

THE SOUNDS OF HMONG

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The Hmong (Hmong: *Hmoob*) are an aboriginal people group of China, referred to within China as Miao (Chinese: 苗族, *miáozú*). Starting in the 18th century, large numbers migrated to Thailand, Laos, Vietnam, and Myanmar. In the second half of the 20th century, as a result of the Indochina and Vietnam wars, some migrated to America, French Guiana, France, and Australia. The number of Hmong worldwide is very difficult to fix. Most Hmong live in China, and I have seen figures for the population there to range from 7 million (1999 figure, Ethnologue) to 10 million (2000 Chinese census, according to Wikipedia). A figure I have seen for the number of Hmong worldwide, however, is 6 million (1999 figure, Ethnologue).

The language that my language consultant speaks is Hmong Daw (Hmong: *Hmoob Dawb*), or White Hmong, which henceforth will simply be called Hmong. The number of speakers of Hmong Daw is at least 165,000 worldwide (Ethnologue). It is mutually intelligible with Mong Leng, or Green Hmong. (The color words arise from traditional Chinese designations for the tribes based on the color of women's dresses.) These are but a prominent two of many Hmong languages, of which Ethnologue reports 21. These languages are in turn related to other Hmongic languages such as Bunu, and they together in turn form the largest constituent in Hmong-Mien, which has 35 languages in all.

No broader classification has had scholarly consensus. Traditionally Chinese linguists have held that Hmong is related to Chinese, but if there is any genetic relation at all, it is too distant to detect. Inquiries into the possibility of genetic relation with Tai, Austronesian, or Mon-Khmer languages have been inconclusive. It is true, however, that Hmong and Chinese share many words through borrowing. Moreover, like many of its neighbors, Hmong morphemes are preponderantly monosyllabic and always bear a tone, and Hmong words are highly analytic.

My consultant was Ia Her (*Iab Haxwj*, [íə hâi]), a 21 year old woman and a student at Cal. She grew up in a refugee camp for Hmong in the town of Chiangkham, in the province Pha Yao, in Thailand. Her family had moved there from Laos. Her mother speaks only Hmong, and her father speaks Hmong and has limited proficiency in Laotian. Ia spoke only Hmong, and was exposed minimally to Thai and other languages. She was taught the Hmong RPA (Romanized Popular Alphabet) at a school for Hmong children, which proved useful during our sessions for naming and eliciting sounds. At age 8, her family moved to Sacramento, California, where they currently reside. She speaks Hmong frequently with her family.

I wish to express heartfelt gratitude to Ia for the opportunity to study the sounds of a language I found both marvelous and elegant. *Ua koj tsaug.*

Overview of Hmong Phonology

The basic phonological unit in Hmong is the syllable, not the word. Most morphemes are monosyllabic, and most syllables have transparent meanings. Words, if polymorphemic, are analytic, and for this reason, they are sometimes called “terms”, with the morphemes themselves being called “words”. I will try to steer clear of such ambiguities in this report.

Each Hmong syllable has an onset, a rime, and a tone, out of a total possible of 57 onsets, 13 rimes, and 7 tones. What complexity there is in the onset is made up for in the simplicity of syllable codas, for the rimes are all zero-coda, except for two that end in [ŋ].

In a language such as Hmong, it is more convenient to speak of onsets and rimes than of segments. Whereas it is quite right to say that an onset such as [mpl], which represents a pre-nasalized bilabial stop with an overlapping lateral, is 3 distinct segments, the fact that such clusters are relatively few compared to the number of segments in the language persuades me to structure my analysis around onsets and rimes rather than around segments.

This report will discuss onsets, rimes and tones in 3 respective sections. The difficult matter of interactions between adjacent syllables will not receive systematic treatment, but will be touched on throughout. There are three appendices: an explanation of the romanization scheme used in this report (Hmong RPA); a word list of some of the words that were elicited during this project; and a list of words that exemplify each onset, rime, and tone encountered.

ONSETS

The 57 syllable onsets for Hmong are given in Table 1, below. Please see Appendix C for exemplifications. The best way to canvass such a large inventory of sounds is to discuss phonemes individually as necessary, and by class when generalizations suffice.

	Bilabial	Bilabial with lateral	Labiodental	Interdental	Dental	Dental affricate	Alveolar	Retroflex	Post-alveolar affricate	Alveopalatal	Palatal	Velar	Uvular	Glottal
Plain stop	p	pl		t		ts		ʈ	tʃ		c	k	q	ʔ
+ aspiration	p ^h	pl ^h		t ^h		ts ^h		ʈ ^h	tʃ ^h		c ^h	k ^h	q ^h	
Prenasalized stop	mp	mpl		nt		nts		ɳʈ	ntʃ		ɲc	ŋk	Nq	
+ aspiration	*mp ^h	mpl ^h		nt ^h		nts ^h		ɳʈ ^h	ntʃ ^h		ɲc ^h	ŋk ^h	Nq ^h	
Voiced stop							d							
Voiced aspirated stop							d ^h							
Nasal (voiced)	m	ml					n				ɲ			
Nasal (voiceless)	m̥	*ml̥					n̥				ɲ̥			
Fricative (voiceless)			f		s			ʂ		ç				h
Fricative (voiced)			v					ʐ						
Approximant											j			
Lateral fricative							ɬ							
Lateral approximant							l							

Table 1: Hmong Syllable Onsets. Asterisks mark onsets for which a word could not be found, but which were recognized by the speaker as part of the language. All references on Hmong include them.

Plain Stops

For unvoiced and unaspirated stops, not counting co-articulations and affricates, there are 7 places of articulation: bilabial, interdental, retroflex, palatal, velar, uvular, and glottal. The

bilabial, velar, and glottal stops are much as they are in English, and require no explanation. Glottal stops occur only as onsets in syllables that would otherwise be without an onset. Thus it was unclear whether glottal stop was a real phoneme, or merely an epiphenomenon arising from the need for speakers to begin utterances with something or divide up syllables. Ia always made glottal stops in words like [kuə ʔi] “eleven”, but I intentionally spoke the word to her without the glottal stop and she said it sounded fine.

Interdental stops are made with the tongue poking out slightly between the upper and lower teeth. Retroflex stops are made with the underside of the tongue tip pressed against the gum ridge and the back of the top front teeth. These two stops are not very distinct to a speaker of English: subjectively a sound such as [ta] sounds brighter and cleaner, and [ɖa] sounds darker, fuzzier, and slightly rhotacized, but I decided to measure the acoustic properties of these two syllables to remove the subjectivity. I had Ia utter a repeating sequence of syllables, first with [ta] and then with [ɖa], which she did rapidly at 4 Hz. I took a syllable from the middle each sequence, pasted them together, and plotted spectrogram and formants (fig 1). Observe that [ɖa] has lower F1 and F3, particularly toward the beginning and end of the syllable, where the stop release and closure are. F3 had a range of 3260-3390 Hz for [ta] and 3030-3140 Hz for [ɖa], which explains why the latter sounds more rhotacized. F1 had a mid-syllable value of 1050 Hz for [ta] and 870 Hz for [ɖa], which may explain why the latter, with its higher vowel, sounded darker. Lastly we can see that [ɖa] has a louder release burst, which explains why it sounds fuzzier. Perhaps the positioning of the tongue in the retroflex stop causes the air that is released to blow against the teeth, creating a much more audible burst.

