]$_{vP}$ *-khu -ʔje -ngi]*$_{AspP}$ *-ʔfa -ya]*$_{TP}$ *-ʔni =nde]*$_{CP}$
be fermented -CAUS -RCPR -IPFV -PROX -PLS -IRR -IF.DS =RPRT

"allegedly$_{RPRT}$ if$_{IF}$ (they$_{PLS}$) will$_{IRR}$ come$_{PROX}$ to be$_{IPFV}$ fermenting$_{CAUS}$ among themselves$_{RCPR}$, (someone else$_{DS}$) …"

b. At least two phonological evaluations per verb

[[kúʔfe]$_{vP}$ *]*$_{TP}$
play

"played"

the *inner* cophonology

applies to

- roots
- *inner* suffixes

active at the spell out of

- *v*P
- AspP

inner: stressed roots

(40) MAXIMALITY(FOOT), or: MAXf
For every metrical foot in the input, there is a corresponding metrical foot in the output.

(41)

a.	(*káti*)	vP: *inner* MAXf ⟩⟩	...
i.	*kati*	*!	
☞ ii.	(*káti*)		*
iii.	*ka*(*tí*)	*!	
	cast		

b.	(*áfa*)*se*	vP: *inner* MAXf ⟩⟩	...
i.	*afase*	*!	
☞ ii.	(*áfa*)*se*		*
iii.	*a*(*fáse*)	*!	
	offend		

inner: glottalized roots

(42) Disyllabic glottalized roots

a. / *séʔje* /
[*séʔje*]
cure

b. / *fíʔthi* /
[*fíʔthi*]
kill

c. / *káʔni* /
[*káʔni*]
enter

(43) Trisyllabic glottalized roots

a. / *ákhuʔsha* /
[*ákhuʔsha*]
chop

b. / *ákheʔpa* /
[*ákheʔpa*]
forget

c. / *ánsaʔnge* /
[*ánsaʔnge*]
be shy

inner: ʔ as a feature of the metrical foot

(44) ʔ AS FEATURE OF THE FOOT IN THE INNER DOMAIN

a.	(×	.	*ʔ*)	.	b.	.	(×	.	*ʔ*)	.	c.	.	(	×	*ʔ*	.	)
	á	*khe*	*pa*			*a*	*tá*	*pa*	*je*			*fû*	*ndûi*	*ngi*			
	forget					breed			IPFV			sweep		PROX			

(45) FOOT{ʔ}, or: f{ʔ}

The glottal stop is a facultative feature of the metrical foot. Assign a violation mark for every stray glottal stop outside of a metrical foot.

inner: ʔ as metrical feature + other constraints

(46) DISYLLABIC GLOTTALIZED ROOTS

a. / *seje,ʔ* /
[*séʔje*]
cure

b. / *fithi,ʔ* /
[*fíʔthi*]
kill

c. / *kani,ʔ* /
[*káʔni*]
enter

(47) TRISYLLABIC GLOTTALIZED ROOTS

a. / *akhusha,ʔ* /
[*ákhuʔsha*]
chop

b. / *akhepa,ʔ* /
[*ákheʔpa*]
forget

c. / *ansange,ʔ* /
[*ánsaʔnge*]
be shy

(48) MAXIMALITY(ʔ), or: MAXʔ
For every ʔ in the input, there is a corresponding ʔ in the output.

(49) DEPENDENCE(FOOT), or: DEPf
For every metrical foot in the output, there is a metrical foot in the input.

(50) ALIGN(ʔ-R, FOOT-R), or: ALʔ)
Every glottal stop is right-aligned with a metrical foot.

(51) NONFINALITY(ʔ), or: NFʔ
A glottal stop is not final in a prosodic word.

inner: disyllabic glottalized roots

			vP : *inner*				
(52)		*seje,ʔ*	f{ʔ},	MAXʔ,	NFʔ ⟩⟩	DEPf,	ALʔ)
	i.	*seje*		∗!			
	ii.	*seje,ʔ*	∗!				∗
☞	iii.	(*séʔje*)				∗	∗
	iv.	(*séjeʔ*)			∗!	∗	
		cure					

inner: trisyllabic glottalized roots

(53)		*akhepa,ʔ*	vP : *inner* f{ʔ},	MAXʔ,	NFʔ ⟩⟩	DEPf,	ALʔ)
	i.	*akhepa*		*∗!*			
	ii.	*akhepa,ʔ*	*∗!*				*∗*
	iii.	*(áʔkhe)pa*				*∗*	*∗!*
☞	iv.	*(ákheʔ)pa*				*∗*	
	v.	*a(khéʔpa)*				*∗*	*∗!*
	vi.	*a(khépaʔ)*			*∗!*	*∗*	
		forget					

inner: alternating glottalized roots

(54) ALTERNATING GLOTTALIZED ROOTS: (C)V.ʔV

a. *kú́.ʔi*
drink

b. *tsá.ʔu*
house

c. *á.ʔi*
person

(55) ... WITH AN INFLECTIONAL SUFFIX: (C)V.ʔV

a. *kú́.ʔi -ji*
drink -PRCL

b. *tsá.ʔu -mbi*
house -NEG

c. *á.ʔi -mbi*
person -NEG

(56) ... WITH THE INNER *-ÑA* CAUS: (C)VVʔ

a. *kúíʔ. -ña*
drink -CAUS

b. *tsáuʔ. -ña*
house -CAUS

inner: bare alternating roots

			vP : *inner*		
(57)		*kûi,ʔ*	f{ʔ},	NFʔ ⟩⟩	ALʔ)
	i.	*kûi,ʔ*	∗!		∗
	ii.	(*kúiʔ*)		∗!	
☞	iii.	(*kû.ʔi*)			∗
	iv.	(*kû.iʔ*)		∗!	
		drink			

inner: alternating roots + *v*P suffixes

(58) PARSESYLLABLES, or: PRSσ
Assign a violation mark for each unfooted syllable in the output.

