A'ingae reduplication is phonologically optimizing*

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1 Introduction

In this paper, I describe and analyze reduplication in A'ingae (ɪsᴏ 639-3: con), an understudied and endangered Amazonian isolate. The reduplicant is a verbal suffix -ʔσ ɢᴘʟs, where ʔ is a fixed segment and σ is a syllable copied from the right edge of the word.[1] Reduplication conveys the meaning of greater subject plurality (Corbett, 2000), i.e. the subject denotes an abundance or a totality of entities (1b, cf. 1a).

(1) a. Rᴇɢᴜʟᴀʀ sᴜʙᴊᴇᴄᴛ ᴘʟᴜʀᴀʟɪᴛʏ

   tʃaˈva -ʔʃa
   buy -ᴘʟs

   "(they) bought"

   b. Gʀᴇᴀᴛᴇʀ sᴜʙᴊᴇᴄᴛ ᴘʟᴜʀᴀʟɪᴛʏ

   ˈtʃava -ʔva -ʔʃa
   buy   -ɢᴘʟs -ᴘʟs

   "(they) all bought"

The A'ingae reduplicated verbs have special phonological properties. For one, only disyllabic roots can be reduplicated, and the disyllabic root is parsed as a trochaic foot in the surface form. Moreover, if the second syllable of the root is a diphthong, it undergoes monophthongization in the base. Thus, the shape of the base and the reduplicant together (henceforth *reduplicated stem*) can be schematized as (ˈσ₁ σ̆₂ʔ)σ₂.

I model these properties with a reduplicant-specific *cophonology* (Inkelas & Zoll, 2007; Sande et al., 2020; Orgun, 1996; Inkelas et al., 1997), which consists of a ranking of constraints motivated independently by the A'ingae grammar or phonological typology (Dąbkowski, ms.). Thus, I demonstrate that A'ingae reduplication is highly phonologically optimizing.
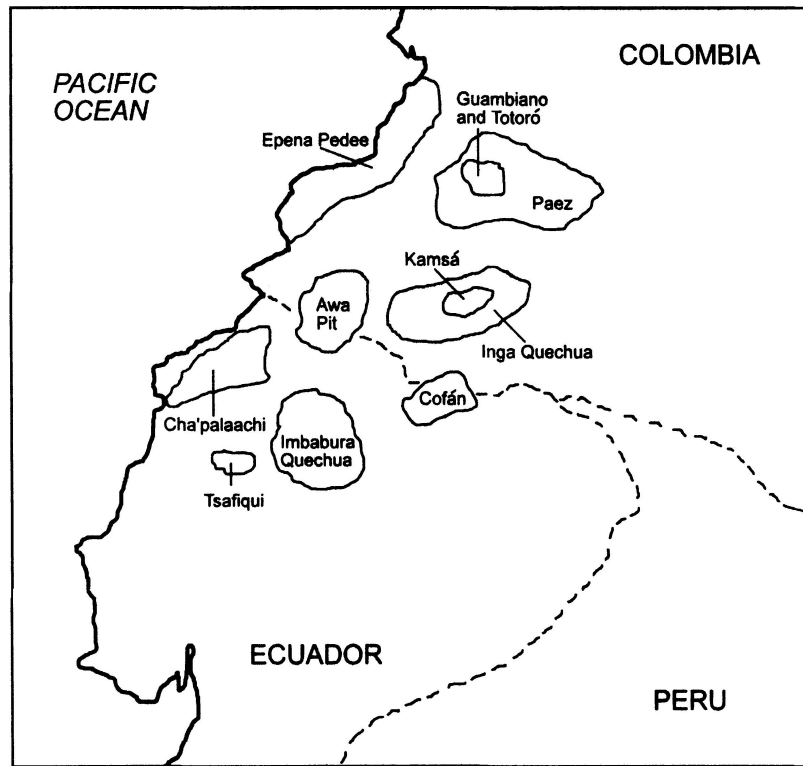
The rest of the paper is organized as follows. Section 2 provides background on the language and its speakers. Section 3 describes the facts of A'ingae reduplication. Section 4 lays out a cophonological analysis of the data. Section 5 considers and rejects an alternative subcategorization-based account. Section 6 concludes. Section A notes the existence of other non-productively reduplicated forms.