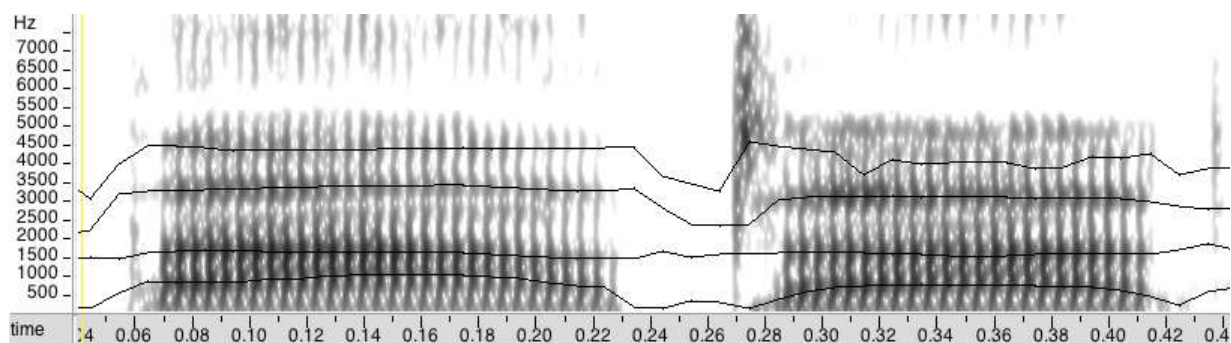


Figure 1: Spectrogram and formant plot of [ta] followed by [ɖa]. A syllable [ta] was cut from the middle of a repeating sequence [tatata...] and pasted next to a syllable [ɖa], cut from the middle of a repeating sequence [ɖaɖa...].

Palatal stops and velar stops are easy to distinguish before non-front vowels because palatal stops take a relatively long time (up to 50 ms) to transition into the vowel, making a palatal

glide in the process (see [cɔ] onset in Figure 2). This cue is not present for front vowels, however, and discrimination between [ce] and [ke] is harder. Both [c] and [k] appear to have a velar pinch, but differ in the quality of the release burst. With [c] the burst is concentrated in the higher frequencies, and with [k] the burst is full-spectrum. The burst is noticeably weaker for [ce], and with this distinguishing feature attenuated, it was easy to confuse the syllable with [ke]. Presumably Hmong speakers listen for the absence of a full-spectrum burst as indicating [c].

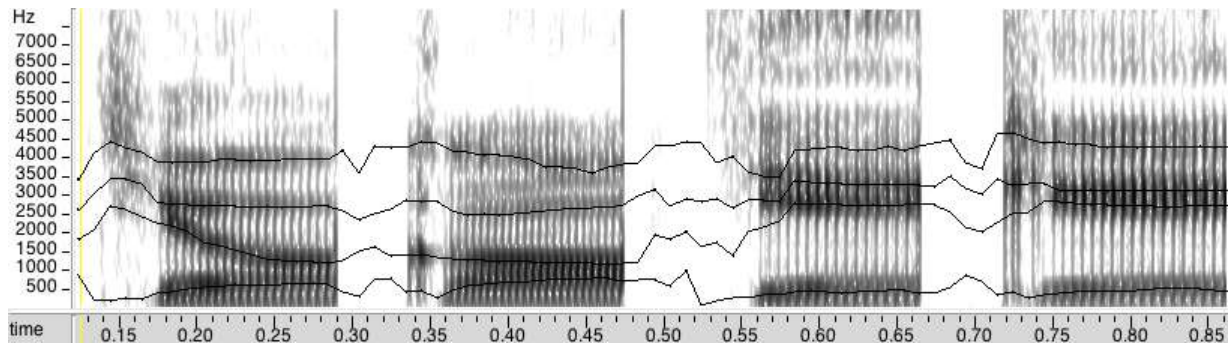


Figure 2: Spectrogram and formant plot of syllable onsets for [cɔ], [kɔ], [ce], and [ke], from *ib co* “a few”, *koj* “thou”, *seev cev* “dance”, *mus kev* “walk”.

Uvular stops sound markedly different than velar stops with their “darker” sound. Plotting formants yielded an explanation – instead of there being a velar pinch, F2 starts low and stays low (fig 3). I had Ia utter repeating sequences of syllables again, this time with [ka] and [qa], and plotted a syllable from the middle of each sequence. Note that F2 is so different that not only are the releases easily distinguishable, but the vowels are quite different. F2 is 1890 Hz for vowel in [ka] and 1450 Hz for the vowel in [qa].

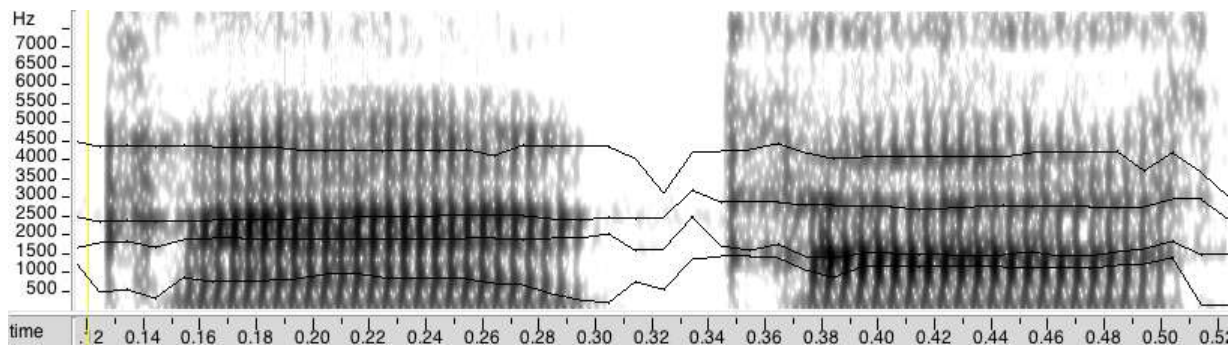


Figure 3: Spectrogram and formant plot of [ka] followed by [qa]. A syllable [ka] was cut from the middle of a repeating sequence [kakaka...] and pasted next to a syllable [qa], cut from the middle of a repeating sequence [qaqaqa...].

Consonant Clusters and Affricates

As far as place and timing of articulation is concerned, the phoneme [p^h] is the same as English “p^l” in a word such as *plow*. The tip of the tongue is lowered from the gum ridge shortly after the lips open, but not simultaneously. In the power plot for [pláu] we can see an up-step at time 0.42 s, corresponding to when the tongue cleared the articulatory pathway (fig 4).

The affricates [ts] and [tʃ] are quite ordinary, and there is nothing unusual about them as far as I can hear.

