

Chiara Repetti-Ludlow

Brown University

chiara.repetti.ludlow@gmail.com**Haoru Zhang**

Brown University

haoru_zhang@brown.edu**Hugo Lucitante**

Brown University

hugo_lucitante@brown.edu**Scott AnderBois**

Brown University

scott_anderbois@brown.edu

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Chelsea Sanker

Brown University

chelsea_sanker@brown.edu

A'ingae (also known as Cofán or Kofán) is a language isolate spoken by approximately 1,500 people in 13 communities in Ecuador and Colombia (Figure 1). Traditionally, the A'i (speakers of A'ingae) lived in the Andean foothills, but over the past century they have migrated down the Aguarico and San Miguel rivers, founding communities at Dureno and Zábalo, where the language is most widely spoken. This migration was spurred in large part by extensive oil contamination; an issue of great concern to the Foundation for the Survival of the Cofán People (FSC) and the community at large (Cepek 2012: 103; 2018: 1–15). Another concern in the Cofán community is the decreasing use of A'ingae, which, according to *Ethnologue* (Simons & Fennig 2017), is 'endangered' in Ecuador and 'severely endangered' in Colombia as a growing emphasis on Spanish disincentivizes the younger generation from learning A'ingae.

There is no known dialectal variation of A'ingae, likely due to the fact that communities were displaced relatively recently. Zábalo, for instance, was established circa 1980. However, despite this recent separation, many in the community anecdotally believe that there is some degree of variation, a claim which merits further investigation. While A'ingae has largely remained the language of everyday life and is learned natively by children in at least Zábalo and Dureno, Spanish and Kichwa appear to be increasing in use to some extent, especially in Dovuno and Sinangoé. We leave it to future research to examine these patterns in detail since this topic has yet to be systematically studied.

There is little previous work on the sound system of A'ingae. The existing phonological descriptions are based on transcription, without acoustic data (Borman 1962, Fischer & Hengeveld 2019), and there are several aspects of phonological contrasts and the phonetic realization of phonemes which are characterized differently in these two works. SIL missionaries Marlytte and Roberta Borman developed an orthography for A'ingae in the 1950s, which has been adapted slightly in recent years by community members. Since the latter is

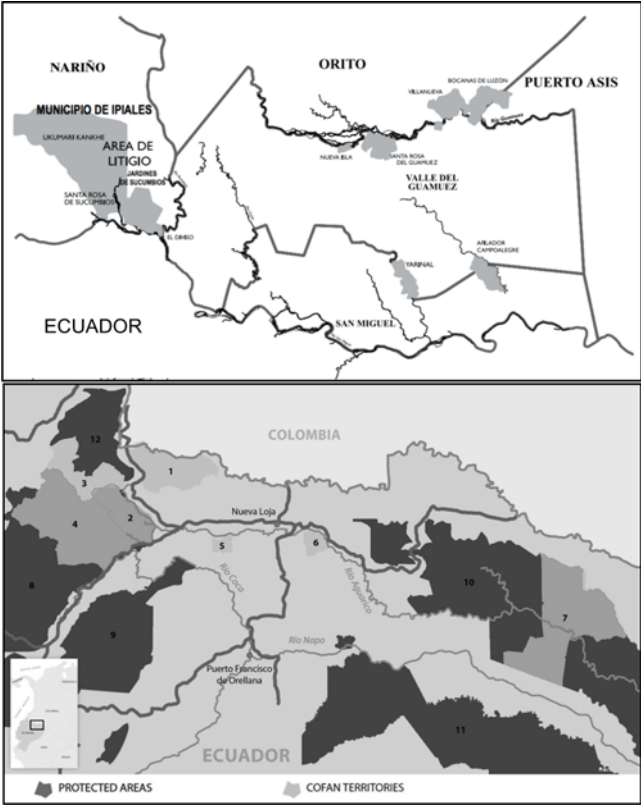


Figure 1 Top: Map of communities of A'ingae speakers in Colombia (Janasoy & Pérez Vera 2005), shaded in light gray. Bottom: Map of communities of A'ingae speakers in Ecuador (Map of Cofán Territories 2014, <http://library.brown.edu/create/firstreading2014/learn-more/maps-of-ecuador/map-of-cofan-territories/>), shaded in light gray and numbered 1, 3, 5, and 6.

in common use presently, but is not fully described in print, we use both in our orthographic transcription, which makes it more accessible to members of the A'ingae community.

We present a complete phonetic description of the A'ingae phonological inventory, based on recordings of three male native speakers (ages 32, 34, and 53 years) of A'ingae, one from Dureno, Ecuador and two from Zábalo, Ecuador. In addition to providing acoustic analyses of allophones, we examine a few notable aspects of A'ingae phonology.