			*v*P : *inner*			
(59)		*kûi,ʔ-ña*	f{ʔ},	NFʔ,	PRSσ ⟩⟩	ALʔ)
	i.	*kûi.ña,ʔ*	∗!		∗!∗	
	ii.	*(kú́.ʔi)ña*			∗!	∗
	iii.	*(kú́.iʔ)ña*			∗!	
☞	iv.	*(kú́iʔ.ña)*				∗
	v.	*(kú́i.ñaʔ)*		∗!		
		drink-CAUS				

inner: alternating glottalized roots + other suffixes

(60) 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.

		AspP : *inner*				
(61)		*[(kú̂.ʔi)]-ji*	f{ʔ},	LINʔ ⟩⟩	PRSσ ⟩⟩	ALʔ)
	i.	*kûi.ji,ʔ*	*!	*	**	*
☞	ii.	*(kú̂.ʔi)ji*			*	*
	iii.	*(kú̂.iʔ)ji*		*!	*	
	iv.	*(kûiʔ.ji)*		*!		*
		drink-PRCL				

inner: stressless roots

		vP : *inner*	
(62)	*afe*	DEPf ⟩⟩	PRSσ
☞ i.	*afe*		**
ii.	*(áfe)*	*!	
	give		

		vP : *inner*	
(63)	*atapa*	DEPf ⟩⟩	PRSσ
☞ i.	*atapa*		***
ii.	*(áta)pa*	*!	*
	breed		

inner: stressless roots + *v*P/AspP suffixes

vP: *inner*

(64)		*afe-an*	MAXf, MAX? ⟩⟩	DEPf
☞	i.	*afian*		
	ii.	*(áfian)*		*!
		give-CAUS		

AspP: *inner*

(65)		*[atapa]-ji*	MAXf, MAX? ⟩⟩	DEPf
☞	i.	*atapaji*		
	ii.	*(áta)paji*		*!
		breed(63)-PRCL		

inner: stressed roots + *v*P/AspP suffixes

		vP: *inner*		
(66)	*seje,ʔ-an*	MAXf,	MAXʔ ⟩⟩	DEPf
	i. *sejian*		*!	
☞	ii. *(séʔjian)*			*
	cure-CAUS			

		AspP: *inner*		
(67)	*[(áfa)se]-ji*	MAXf,	MAXʔ ⟩⟩	DEPf
	i. *afaseji*	*!		
☞	ii. *(áfa)seji*			
	offend(41b)-PRCL			

inner recessive suffixes

(68) Phonological rankings in A'ingae, first iteration

a. *master:* { Maxf, Max?, Lin? } ⟫ Depf ⟫ Prsσ, NF?

b. *inner:* f{?}, { NF?, Prsσ } ⟫ Al?)

(69) *Master* ranking compiled with *inner* ranking

master ⨁ *inner:*

f{?}, { Maxf, Max?, Lin? } ⟫ Depf ⟫ { NF?, Prsσ } ⟫ Al?)

dominant: AntiMaximality

(70) PhaseAntiMaximality(Foot{}), or: ¬Max[f{}]
For no metrical foot or its feature in the previously spelled-out phase, is there a corresponding metrical foot or a corresponding metrical feature in the output.
I. e., assign a violation for each metrical foot and each glottal stop in the previously spelled-out phase that is also present (and also a feature of the metrical foot) in the output.

differences from Alderete (1999, 2001):

1. deletion of a metrical foot entails the deletion of its features
2. ¬Max[f{}] is sensitive only to the foot (and glottalization) in the previously spelled-out phase
3. ¬Max[f{}] involves universal quantification

inner dominant suffixes deleting stress

			AspP : *inner* ⊕ *dominant*		
(71)		*[(áfa)se]-ye*	¬MAX[f{}] ⟩⟩	MAXf,	DEPf
☞	i.	*afaseye*		*	
	ii.	*(áfa)seye*	*!		
	iii.	*afa(séye)*		*	*!
		offend$^{(41b)}$-PASS			

inner dominant suffixes deleting stress and ʔ

		AspP : *inner* ⊕ *dominant*					
(72)	*[(ákheʔ)pa]-khu*	f{ʔ},	¬Max[f{}] ⟩⟩	Maxf,	Maxʔ ⟩⟩	Depf	
☞ i.	*akhepakhu*			*	*		
ii.	*akheʔpakhu*	*!	*	*			
iii.	*(ákhe)pakhu*		*!		*		
iv.	*(ákheʔ)pakhu*		*!*				
v.	*akhe(pákhu)*			*	*	*!	
	forget(53)-RCPR						