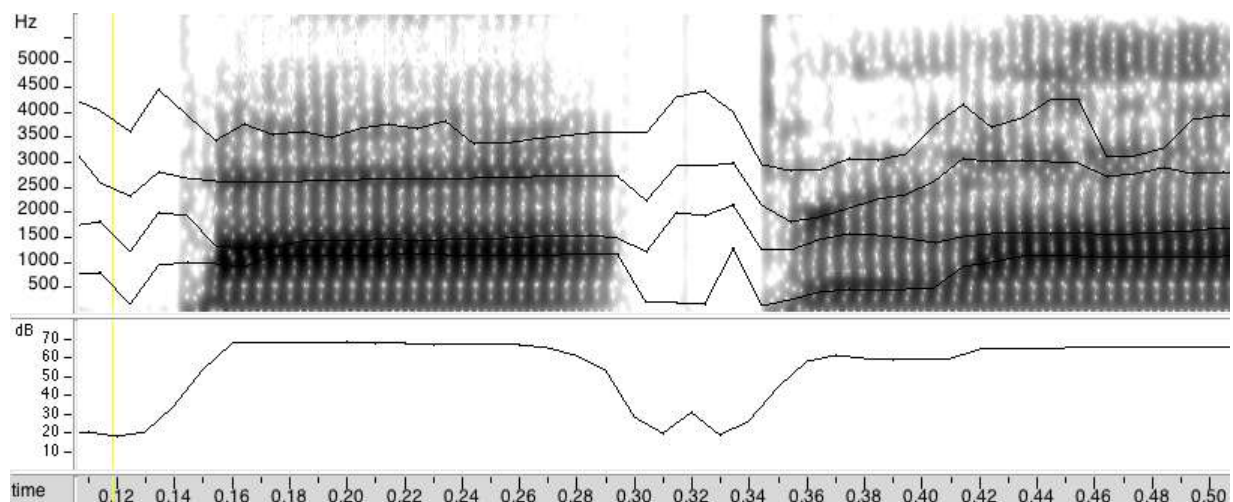


Figure 4: Formant and power plot of onsets of [páu] and [pláu], from *paub* “know” and *plaub* “four”.

Aspiration and Prenasalization

All the stops mentioned so far besides glottal stop can be aspirated, prenasalized, or both. Aspiration is a bit stronger than in English, but otherwise quite ordinary. Prenasalization (fig 5) involves voicing a homorganic nasal before releasing the stop. The velar passage to the nose must then be shut or nearly shut after the nasal sound is made, or else a stop could not be made and the result would be a nasal consonant. In practice, the nasal blip is quite short (70 ms in this example) and the velum springs closed as soon as it opened. More to confirm this is that there is no nasalization in the rime of the syllable [ntě], although, oddly enough, there does seem to be some in [tě].

In multisyllabic utterances, it is normal for the nasal from the prenasalization to serve as the coda of the preceding syllable, even though the native hearer will associate it with its own syllable. This happens very often, as most Hmong syllables lack codas. Thus with a phrase

such as *tus nplaig* “a tongue”, the syllables are pronounced [tù] [mplaj] individually, but together sound like [tùm.plaj].

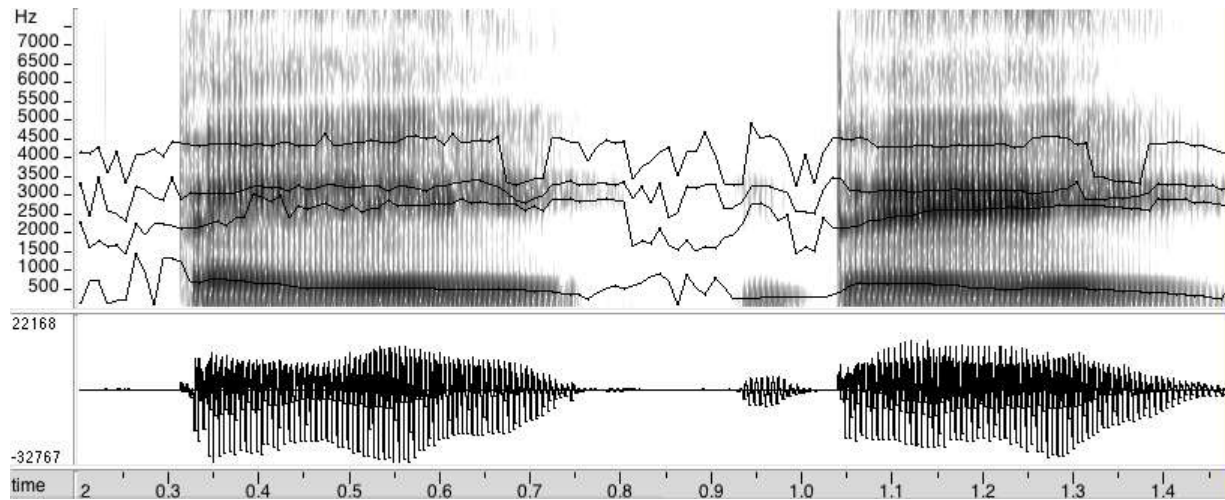


Figure 5: Spectrogram and waveform of [tě] and [ntě], *tev* “peel” and *ntev* “long”.

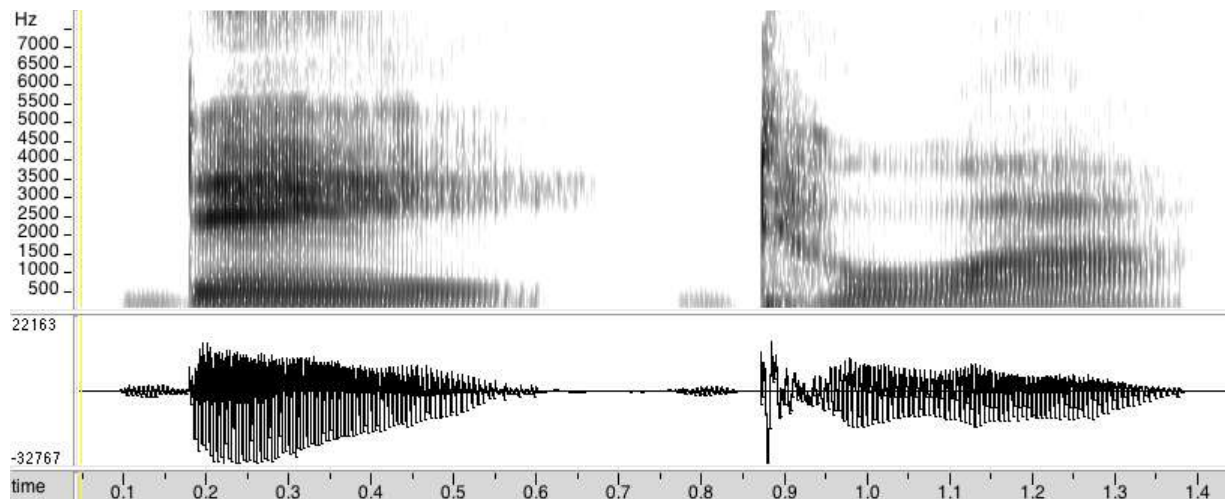


Figure 6: Spectrogram and waveform of [dê] and [dʰə], *dej* “water” and *dbuav* “to be tired of something”.

