A DIACHRONIC LOOK AT THE A'INGAE HIGH FRONTING DIPHTHONG

MAKSYMILIAN DĄBKOWSKI
UNIVERSITY OF CALIFORNIA, BERKELEY
BORDERLANDS, MINORITIES, MIGRATIONS
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ABSTRACT This paper analyzes the diachrony of *ai* and *ɨi* in A'ingae (or Cofán, an Amazonian isolate, ISO 639-3: con) by comparing the data reported in Borman's (1976) dictionary with contemporary productions. In Borman (1976), *ai* does not generally appear after labial vowels; the distribution of *ɨi* is not restricted. In some modern productions, postlabial *ai* is allowed when the diphthong crosses a morpheme boundary (*a*+*i*).

I propose that Borman's (1976) distribution of *ai* and *ɨi* is a consequence of a diachronic change of *ai* to *ɨi* after labial consonants (**ai* → *ɨi* / B _). The contemporary distribution reflects paradigm leveling and contact-induced replacement: Borman's (1976) *ɨi* corresponds to contemporary *ai* if *a* is present in another related form. In novel productively-formed words, the availability of postlabial raising is speaker-specific.

The proposed sound change of postlabial raising (**ai* → *ɨi* / B _) is unusual and lacks obvious phonetic motivation. I speculate that postlabial raising reflects postlabial rounding (**ai* → **ui* / B _) opacified by subsequent unconditioned unrounding and centralizing of the back round vowel (**u* → *ɨ*). All the contemporary data were collected by the author.

1 INTRODUCTION

In this paper, I discuss and analyze the diachronic relationship between the closing front diphthong *ai* and the high fronting diphthong *ɨi* in A'ingae (or Cofán, an Amazonian isolate, ISO 639-3: con). To do so, I compare the realizations of morphologically simplex and complex words reported in Borman's (1976) dictionary with their contemporary productions. I find systematic differences between Borman (1962) and contemporary A'ingae, which I take as evidence of recent language change.

In Borman (1976), *ai* does not generally appear after labial consonants; the distribution of *ɨi* is not restricted. In forms reported by some contemporary speakers, postlabial *ai* is sometimes allowed, especially when the diphthong falls across a morpheme boundary (*a*+*i*).

I propose that Borman's (1976) distribution of *ai* and *ɨi* is a consequence of a diachronic change of *ai* to *ɨi* after labial consonants (**ai* → *ɨi* / B _). The contemporary distribution reflects paradigm leveling and contact-induced replacement: *ɨi* is sometimes replaced by *ai* if *a* is present in another transparently related form and in identifiable borrowings from languages known by A'ingae speakers. In new productive formations, the availability of postlabial raising varies with the speaker. This shows that a diachronic change has been variably phonologized by contemporary speakers, leading to considerable language-internal variation.

Finally, I note that the proposed postlabial raising (**ai* → *ɨi* / B _) lacks any obvious phonetic motivation. Thus, it is an instance of an unusual and unexpected sound change. I speculate that

postlabial raising reflects phonetically natural postlabial rounding (**ai* → **ui* / B _) opacified by subsequent unconditioned unrounding and centralizing of the back round vowel (**u* → *ɨ*).

Thus, I present a study which combines internal reconstruction with a comparison between relatively recent language description and contemporary fieldwork data to understand the trajectory of language change and make sense of variation in a fieldwork context.

The rest of the paper is structured as followed. Section 2 gives background on the language and its speakers. Section 3 describes and analyzes the diachronic relationship between the diphthongs *ai* and *ɨi*. Section 4 concludes.

2 LANGUAGE BACKGROUND

A'ingae (or Cofán, ISO 639-3: con) is an endangered and highly underdocumented Amazonian language isolate spoken by ca. 1,500 Cofán people in the province of Sucumbíos, Ecuador and the department of Putumayo, Colombia. In recently history, the Cofán have experienced severe economic, ecological, and political pressures. Notwithstanding, the Cofán attitudes towards their language and cultural heritage remain uniformly positive (Dąbkowski, 2021a).

The history of the Cofán can be traced back to the Eastern Andean Cordilleras, where they used to live around the 16th century. They have since then descended into the Amazon Basin (Lucitante, 2019). The typological profile of A'ingae reflects this history of the Cofán migration, as the language both retains typically Andean features and shows Amazonian innovations (AnderBois, Emlen, et al., 2019). A'ingae is robustly spoken in most Cofán communities, especially in Ecuador. There is limited bilingualism with Kichwa and robust bilingualism with Spanish (Dąbkowski, 2021a).