preglottalized *inner dominant* assigning stress i

(73)		*[atapa]-ʔje*	f{ʔ},	¬MAX[f{}] ⟩⟩	MAXf,	MAXʔ ⟩⟩	DEPf,	ALʔ)
			AspP : *inner* ⊕ *dominant*					
	i.	*atapaje*			*!			
	ii.	*atapaʔje*	*!					*
☞	iii.	*a(tápaʔ)je*					*	
	iv.	*ata(páʔje)*					*	*!
		breed(62b)-IPFV						

preglottalized *inner dominant* assigning stress ii

		AspP: *inner* ⊕ *dominant*					
(74)	*[(ákheʔ)pa]-ʔje*	f{ʔ},	¬MAX[f{}] ⟩⟩	MAXf,	MAXʔ ⟩⟩	DEPf,	ALʔ)
i.	*akhepaje*			*	**!		
ii.	*akhepaʔje*	*!		*	*		*
iii.	*(ákheʔ)paje*		*!*		*		
☞ iv.	*a(khépaʔ)je*			*	*	*	
v.	*a(khéʔpaʔ)je*	*!	*	*	**	*	*
vi.	*akhe(páʔje)*			*	*	*	*!

forget(53)-IPFV

master, *inner*, and *dominant*: a recap

glottal stop is a feature of the metrical foot (in the inner domain)

- deletion of stress also deletes glottalization

(75) Phonological rankings in A'ingae, second iteration

a. *master:* { Maxf, Max?, Lin? } ⟫ Depf ⟫ Prsσ, NF?

b. *inner:* f{?}, { NF?, Prsσ } ⟫ { Al?) }

c. *dominant:* ¬Max[f{}] ⟫ { Maxf, Max?, Lin? }

the *outer* cophonology

applies to

- outer suffixes

active at the spell out of

- TP
- CP

stressless base + TP suffixes

(76) LexicalWord≈ProsodicWord, or: Lx≈ω
Every lexical word corresponds to a prosodic word.

(77) Align(Stress-R, Phase-R), or: Aló]
Primary stress is right-aligned with the right edge of the previous phase.

			TP: *outer*		
(78)		*[afaseye]-ya*	Lx≈ω ⟩⟩	Aló] ⟩⟩	Depf
	i.	*afaseyeya*	*!		
	ii.	*(áfa)seyeya*		*!**	*
	iii.	*a(fáse)yeya*		*!*	*
	iv.	*afa(séye)ya*		*!	*
☞	v.	*afase(yéya)*			*
	vi.	*afaseye(yá)*		*!	*
		offend-pass(71)-irr			

outer: ʔ as a regular consonant

(79) ʔ AS A REGULAR SEGMENT IN THE OUTER DOMAIN

a. (× .) .
á khe? pa
forget

b. . (× .).
a tá pa ʔje
breed IPFV

c. . (× .)
fû ndûi ʔngi
sweep PROX

d. . . (× .)
a ta pá ʔfa
breed PLS

(80) CONSONANT{ʔ}, or: C{ʔ}
Glottal stops are regular consonantal segments. Assign a violation mark for every glottal stop which is a feature of the metrical foot.

stressless base + (preglottalized) TP suffixes

		TP: *outer*		
(81)	*[atapa]-ʔfa-ya*	C{ʔ},	ALÓ] ⟩⟩	DEPf
i.	*a(tápaʔ)faya*	∗!	∗	∗
ii.	*a(tápaʔ)faya*		∗!	∗
iii.	*ata(páʔfa)ya*	∗!		∗
☞ iv.	*ata(páʔfa)ya*			∗
v.	*atapaʔ(fáya)*		∗!	∗

breed$^{(62b)}$-PLS-IRR

stressed (glottalized) base + TP suffixes

			TP: *outer*			
(82)		*[a(tápaʔ)je]-ya-mbi*	C{ʔ},	MAXf,	MAXʔ ⟩⟩	ALÓ]
	i.	*a(tápa)jeyambi*			*!	**
	ii.	*a(tápaʔ)jeyambi*	*!			**
☞	iii.	*a(tápaʔ)jeyambi*				**
	iv.	*atapa(jéya)mbi*		*!	*	
	v.	*atapaʔ(jéya)mbi*		*!		

breed-IPFV[(73)]-IRR-NEG

stressless base + CP suffixes

		CP : *outer*			
(83)	*[atapa]-saʔne*	C{ʔ},	MAXf,	MAXʔ ⟩⟩	ALÓ]
i.	*a(tápa)saʔne*				∗!
☞ ii.	*ata(pásaʔ)ne*				
iii.	*atapa(saʔne)*				∗!
	breed$^{(63)}$-APPR				

stressless base + TP and CP suffixes

		TP : *outer*		
(84)	*[atapa]-ʔfa*	C{ʔ},	MAXf ⟩⟩	ALÓ]
i.	*a(tápaʔ)fa*			*!
☞ ii.	*ata(páʔfa)*			
iii.	*atapaʔ(fá)*			*!
	breed$^{(62b)}$-PLS			

		CP : *outer*		
(85)	*[ata(páʔfa)]-ja*	C{ʔ},	MAXf ⟩⟩	ALÓ]
☞ i.	*ata(páʔfa)ja*			*
ii.	*atapaʔ(fája)*		*!	
iii.	*atapaʔfa(já)*		*!	*
	breed-PLS$^{(84)}$-IMP			

outer CP spell-out, no CP suffixes

(86) NonFinality(Stress), or: NFó
Primary stress is not final in a prosodic word.