All items were elicited as translations from Spanish or English. Each word was produced twice in isolation and then twice in the frame sentence *afa'chu* ___ *ayepambi* 'the word ___ is easy'; all measurements come from the second utterance within the frame sentence, to ensure the most fluent production. Measurements for both consonants and vowels averaged across all three speakers, with the phoneme in question measured word-initially for half of the utterances and word-medially for the other half of the utterances. Two different recorders were used due to different recording conditions. One speaker was recorded in Providence with the internal microphone of the Zoom H4n Handy Recorder in a sound-attenuated room. The two speakers in Ecuador were recorded on the Audio Technica AT803 Lavalier Microphone in a quiet room. A sampling rate of 44100 Hz was used for both.

Consonants

There are 27 consonant phonemes in A'ingae, illustrated in the chart and word list below. Voicing is contrastive for stops and affricates, but not for fricatives. Examples of each

62 consonant are word-initial, except for consonants which are not attested word-initially:
 63 /ʔ/ and /uɣ/.

Q2

	Bilabial	Labio-dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive	p p ^h m ^b		t t ^h n ^d			k k ^h ŋ ^g	ʔ
Affricate			ts̄ ts ^h n ^d dz̄	tʃ̄ tʃ ^h n ^d ʒ̄			
Fricative		f	s	ʃ			h
Nasal	m		n		ɲ		
Approximant		ʋ			j	uɣ	
Tap			r				

p ^h	p ^h a. ¹ p ^h a.k ^h o	‘floor’	m ^b	¹ m ^b a.re	‘valuable’
p	¹ pa.ti	‘rock’	t ^h	¹ t ^h a.t ^h a.je	‘to search’
t	¹ ta.ʔe	‘becoming hard’	f	¹ fa. ^m bi	‘eel’
n ^d	¹ da.ro	‘piranha’	s	¹ saʔ.vi̯.tsi	‘warm’
k ^h	¹ k ^h a.p ^h oʔ.p ^h a	‘sand bank’	ʃ	¹ ʃa.ka	‘debt’
k	¹ ka.ni	‘yesterday’	h	¹ ha.je	‘to go’
ŋ ^g	¹ ga.na.je	‘earn’	m	¹ maʔ.t ^h i	‘where’
ʔ	¹ m ^b iaʔ.a	‘long’	n	¹ na.ʔe	‘river’
ts̄ ^h	¹ ts̄ ^h a.ts̄ ^h a.vo	‘grater’	ɲ	¹ ɲa	‘me’
ts̄	¹ t̄sa. ⁿ di.je	‘man’	ʋ	¹ va.tʃ̄oʔ.va	‘net’
n ^d dz̄	¹ n ^d dz̄a. ⁿ dza.je	‘splash water on’	j	¹ ja.sa	‘arm’
tʃ̄ ^h	¹ tʃ̄ ^h a.ra.ts̄ ^h i	‘bright’	uɣ	¹ e.uɣa	‘bad’
tʃ̄	¹ tʃ̄aʔ. ⁿ di	‘became cold’	r	¹ ra.hi	‘monkey’
n ^d ʒ̄	¹ n ^d ʒ̄ai.ɲa	‘sit one down’			

64 The glottal stop can be realized as creakiness and is not always reflected phonetically
 65 in rapid speech. However, it is phonologically contrastive, as indicated by the minimal pair
 66 in (1).

- (1) a. ¹tʃ̄aʔ.ⁿdi ‘became cold’
 b. ¹tʃ̄a.ⁿdi ‘became clear’

67 A'ingae has both short- and long-lag voiceless stops and affricates, as well as voiced stops
 68 and affricates that are produced with prenasalization. The short-lag stops and affricates, while
 69 transcribed as unaspirated, have a substantially positive voice onset time (VOT), as is given
 70 in Table 1. Among affricates, the mean VOT of each voiceless category is even longer.

Table 1 Average VOTs of A'ingae stops and affricates by place (in ms).

	Bilabial	Alveolar	Post-alveolar	Velar
Voiceless unaspirated stop	21 (sd = 34)	32 (sd = 7)	—	39 (sd = 10)
Voiceless aspirated stop	59 (sd = 10)	71 (sd = 13)	—	90 (sd = 18)
Voiceless unaspirated affricate	—	60 (sd = 9)	79 (sd = 17)	—
Voiceless aspirated affricate	—	92 (sd = 9)	117 (sd = 16)	—

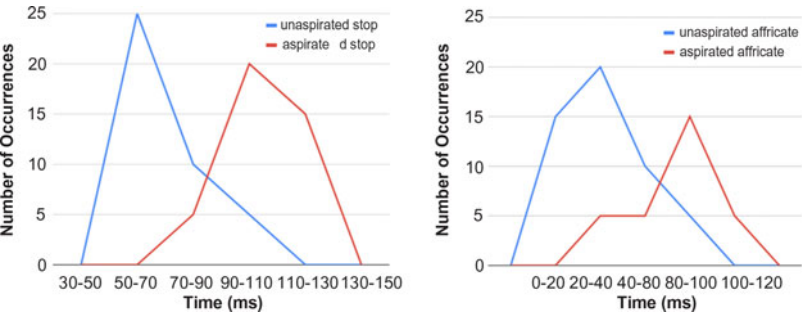


Figure 2 Density plot of VOTs for A'ingae long-lag and short-lag voiceless stops (left) and voiceless affricates (right).