Previous work on the phonetics and phonology of A'ingae includes Borman's (1962) phonological sketch, Repetti-Ludlow et al.'s (2019) phonetic study, Fischer and Hengeveld's (to appear) grammatical sketch, Sanker and AnderBois's (2021) internal reconstruction of nasality, and Dąbkowski's (2021b, 2022) phonological analyses of metrical stress and the glottal stop. A short dictionary compiled by Borman (1976) will serve as a basis for comparison between A'ingae form 50~70 years ago and contemporary A'ingae.

f		*s*	*ʃ*		*h*
pʰ	*tʰ*	*tsʰ*	*tʃʰ*	*kʰ*	
p	*t*	*ts*	*tʃ*	*k*	*ʔ*
ᵐb	*ⁿd*	*ⁿdz*	*ⁿdʒ*	*ᵑg*	
m	*n*		*ɲ*		
v	*ɾ*		*j*	*ɰ*	

i, ĩ	*ɨ, ɨ̃*	*o, õ*
e, ẽ	*a, ã*	
ie, ĩẽ	*ɨi, ɨ̃ĩ*	*io, ĩõ*
ei, ẽĩ	*oe, õẽ*	*oi, õĩ*
ia, ĩã	*ae, ãẽ*	*oa, õã*
ai, ãĩ		*ao, ãõ*

Table 1: Phonemic inventory of A'ingae.

The phonemic inventory of A'ingae (given in Table 1) is moderately large, totaling twenty-seven consonants and five vowels, which can form eleven diphthongs. A'ingae vowels can be either oral or nasal; diphthongs are either fully oral or fully nasal. Diphthongs are generally rare in the language,[1]

1 Sanker and AnderBois (2021) propose that A'ingae diphthongs are rare because they are a recent innovation. Borman (1962), however, reports forms with diphthongs which are absent from the modern A'ingae inventory and which

which means that many consonant-diphthong sequences are unattested. However, I will argue that some of these gaps are not accidental.

All the contemporary data were collected by the author remotely in the spring of 2022 and reflect the judgments of three native speakers from the province of Sucumbíos, Ecuador.

3 DESCRIPTION AND ANALYSIS

In this section, I compare and analyze the realizations of words which contain *ai* or *ɨi* as reported by Borman (1976) and as produced by three contemporary native speakers. First, I discuss the distribution of the two diphthongs in native roots. Second, I address the adaptations of borrowings. Lastly, I look at morphological complex forms.

Borman (1976, henceforth B76) is the most complete A'ingae dictionary to date. It was authored by Marlytte "Bub" Borman, a missionary SIL linguist. He and his wife Roberta "Bob" Borman worked in the Cofán communities since 1954 (Hugo Lucitante, p.c.). Thus, any systematic difference between the Borman (1976) and contemporary A'ingae provides evidence for language change in the past 50~70 years. The Bormans worked predominantly in the community of Dureno, Sucumbíos (Hugo Lucitante, p.c.). Thus, I assume that the data reported by Borman (1976) reflect the Dureno language variety.

The productions I report come from three native speakers which I identify as JXM, RGQ, and SIA. All three speaker are male. JXM and SIA both come from the Ecuadorian community of Dureno (where the Bormans worked), which controls for dialectal variation. JXM is 36 years old and SIA is 23. RGQ comes from the Ecuadorian community of Dovuno, Sucumbíos and is 34 years old.

First, I consider the distribution of *ɨi* and *ai* in native A'ingae roots. The distribution of the high fronting diphthong *ɨi* in native roots is not restricted with respect to the major place of articulation.[2] This is to say, the diphthong can appear after velars (1a-b), coronals (1c-g), and labials (1h-j). In the data sets below, the first column gives the root as reported by Borman (1976)[3] along with its meaning. The other three columns give the realizations produced by contemporary speakers.

To obtain the contemporary judgements, I asked each consultant whether each word can be realized with *ai* or with *ɨi*. For example, for 'catfish' reported by Borman (1976) as *kʰɨivo* (1a), I asked if the word can be realized as *kʰɨivo* and *kʰaivo*. For each realization identified as correct, I requested that it be repeated out loud by the consultant. If both realizations were identified as correct, I asked if they preferred one realization over the other. If only one realization was identified as correct, I asked if other native speakers could use the incorrect pronunciation. For no items in (1) were any differences found between Borman's (1976) and the contemporary productions.

correspond to monophthongs in contemporary realizations. For example, Borman (1976) reports *ᵐboɨtʰo* 'run,' which corresponds to Borman's (1976) and contemporary *ᵐbɨtʰo*. The other possibility, therefore, is that diphthongs are an archaism and many of them have been lost relatively recently.

2 The distribution of *ɨi* is restricted in other ways due to independent restrictions on *ɨ*. For example, in Borman (1976), *ɨ* does not appear after palatal consonants, and neither does *ɨi*. These restrictions are orthogonal to the sound change discussed in this paper. For further discussion, see AnderBois and Sanker (2019).

3 Borman (1976) uses a practical phonemic orthography, which has been here transliterated to IPA.

(1) DIPHTHONG *ɨi* APPEARS AFTER VELARS, CORONALS, LABIALS

	B76	JXM	RGQ	SIA
a.	*kʰɨivo* 'catfish'	*kʰɨivo*	*kʰɨivo*	*kʰɨivo*
b.	*kɨiʔ-* 'drink'	*kɨiʔ-*	*kɨiʔ-*	*kɨiʔ-*
c.	*sɨiʔvo* 'twist'	*sɨiʔvo*	*sɨiʔvo*	*sɨiʔvo*
d.	*kitsɨi* 'pinch'	*kitsɨi*	*kitsɨi*	*kitsɨi*
e.	*atʰɨi* 'spit'	*atʰɨi*	*atʰɨi*	*atʰɨi*
f.	*tɨi* 'rain'	*tɨi*	*tɨi*	*tɨi*
g.	*fɨⁿdɨi* 'sweep'	*fɨⁿdɨi*	*fɨⁿdɨi*	*fɨⁿdɨi*
h.	*fɨite* 'help'	*fɨite*	*fɨite*	*fɨite*
i.	*opɨi* 'cover up'	*opɨi*	*opɨi*	*opɨi*
j.	*vɨiki* 'calm down'	*vɨiki*	*vɨiki*	*vɨiki*