TP: *outer*

(87)		*[akhepayeji]*	C{ʔ},	Maxf,	NFó,	Lx≈ω ⟩⟩	Alό]
	i.	*akhepayeji*				*!	
	ii.	*akhe(páye)ji*					**!
☞	iii.	*akhepa(yéji)*					*
	iv.	*akhepaye(jí)*			*!		

forget-pass-prcl

outer dominant suffixes deleting stress, not ʔ

			CP: *outer* ⊕ *dominant*				
(88)		*[a(tápaʔ)je]-jama*	C{ʔ},	¬MAX[f{}] ⟩⟩	MAXf,	MAXʔ ⟩⟩	ALÓ]
	i.	*a(tápaʔ)jejama*	*!	**			**
	ii.	*a(tápaʔ)jejama*		*!			**
	iii.	*atapa(jéja)ma*			*	*!	
☞	iv.	*atapaʔ(jéja)ma*			*		
	v.	*atapaʔje(jáma)*			*		*!

breed-IPFV(73)-PRHB

all cophonologies: a recap

(89) Phonological rankings in A'ingae, final iteration

a. *master:* { Maxf, Max?, Lin? } ⟫ Depf ⟫ Prsσ, NFó, NF?

b. *inner:* f{?}, { NF?, Prsσ } ⟫ { Al?) }

c. *outer:* C{?}, { Maxf, NFó, Lx≈ω } ⟫ Alσ] ⟫ Depf

d. *dominant:* ¬Max[f{}] ⟫ { Maxf, Max?, Lin? }

conclusion

conclusion i

stress assignment/deletion × glottalization interaction

- deletion of a foot entails deletion of its features (glottal stops in the inner domain)

dominance as the only lexical parameter

- *dominant* cophonology combines with *inner* or *outer*

	inner	*inner* ⊕ *dominant*	*outer*	*outer* ⊕ *dominant*
STRESS	preserved	deleted	preserved	deleted
GLOTTALIZATION	preserved	deleted	preserved	preserved
IF ABSENT OR DELETED, STRESS (RE)ASSIGNED	only due to glottalization: (σσʔ)		to the R-edge of spelled-out phrase	

table 7: interactions of the *inner*, *outer*, and *dominant* cophonologies

conclusion ii

organization of phonological grammar:

- morphological domains $\longleftrightarrow$ *inner* or *outer*
- individual affixes ($\longleftrightarrow$ *dominant*)

CbP implementation:

- morphological domains $\approx$ phase heads
- individual affixes $\approx$ morphosyntactic feature bundles

conclusion iii

typologically new application of CbP

previous extensive case study: Guébie (Sande, 2019)

- ATR harmony, vowel replacement, scalar tone shift
- monomorphemic words

current case study: A'ingae

- stress assignment, stress deletion, prosodic glottalization
- subword domains of highly agglutinative verbs

Cophonologies by Phase affords insight into and successfully models formally different phenomena in typologically dissimilar languages

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appendix

additional data i

(90) STRESSLESS MONOSYLLABIC ROOTS

a.	b.	c.	d.
/ *phi* /	/ *tsun* /	/ *dyai* /	/ *kuen* /
[***phí***]	[***tsún***]	[***dyái***]	[***kuén***]
sit	do	sit	grow

(91) STRESSLESS MONOSYLLABIC ROOTS WITH SUFFIXES

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

(92) STRESSLESS DISYLLABIC ROOTS

a.	b.	c.	d.	e.	f.
/ *panza* /	/ *afe* /	/ *sema* /	/ *fetha* /	/ *fûite* /	/ *fûndûi* /
[***pá****nza*]	[***á****fe*]	[***sé****ma*]	[***fé****tha*]	[***fû́i****te*]	[***fû́****ndûi*]
hunt	give	work	open	help	sweep

(93) STRESSLESS DISYLLABIC ROOTS WITH SUFFIXES

a.	b.	c.	d.	e.	f.
/ *panza -ji* /	/ *afe -ji* /	/ *sema -ji* /	/ *fetha -ji* /	/ *fûite -ji* /	/ *fûndûi -ji* /
[*pa****nzá*** *-ji*]	[*a****fé*** *-ji*]	[*se****má*** *-jin*]	[*fe****thá*** *-ji*]	[*fûi****té*** *-ji*]	[*fûn****dû́i*** *-ji*]
hunt -PRCL	give -PRCL	work -PRCL	open -PRCL	help -PRCL	sweep -PRCL

additional data ii

(94) STRESSLESS TRISYLLABIC ROOTS

a.	b.	c.	d.	e.
/ *atapa* /	/ *utishi* /	/ *shukendi* /	/ *upathû* /	/ *avûja* /
[*atápa*]	[*utíshi*]	[*shukéndi*]	[*upáthû*]	[*avûja*]
breed	wash	turn	cut	rejoice