Voiced and Aspirated Voiced Stops

The phonemes [d] and [d^h] are articulated at the alveolar ridge. Each has up to 75 ms of voicing before the release burst (fig 6). The aspirated stop [d^h] additionally has up to 75 ms of aspiration, during which the voicing gradually drops out and then recovers. There is also a conspicuous silence of up to 20 ms before the release burst, after the voicing had tapered

off. Presumably this hiatus is for the building-up of pressure in the oral and sub-glottal cavities, which are now joined, so that aspiration may take place.

Nasals and Liquids

Whereas prenasalized stops produce nasal segments at all places of articulation, nasal syllable onsets occur only at three: bilabial, alveolar, and palatal. Liquids are alveolar. Nasal and liquid onsets may be devoiced (fig 7). This entails exhalation through the nose (for nasals) or mouth (for the liquid) to produce a fricative instead of voicing. Even with moderately high rates of exhalation, the sound produced is soft. In the example below, voiced [m] segment (with lips closed) was 10 dB louder than the unvoiced [m̥] segment. Information about the place of articulation would have to be from after voicing starts; voicing starts at the beginning of the oral release, or perhaps precedes it by 5-10 ms.

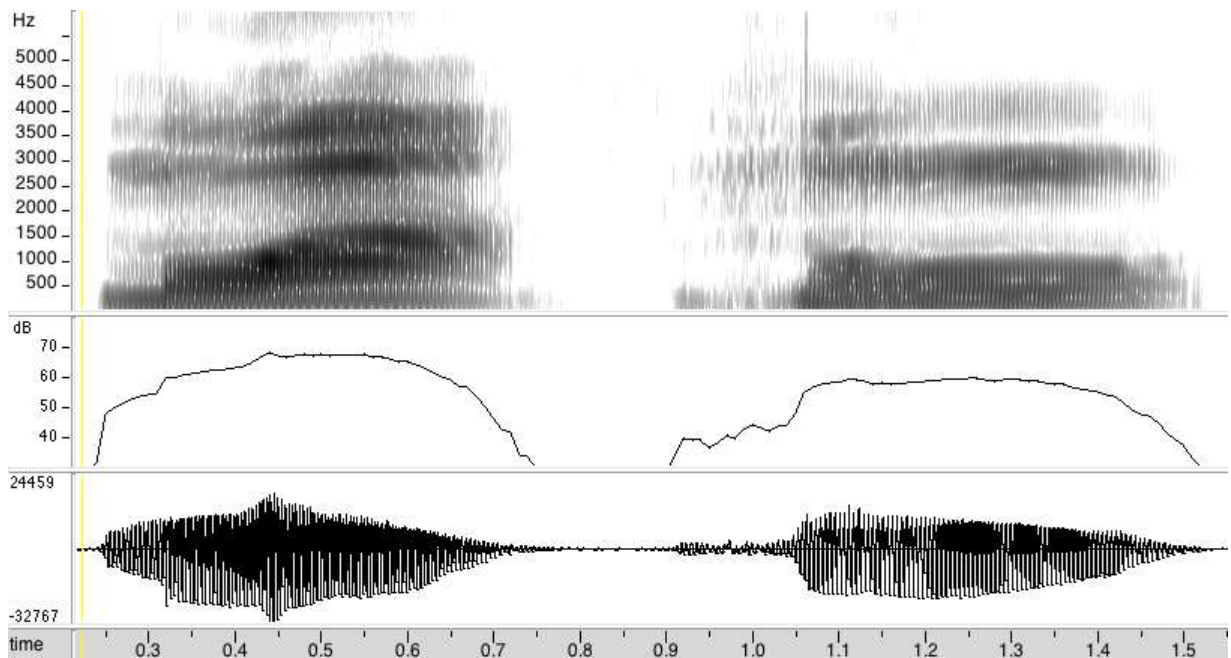


Figure 7: Spectrogram, power plot, and waveform of [múə] and [m̥ũ], *muab* “give” and *hmuv* “spear”.

Fricatives

Bilabial fricatives [f] and [v], and palatal stop [j], resemble their counterparts in English, except that [v] sounds lighter, perhaps because there is no [w] in Hmong for it to contrast with. Glottal fricative [h] sounds heavier than its counterpart in English, but I ruled out the

possibility of it being pharyngeal because adjacent vowels lacked the distinctive coloring that they get in Arabic or Hebrew around pharyngeal consonants.

There are 4 sibilants in Hmong: alveolar [s], retroflex [ʂ] and [ʐ], and alveolopalatal [ç]. The alveolar [s] is the same as in English. The retroflex segments sound very similar to [ʃ] and [ʒ] in English, but the articulation is slightly different. In English, the lips are often slightly rounded and the oral constriction is between a post-alveolar spot and the blade of the tongue. In Hmong, the lips are rounded more consistently and the oral constriction is between the same post-alveolar spot and the tip of the tongue, with the tongue held slightly farther back than in English [ʃ]. This is in contrast to the alveolopalatal [ç], in which the lips are unrounded and the constriction is between the post-alveolar ridge and blade, and also between the palate and the tongue dorsum. In [ç] the tongue is somewhat more elongated than in English [ʃ].

The contrast between [ʂ] and [ç] can be hard for the English speaker to hear, but the two appear fairly distinct on a spectrogram (fig 8). First we see that for the alveolar [s], the noise is concentrated in higher frequencies that fall out of the range of my recording, whereas for [ʂ], the noise is spread roughly evenly from 2500-7000 Hz. For [ç], the noise is concentrated at the low end of that range, and there are two distinct formants at 3000 and 4000 Hz.