This three-part series was observed by Borman (1962) and Fischer & Hengeveld (2019); we contribute to the analysis by providing VOT measures. As shown in Figure 2, according to data averaged across 16 utterances per speaker, voiceless unaspirated and voiceless aspirated stops and affricates have distinct VOT distributions. The small degree of overlap is due to physiologically driven differences between places of articulation, as are observed elsewhere (Cho & Ladefoged 1999); e.g. the VOT of /k/ is sometimes longer than the VOT of /p^h/, but there is no overlap within a place of articulation.

Drawing on our corpus of speech and written texts, there is a laryngeal co-occurrence constraint in A'ingae not observed in previous literature: within a root, voiceless stops and affricates with the same place of articulation also must match in their aspiration type, as illustrated by the examples in (2) and (3).¹

(2) *Attested forms*

- a. 't^ha.t^ha.je 'to look for'
- b. 'tõ.tõ 'uncle'
- c. 't^hi.t^hi.k^ho 'knife'
- d. 't^ʃo.t^ʃo 'breast'

(3) *Unattested forms*

- a. *ta.t^ha
- b. *t^ho.t^ʃo

No observed roots have voiceless stops or affricates that match in place but differ in VOT category, nor could our informants think of any examples when prompted. On the other hand,

¹ Thanks to Yiming Gu and Maksymilian Dabkowski for assistance in formulating this constraint.

84 when stops and affricates within a root differ in place they can also differ in VOT category.
 85 This restriction is only present within the two voiceless series. The prenasalized series of
 86 stops and affricates does not abide by the laryngeal constraint; prenasalized segments can
 87 co-occur with both of the voiceless series.

88 Although informants could not think of any examples of words in which a root had
 89 voiceless stops matching in place but differing in VOT category, given the very limited
 90 documentation, it is possible that such forms are simply infrequent and may yet be discovered.

91 The co-occurrence constraint is not active across morphological boundaries, as is demon-
 92 strated in (4), in which surface forms have sequences of stops which match in place of
 93 articulation but differ in laryngeal category.

- (4) a. ^hat^ha = ti = ki search = INTERR = 2SG ‘did you look for?’
 b. ^ha-ki other-day ‘another day’

94 Co-occurrence restricted to the domain of the root is cross-linguistically common, both for
 95 long distance co-occurrence constraints generally (e.g. Hansson 2010) and for laryngeal con-
 96 straints more specifically (e.g. MacEachern 1999). The co-occurrence restriction does not
 97 have an effect across manner of articulation. That is, a voiceless alveolar stop may differ in
 98 VOT category from a voiceless alveolar affricate in the same morpheme.

99 On the basis of acoustic measurements, we find that voiced stops and affricates are con-
 100 sistently realized with prenasalization, as illustrated by the circled part of Figure 3, in which
 101 there is a clear period of nasalization before the closure of the word-initial stop. While the
 102 period of prenasalization has a significant intensity and duration in word-medial segments,
 103 these effects are slightly weaker word-initially, which may be why Fischer & Hengeveld
 104 (2019) describe these stops and affricates as being underlyingly prenasalized but lacking
 105 prenasalization in word-initial position. Others, such as Borman (1962: 51), have also been
 106 uncertain about the nature of prenasalization, claiming that voiced stops and affricates are
 107 allophonically prenasalized following nasal vowels. The realization of these segments is also
 108 consistent in borrowed words, e.g. [^hgrɪ. ^hgõ. ^hge] ‘English’.

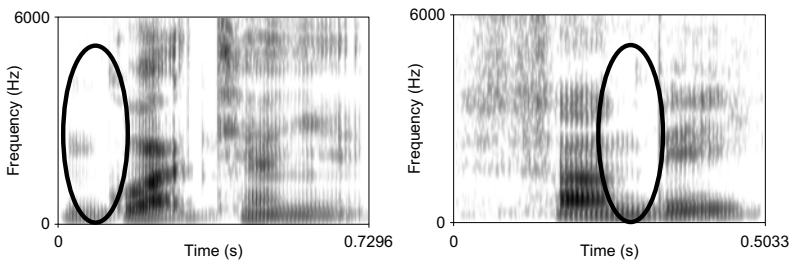


Figure 3 [^hgoa.tʰia.nẽ] ‘to boil’ (left); [^hfa.mbi] ‘eel’ (right).

109 The average durations of prenasalization in voiced stops and affricates are given in
 110 Table 2. This data was gathered from eight utterances from each speaker. The relative
 111 durations of nasalization and full closure differ between the stops and affricates.

112 There are four voiceless fricatives: /f/, /s/, /ʃ/, and /h/. They are all typical representatives
 113 of their respective phonological categories, except for /s/, which is usually realized with aspi-
 114 ration (Gordon, Barthmaier & Sands 2002). The area encompassed by the oval in Figure 4

Table 2 Average duration of nasalization in A'ingae prenasalized voiced stops (in ms).