2 Language background

A'ingae (or Cofán, ɪsᴏ 639-3: con) is an indigenous language spoken by ca. 1,500 Cofán people in northeast Ecuador and southern Colombia (Dąbkowski 2021a; map in Figure 1 from Curnow & Liddicoat 1998). Despite spurious, mostly geography-driven, claims about genetic affiliations with other languages (e.g. with Barbacoan in Rivet 1924, 1952 and Chicham in Ruhlen 1987), A'ingae remains classified as a language isolate (AnderBois et al., 2019). Around the 16th century, the Cofán still lived in the Eastern Andean Cordilleras. The history of the Cofán descent to the Amazon Basin finds reflection in their language which retains Andean features, while showing various Amazonian innovations (AnderBois et al., 2019). A'ingae is endangered and highly underdocumented. However, despite economic, ecological, and political pressures, the Cofán language attitudes towards A'ingae are uniformly positive (Dąbkowski, 2021a).

[1] The following glossing abbreviations have been used: 3 = third person, ᴅɪsᴛ = distal, ɢᴘʟs = greater plural subject, ɪᴘꜰᴠ = imperfective, ᴘᴀss = passive, ᴘʟs = plural subject, ᴘʀᴄʟ = preculminative, ᴘʀᴏx = proximal, sᴍꜰᴄ = semelfactive.

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

All the data were collected remotely by the author in 2021 and 2022 with two native speaker consultants (both male, 24 and 36 years old) from the community of Dureno, Sucumbíos, Ecuador.

A'ingae syllable structure is (C)V(V)(ʔ). Thus, there are no codas except the glottal stop.[2] Extensive analyses of the A'ingae verbal domain have been presented in Dąbkowski (ms., 2021b). The present paper builds on those analyses to provide an account of the A'ingae verbal reduplication.

3   Description

In this section, I describe the basic phonological properties of the A'ingae reduplication. The A'ingae reduplicative suffix -ʔσ GPLS can attach to disyllabic verbal roots (2). The glottal stop ʔ is a fixed segment, and the syllable represented with σ is copied from the right edge of the base. A'ingae verbal reduplication is productive; any disyllabic root can undergo it. In the reduplicated surface forms, stress is always assigned to the word-initial syllable, or two syllables to the left of the reduplicant. This is regardless of whether the verbal stem is underlyingly stressless (2a-b,e-f) or stressed (2c-d,g-h).[3]

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[2] The glottal stop appears primarily in codas; onset glottal stops are restricted by morphophonological factors. For further details, including an analysis of apparent glottal stop metathesis, see Dąbkowski (ms.).

[3] Both stressless and stressed roots surface with penultimate stress in isolation. However, in morphologically complex forms, penultimate default stress is assigned to underlyingly stressless forms / *fetʰa-hi* / 'open-PRCL' → [*fe('tʰahi*)], but underlying stress surfaces faithfully / (*'kati*)-*hi* / 'cast-PRCL' → [(*'kati*)*hi*]. For more on the different phonological classes of A'ingae verbal roots, see Dąbkowski (ms.).

(2)   Disyllabic roots reduplicated

    a. / *fetha -ʔσ* /   b. / *fiite -ʔσ* /   c. / (ˈ*kati*) *-ʔσ* /   d. / (ˈ*ãnã*) *-ʔσ* /

       [(ˈ*fetʰaʔ*)*tʰa*]   [(ˈ*fiiteʔ*)*te*]   [(ˈ*katiʔ*)*ti*]   [(ˈ*ãnãʔ*)*nã*]

       open -GPLS   help -GPLS   cast -GPLS   sleep -GPLS

    e. / *fɨⁿdii -ʔσ* /   f. / *opii   -ʔσ* /   g. / (ˈ*koʔfe*) *-ʔσ* /   h. / (ˈ*hiʔɾi*) *-ʔσ* /

       [(ˈ*fɨⁿdɨʔ*)ⁿ*dii*] [(ˈ*opiʔ*)*pii*]   [(ˈ*kofeʔ*)*fe*]   [(ˈ*hiɾiʔ*)*ɾi*]

       sweep -GPLS   shelter -GPLS   play -GPLS   burn -GPLS

If the root ends in a diphthong, the diphthong is truncated to its first component in the base, but faithfully rendered in reduplicant (2e-f). If the root contains underlying glottalization, the root's glottalization does not surface in the reduplicated stem; only the reduplicant's glottal stop survives (2g-h).