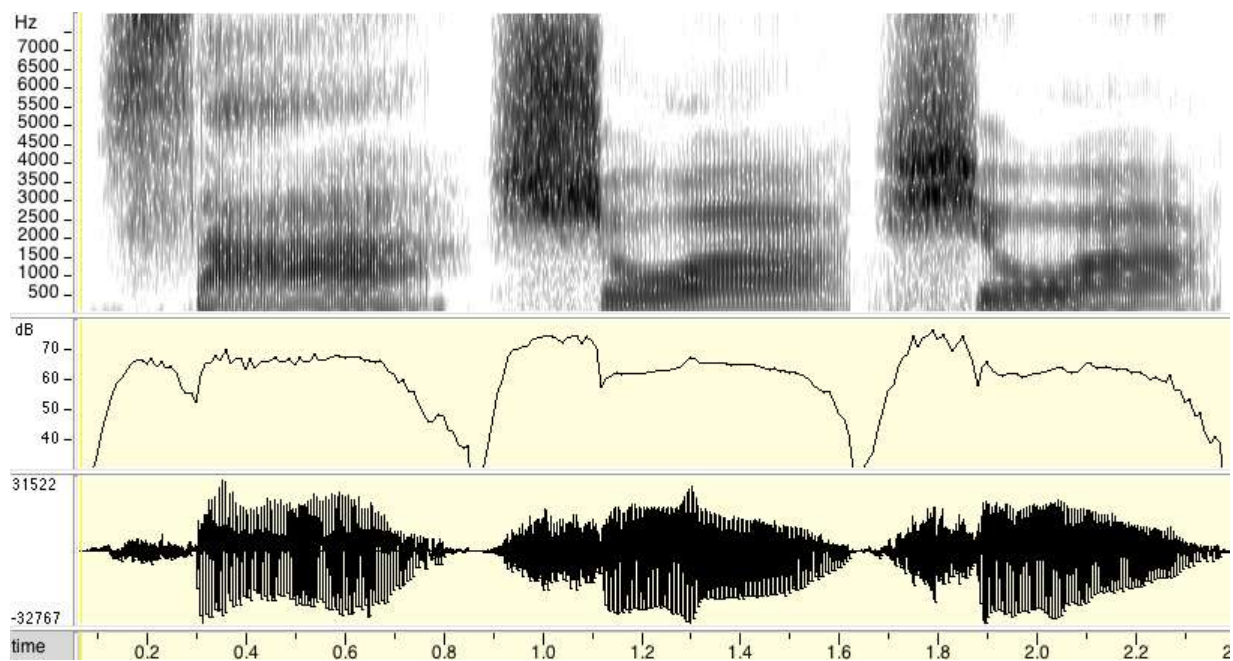


Figure 8: Spectrogram, power plot, and waveform of [sǎ], [ʂúə] and [çùə], *xav* “think”, *suab* “sound” and *xyuas* “visit”.

RIMES

Hmong has 6 vowels and 5 diphthongs (fig 9). There are 3 high vowels, [i], [ɨ], and [u]; 2 mid vowels, [e] and [ɔ], which differ in height; and one low-central vowel [a]. The mid-front vowel [e] resembles English [e], and is somewhat lower than cardinal. It often begins slightly lower for bilabial and glottal onsets, and often ends with a slight off-glide toward [i]. The mid-back vowel is fairly low, and has a slight on-glide from below: [a→ɔ]. The 3 diphthongs starting from [a] ([ai], [aɨ], and [au]) are paced so that the transition from low to high sounds almost linear. The 2 diphthongs going the other way, [iə] and [uə], linger on the first vowel before transitioning to a mid-central unrounded one. Also there is a tendency for [uə] to be realized as [oə] everywhere except in a word that has glottal stop onsets like [ʔua si] (*ua si* “play”).

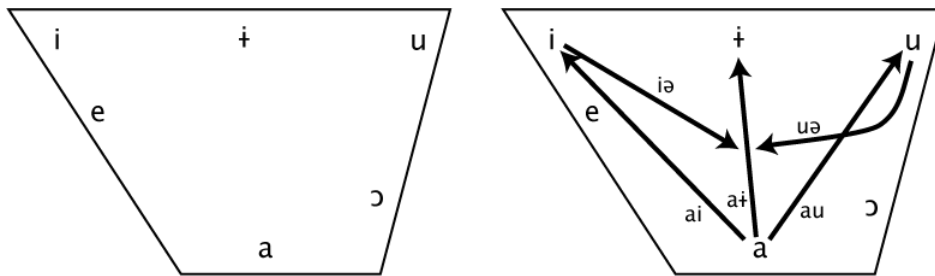


Figure 9: Diagram of 6 vowels and 5 diphthongs showing subjective vowel height and backness.

Figure 11 shows the spectrograms for syllables containing the 6 monophthong vowels. The formants were extracted, and tabulated and plotted below in Figure 10.

	F1	F2	F3	F4
[i]	230	2990	3670	4800
[ɨ]	410	1800	2920	4120
[u]	440	880	3870	4300
[e]	650	2520	3150	4420
[ɔ]	800	1100	2770	3570
[a]	1190	1580	2780	4510

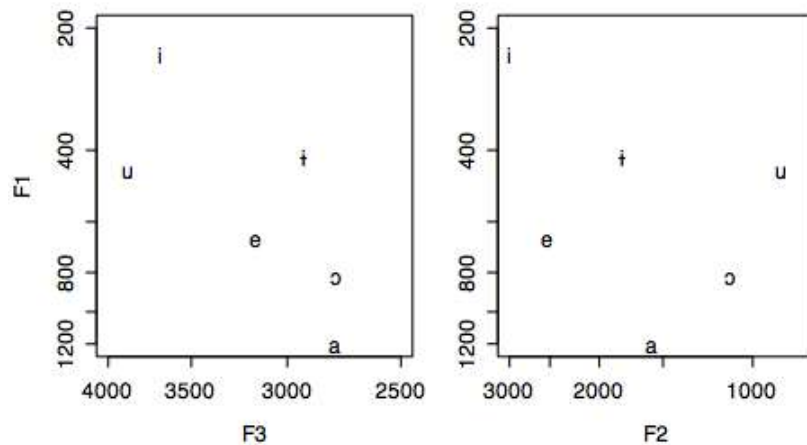


Figure 10: Log / log plots of F1 / F3 on left; F1 / F2 on the right.

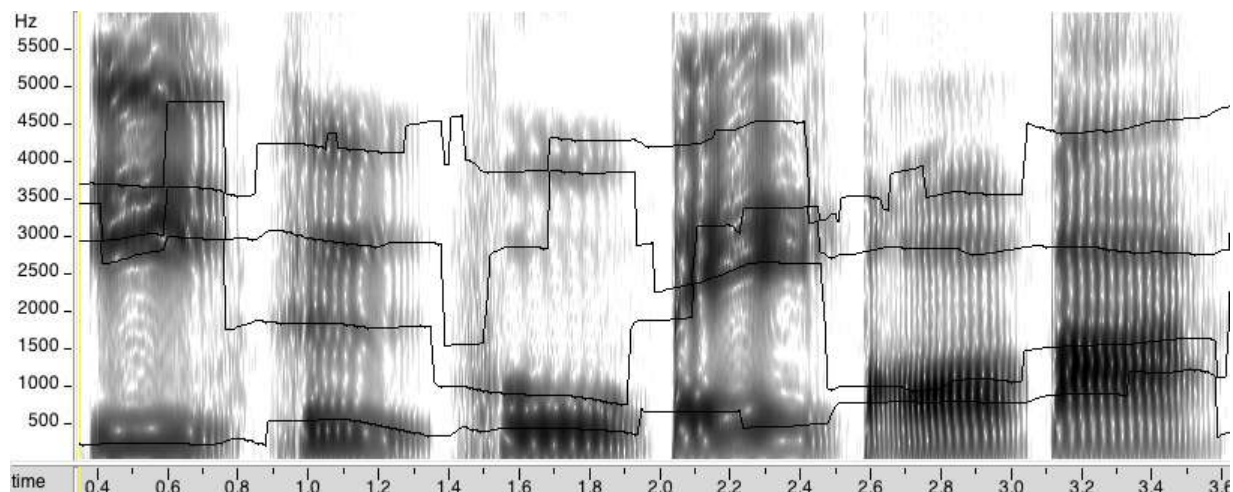


Figure 11: 6 syllables exemplifying the monophthong vowels, with formant plot lines wandering around gratuitously. The vowels are, from left to right: [i ɪ u e ɔ a]. The syllables are: [ʔiá] [hì] [hu] [pé] [pǒ] [pa]. Translations are in Appendix C.