	Pre-nasalization average
Stop	96 (sd = 26)
Affricate	74 (sd = 26)

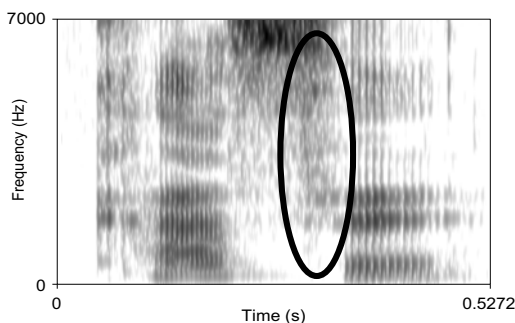


Figure 4 [ˈkʰa.se] 'again'.

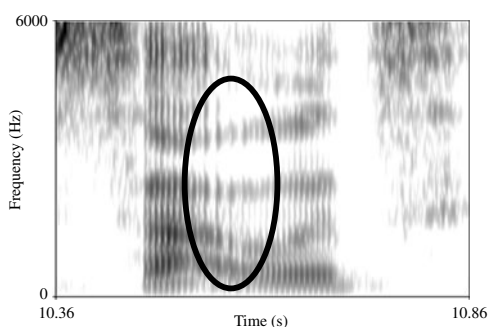


Figure 5 /ˈsaʔ.ʉ̯.tsi/ 'warm'.

illustrates this realization. The presence of aspiration is reflected by a shift from high frequency high amplitude aperiodic noise characteristic of [s] to a period of lower amplitude and more evenly distributed noise. The aspiration is similar to that of other short-lag VOT obstruents in A'ingae, with a mean of 20 ms (sd = 8). In addition to the direct evidence of aspiration, the vowels following /s/ have a more negative spectral slope than vowels following other fricatives, suggesting breathiness, as often results from neighboring segments with spread glottis features. None of the fricatives other than /s/ exhibits evidence of aspiration.

The presence of an aspirated fricative without an unaspirated counterpart would be typologically unparalleled (Jacques 2011: 1519), with the possible exception of Korean, in which there is a phonetically aspirated /s/ and a glottalized 'fortis' /s*/, but it is not clear which aspects of the phonetic differences are phonologically fundamental to the contrast (Cho, Jun & Ladefoged 2002). The duration of this aspiration in A'ingae is somewhat shorter than it is in other languages, though aspiration on fricatives tends to be short cross-linguistically (Jacques 2011, Salgado, Slavic & Zhao 2013).

There are three approximants in A'ingae; /j/, /v/, and /ʉ̯/. The nature of the labiodental approximant, seen in the oval-encompassed area in Figure 5, has been a source of some disagreement, but analysis of video data confirms the place of articulation as labiodental, and acoustic analyses confirm that the sound is consistently realized as an approximant, with clear formants and little aperiodic noise. Thus, our data supports Fischer & Hengeveld's claim that the sound is indeed the labiodental approximant, [ʉ̯], which had been erroneously described by Borman (1962: 51) as being the voiced bilabial fricative /β/ with labiodental variants following low unrounded vowels. This misinterpretation was likely due to the fact that aerodynamic constraints can result in voiced fricatives being more sonorous than their voiceless counterparts, however, the lack of other voiced fricatives in the phonological

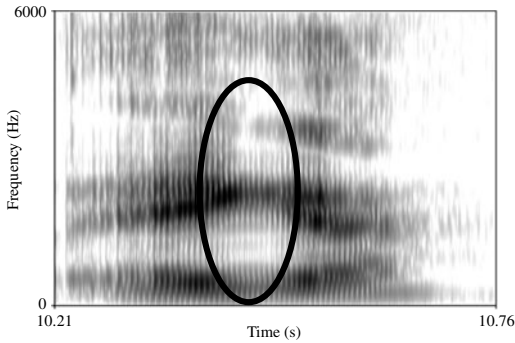


Figure 6 /^he.uqa/ 'bad'.

139 inventory are consistent with this sound being an approximant phonologically and not just
140 phonetically.

141 Previous descriptions of the velar approximant /uɣ/ have been more varied. Borman
142 (1962: 46) described it as a contrastive phoneme and identified it as the voiced velar fricative /ɣ/. Fischer & Hengeveld (2019) do not include this segment in their inventory, though
143 in words where we have identified this segment, they transcribe it with [g]. Our acoustic
144 analysis demonstrates that the sound is consistently realized as an approximant [uɣ], with little
145 aperiodic noise and clear formants reflecting a velar constriction, as seen in the part of
146 the spectrogram in Figure 6 that the oval encompasses. Beyond these phonetic observations,
147 we note that this produces a more uniform phonemic inventory, with one series of voiced
148 approximants and one series of voiceless fricatives.