The distribution of *ai* in native roots is restricted with respect to the major place of articulation. The diphthong *ai* can appear after after velars (2a) and coronals (2b-h), but sequences of a labial consonant followed by *ai* are systematically missing. The only exception is 'incline,' reported by Borman (1976) with two realizations: *pʰãĩŋã* and *pʰɨĩŋã* (2i). All three consultants accept *pʰɨĩŋã*; RGQ and SIA remark that other native speakers could use *pʰãĩŋã*. Realizations absent from a consultant's idiolect but recognized as present in the speech community are marked with a superscripted at sign ($^{@}$).

(2) DIPHTHONG *ai* APPEARS AFTER VELARS, CORONALS, BUT NOT LABIALS

	B76	JXM	RGQ	SIA
a.	*ᵑgãĩŋã* 'scatter'	*ᵑgãĩŋã*	*ᵑgãĩŋã*	*ᵑgãĩŋã*
b.	*otʃʰai* 'smack'	*otʃʰai*	*otʃʰai*	*otʃʰai*
c.	*ⁿdʒai* 'sit'	*ⁿdʒai*	*ⁿdʒai*	*ⁿdʒai*
d.	*tsʰai* 'punch'	*tsʰai*	*tsʰai*	*tsʰai*
e.	*tsai* 'bite'	*tsai*	*tsai*	*tsai*
f.	*ⁿdzãĩŋã* 'pour out'	*ⁿdzãĩŋã*	*ⁿdzãĩŋã*	*ⁿdzãĩŋã*
g.	*tai* 'pick up'	*tai*	*tai*	*tai*
h.	*nãĩʔ-* 'river'	*nãĩʔ-*	*nãĩʔ-*	*nãĩʔ-*
i.	*pʰãĩŋã, pʰɨĩŋã* 'incline'	*pʰɨĩŋã*	*$^{@}$pʰãĩŋã, pʰɨĩŋã*	*$^{@}$pʰãĩŋã, pʰɨĩŋã*

To account for this distributional gap, I propose that the diphthong *ai* underwent raising to *ɨi* after labial consonants (3), resulting in a conditioned merger of *ai* and *ɨi*. The capital letter B abbreviates {*f*, *pʰ*, *p*, *ᵐb*, *m*, *v*}.

(3) POSTLABIAL RAISING (sound change)
**ai* → *ɨi* / B _

A few borrowings where *ai* appears after a labial in the donor language provide evidence for postlabial raising (4). In the data set below, the first columns gives the donor language form and the

name of the language (parenthesized). The following notation is used in reporting the consultants' judgements. No superscript indicates a given speaker's only or preferred realization. A superscripted at sign ($^{@}$) indicates that the speaker identified the realization as incorrect, dispreferred, or absent from their idiolect, but recognized that other native speakers could use it. An asterisk (*) indicates that the speaker identified the realization as archaic. A superscripted question mark ($^{?}$) indicates that the speaker was inconsistent (they provided different judgments on different occasions). Realizations rejected as categorically wrong and identified as nonexistent within the entire speech community are not given. Items absents from a consultant's idiolect are represented with an em dash (—). Contemporary judgements which differ from realizations reported in Borman (1962) are additionally marked with a wavy underline.

(4) LOAN WORDS

	source	B76	JXM	RGQ	SIA
a.	*airo* (Secoya)[4]	*airo* 'mountain'	*airo*	—	—
b.	*waita* (Kichwa)[5]	*(sĩ)mɨ̃ĩta* 'vanilla'	*(sĩ)mɨ̃ĩta*	—	—
c.	*waita* (Kichwa)	*(rosa)vɨita* 'marigold'	$^{@}$*(rosa)vɨita*, *(rosa)vaita*	$^{*?}$*(rosa)vɨita*, $^{?}$*(rosa)vaita*	*(rosa)vɨita*, $^{@}$*(rosa)vaita*
d.	*paitʃe* (Spanish)	*paitsɨ*, *pɨitsɨ* 'paiche'	*paitsɨ*	*paitsɨ*	*paitsɨ*

In most environments, a donor language *ai* corresponds to an A'ingae *ai*. Such is the case with the Secoya *airo* 'mountain' borrowed faithfully as *airo*[6] (4a). Now, where *ai* occurs after a labial consonant in the donor language, a few borrowings show *ɨi*. The Kichwa root *waita* 'flower' appears in two A'ingae compounds *sĩmɨ̃ĩta*[7] 'vanilla' (4b, from A'ingae *sĩ* 'black' and *waita*) and *rosavɨita* 'marigold' (4c, from Spanish *rosa* 'rosa' and *waita*). Borman (1976) reports both compounds with the high fronting diphthong *ɨi*. This provides evidence for postlabial raising in A'ingae and suggests that the borrowing took place before or during postlabial raising. JXM corroborates Borman's (1976) realization of *sĩmɨ̃ĩta*. RGQ and SIA do not recognize the word.