    Reduplication of monosyllabic and trisyllabic roots is impossible (3-4). When reduplication is impossible, the semantics of greater plurality can be expressed with periphrasis (5).

(3)   Monosyllabic roots do not reduplicate

    a. / *pʰi -ʔσ* /   b. / ⁿ*do -ʔσ* /   c. / *i   -ʔσ* /   d. / *bii   -ʔσ* /

       —   —   —   —

       sit -GPLS   split -GPLS   bring -GPLS   enverb -GPLS

(4)   Trisyllabic roots do not reduplicate

    a. / *otiʃi   -ʔσ* /   b. / *opatʰɨ -ʔσ* /   c. / (ˈ*afa*)*se -ʔσ* /   d. / (ˈ*akʰuʔ*)*ʃa -ʔσ* /

       —   —   —   —

       wash hands -GPLS   pick -GPLS   offend -GPLS   chop   -GPLS

(5)   Greater plurality conveyed with periphrasis

    tiseʔpa piijikʰo=tsi opʰatʰɨ-ʔfa

    they   all=3   pick-PLS

    "they all picked (fruit)"

4   Analysis

In this section, I present an analysis of the four notable properties of A'ingae reduplication. First, the reduplicant assigns stress two syllables to its left. Second, stem-final diphthongs are truncated in the base, but faithfully retained in the reduplicant. Third, only disyllabic stems can be reduplicated. Fourth, glottal stops which are present underlyingly in the verbal roots are not realized. I show that all of these properties can be modeled by a ranking of constraints motivated independently by the grammar of A'ingae or phonological typology. Thus, I propose that the greater subject plurality reduplicant -*ʔσ* GPLS is associated with a *cophonology*, or a morpheme-specific phonological grammar (Inkelas & Zoll, 2007; Sande et al., 2020; Orgun, 1996; Inkelas et al., 1997).

    First, in reduplicated stems, stress falls on the second syllable to the left of the reduplicant (in this case, the word-initial syllable) (2). This stress assignment is not unique to the reduplicant. In A'ingae, stress is preferably assigned to the syllable which precedes the glottalized syllable, regardless of the identity of the morpheme (6). This is to say, the assignment of stress to the syllable which precedes the glottalized syllable is a general phonological process in A'ingae.[4] Dąbkowski (ms.) models this with ALIGN(ʔ-R, FOOT-R), which requires that each glottal stop be aligned with the right edge of a metrical foot (7).[5] Since A'ingae footing is trochaic, aligning the right edge of a disyllabic foot with the glottal stop means that the strong (stressed) branch of the foot precedes the glottalized syllable, capturing the stress facts in (2) and (6).

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[4] This generalization holds of the A'ingae inner morphophonological stratum, but not of the outer stratum. The regular plural subject suffix -*ʔfa* PLS is introduced in the outer stratum. Thus, it does not assign stress two syllables to its left in (1a). For further discussion of the A'ingae verbal morphophonology, see Dąbkowski (ms.).

[5] Dąbkowski (ms.)'s analysis also makes use of other constraints regulating the interaction between glottal stops and stress, such as FOOT{ʔ}, which states that the glottal stop is a facultative feature of the foot and assigns a violation mark for every stray glottal stop outside of a metrical foot. For more on the A'ingae morphophonology, see Dąbkowski (ms.).