(95) STRESSLESS TRISYLLABIC ROOTS WITH SUFFIXES

a.	b.	c.	d.	e.
/ *atapa -ji* /	/ *utishi -ji* /	/ *shukendi -ji* /	/ *upathû -ji* /	/ *avûja -ji* /
[*atapá -ji*]	[*utishí -ji*]	[*shukendí -ji*]	[*upathû -ji*]	[*avûjá -ji*]
breed -PRCL	wash -PRCL	turn -PRCL	cut -PRCL	rejoice -PRCL

(96) STRESSED DISYLLABIC ROOTS

a.	b.	c.	d.	e.	f.
/ *áfa* /	/ *ána* /	/ *káti* /	/ *fúndu* /	/ *ítsa* /	/ *áthe* /
[*áfa*]	[*ána*]	[*káti*]	[*fúndu*]	[*ítsa*]	[*áthe*]
speak	sleep	cast	shout	remove	see

(97) STRESSED DISYLLABIC ROOTS WITH SUFFIXES

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

additional data iii

(98) STRESSED TRISYLLABIC ROOTS

a.	/ *áfase* /	b.	/ *kúndase* /
	[*áfase*]		[*kúndase*]
	offend		tell

(99) STRESSED TRISYLLABIC ROOTS WITH SUFFIXES

a.	/ *áfase -ji* /	b.	/ *kúndase -ji* /
	[*áfase -ji*]		[*kúndase -ji*]
	offend -PRCL		tell -PRCL

(100) GLOTTALIZED DISYLLABIC ROOTS

a.	/ *séʔje* /	b.	/ *íʔna* /	c.	/ *fíʔthi* /	d. *	/ σʔσ /	e. *	/ ʔóσ /	f. *	/ óσʔ /
	[*séʔje*]		[*íʔna*]		[*fíʔthi*]		[óʔσ]		[ʔóσ]		[óσʔ]
	cure		cry		kill		ROOT		ROOT		ROOT

(101) GLOTTALIZED DISYLLABIC ROOTS WITH SUFFIXES

a.	/ *séʔje -ji* /	b.	/ *íʔna -ji* /	c.	/ *fíʔthi -ji* /	d. *	/ σʔσ -ji /	e. *	/ ʔóσ -ji /	f. *	/ óσʔ -ji /
	[*séʔje -ji*]		[*íʔna -jin*]		[*fíʔthi -ji*]		[σʔó -ji]		[ʔóσ -ji]		[óσʔ -ji]
	cure -PRCL		cry -PRCL		kill -PRCL		ROOT -PRCL		ROOT -PRCL		ROOT -PRCL

additional data iv

(102) GLOTTALIZED TRISYLLABIC ROOTS

a.	b.	c.	d.	e.
/ *ákheʔpa* /	/ *ánsaʔnge* /	/ *ákhuʔsha* /	* / *σσʔσ* /	* / *σ́ʔσσ* /
[*ákheʔpa*]	[*ánsaʔnge*]	[*ákhuʔsha*]	[*σσ́ʔσ*]	[*σ́ʔσσ*]
forget	be shy	chop	ROOT	ROOT

(103) GLOTTALIZED TRISYLLABIC ROOTS WITH SUFFIXES

a.	b.	c.	d.	e.
/ *ákheʔpa -ji* /	/ *ánsaʔnge -ji* /	/ *ákhuʔsha -ji* /	* / *σσʔσ -ji* /	* / *σ́ʔσσ -ji* /
[*ákheʔpa -ji*]	[*ánsaʔnge -ji*]	[*ákhuʔsha -ji*]	[*σσʔσ́ -ji*]	[*σ́ʔσσ -ji*]
forget -PRCL	be shy -PRCL	chop -PRCL	ROOT -PRCL	ROOT -PRCL

(104) ALTERNATING GLOTTALIZED ROOTS

a.	b.	c.	d.	e.
kṹ.ʔi	*tsá.ʔu*	*á.ʔi*	*tṹ.ʔi*	*já.ʔi*
drink	house	person	tomorrow	later

(105) ALTERNATING GLOTTALIZED ROOTS WITH AN INFLECTIONAL SUFFIX

a.	b.	c.	d.	e.
kṹ.ʔi -ji	*tsá.ʔu -mbi*	*á.ʔi -mbi*	*tṹ.ʔi -mbi*	*já.ʔi -mbi*
drink -PRCL	house -NEG	person -NEG	tomorrow -NEG	later -NEG

(106) ALTERNATING GLOTTALIZED ROOTS WITH A DERIVATIONAL SUFFIX

a.	b.	c.	d.	e.
kṹiʔ. -khû	*tsáu -ʔ.pa*	*áiʔ. -vu*	*tṹiʔ. -ve*	*jáiʔ. -ngae*
drink -SH.DLM	house -N	person -?	tomorrow -ACC2	later -MANN
“chucula”	“nest”	“body”	“overmorrow”	“eventually”

additional data v

(107) ALTERNATING GLOTTALIZED ROOTS WITH THE INNER -*ÑA* CAUS

a. *kʉ́iʔ. -ña*
drink -CAUS

b. *tsáuʔ. -ña*
house -CAUS

(108) VARIOUS BASES WITH -*ʔJE*$^{\varnothing}$ IPFV

a. / *atapa -ʔje*$^{\varnothing}$ /
[*atápa -ʔje*]
breed -IPFV

b. / *áfase -ʔje*$^{\varnothing}$ /
[*afáse -ʔje*]
offend -IPFV

c. / *séʔje -ʔje*$^{\varnothing}$ /
[*séje -ʔje*]
cure -IPFV

d. / *ákheʔpa -ʔje*$^{\varnothing}$ /
[*akhépa -ʔje*]
forget -IPFV

e. / *ákheʔpa -en -ʔje*$^{\varnothing}$ /
[*akhepá -en -ʔjen*]
forget -CAUS -IPFV

f. / *ákheʔpa -ye*$^{\varnothing}$ *-ʔje*$^{\varnothing}$ /
[*akhepá -ye -ʔje*]
forget -PASS -IPFV