All three speakers recognize both *rosavɨita* and *rosavaita*. JXM prefers *rosavaita* and SIA prefers *rosavɨita*. RGQ vacillates between the two realizations. I propose that *rosavɨita* is the older realization and *rosavaita* shows a recent replacement of *vɨita* with *vaita* motivated by greater phonological similarity to the source language. This is plausible given that the compound is relatively morphologically transparent and many Cofán people are moderately bilingual with Kichwa (Dąbkowski, 2021a). Remarkably, RGQ explicitly notes that "the elders would always say *rosavɨita*," lending further credibility to this scenario.

According to Borman (1976), the Spanish *paitʃe* 'paiche (a fish species)' is borrowed as both *pɨitsɨ* and *paitsɨ*. The former shows postlabial raising; the latter is more faithful to the source language. All the three consultants identify *paitsɨ* as the correct form; none recognize *pɨitsɨ*. I propose that *paitsɨ* won over *pɨitsɨ* due to a pressure to reflect the pronunciation of the source language more accurately.

4 (Scott AnderBois, p.c.)
5 (Chango A. and Potosí C., 2009)
6 The root *airo* appears only in the compound *airo jahe* 'mountain yajé.'
7 Progressive nasalization of approximants and vowels after a nasal segment is a regular process in A'ingae (AnderBois and Sanker, 2019).

This scenario, again, is feasible because of a high degree of bilingualism with Spanish among the A'ingae speakers (Dąbkowski, 2021a).

Now, I consider the realizations of /B*a*+*i*/ at morpheme boundaries to see whether postlabial raising is only a historical change or if it has been learned as an active phonological rule. To do so, I investigate the B*a*-final roots followed by *i*-initial suffixes.

There are two relevant *i*-initial suffixes: the periodic *-ite* PRD and the instrumental *-iʔkʰɨ* INS.[8] The periodic *-ite* PRD appears in the conventional names of seasons of the year, but it can also be used to productively derive new periods of time. The traditional season names which can be found in Borman (1976) are given in (5). The first column gives the root and its meaning. The second column given the season name and its time span as reported by Borman (1976).

(5) CONVENTIONALIZED FORMS DERIVED WITH *-ite* PRD

	root	B76	JXM	RGQ	SIA
a.	*na* 'fruit'	*naite* 'fruit season'	*naite*	*naite*	*naite*
b.	*sãfã* 'San Juan'	*sãfɪ̃ite* 'winter'	?*sãfɪ̃ite*, ?*sãfãĩte*	**sãfɪ̃ite*, *sãfãĩte*	@*sãfɪ̃ite*, *sãfãĩte*
c.	*taʔva* 'cotton'	*tavɨite* 'Aug–Nov'	@*tavɨite*, *tavaite*	*tavaite*	*tavɨite*, @*tavaite*
d.	*koehefa* 'sun ray'	*koehefɨite* 'summer'	*koehefɨite*	*koehefaite*	*koehefɨite*, @*koehefaite*
e.	*ʧarapa* 'turtle'	*ʧarapɨite* 'Dec–Jan'	@*ʧarapɨite*, *ʧarapaite*	**ʧarapɨite*, *ʧarapaite*	*ʧarapɨite*, @*ʧarapaite*
f.	*oʔma* 'peach palm'	*omɨite* 'Feb–Apr'	@*omɨite*, *omaite*	**omɨite*, *omaite*	@*oʔmɨite*, *oʔmaite*

When the root ends in *a*, but not B*a*, the environment for postlabial raising is not satisfied, so the season name (unsurprisingly) shows no postlabial raising (5a). When the roots ends in B*a*, Borman (1976) reports postlabial raising for all the season names (5b-f). The three contemporary consultants report forms with as well as without postlabial raising. They show variation in which forms they accept and/or prefer, but most of them recognize both forms of each season name as available for at least some speakers.

I propose that the forms with postlabial raising (*ɨi*) are older, whereas the forms without postlabial raising (*ai*) are analogical innovations (*na* : *naite* :: *ʧarapa* : *ʧarapaite*). Note that the season names are conventional and not entirely predictable from the meaning of the root. Nevertheless, paradigm leveling can take place because native speakers are aware of the morphological relationship between the root and the season name.

Both JXM and RGQ generally prefer forms with *ai*, even though they recognize that forms with *ɨi* are present in the speech community. Remarkably, RGQ explicitly identifies *sãfɪ̃ite*, *ʧarapɨite*, and

8 The following glossing abbreviations have been used: CAUS = causative, INS = instrumental, PRD = periodic.

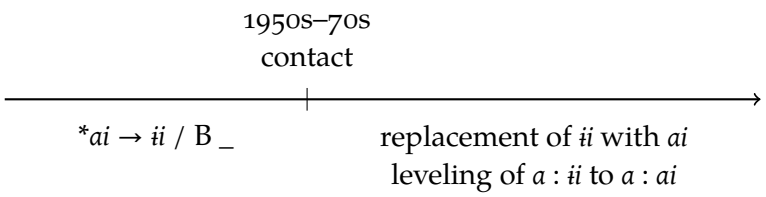

Figure 1: Timeline of the A'ingae *ai* and *ɨi* (interim).

omɨite as forms that could be used by the elders. SIA generally prefers the forms with *ɨi*. This makes SIA apparently the most conservative speaker, despite being the youngest of the three. The interim timeline of the developments discussed up to this point is given in Figure 1.