(6)   GLOTTAL STOPS ARE FINAL IN A TROCHAIC FOOT   (Dąbkowski, ms.)
    a.   / atapa   -ʔhe /   b.   / (ˈafa)se -ʔnakʰa /   c.   / (ˈakʰeʔ)pa -ye -ʔnakʰa /
       [a(ˈtapa -ʔ)he]   [a(ˈfase -ʔ)nakʰa]   [akʰe(ˈpa -ye -ʔ)nakʰa]
       breed   -IPFV   offend -SMFC   forget   -PASS -SMFC

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

    Second, when the root is diphthong-final, the second vowel of that diphthong is truncated in the base but preserved in the reduplicant (2e-f). I propose that the diphthong in the base is truncated in order to avoid a heavy syllable in the weak branch of the trochaic foot. This is an independently attested restriction on the A'ingae foot shape. Dąbkowski (ms.) captures this restriction with the FOOTSHAPE=(×μ) constraint (8).[6]

(8)   FOOTSHAPE=(×μ), or: (×μ)   (Dąbkowski, ms.)
    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).

    Dąbkowski motivates FOOTSHAPE=(×μ) with the data in (9-12). In (9-12a), the root consists of two light syllables. In (9-12b), the first syllable of the root is heavy and the second syllable is light. In both cases, stress is assigned two syllables to the left of the preglottalized suffix due to the activity of ALIGN(ʔ-R, FOOT-R). In (9-12c), however, stress is assigned to the root-final glottalized syllable. Dąbkowski (ms.) proposes that in (9-12c), ALIGN(ʔ-R, FOOT-R) is violated in order to avoid violating the higher ranked FOOTSHAPE=(×μ).

	WEIGHT-SENSITIVE STRESS ASSIGNMENT WITH PREGLOTTALIZED SUFFIXES		(Dąbkowski, ms.)
	fetha 'open'	*fiite* 'help'	*findii* 'sweep'
(9) -ʔhe IPFV	a. (ˈfetʰa-ʔ)he	b. (ˈfiite-ʔ)he	c. fi(ⁿdii-ʔhe)
(10) -ʔnakʰa SMFC	a. (ˈfetʰa-ʔ)nakʰa	b. (ˈfiite-ʔ)nakʰa	c. fi(ⁿdii-ʔna)kʰa
(11) -ʔⁿgi PROX	a. (ˈfetʰa-ʔ)ⁿgi	b. (ˈfiite-ʔ)ⁿgi	c. fi(ⁿdii-ʔⁿgi)
(12) -ʔⁿga DIST	a. (ˈfetʰa-ʔ)ⁿga	b. (ˈfiite-ʔ)ⁿga	c. fi(ⁿdii-ʔⁿga)

    Thus, both the truncation of the root-final diphthong in reduplicated stems (2e-f) as well as the weight-sensitive stress assignment in (9-12) show the activity of FOOTSHAPE=(×μ), which bans heavy syllables (diphthongs) in the second syllable of a foot. In (9-12), the dispreference for right-branch diphthongs results in a violation of ALIGN(ʔ-R, FOOT-R). In (2e-f), the same constraint is satisfied by truncating the diphthong, in violation of MAXIMALITY(VOWEL) (13).

(13) MAXIMALITY(VOWEL), or: MAXV
    For every vowel in the input, there is a corresponding vowel in the output.

    I assume that reduplication involves a violation of INTEGRITY(SYLLABLE) (14), which penalizes multiple occurrences of one input syllable in the output. Since reduplication is modeled as input-output correspondence, the input diphthong is faithfully rendered in the reduplicant, avoiding a gratuitous violation of MAXIMALITY(VOWEL).

(14) INTEGRITY(SYLLABLE), or: INTσ
    No syllable in the input has multiple correspondents in the output.