150 Vowels

151 The vowel system of A'ingae includes 22 vowels: five oral monophthongs, six distinct oral
152 diphthongs, and contrastive nasal counterparts of each, as reflected in the near-minimal pair
153 /^ho.thi/ 'to hammer' and /^hõ.tĩ/ 'horsefly'.

a	^h a.th ^h e.je	'to see'	ã	^h ã.ti.jã	'relative'
e	^h e.thi	'house'	ẽ	ẽ. ^h t ^h ĩ. ^h ge	'middle'
i	^h i.th ^h o.th ^h oʔ.tʃ ^h o	'cough'	ĩ	^h ĩ.ʔ.ha	'to want'
o	^h o.tha	'to be laying on'	õ	^h õ.t ^h ĩ	'mosquito'
ĩ	^h ĩ.thie	'ahead'	ĩ	^h ĩ.ke	'goddaughter'

154 The five oral monophthongs are /a/, /e/, /i/, /o/, and /ĩ/, which is consistent with previous
155 work (Borman 1962, Fischer & Hengeveld 2019), and the formants of oral monophthongs
156 are the same as their nasal counterparts. A formant analysis across 20 utterances per vowel
157 confirms the distinctiveness of each oral monophthong, as shown in the first half of Figure 7.
158 The second half of the figure gives the mean values for the corresponding nasal monophthongs;
159 we had fewer tokens for the nasal vowels, but the oral formants are very similar to
160 those in the oral vowels.

161 While there is some overlap in the distributions of /e/ and /ĩ/ due to sampling across envi-
162 ronments, their means are different both in F1 (4.05 Bark for /e/, 3.78 Bark for /ĩ/) and F2
163 (11.01 Bark for /e/, 10.17 Bark for /ĩ/); F3 further helps distinguish them (mean 12.82 Bark

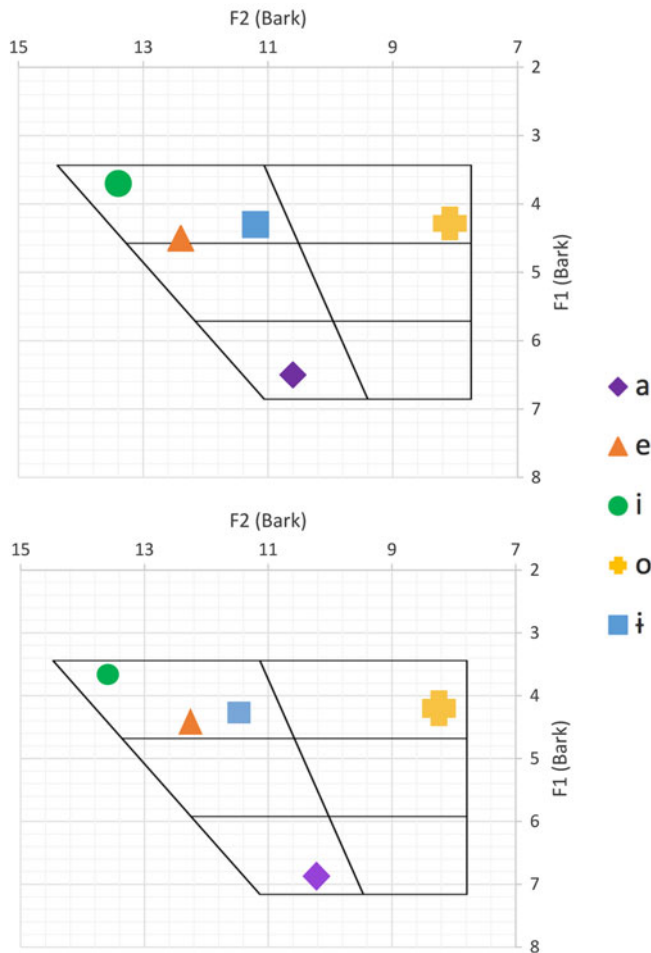


Figure 7 Average F1 and F2 of A'ingae oral monophthongs (top); average F1 and F2 of A'ingae nasal monophthongs (bottom).

164 for /e/, 12.35 Bark for /ɨ/). These vowels are all phonologically contrastive, as is appar-
165 ent from speakers' consistent production of them in particular words, and their ability to
166 distinguish between them, even when presented in the same environment.

ai	¹ⁿ d͡ʒai.na	‘sit one down’	oi	^{1p} hoi.ka.nẽ	‘to watch’
oe	jõ. ¹ⁿ goe.si	‘what’	ii	^{1k} ii?.he	‘drinking’
oa	¹ⁿ goa.thia.nẽ	‘to boil’	ao	a. ^{1h} je?.k ^h ao	‘nauseated’

167 There are six diphthongs in our data: [ai], [oe], [oa], [oi], [ii], and [ao]. While there are **Q3**
168 other orthographic VV sequences, several of them are consistently realized with an interven-
169 ing glide. In addition, orthographic <ae> and <ai>, which Borman (1962: 54) describes
170 as distinct sequences, are not acoustically distinguished in our data, though the spelling of
171 individual words is generally consistent in which one is used. Several other orthographic pairs
172 similarly do not seem to be contrastive.