The conventionalized season names are sufficiently morphologically transparent for some speakers to level the postlabial *ɨi* to *ai*. Nevertheless, the season names are semantically non-compositional and have to be learned by on a case-by-case basis. Thus, the presence or absence of postlabial raising in (5) might show lexically-specific effects.

To test whether postlabial raising is a productive phonological process, I ask about the pronunciation of neologisms derived with the periodic suffix *-ite* PRD (6). In its productive usage, *-ite* PRD derives time period nouns and adverbials from nouns and verbs. E. g. *fetʰa* means 'open' and *fetʰaite* can mean either 'opening season' or 'in the opening season' (6a-i). Some of the season names derived in this ways can be quite absurd, e.g. *tʃînaite* 'daughter-in-law season' (6a-iv). Since they were almost certainly never heard before, these productions must reflect productive phonology.

(6) FULLY COMPOSITIONAL FORMS DERIVED WITH *-ite* PRD

a. ¬B*a*-FINAL ROOTS

	root	JXM	RGQ	SIA
i.	*fetʰa* 'open'	*fetʰaite*	*fetʰaite*	*fetʰaite*
ii.	*ʃaka* 'miss'	*ʃakaite*	*ʃakaite*	*ʃakaite*
iii.	*ĩŋãka* 'get hurt'	*ĩŋãkaite*	*ĩŋãkaite*, @*iñakɨite*	*ĩŋãkaite*
iv.	*tʃînã* 'daughter-in-law'	*tʃînãĩte*	*tʃînãĩte*	*tʃînãĩte*
v.	*ãnã* 'sleep'	*ãnãĩte*	*ãnãĩte*, @*ãnɨ̃ĩte*	*ãnãĩte*
vi.	*tsõsînã* 'ear'	*tsõsînãĩte*	*tsõsînãĩte*, *@*tsõsînɨ̃ĩte*	*tsõsînãĩte*
vii.	*ᵑgasorînã* 'gasolina'	*ᵑgasorînãĩte*	*ᵑgasorînãĩte*, *ᵑgasorînɨ̃ĩte*	*ᵑgasorînãĩte*
viii.	*kʰaʔja* 'swim'	*kʰajaite*	*kʰaʔjaite*, @*kʰaʔjɨite*	*kʰaʔjaite*
ix.	*pãŋnã* 'hear'	*pãŋnãĩte*	*pãŋnãĩte*, @*pãŋnɨ̃ĩte*	*pãŋnãĩte*

b. B*a*-FINAL ROOTS

	root	JXM	RGQ	SIA
i.	*ʃakapa* 'debt'	*ʃakapaite*	*ʃakapaite*, @*ʃakapɨite*	*ʃakapaite*, *ʃakapɨite*
ii.	*sẽmã* 'work'	*sẽmãĩte*	*sẽmãĩte*, **sẽmɨ̃ĩte*	*sẽmãĩte*, *sẽmɨ̃ĩte*
iii.	*sisipa* 'sand'	*sisipaite*	*sisipaite*, **sisipɨite*	*sisipaite*, @*sisipɨite*
iv.	*sefa* 'run out'	*sefaite*	*sefaite*, @*sefɨite*	*sefaite*, @*sefɨite*
v.	*sheheʔpa* 'medicine'	*sehepaite*	*sheheʔpaite*, *sheheʔpɨite*	*sheheʔpaite*, *sheheʔpɨite*
vi.	*ajaʔfa* 'language'	*ajafaite*	*ajaʔfaite*, *ajaʔfɨite*	*ajaʔfaite*, *ajaʔfɨite*
vii.	*tʃava* 'buy'	*tʃavaite*	*tʃavaite*, @*tʃavɨite*	*tʃavaite*, *tʃavɨite*
viii.	*jajaʔpa* 'lard'	*jajaʔpaite*	*jajaʔpaite*, @*jajaʔpɨite*	*jajaʔpaite*, *jajaʔpɨite*

The three consultants show three different patterns when it comes to novel formations with the periodic *-ite* PRD. JXM only judges forms with *ai* as grammatical and does not recognize any variation in the speech community (6). Thus, JXM did not generalize postlabial raising as a productive phonological rule.

SIA does not allow for the raising of morphologically-derived *ai* to *ɨi* if the sequence arises after a non-labial consonant (6a). However, when the sequence arises after a labial, SIA allows for, but does not require, raising. Some forms with *ɨi* are identified as dispreferred or used by others (6b-iii,iv) but most of them are equally available for SIA. I speculate that the presence of forms where both *ai* and *ɨi* appear in the speech community (4-5) has led SIA to acquire postlabial raising as an optional but productive phonological rule (7). Note that since SIA does not raise *ai* to *ɨi* after labials unconditionally (2, 4-5), the rule must reference the morpheme boundary.