    Third, mono- and trisyllabic roots cannot be reduplicated (3-4). I attribute this to an interaction of several constraints. ALIGN(FOOT-L, WORD-L) (15) requires alignment between the left edge of the foot and the left edge of the word. Following Prince & Smolensky (1993), I assume that an empty output (or the *null parse*)

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[6] FOOTSHAPE=(×μ) subsumes three more atomic constraints: FOOTBINARITY (FTBIN), RHYTHMICTYPE=TROCHAIC (TROCHEE), and WEIGHT→STRESSPRINCIPLE (WSP). FOOTBINARITY ensures that feet comprise two units, be they syllabic or moraic (McCarthy & Prince, 1986; Prince & Smolensky, 1993; Prince, 1980). RHYTHMICTYPE=TROCHAIC favors the left-prominent trochee over the right-prominent iamb (Hayes, 1985, 1995). WSP assigns violations for heavy syllables in unstressed positions (Prince, 1990).

is generated as a possible candidate in each phonological computation. The empty output violates the EMPTY-OUTPUTCONSTRAINT (16); faithfulness and markedness constraints are not violated by the null parse candidate. MAXIMALITY(SYLLABLE) (17) penalizes truncating words by deleting input syllables. In the cophonology of the greater subject plurality reduplicant -$ʔσ$ GPLS, ALIGN(FOOT-L, WORD-L), MAXIMALITY(SYLLABLE), ALIGN(ʔ-R, FOOT-R), and FOOTSHAPE=($×μ$) all rank above the EMPTYOUTPUTCONSTRAINT. This means that an empty output is preferred to all other alternatives, capturing the impossibility of reduplicating mono- and trisyllabic roots. MAXIMALITY(VOWEL) and INTEGRITY(SYLLABLE) rank below the EMPTYOUTPUTCONSTRAINT, which means that they can be violated in reduplicated stems.

(15) ALIGN(FOOT-L, WORD-L), or: AL[$_ω$f (McCarthy & Prince, 1993)
Every foot is aligned with the left edge of the word.

(16) EMPTYOUTPUTCONSTRAINT, or: EOC (Prince & Smolensky, 1993)
Assign a violation mark to the empty output ($\varnothing$).

(17) MAXIMALITY(SYLLABLE), or: MAXσ
For every syllable in the input, there is a corresponding syllable in the output.

Fourth, the difference between the underlyingly glottalless (2a-f) and glottalized (2g-h) roots is neutralized in reduplicated stems. This is to say, reduplicated stems surface only with the reduplicant's glottal stop; the glottal stop of the root is not realized.

Dąbkowski (ms.) observes that the position of glottalization in roots is entirely predictable; the glottal stop always surfaces in the penultimate syllable. This is to say, in disyllabic roots, the first syllable is glottalized (18). In trisyllabic roots, the second syllable is glottalized (19). Since the position of glottalization is fully predictable on the surface, Dąbkowski (ms.) proposes that glottalization is underlyingly non-linearized. As such, the underlying forms of glottalized roots are represented as / *root,ʔ* /. (Macaulay & Salmons 1995 present a similar treatment of glottalization in Mixtec). The surface position of the glottal stop is a result of the interaction of several constraints, such as ALIGN(ʔ-R, FOOT-R), FOOT{ʔ}, and NONFINALITY(ʔ). For details of the analysis, see Dąbkowski (ms.).

(18) UNDERLYINGLY FLOATING GLOTTALIZATION IN DISYLLABIC ROOTS
    a. / *sehe,ʔ* /   b. / *fitʰi,ʔ* /   c. / *kani,ʔ* /
       [(ˈseʔhe)]   [(ˈfiʔtʰi)]   [(ˈkaʔni)]
       cure   kill   enter

(19) UNDERLYINGLY FLOATING GLOTTALIZATION IN TRISYLLABIC ROOTS
    a. / *akʰoʃa,ʔ* /   b. / *akʰepa,ʔ* /   c. / *ãsaⁿge,ʔ* /
       [(ˈakʰoʔ)ʃa]   [(ˈakʰeʔ)pa]   [(ˈãsaʔ)ⁿge]
       chop   forget   be shy

The reduplicant -$ʔσ$ GPLS adds an additional syllable to a disyllabic root, making it trisyllabic. In trisyllabic roots, the glottal stop surfaces in the coda of the second syllable. Thus, in a reduplicated stem, the root glottal stop would be expected to surface in the same position as the glottal stop introduced by the reduplicant. I propose that the two glottal stops coalesce, leading to the apparent disappearance of the root glottal stop (20). The constraint violated by glottal stop coalescence is UNIFORMITY(ʔ) (21). UNIFORMITY(ʔ) ranks below the EMPTYOUTPUTCONSTRAINT.