(109) VARIOUS BASES WITH -*ʔÑAKHA*$^{\varnothing}$ SMFC

a. / *atapa -ʔñakha*$^{\varnothing}$ /
[*atápa -ʔñakha*]
breed -SMFC

b. / *áfase -ʔñakha*$^{\varnothing}$ /
[*afáse -ʔñakha*]
offend -SMFC

c. / *séʔje -ʔñakha*$^{\varnothing}$ /
[*séje -ʔñakha*]
cure -SMFC

d. / *ákheʔpa -ʔñakha*$^{\varnothing}$ /
[*akhépa -ʔñakha*]
forget -SMFC

e. / *ákheʔpa -en -ʔñakha*$^{\varnothing}$ /
[*akhepá -en -ʔñakha*]
forget -CAUS -SMFC

f. / *ákheʔpa -ye*$^{\varnothing}$ *-ʔñakha*$^{\varnothing}$ /
[*akhepá -ye -ʔñakha*]
forget -PASS -SMFC

additional data vi

(110) VARIOUS BASES WITH *-ʔNGI*$^{\varnothing}$ PROX

a. / *atapa -ʔngi*$^{\varnothing}$ /
[*atápa -ʔngi*]
breed -PROX

b. / *áfase -ʔngi*$^{\varnothing}$ /
[*afáse -ʔngi*]
offend -PROX

c. / *séʔje -ʔngi*$^{\varnothing}$ /
[*séje -ʔngi*]
cure -PROX

d. / *ákheʔpa -ʔngi*$^{\varnothing}$ /
[*akhépa -ʔngi*]
forget -PROX

e. / *ákheʔpa -en -ʔngi*$^{\varnothing}$ /
[*akhepá -en -ʔngi*]
forget -CAUS -PROX

f. / *ákheʔpa -ye*$^{\varnothing}$ *-ʔngi*$^{\varnothing}$ /
[*akhepá -ye -ʔngi*]
forget -PASS -PROX

(111) VARIOUS BASES WITH *-ʔNGA*$^{\varnothing}$ DIST

a. / *atapa -ʔnga*$^{\varnothing}$ /
[*atápa -ʔnga*]
breed -DIST

b. / *áfase -ʔnga*$^{\varnothing}$ /
[*afáse -ʔnga*]
offend -DIST

c. / *séʔje -ʔnga*$^{\varnothing}$ /
[*séje -ʔnga*]
cure -DIST

d. / *ákheʔpa -ʔnga*$^{\varnothing}$ /
[*akhépa -ʔnga*]
forget -DIST

e. / *ákheʔpa -en -ʔnga*$^{\varnothing}$ /
[*akhepá -en -ʔnga*]
forget -CAUS -DIST

f. / *ákheʔpa -ye*$^{\varnothing}$ *-ʔnga*$^{\varnothing}$ /
[*akhepá -ye -ʔnga*]
forget -PASS -DIST

(112) VARIOUS ROOTS WITH *-ʔJE*$^{\varnothing}$ IPFV AND *-ʔNGI*$^{\varnothing}$ PROX

a. / *atapa -ʔje*$^{\varnothing}$ *-ʔngi*$^{\varnothing}$ / [*atápa -ʔje -ngi*] breed -IPFV -PROX
b. / *áfase -ʔje*$^{\varnothing}$ *-ʔngi*$^{\varnothing}$ / [*afáse -ʔje -ngi*] offend -IPFV -PROX
c. / *séʔje -ʔje*$^{\varnothing}$ *-ʔngi*$^{\varnothing}$ / [*séje -ʔje -ngi*] cure -IPFV -PROX
d. / *ákheʔpa -ʔje*$^{\varnothing}$ *-ʔngi*$^{\varnothing}$ / [*akhépa -ʔje -ngi*] forget -IPFV -PROX

additional data vii

(113) VARIOUS ROOTS WITH *-ʔJE*$^{\varnothing}$ IPFV AND *-ʔNGA*$^{\varnothing}$ DIST

a. / *atapa -ʔje*$^{\varnothing}$ *-ʔnga*$^{\varnothing}$ / // *áfase -ʔje*$^{\varnothing}$ *-ʔnga*$^{\varnothing}$ / // *séʔje -ʔje*$^{\varnothing}$ *-ʔnga*$^{\varnothing}$ / / *ákheʔpa -ʔje*$^{\varnothing}$ *-ʔnga*$^{\varnothing}$ /
[*atápa -ʔje -nga*] [*afáse -ʔje -nga*] [*séje -ʔje -nga*] [*akhépa -ʔje -nga*]
breed -IPFV -DIST offend -IPFV -DIST cure -IPFV -DIST forget -IPFV -DIST