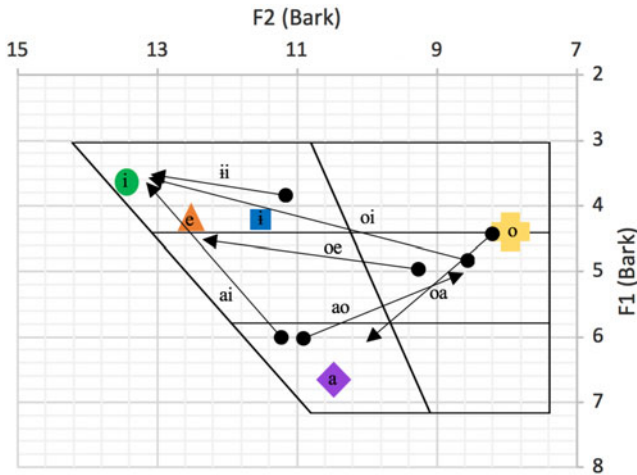


Figure 8 Quadrilateral of average A'ingae diphthongs.

Figure 8 demonstrates the trajectories of diphthong formant averages from 20% to 80% through the vowel. Between four and seven words were analyzed per diphthong, depending on how many examples we had identified for our elicitations. The formants largely align with the corresponding monophthongs.

Nasal spreading

In addition to the phonemic contrast of oral and nasal vowels, there are several nasal spreading processes. All vowels after nasal consonants are nasalized, as is observed by Fischer & Hengeveld (2019). Vowels in these environments are nasalized throughout, indicating that the process is phonological, and not merely phonetic coarticulation. However, nasal vowels can occur after oral consonants and also word-initially, so they are clearly phonologically contrastive. Nasality also spreads between adjacent vowels and vowels separated by a glottal consonant, as can be seen in suffixes (morpheme boundaries denoted by the symbol '='), which vary in nasalization depending on the preceding vowel, as in (5).

- | | | | | |
|-----|----|----------|----|------------|
| (5) | a. | /ã=he/ | b. | /kɨi?=he/ |
| | | [ˈã.hẽ] | | [ˈkɨi?.he] |
| | | eat=PROG | | drink=PROG |
| | | ‘eating’ | | ‘drinking’ |

However, consonants with oral constrictions block nasal spreading (Fischer & Hengeveld 2019), as is apparent in the oral vowels of [jõ.^hgoe.sɨ] ‘what’ and [nẽ.^hpi.je] ‘to arrive, to finish’ (note that prenasalized voiced stops are among the consonants that block nasal spreading). This kind of nasal spreading has been found in many Amazonian languages (Payne 2001, Stenzel 2007). Van Gijn (2014) offers a summary of the Amazonian languages that exhibit this feature and contrasts them with the Andean languages, where this pattern is not observed. This provides further support for regarding A'ingae as belonging to the Amazonian linguistic area, a position which – while not especially controversial – is not a given due to the A'i people's historical territory at the interface of these two regions.

195 Nasality also spreads rightward from nasal vowels onto adjacent consonants, at least
 196 in certain morphemes; voiceless unaspirated stops become voiced prenasalized stops and
 197 approximants become nasals after a nasal vowel, as is reflected in affixes which vary in form
 198 depending on the preceding vowel (Fischer & Hengeveld 2019). This pattern is illustrated
 199 in (6).

(6)	a. /ha=je/	b. /hẽ=je/	c. /sema=je/
	[^h ha=je]	[^h hẽ=ɲẽ]	[se ^h mã=ɲẽ]
	go=INF	sound=INF	work=INF
	‘to go’	‘to sound’	‘to work’

200 Sequences of nasal vowels followed by voiceless unaspirated stops are infrequent within
 201 the lexicon. However, there are counterexamples such as [ˈã.ti.jã] ‘relative’, in which such a
 202 sequence is maintained without nasal spreading. It is possible that the infrequentness of these
 203 sequences is due to a historical phonological rule that is now inactive, with morphophono-
 204 logical alternations preserved for certain morphemes. Although we can draw no definitive
 205 conclusions at this point, the pattern is noteworthy nonetheless; future work may elucidate
 206 the nature of the assimilation process and the apparent exceptions to it.

207 Syllables and stress

208 A’ingae syllable structure is (C)V(?); nuclei can contain a vowel or a diphthong and glottal
 209 stops are the only licit codas (Borman 1962: 54; Fischer & Hengeveld 2019). Sequences of
 210 a high vowel followed by another syllable beginning with a homorganic glide are sometimes
 211 realized without the high vowel, resulting in surface CCV(?) syllables in which the second
 212 consonant is a glide, e.g. [bijaʔa] ‘long’ also as [bjaʔa]. Many of these sequences seem
 213 to come from VV sequences produced across morpheme boundaries, and it is not entirely
 214 clear how best to analyze their underlying forms. In addition, there are some exceptions to
 215 the CV syllable structure in borrowed words, where additional onset clusters are allowed,
 216 e.g. [ˈɡrĩ.ˈɡõ.ˈɡe] ‘English’. However, in other borrowed words, like [rãⁿde] ‘big’ from the
 217 Spanish <grande>, the onset clusters are simplified.