(20) COALESCENCE OF TWO ADJACENT GLOTTAL STOPS
    / *kofe,ʔ$_1$ -ʔ$_2$σ* / $\rightarrow$ (ˈkofeʔ$_1$ʔ$_2$)fe $\rightarrow$ [(ˈkofeʔ$_{1,2}$)fe]
      play   -GPLS

(21) UNIFORMITY(ʔ), or: UNIʔ
No glottal stop in the output has multiple correspondents in the input.

The constraint ranking described above is specific to the greater subject plurality reduplicant -$ʔσ$ GPLS. Thus, it is a morpheme-specific cophonology (Inkelas & Zoll, 2007; Sande et al., 2020; Orgun, 1996; Inkelas et al., 1997). The proposed ranking captures all aspects aspect of the A'ingae verbal reduplication.

In reduplicated verbs (22), the second syllable of the root in the input corresponds to two syllables in the output: the last syllable of the base and the reduplicant. This involves a violation of INTEGRITY(SYLLABLE).

Due to a high ranking of Align(Ɂ-R, Foot-R) and FootShape=(×µ), a trochaic foot right-aligned with the reduplicant's glottal stop is constructed. That foot is also aligned with the left edge of the prosodic word, in compliance with Align(Foot-L, Word-L).

(22)	*fetʰa -Ɂσ*	AL?),	(×µ),	AL[ω f,	MAXσ ⟫	EOC ⟫	MAXV,	INTσ,	UNI?
i.	∅					*!			
ii.	*fetʰaɁtʰa*	*!						*	
☞ iii.	*('fetʰaɁ)tʰa*							*	

open -GPLS

In reduplicated verbs with heavy-final roots (23), the diphthong of the second syllable of the base is truncated in the output. This is due to FootShape=(×µ), which prohibits heavy syllables in the weak branch of a foot. The truncation of the base diphthong violates the lower-ranked Maximality(Vowel). The diphthong is rendered fully in the reduplicant, avoiding a gratuitous violation of Maximality(Vowel).

(23)	*fĩⁿdii -Ɂσ*	AL?),	(×µ),	AL[ω f,	MAXσ ⟫	EOC ⟫	MAXV,	INTσ,	UNI?
i.	∅					*!			
ii.	*fĩⁿdiiɁⁿdii*	*!						*	
iii.	*('fĩⁿdiiɁ)ⁿdii*		*!					*	
☞ iv.	*('fĩⁿdĩɁ)ⁿdii*						*	*	
v.	*('fĩⁿdĩɁ)ⁿdɨ*						**!	*	

sweep -GPLS

Monosyllabic (24) and trisyllabic (25) verbs cannot be reduplicated. This is formally modeled as the null parse (the empty output) being the optimal candidate. The null parse violates the EmptyOutputConstraint, which effectively draws a dividing line between the inviolable and violable constraints. Every constraint which ranks above the EmptyOutputConstraint is inviolable, as the null parse is preferred to its violation. In the cophonology of the reduplicant -Ɂσ GPLS, the constraints Align(Ɂ-R, Foot-R), FootShape=(×µ), Align(Foot-L, Word-L), and Maximality(Syllable) all rank above the EmptyOutputConstraint. Consequently, the reduplicated stem must have a FootShape-obeying trochee left-aligned with the left edge of the word and right-aligned with the glottal stop, but without truncating the base (as in 25iv). As satisfying all these demands at the same time is impossible for monosyllabic and trisyllabic roots, they cannot be reduplicated.