(7) SIA: POSTLABIAL RAISING (phonological rule)
a+*i* → *ɨi* / B _ (optional)

Finally, RGQ shows the greatest variation in his judgements. He always prefers forms with *ai*. Depending on the word, forms with *ɨi* are identified as impossible, possible but dispreferred, used by others, or archaic. Notably, RGQ notes that in some words the underlying sequence /*ai*/ may be realized as [*ɨi*], even when it is not preceded by labial consonant. This suggest that RGQ generalized the raising of *ai* to *ɨi* beyond its original conditioning environment (8). Given that RGQ does not raise *ai* to *ɨi* unconditionally (2, 4-5), but only allows for it in a derived environment, the acquired rule must reference the morpheme boundary.

(8) RGQ: DERIVED-ENVIRONMENT POSTLABIAL RAISING (phonological rule)
a+*i* → *ɨi* (optional)

The other morpheme which begins with *i* is the instrumental case *-iʔkʰɨ* INS. Like in English, the A'ingae instrumental also has the comitative function. Thus, the instrumental *-iʔkʰɨ* INS attaches freely to any animate or inanimate noun (9).

(9) FULLY COMPOSITIONAL FORMS INFLECTED WITH *-iʔkʰɨ* INS

a. ¬B*a*-FINAL ROOTS

	root	JXM	RGQ	SIA
i.	*tsɨʔtʰa* 'bone'	*tsɨʔtʰaiʔkʰɨ*	*tsɨʔtʰaiʔkʰɨ*	*tsɨʔtʰaiʔkʰɨ*
ii.	*tʃĩnã* 'daughter-in-law'	*tʃĩnãĩʔkʰɨ*	*tʃĩnãĩʔkʰɨ*	*tʃĩnãĩʔkʰɨ*
iii.	*tsõsĩnã* 'ear'	*tsõsĩnãĩʔkʰɨ*	*tsõsĩnãĩʔkʰɨ*	*tsõsĩnãĩʔkʰɨ*
iv.	*ᵑgasorĩnã* 'gasolina'	*ᵑgasorĩnãĩʔkʰɨ*	*ᵑgasorĩnãĩʔkʰɨ*	*ᵑgasorĩnãĩʔkʰɨ*

b. B*a*-FINAL ROOTS

	root	JXM	RGQ	SIA
i.	*ãʔᵐba* 'yucca'	*ãʔᵐbaiʔkʰɨ*	*ãʔᵐbaiʔkʰɨ*	*ãʔᵐbaiʔkʰɨ*, @*ãʔᵐbɨiʔkʰɨ*
ii.	*sĩõʔmã* 'navel'	*sĩõʔmãĩʔkʰɨ*	*sĩõʔmãĩʔkʰɨ*	*sĩõʔmãĩʔkʰɨ*, @*sĩõʔmɨ̃ĩʔkʰɨ*
iii.	*ʃakapa* 'debt'	*ʃakapaiʔkʰɨ*	*ʃakapaiʔkʰɨ*	*ʃakapaiʔkʰɨ*, @*ʃakapɨiʔkʰɨ*
iv.	*sisipa* 'sand'	*sisipaiʔkʰɨ*	*sisipaiʔkʰɨ*, **sisipɨiʔkʰɨ*	*sisipaiʔkʰɨ*, @*sisipɨiʔkʰɨ*
v.	*sehеʔpa* 'medicine'	*sehеʔpaiʔkʰɨ*	*sehеʔpaiʔkʰɨ*, **sehеʔpɨiʔkʰɨ*	*sehеʔpaiʔkʰɨ*, *sehеʔpɨiʔkʰɨ*
vi.	*ajaʔfa* 'language'	*ajaʔfaiʔkʰɨ*	*ajaʔfaiʔkʰɨ*, @*ajaʔfɨiʔkʰɨ*	*ajaʔfaiʔkʰɨ*, *ajaʔfɨiʔkʰɨ*
vii.	*vatova* 'lizard'	*vatovaiʔkʰɨ*	*vatovaiʔkʰɨ*	*vatovaiʔkʰɨ*, @*vatovɨiʔkʰɨ*
viii.	*ãnãẽʔmã* 'hammock'	*ãnãẽʔmãĩʔkʰɨ*	*ãnãẽʔmãĩʔkʰɨ*	*ãnãẽʔmãĩʔkʰɨ*

ix.	*tãsĩʔfa* 'right'	*tãsĩʔfaiʔkʰɨ*	*tãsĩʔfaiʔkʰɨ*, @*tãsĩʔfɨiʔkʰɨ*	*tãsĩʔfaiʔkʰɨ*, @*tãsĩʔfɨiʔkʰɨ*
x.	*mãmã* 'mom'	*mãmãĩʔkʰɨ*	*mãmãĩʔkʰɨ*	*mãmãĩʔkʰɨ*, *mãmɨ̃ĩʔkʰɨ*
xi.	*jajaʔpa* 'lard'	*jajaʔpaiʔkʰɨ*	*jajaʔpaiʔkʰɨ*, *jajaʔpɨiʔkʰɨ*	*jajaʔpaiʔkʰɨ*, *jajaʔpɨiʔkʰɨ*

JXM and SIA's judgements reported for the periodic *-ite* PRD are largely replicated with the instrumental *-iʔkʰɨ* INS: JXM never recognizes form with *ɨi* (9); SIA allows for raising postlabially (9b), but not otherwise (9a). A notable difference is that SIA identifies the *ite*-forms with postlabial raising as good, but he identifies many *iʔkʰɨ*-forms with postlabial raising as dispreferred or used by others.