(114) STRESSLESS BASES WITH PLAIN AND PREGLOTTALIZED OUTER SUFFIXES

a. / [*atapa*] *-saʔne* /
[*atapá -saʔne*]
breed -APPR

b. / [*phi -ña*] *-ya =tsû* /
[*phi -ñá -ña =tsû*]
sit -CAUS -IRR =3

c. / [*afe -ji*] *-mbi -ʔma* /
[*afe -jí -mbi -ʔma*]
give -PRCL -NEG -FRST

d. / [*atapa*] *-ʔfa =te* /
[*atapá -ʔfa =te*]
breed -PLS =RPRT

e. / [*phi -ña*] *-ʔfa -ʔta* /
[*phi -ñá -ʔfa -ʔta*]
sit -CAUS -PLS -IF.SS

f. / [*afe -ji*] *-ʔfa -ya -mbi* /
[*afe -jí -ʔfa -ya -mbi*]
give -PRCL -PLS -IRR -NEG

(115) STRESSED ROOTS WITH OUTER SUFFIXES

a. / [*káti*] *-ʔya* /
[*káti -ʔya*]
cast -VER

b. / [*séʔje -an*] *-mbi* /
[*séʔji -an -mbi*]
cure -CAUS -NEG

c. / [*ákheʔpa -ji*] *-ye* /
[*ákheʔpa -ji -ye*]
forget -PRCL -INF

d. / [*káti*] *-ya -mbi* /
[*káti -ya -mbi*]
cast -IRR -NEG

e. / [*séʔje -ji*] *-ʔfa -ye* /
[*séʔje -ji -ʔfa -ye*]
cure -PRCL -PLS -INF

f. / [*ákheʔpa -en*] *-ya -ʔya* /
[*ákheʔpa -en -ña -ʔña*]
forget -CAUS -IRR -VER

additional data viii

(116) Inner preglottalized suffixes with outer suffixes

a. / [atapa -ʔngi$^{\varnothing}$] -ʔya /
[atápa -ʔngi -ʔya]
breed -PROX -VER

b. / [séʔje -ʔñakha$^{\varnothing}$] -mbi /
[seje -ʔñakha -mbi]
cure -SMFC -NEG

c. / [ákheʔpa -ʔnga$^{\varnothing}$] -ye /
[akhépa -ʔnga -ye]
forget -DIST -INF

d. / [áfase -ʔje$^{\varnothing}$] -ya -mbi ɬ/
[afáse -ʔje -ya -mbi]
offend -IPFV -IRR -NEG

e. / [séʔje -khu$^{\varnothing}$ -ʔje$^{\varnothing}$] -ʔfa /
[sejé -khu -ʔje -ʔfa]
cast -RCPR -IPFV -PLS

f. / [ákheʔpa -en -ʔje$^{\varnothing}$] =tsû /
[akhepá -en -ʔjen =tsû]
forget -CAUS -IPFV =3

(117) Inner plain dominant suffixes with outer suffixes

a. / [káti -an -ye$^{\varnothing}$] =ki /
[kati -an -ñé =ki]
cast -CAUS -PASS =2

b. / [séʔje -khu$^{\varnothing}$ -ji] -ʔfa /
[seje -khu -jí -ʔfa]
cure -RCPR -PRCL -PLS

c. / [ákheʔpa -ye$^{\varnothing}$] -ye /
[akhepa -yé -ye]
forget -PASS -INF

d. / [káti -khu$^{\varnothing}$] -pa =ti /
[kati -khú -pa =ti]
cast -RCPR -SS =YNQ

e. / [séʔje -khu$^{\varnothing}$] -ʔfa -ya /
[seje -khú -ʔfa -ya]
cure -RCPR -PLS -IRR

f. / [ákheʔpa -ye$^{\varnothing}$ -ji] -ʔfa -saʔne
[akhepa -ye -jí -ʔfa -saʔne
forget -PASS -PRCL -PLS -APPR

(118) Stressless and stressed bases with -JAMA$^{\varnothing}$ PRHB

a. / [atapa] -jama$^{\varnothing}$ /
[atapá -jama]
breed -PRHB

b. / [áfase] -jama$^{\varnothing}$ /
[afasé -jama]
offend -PRHB

c. / [áfase -an] -jama$^{\varnothing}$ /
[afasi -án -jama]
offend -CAUS -PRHB

additional data ix

(119) Glottalized roots with -*JAMA*$^{\varnothing}$ PRHB

a. / [*sé?je*] -*jama*$^{\varnothing}$ /
[*se?jé* -*jama*]
cure -PRHB

b. / [*ákhe?pa*] -*jama*$^{\varnothing}$ /
[*akhe?pá* -*jama*]
forget -PRHB

c. / [*ákhe?pa* -*en*] -*jama*$^{\varnothing}$ /
[*akhe?pá* -*en* -*jama*]
forget -CAUS -PRHB