(24)	*pʰi -Ɂσ*	AL?),	(×µ),	AL[ω f,	MAXσ ⟫	EOC ⟫	MAXV,	INTσ,	UNI?
☞ i.	∅					*			
ii.	*pʰiɁpʰi*	*!						*	
iii.	*('pʰiɁ)pʰi*		*!					*	
iv.	*('pʰiɁpʰi)*	*!						*	

sit -GPLS

(25)	*atapa -Ɂσ*	AL?),	(×µ),	AL[ω f,	MAXσ ⟫	EOC ⟫	MAXV,	INTσ,	UNI?
☞ i.	∅					*			
ii.	*atapaɁpa*	*!						*	
iii.	*a('tapaɁ)pa*			*!				*	
iv.	*('tapaɁ)pa*				*!		*	*	

breed -GPLS

In disyllabic verbs with underlying glottalization (26), the glottalization coalesces with the glottalization of the reduplicant -$ʔσ$ GPLS. This leads to a violation of the low-ranked UNIFORMITY($ʔ$).

(26)	*kofe,ʔ -ʔσ*	AL$ʔ$),	(×μ),	AL[$_ω$f,	MAXσ $\rangle\!\rangle$ EOC $\rangle\!\rangle$ MAXV,	INTσ,	UNI$ʔ$
i.	∅				*!		
ii.	*kofeʔfe*	*!				*	
☞ iii.	*('kofeʔ)fe*					*	*

play -GPLS

In summary, the cophonology proposed for the A'ingae greater plural subject reduplicant -$ʔσ$ GPLS correctly captures the following facts about the reduplicated stems: (i) stress is assigned to their first syllable, (ii) a root-final diphthong is truncated in the base, but not in the reduplicant, (iii) only disyllabic verbs can be reduplicated, and (iv) the glottalization of underlyingly glottalized roots does not surface independently of the preglottalization of the reduplicant.

5   Alternative analysis

The account above models the shape of the reduplicated stem with a reduplicant-specific ranking of constraints that are motivated cross-linguistically or independently attested in the A'ingae grammar. An alternative analysis could make use of a subcategorization frame to capture the A'ingae reduplication data. The proposed vocabulary item is given in (27). $\mathfrak{F}$ introduces its segmental phonology. $\mathfrak{P}$ introduces the subcategorization frame.

(27)   LEXICAL ENTRY FOR -$ʔσ$ GPLS

$$\text{GPLS} \longleftrightarrow \left\{ \begin{array}{ll} \mathfrak{F}: & ʔσ \\ \mathfrak{P}: & \#σσ\text{-}\_ \end{array} \right\}$$

The subcategorization frame of $\#σσ$-_ is equivalent to saying that the reduplicant -$ʔσ$ GPLS is a suffix which selects for a disyllabic stem. The upside of this analysis is that it allows for dispensing with the EMPTYOUTPUTCONSTRAINT, since the subcategorization frame in (27) is sufficient to rule out the reduplication of mono- and trisyllabic roots.

However, subcategorization is an arbitrary selectional requirement. This means that subcategorization need not be phonologically optimizing (Paster, 2007). As a consequence, (27) misses the phonological motivation behind the root size restriction: The root must be disyllabic because it is parsed as a foot. This, in turn, is because -$ʔσ$ GPLS is a preglottalized suffix and its glottal stop must be, per ALIGN($ʔ$-R, FOOT-R), right-aligned with a foot.

Finally, the phonology of the reduplicant differs from other affixes in a way not captured by (27). In the case of most preglottalized suffixes, a diphthong in the weak branch of a foot is avoided by misaligning the right edge of the foot with the glottal stop (9-12). The corresponding phonological ranking is given in (28). In the case of reduplication, a diphthong in the weak branch of the foot is avoided by truncating the second portion of the diphthong in the base (2e-f). The corresponding ranking is given in (29). Consequently, the subcategorization frame in (27) is not sufficient to account for the facts of A'ingae reduplication; it still needs to be supplemented with a reduplicant-specific phonological ranking.

(28)   DEFAULT A'INGAE RANKING
FOOTSHAPE=(×μ), MAXIMALITY(VOWEL) $\rangle\!\rangle$ ALIGN($ʔ$-R, FOOT-R)

(29)   REDUPLICANT-SPECIFIC RANKING
FOOTSHAPE=(×μ), ALIGN($ʔ$-R, FOOT-R) $\rangle\!\rangle$ MAXIMALITY(VOWEL)

In sum, the subcategorization analysis misses the phonologically optimizing aspect of A'ingae reduplication and still requires associating the reduplicative -$ʔσ$ GPLS with a morpheme-specific cophonology.