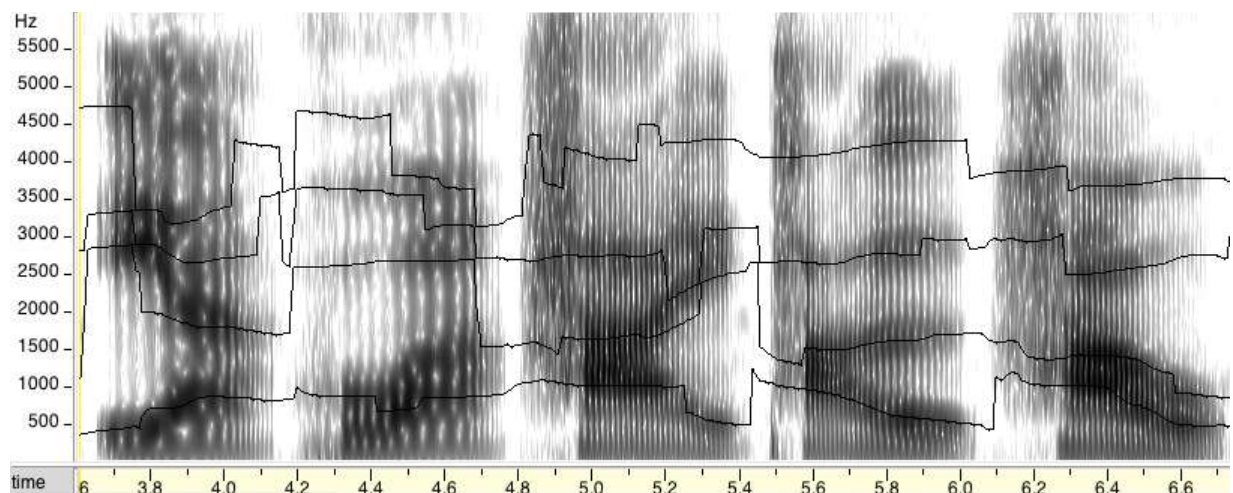


Figure 12: 5 syllables exemplifying the diphthong vowels, with formant plot lines wandering around fecklessly. The vowels are, from left to right: [iə uə ai aɪ au]. The syllables are: [ʔiə] [húə] [hài] [pʰäi] [hàu]. Translations are in Appendix C.

I tried to pick syllables which were words with glottal or bilabial onsets, to reduce the chance that the vowels will be colored by the consonant. In Figure 10, the monophthong vowels appear evenly spread out in the F1/F2 vowel space. It is interesting to note that [ɪ] differs from [i] and [u] by having a significantly lower F3.

Codas and Nasalization

The only coda that occurs in Hmong is [ŋ], which is restricted to being after [e] or [ɔ]. Whenever this coda occurs, the preceding vowel is nasalized. I have never observed this coda to assimilate to the place of the onset of the following syllable.

Recall that the nasal segment of a prenasalized onset can also serve as the coda of the previous syllable. As it turns out, whenever this happens, there is also a strong tendency for that syllable to be nasalized. It thus appears that there is a rule, that all closed syllables are nasalized.

I have also observed nasalization to happen sporadically in open syllables, but have not so far been able to discover a rule. Ia is never aware of the nasalization, and it seems to be semantically unimportant.

TONES

References state that Hmong has 7 tones, defined as follows:

[á] high-level	[a] mid-level	[ǎ] creaky low-falling
[â] high-falling	[ǎ̃] mid-rising	[ǎ̄] breathy mid-low
	[à] low-level	

It was easy to elicit all 7 from my speaker because the orthography encodes them unambiguously. I found that the syllable [pa] happens to mean something in each tone, and I recorded it to measure the tones. (See plot in Figure 12, and Appendix C for translations.) I found that the standard definitions of the tones were not an adequate description of what I heard, but close enough that I decided to retain the use of the conventional IPA diacritics.

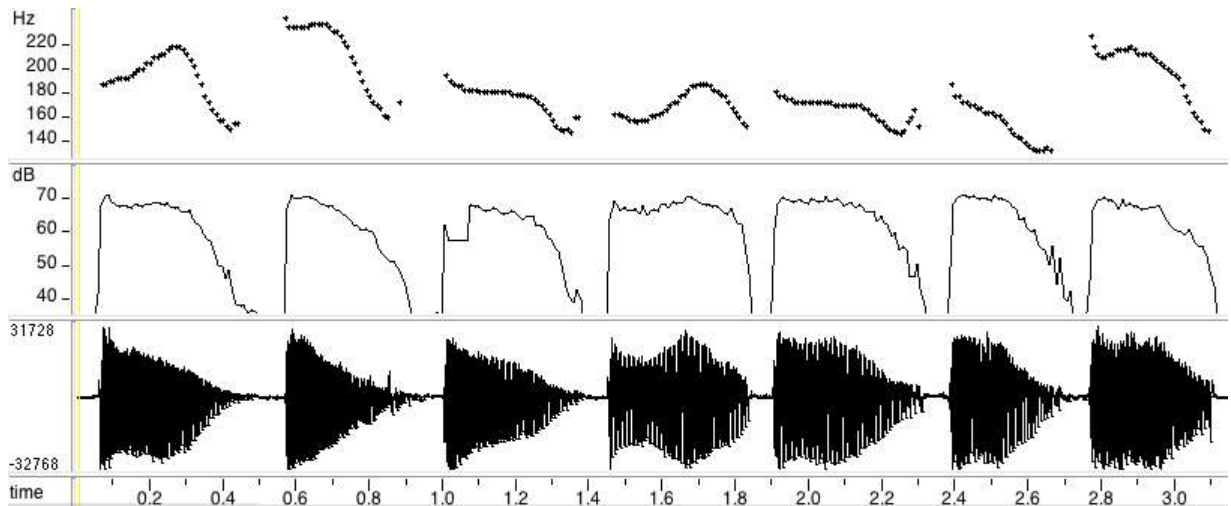


Figure 13: Pitch contour, power plot, and waveform for: [pá] [pâ] [pa] [pǎ] [pà] [pǎ̄] [pǎ̄̄]

The first peculiarity I noticed is that single syllable utterances tend to have a tail, where the pitch drops off starting at about halfway to two-thirds into the syllable, along with an accompanying drop in power. I noticed that phrase-final syllables are often given to this kind of embellishment, which naturally serves as a marker for phrase or utterance termination. While working with the language, I had become used to discounting the tail when trying to apprehend the tone, and the plot bears out the notion that most of the distinguishing features are before the tail. (The slight final pitch rise shown in the plot for [pà] and [pǎ̄] are inaudible, and may be mere artifacts of measurement.)