218 Glottal stops have a limited distribution; they only occur in codas and cannot occur word-
 219 finally. Borman (1962: 56) identified several cases of alternations in glottal stop position
 220 within morphemes, but did not provide a phonological analysis of the process producing the
 221 alternations. We propose that glottal stops undergo metathesis with preceding vowels when
 222 their underlying position is word-final, as demonstrated in examples (7) and (8). When the
 223 glottal stop is followed by another syllable, it surfaces in the same position.

(7)	a. /aiʔ/	[^h a.ʔi]	‘(A’i) person’
	b. /aiʔpa/	[^h aiʔ.pa]	‘non-A’i person’
(8)	a. /t̪iʔ/	[^h t̪i.ʔi]	‘tomorrow’
	b. /t̪iʔve/	[^h t̪iʔ.ve]	‘day after tomorrow’

224 While underlying glottal stops are sometimes realized as creakiness on the preceding vowel,
 225 creakiness can also occur phrase-finally. All instances of word-final creaky vowels seem to
 226 be the result of phrase boundaries, rather than underlying glottal stops.

227 A’ingae has phonological stress, reflected phonetically primarily in duration, though it is
 228 also associated with higher f₀, at least within the declarative frame sentence and in isola-
 229 tion. Amplitude was also measured, but did not exhibit significant stress-related differences.

Table 3 Average duration of nasalization in A'ingae prenasalized voiced stops (in ms).

	Isolation		Declarative frame	
	Vowel duration	f0 max	Vowel duration	f0 max
Stressed	150 ms (sd = 29)	143 Hz (sd = 13)	128 ms (sd = 27)	141 Hz (sd = 17)
Unstressed	82 ms (sd = 19)	121 Hz (σ = 9)	80 ms (sd = 15)	121 Hz (sd = 25)

Stressed and unstressed syllables were compared within a speaker for each of the three speakers; vowel quality, word length, and position of the syllable within the word were balanced across items. All syllables were penultimate or antepenultimate, within disyllabic and trisyllabic words. The syllables were elicited in both isolation and in a declarative sentence, and mean values for stressed and unstressed syllables are given in Table 3. Both the duration and f0 maximum differed significantly between stressed and unstressed syllables in both elicitation environments based on 10 words analyzed per speaker.

Our observation that prominence in A'ingae syllables within the contexts that we examined is regularly cued by high f0 is not meant to suggest that f0 is an inherent characteristic of stress; previous work in other languages has demonstrated that the relationship between f0 and stress can be mediated by the intonational context (e.g. Ladd 1996: 45–50). Nonetheless, as this is the first sketch of the phonology of A'ingae, and we do not yet have data to evaluate possible intonational conditioning of stress realization or interactions with the features of surrounding segments, we choose to report the observed f0 patterns, as they may be relevant for subsequent work. We report f0 maximum rather than peak timing because many syllables have very flat f0, which hinders measurement of peaks, and because the prevalence of voiceless obstruents inhibits consistent pitch tracking across syllables as well as perturbing f0 at vowel edges.

The position of stress is somewhat constrained, but does not seem to be predictable. There is some lexically specific variation in stress position, as well as interactions with morphology, which can produce different stress positions within the same root. Some related forms exhibit different stress based on differences in the transparency of their morphological breakdown, as in (9); these reflect the partial regularity of stress within the same morphological environment.

- (9) a. ¹tʃ^hiʋanẽ ‘from God’
 b. tʃ^hi¹ʋanẽ ‘please’

There are also some minimal pairs distinguished only by stress, with the same morphological environments, as in (10); these demonstrate the lexical component of stress.

- (10) a. ¹nẽpije ‘to disappear’
 b. nẽ¹pije ‘to arrive’

Borman (1962: 57–59) describes stress as usually being penultimate or earlier within a word, noting that there are interactions between stress and morphology that were beyond the scope of that paper. Fischer & Hengeveld (2019) assert that stress usually occurs on the final syllable of verb stems and on the penultimate syllable of noun stems, with the stress domain including derivational suffixes but not inflectional suffixes or clitics. Given our data, this analysis does not seem sufficient. Stress is usually penultimate or antepenultimate within the root, and never occurs word-finally except in monosyllabic words. However, stress can differ depending on the particular root and is affected differently by different affixes and clitics; we do not yet have enough systematic data on combinations of each of these elements to propose a full system.

266 Likewise, we do not yet have enough systematic data across sentence types to propose
 267 an analysis of the intonational system. Most utterances within our corpus are declarative
 268 sentences and words in isolation; both exhibit an overall falling f0. Words that are focused by
 269 a quotative context, like the forms elicited by our frame sentence, are realized with a higher
 270 f0 than surrounding words.