In the small sample of four roots which do not have a labial consonant before the final *a*, RGQ only recognizes forms with *ai*, and considers raising to be impossible (9a). In roots which have a labial consonant before a final vowel, RGQ considers raising to be largely impossible. In a few of those roots, raising is possible but dispreferred, used by others, or archaic (9b). Thus, the general availability of raising for RGQ is considerably lower in *iʔkʰɨ*-forms than in *ite*-forms. Since the periodic *-ite* PRD is a derivational morpheme and *-iʔkʰɨ* is an inflectional morpheme, I speculate that the difference may be attributed to morphological boundary strength.

In interim summary, I observed that (i) the diphthong *ai* is unattested after labial consonants in native A'ingae roots, (ii) some borrowings and conventionalized season names adapt postlabial *ai* as *ɨi*, and (iii) in novel morphologically complex words *ai* may sometimes optionally rise to *ɨi*. To account for these facts, I proposed that A'ingae had postlabial raising as a regular sound change. Some borrowings and conventionalized season names have B*ai* instead of the expected B*ɨi* due to ongoing language contact-induced replacement and paradigm leveling. The availability of both B*ai* and B*ɨi* in some lexical items catalyzed for some speakers the acquisition of (postlabial) raising as an optional morphologically-conditioned phonological rule.

Nevertheless, postlabial raising lacks an obvious phonetic motivation. This is not a problem for the synchronic phonological rules in (7-8) since there is ample evidence that phonetically unnatural phonological rules can be acquired (Bach and Harms, 1972; Hyman, 2001; Kiparsky, 1973). However, a phonetically unnatural process is not an expected sound change.

To address this issue, I speculate that A'ingae postlabial raising came about as two subsequent sound changes. First, postlabial **ai* underwent rounding to **ui* (10i). Second, the round back vowel **u* underwent unconditioned unrounding and centralization to **ɨ* (10ii). (This idea was first suggested to me by Chelsea Sanker, p.c.)

(10) POSTLABIAL RAISING, DECOMPOSED

i. POSTLABIAL ROUNDING (sound change)
**ai* → **ui* / B _

ii. *U*-CENTRALIZATION (sound change)
**u* → **ɨ*

Two facts lend credibility to this scenario. First, the pressure to round postlabial vowels is independently attested in A'ingae. The diphthong *ae* can be rounded to *oe* after labials (11). This rounding is optional and may be partial (i. e. intermediate realizations such as *ạe* are possible). Postlabial rounding can apply within roots (11a) and across morpheme boundaries (11b).

(11) POSTLABIAL ROUNDING (phonological rule)
ae → *oe* / B _, e.g.

a. *faesɨ* → *faesɨ* ~ *faẹsɨ* ~ *foesɨ*
other

b. *atapa -ẽ* → *atapãẽ* ~ *atapa̰ẽ* ~ *atapõẽ*
breed -CAUS

Second, the origin of the Cofán people can be traced back to the Andean Cordilleras (Lucitante, 2019). In the inventories of Andean languages, the vowel *u* is commonly attested (Figure 2), but *ɨ* is rare (Figure 3). Thus, reconstructing the vowel inventory of **a, e, i, o, u* for the precolonial A'ingae is consistent with what one might expect given the known geography of the language at that time. The vowel *ɨ*, on the other hand, is common in Amazonian langauges (Figure 3). Thus, the centralization and unrounding of **u* to *ɨ* (10ii) is a plausible contact-induced shift.