I decided that in order to uncover the unembellished structure of each tone contour, I would have to elicit syllables uttered before other ones. The problem is that there may be

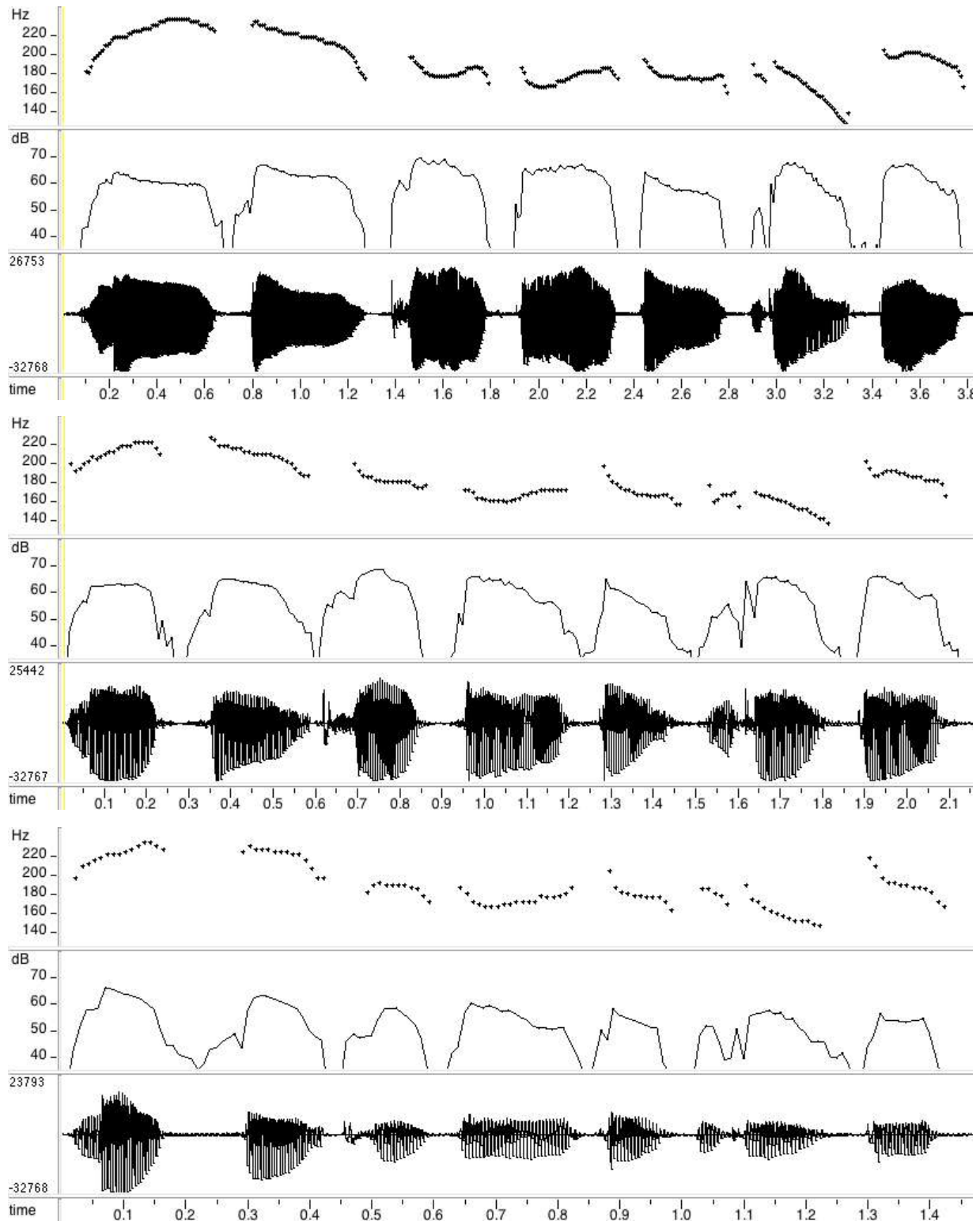


Figure 14: Collages of seven syllables of different tones. They were spoken slowly in the top plot, moderately fast in the middle, and fast on the bottom. Each syllable was spoken in a phrase that had a succeeding syllable of mid-level tone. The tones, left to right: [á â a ä à ą] or {*bj-vsmg*}.

no neutral tonal context in this language, but I decided arbitrarily that the mid-level tone would be neutral enough. Ia and I constructed seven two-syllable phrases, each with a different tone for the first syllable and a mid-level tone for the second. We used classifier-noun pairs, which occur naturally in Hmong, and which make a natural thing to say: *lub qe* [lú qe] “an egg”, *txoj hlua* [tsô ɬuə] “a rope”, *phau kbau* [p^hau k^hau], *cov ntshw* [cǒ ntʃ^hɨ] “elephants”, *tus cw* [tù ci] “a lobster”, *nkawm kbau* [ŋkaj k^hau] “shoes”, *paɯwɯw cua* [paɯ cua] “gust of wind”. (The third pair, however, is ungrammatical; time did not suffice to find a better pair.) I asked Ia to say them all in sequence, and to say each sequence three times: first slowly, then moderately fast, and then as quickly as possible. Then I cut out the first syllable from each pair, and plotted their pitch (fig 14), with resulting tailless pitch contours. It is interesting to see that the contours remain much the same even as the speed varied almost threefold.

It can be seen that the high-level tone [á] is always realized as a high rising tone, as if to contrast with the high-falling tone [â], which is just as high or higher, but does not rise. In fact, Ia has commented that my high-level tones sound indeterminate if they do not also rise slightly. From Figure 13 we can surmise that in single syllable utterances, the high-level tone is further altered in that it receives a tail, and the high-falling does not receive a tail, but is given a longer plateau at the beginning.

The mid-level tone [a] and the mid-rising [ǎ] tone are indeed similar in height. The syllable with the mid-rising tone unfortunately has a palatal onset, which is relatively long and has some inherent pitch, and if it weren't for that, the pitch would probably rise much sooner. In Figure 13, we can see that the mid-level tone is largely unchanged in the embellished form, but the mid-rising tone has been given both a plateau at the beginning, and a tail at the end.

The low tone [à] resembles the mid tone except the overall pitch is 6-8 percent lower. Apparently this interval of 1 to 1½ musical semitones is enough for two tones to be distinguished, for I was unable to find any other reliable measurable difference, such as phonation or vowel quality. I did find, however, that in some phrases where the tones are in adjacent syllables, the speaker contrasted them by making the lower tone lower (fig 15). In the phrase [tù ci], the first syllable has an overall pitch of 14 percent lower, which is somewhat more than a whole tone. In the second phrase, [tù me ɲuə], the overall pitch of the first syllable is only 5.5 percent lower than of the second syllable.

It is easy to see from Figures 13 & 14 that the creaky low-falling tone [a̰] is consistently low and falling — it is quite apparently the lowest of the tones — but is it creaky? It sounds creaky only toward the end of the contour, as the pitch drops to its lowest point, and

measurements bear this out (fig 16). By comparing the magnitudes of the fundamental frequency and the octave harmonic, we can determine that phonation appears to be modal at the beginning of the syllable, but becomes creaky right as the power of the signal begins to diminish.