6   Conclusions

In conclusion, I describe and analyze the phonological facts of A'ingae verbal reduplication. The A'ingae greater plural subject reduplicant -ʔσ GPLS is a suffix that copies a syllable from the right edge of the base. The reduplicant requires parsing the base as a trochee. If the root ends in a diphthong, that diphthong is truncated in the base, but faithfully rendered in the reduplicant. Only disyllabic verbs can be reduplicated. Underlying glottalization, if present in a root, does not surface in the output.

To account for these facts, I propose that the A'ingae reduplicant -ʔσ GPLS is associated with a morpheme-specific phonological ranking, or *cophonology* (Inkelas & Zoll, 2007; Sande et al., 2020; Orgun, 1996; Inkelas et al., 1997). Thus, I show that the properties of and restrictions on A'ingae reduplication are a consequence of phonological optimization.

Finally, I consider an alternative analysis which uses a subcategorization frame to capture the fact that only disyllabic verbs can be reduplicated. I argue that the subcategorization analysis fails to capture the phonologically-optimizing character of the A'ingae reduplication. Moreover, the subcategorization analysis needs to be supplemented with a morpheme-specific cophonology to capture phonological differences between the reduplicant -ʔσ GPLS and other preglottalized suffixes anyway.

A   Non-productive reduplication

In addition to the productive reduplication described and analyzed in this paper, there are reduplicated forms in A'ingae that deviate from the discussed pattern. A selection of such forms is given in (30). These ways of reduplicating a verb are restricted to a handful of lexical items and therefore do not constitute a synchronic morphophonological process.

(30)   BASE   REDUPLICATED FORM
    a.   *hi*   come   *hihi*   come.GPLS
    b.   *ha*   go   *haha*   go.GPLS
    c.   *kã*   look   *kãkã*   look quickly
    d.   *pʰi*   sit   (ˈpʰiʔpʰi)   place (many things)
    e.   *tsʰai*   hit   (ˈtsʰeʔtsʰe)   hit (many times)
    f.   —   (ˈtʃʰiʔtʃʰi)   cut

Two verbs of motion *hi* 'come' and *ha* 'go' have the reduplicated forms *hihi* 'come.GPLS' and *haha* 'go.GPLS.' The meaning of the reduplicated stems is that of greater subject plurality ("(they) all came," "(they) all went"), but their forms deviate from the generalizations discussed above: these verbs of motion are monosyllabic, the reduplicant is not preglottalized, and the reduplicated stems are underlyingly stressless. The verb *kã* 'look' reduplicates similarly as *kãkã*. However, this form does not have the meaning of greater subject plurality; rather, it means to 'look quickly.' Neither formation is productive.

The verb *pʰi* 'sit' is related to the reduplicated form (ˈpʰiʔpʰi) 'place (many things).' The reduplicant has a glottal stop and the reduplicated stem has initial stress. Yet, the meaning of the reduplicated form is not that of greater subject plurality; it is rather a pluractional causative. Thus, (ˈpʰiʔpʰi) 'place (many things)' does not contain the reduplicant -ʔσ GPLS discussed in this paper.

Hengeveld & Fischer (ms.) additionally exemplify reduplication with (ˈtsʰeʔtsʰe) 'hit (many times)' and (ˈtʃʰiʔtʃʰi) 'cut.' The first verb is related to *tsʰai* 'hit.' However, (ˈtsʰeʔtsʰe) is an irregular formation and the change of *ai → e* is not an active phonological process in the language. The second verb (ˈtʃʰiʔtʃʰi) 'cut' does not appear to be a synchronic case of reduplication at all; no corresponding form such as *tʃʰi* exists. I propose that the reduplicated or apparently reduplicated forms in (30) are all lexically listed; they do not represent productive processes of reduplication in A'ingae.

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