271 Transcribed passage

272 English

273 The North Wind and the Sun were disputing which was the stronger, when a traveler came along
 274 wrapped in a warm cloak.

275 They agreed that the one who first succeeded in making the traveler take his cloak off should be
 276 considered stronger than the other.

Q4

277 Then the North Wind blew as hard as he could, but the more he blew the more closely did the
 278 traveler fold his cloak around him; and at last the North Wind gave up the attempt.

279 Then the Sun shone out warmly, and immediately the traveler took off his cloak.

280 And so the North Wind was obliged to confess that the Sun was the stronger of the two.

281 A'ingae phonetic transcription

282 ɔ̃. ^mba.k^hi̯.ni.sĩ 'fĩ. ^ŋgiã 'to.ja.kãe koɛ. 'he.te a. 'fã.k^ho.he.fa 'mã.jã."de 'ti.ts^hi̯i̯ 'kĩ.jã.k^hẽ
 283 'tsõ.hẽ.nĩ."de 'ha.kã.sĩ 'tõ. ^mbiã 'sã.vĩ.ts^hia o. 'puĩ.hẽ. ^ŋga fĩ. 'di.je.t̥ʃo 'hi
 284 tã.'s̥j̥.fa.te.t̥sa 'mã.hã 'o.tiɛ 'ti.se 'ha.kã.sĩ fĩ. ⁿdi.je.t̥ʃo o.'puĩ.hẽ.mã u. 'ʃiʔ.t̥ʃ^ha.t̥ʃ^ho k̥ĩ.jã.nẽ
 285 'tsõ. ^mba.te'õ. ^mba.ni.sĩ fĩ. ^ŋgiã'ĩ.fakiã.mẽ'ti.se'u.ʃã.fã. ^ŋga't̥sa.ma'ti.se'ti.ts^he'ĩ.fã.ni'ha.kã.sĩ
 286 'ti.se o.'puĩ.hẽ.mã 'fĩ."di o. 'se.faʔ.pã. ^ŋga õ. ^mba.k^hi̯.nĩ.su 'fĩ. ^ŋgiã u. 'ʃã. ^mbi.pa ã.t^hɛ
 287 'tsõ.si.te 'ko.e.he 'saʔ.vĩ.tsĩ 't̥ʃã.hĩ 'tsĩĩ.ki.tɛ fa. 'va.tsĩi 'ha.kã.sĩ 'ti.se o. 'puĩ.he.mã u. 'ʃi.t̥ʃ^ha
 288 't̥so. ^mbaʔ.tɛ 'õ. ^mba.ni.su 'fĩ. ^ŋgiã tã.'si.jã.t̥ʃo.ve.'dã.ja t̥sa 'koɛ.he 'k^huã. ^ŋgi. ^ŋga 'iʔ.ha.ni 'ti.ts^he
 289 'k̥ĩ.jã.k^hẽ

290 A'ingae orthographic transcription (Borman orthography)

291 Omba'ccuni'su Fingian toyacaen Coe'jete afa'cco'je'fa majan de ti'tsse qui'an'qqe,
 292 tson'jeninde jacan'su to'mbia sa'vutssia opui'jenga findiye'cho ji
 293 Tansi'fate tsa majan o'tie tise jacan'su findiye'cho opui'jema oshi'chhachho ti'tsse qui'añe
 294 Tsombate, ombani'su fingian u'fa quia'me tise osha'fanga, tsama tise ti'tsse ufa'ni jacan'su tise
 295 opui'jema findi; osefa'panga ombaccuni'su fingian oshambipa antte
 296 Tsonsite coe'je sa'vutssi chan'jun, tsuin'ccute favatsseyi jacan'su tise opui'jema oshicha
 297 Tsombate ombani'su fingian tansi'ña'choveda'ya tsa coe'je ccoa'nginga in'jani ti'tsse
 298 quian'qqe.

299 **A'ingae orthographic transcription (Community orthography)**

300 Umba'khûni'sû Fingian tuyakaen kue'jete afa'khu'je'fa majan de ti'tshe ki'an'khe, tsun'jeninde
 301 jakan'sû tu'mbia sa'vutshia upûi'jenga findiye'chu ji

302 Tansi'fate tsa majan u'tie tise jakansû findiye'chu upûi'jema ushi'chhachhu ti'tshe ki'añe

303 Tsumbate, umbani'sû fingian û'fa kia'me tise usha'fanga, tsama tise ti'tshe ûfa'ni jakan'sû tise
 304 upûi'jema findi; usefa'panga umbakhûni'sû fingian ushambipa anthe

Q5

305 Tsunsite kue'je savutshi chan'jun, tsuin'khûte favatsheyi jacan'su tise upûi'jema ushicha

306 Tsumbate umbani'sû fingian tansi'ña'choveda'ya tsa kue'je kua'nginga in'jani ti'tshe kian'khe.

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