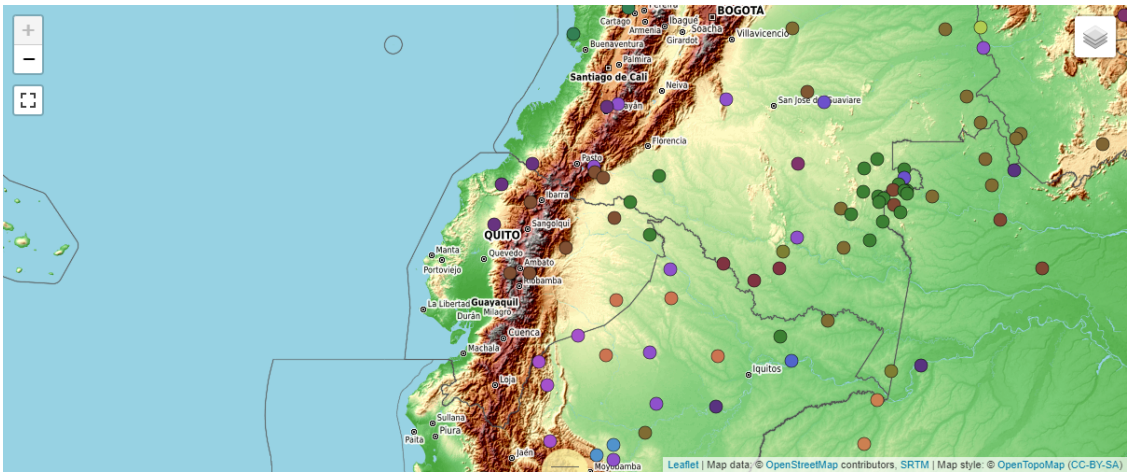

Figure 2: Vowel *u* in the neighborhood of A'ingae (Moran and McCloy, 2019).

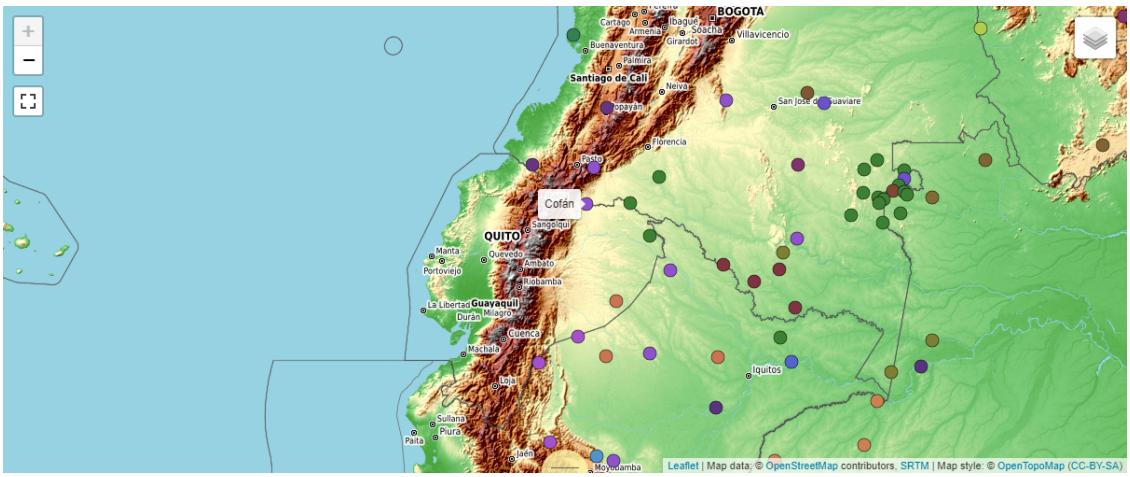

Figure 3: Vowel *ɨ* in A'ingae (Cofán) and its neighborhood (Moran and McCloy, 2019).

The proposed timeline of changes is summarized in Figure 4. Note that this timeline implies that the original postlabial change, the postlabial rounding, must have happened over 400 years ago, a long time before any replacement and leveling of *ɨi* to *ai*.

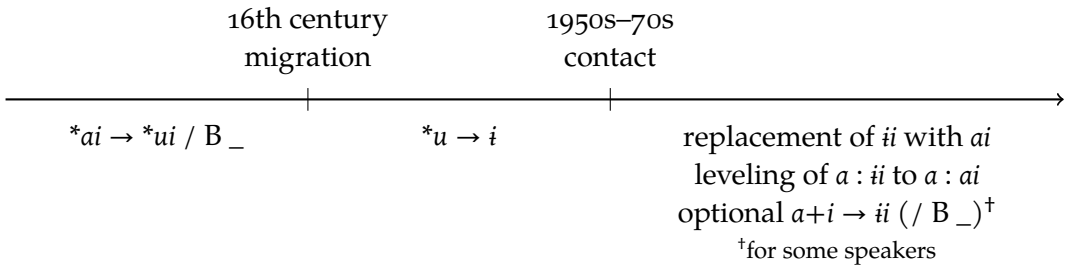

Figure 4: Timeline of the A'ingae *ai* and *ɨi*.

4 CONCLUSION

In conclusion, I investigated the diachronic relationship between the two A'ingae diphthongs *ai* and *ɨi*. I observed that *ai* does not appear after labial consonants, and that some borrowings and conventionalized forms show a shift of *ai* to *ɨi*. To account for these facts, I proposed that postlabial raising of *ai* to *ɨi* took place in A'ingae as a regular sound change. There are forms in contemporary A'ingae where *ai* appears after labial consonants. I argued that these are cases of paradigmatic leveling and replacement driven by language contact.

Native speakers differ when it comes to the application of postlabial raising to new productive formations: JXM does not allow for postlabial raising, SIA generalizes it as an optional but productive phonological rule, and RGQ appears to generalize the process beyond its original conditioning environment.

Finally, I speculated about the postlabial raising of *ai* to *ɨi* as a regular sound change given its phonetic unnaturalness. I suggested that postlabial raising took place in two steps, with postlabial rounding (**ai → *ui / B _*) followed by *u*-centralization (**u → ɨ*). These two changes, I argued, are consistent with the phonological profile of the language and its known geographic history.

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