(120) Inner preglottalized suffixes with -*JAMA*$^{\varnothing}$ PRHB

a. / [*áfase* -*?je*$^{\varnothing}$] -*jama*$^{\varnothing}$ /
[*afase* -*?jé* -*jama*]
offend -IPFV -PRHB

b. / [*sé?je* -*?je*$^{\varnothing}$] -*jama*$^{\varnothing}$ /
[*seje* -*?jé* -*jama*]
cure -IPFV -PRHB

c. / [*ákhe?pa* -*?je*$^{\varnothing}$] -*jama*$^{\varnothing}$ /
[*akhepa* -*?jé* -*jama*]
forget -IPFV -PRHB

(121) (Glottalized roots and) outer preglottalized suffixes with -*JAMA*$^{\varnothing}$ PRHB

a. / [*áfase*] -*?fa* -*jama*$^{\varnothing}$ /
[*afase* -*?fá* -*jama*]
offend -PLS -PRHB

b. / [*sé?je*] -*?fa* -*jama*$^{\varnothing}$ /
[*se?je* -*?fá* -*jama*]
cure -PLS -PRHB

c. / [*ákhe?pa*] -*?fa* -*jama*$^{\varnothing}$ /
[*akhe?pa* -*?fá* -*jama*]
forget -PLS -PRHB

(122) Inner and outer preglottalized suffixes with -*JAMA*$^{\varnothing}$ PRHB

a. / [*áfase* -*?je*$^{\varnothing}$] -*?fa* -*jama*$^{\varnothing}$ /
[*afase* -*?je* -*?fá* -*jama*]
offend -IPFV -PLS -PRHB

b. // [*sé?je* -*?je*$^{\varnothing}$] -*?fa* -*jama*$^{\varnothing}$ ./
[*seje* -*?je* -*?fá* -*jama*]
cure -IPFV -PLS -PRHB

c. / [*ákhe?pa* -*?je*$^{\varnothing}$] -*?fa* -*jama*$^{\varnothing}$ /
[*akhepa* -*?je* -*?fá* -*jama*]
forget -IPFV -PLS -PRHB

(123) Stressless and stressed bases with -*KHA*$^{\varnothing}$ IMP2

a. / [*atapa*] -*kha*$^{\varnothing}$ /
[*atapá* -*kha*]
breed -IMP2

b. / [*áfase*] -*kha*$^{\varnothing}$ /
[*afasé* -*kha*]
offend -IMP2

c. / [*áfase* -*an*] -*kha*$^{\varnothing}$ /
[*afasi* -*án* -*kha*]
offend -CAUS -IMP2

additional data x

(124) GLOTTALIZED ROOTS WITH -*KHA*$^{\varnothing}$ IMP2

a. / [*sé*ʔ*je*] -*kha*$^{\varnothing}$ /
[*se*ʔ*jé* -*kha*]
cure -IMP2

b. / [*á*k*he*ʔ*pa*] -*kha*$^{\varnothing}$ /
[*akhe*ʔ*pá* -*kha*]
forget -IMP2

c. / [*á*k*he*ʔ*pa* -*en*] -*kha*$^{\varnothing}$ /
[*akhe*ʔ*pá* -*en* -*kha*]
forget -CAUS -IMP2

(125) INNER PREGLOTTALIZED SUFFIXES WITH -*KHA*$^{\varnothing}$ IMP2

a. / [*á*f*ase* -ʔ*je*$^{\varnothing}$] -*kha*$^{\varnothing}$ /
[*afase* -ʔ*jé* -*kha*]
offend -IPFV -IMP2

b. / [*sé*ʔ*je* -ʔ*je*$^{\varnothing}$] -*kha*$^{\varnothing}$ /
[*seje* -ʔ*jé* -*kha*]
cure -IPFV -IMP2

c. / [*á*k*he*ʔ*pa* -ʔ*je*$^{\varnothing}$] -*kha*$^{\varnothing}$ /
[*akhepa* -ʔ*jé* -*kha*]
forget -IPFV -IMP2

(126) (GLOTTALIZED ROOTS AND) OUTER PREGLOTTALIZED SUFFIXES WITH -*KHA*$^{\varnothing}$ IMP2

a. / [*á*f*ase*] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*afase* -ʔ*fá* -*kha*]
offend -PLS -IMP2

b. / [*sé*ʔ*je*] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*se*ʔ*je* -ʔ*fá* -*kha*]
cure -PLS -IMP2

c. / [*á*k*he*ʔ*pa*] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*akhe*ʔ*pa* -ʔ*fá* -*kha*]
forget -PLS -IMP2

(127) INNER AND OUTER PREGLOTTALIZED SUFFIXES WITH -*KHA*$^{\varnothing}$ IMP2

a. / [*á*f*ase* -ʔ*je*$^{\varnothing}$] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*afase* -ʔ*je* -ʔ*fá* -*kha*]
offend -IPFV -PLS -IMP2

b. / [*sé*ʔ*je* -ʔ*je*$^{\varnothing}$] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*seje* -ʔ*je* -ʔ*fá* -*kha*]
cure -IPFV -PLS -IMP2

c. / [*á*k*he*ʔ*pa* -ʔ*je*$^{\varnothing}$] -ʔ*fa* -*kha*$^{\varnothing}$ /
[*akhepa* -ʔ*je* -ʔ*fá* -*kha*]
forget -IPFV -PLS -IMP2

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