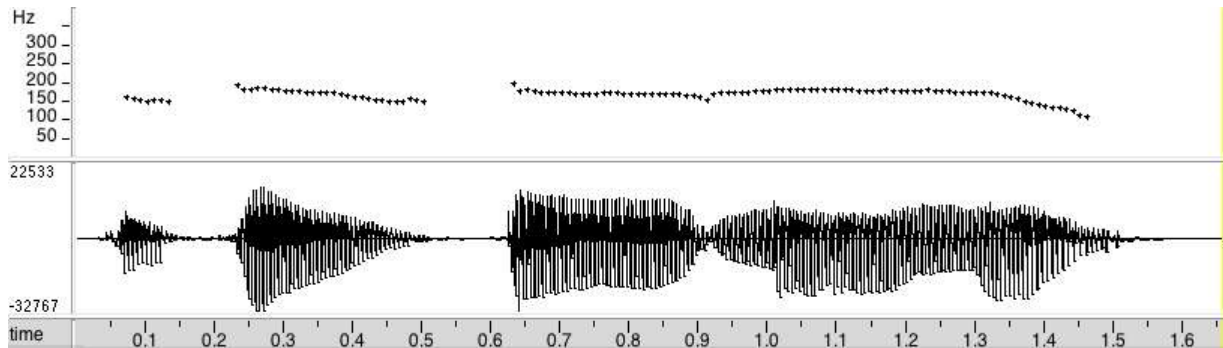


Figure 15: Pitch plot of (1) *tus cɔw* [tù cɔ] “a lobster”, and (2) *tus me nyuam* [tù me nyə] “a child”.

The breathy tone [a] is produced at high or mid-high pitch, where the breathy phonation is very audible. This contradicts the references that assign to this tone a mid-low pitch, but pitch is probably not as important as phonation for this tone. Measurements show the fundamental and the octave harmonic differing by more than 10 decibels of magnitude, as opposed to 3 decibels or so for normal (modal) phonation.

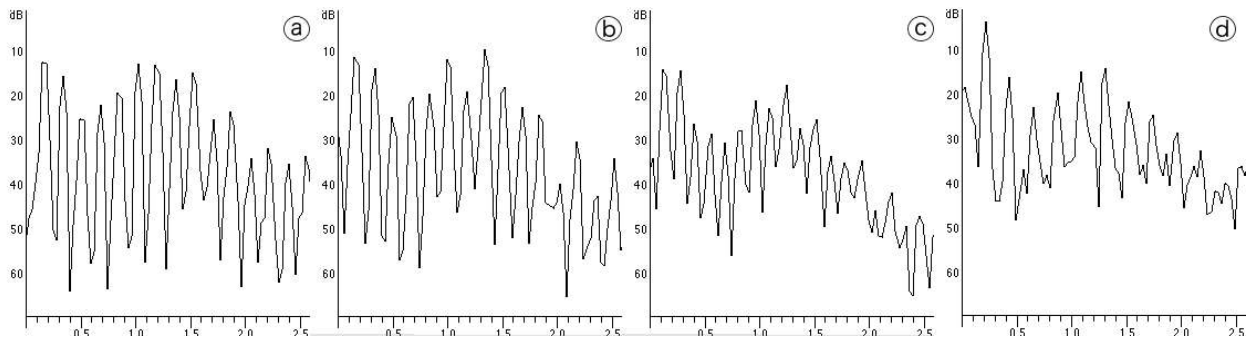


Figure 16: Spectrum sections of [pa] syllables from Figure 6: (a) from center of *pas* [pà], showing normal (modal) phonation, with first two peaks differing by 3dB; (b) from beginning of *pam* [pə], showing modal phonation as well; (c) from the place in *pam* [pə] where the signal power is beginning to drop, showing creaky phonation, with first two peaks nearly equal; (d) from the middle of *pag* [pə], showing breathy phonation, with first two peaks differing by 10dB.

Appendix A: Hmong RPA

Hmong RPA (Romanized Popular Alphabet) is the most common orthography for many dialects of Hmong. Each syllable is transcribed using one or more consonants for the onset, a vowel or “w” for the nucleus, and a consonant at the end to mark the tone. If the syllable has the coda [ŋ], the vowel is written twice. Onsets are transcribed according to this table:

	Bilabial	Bilabial with lateral	Labiodental	Interdental	Dental	Dental affricate	Alveolar	Retroflex	Post-alveolar affricate	Alveopalatal	Palatal	Velar	Uvular	Glottal
Plain stop	p	pl		t	tx			r	ts		c	k	q	-
+ aspiration	ph	plh		th	txh			rh	tsh		ch	kh	qh	
Prenasalized stop	np	npl		nt	ntx			nr	nts		nc	nk	nq	
+ aspiration	nph	nplh		nth	ntxh			nrh	ntsh		nch	nkh	nqh	
Voiced stop							d							
Voiced aspirated stop							dh							
Nasal (voiced)	m	ml					n				ny			
Nasal (voiceless)	hm	hml					hn				hny			
Fricative (voiceless)			f		x			s		xy				h
Fricative (voiced)			v					z						
Approximant											y			
Lateral fricative							hl							
Lateral approximant							l							

Rimes are transcribed thus:

[a] – a	[e] – e	[eŋ] – ee	[i] – i
[i] – w	[ɔ] – o	[ɔŋ] – oo	[u] – u

Tones are transcribed thus:

[á] – b	[â] – j	[a] – none	[ǎ] – v
[à] – s	[ǎ] – m	[a] – g	

Appendix B: Word List

This is list of transcriptions of translations of words from the assignment handout, elicited during the project. Transcriptions are given in both Hmong RPA and IPA. All nouns are cited with their classifiers when possible.

all	<i>tas nrho</i>	tà ɲ ^h ɔ	cut	<i>txiav</i>	tsǐə
and	<i>thiab</i>	t ^h íə			
animal	<i>tus tsiaj</i>	tù tʃíə	dance	<i>seev cev</i>	sěŋ cě
ashes	<i>hmooov av</i>	mǔǔŋ ǎ	day	<i>hnub</i>	ɲú
at	<i>tov</i>	tǔ	die	<i>tuag</i>	tɹə
			dig	<i>khaɔwb</i>	k ^h ái
back	<i>nrab qaum</i>	ɲǎ qau	dirty	<i>qias neeg</i>	qia neŋ
bad	<i>tsis zoo</i>	tʃi zɔŋ	dog	<i>tus dev</i>	tù dě
bark	<i>tsem</i>	tʃe	drink	<i>haus</i>	hàu
because	<i>rau qhov</i>	ʃau q ^h ǔ	dry	<i>qhuav</i>	q ^h úə
belly	<i>lub plab</i>	lú plá	dull	<i>npub</i>	mpú
big	<i>loj</i>	lô	dust	<i>pluas plav</i>	plùə plǎ
bird	<i>tus noog</i>	tù nɔŋ			
bite	<i>tom</i>	tɔ	ear	<i>pob ntseg</i>	pó ntʃe
black	<i>dub</i>	dú	earth	<i>lub ntiaj teb</i>	lú ntíə té
blood	<i>ntshav</i>	ntʃ ^h ǎ	eat	<i>noj</i>	nô
blow	<i>tsbuab</i>	tʃ ^h úə	egg	<i>qe</i>	qe
bone	<i>pob txba</i>	pó ts ^h a	eight	<i>yim</i>	ji
breast	<i>lub mis</i>	lú mì	eye	<i>qhov muag</i>	q ^h ǔ mɹə
breathe	<i>ua pa</i>	ʔuə pa			
brother	<i>tus nus</i>	tù nù	fall	<i>poob</i>	póŋ
burn	<i>kub nyhiab</i>	kú ɲíə	far	<i>deb</i>	dé
			fat/grease	<i>muaj roj</i>	múə ʃ
child	<i>tus me nyuam</i>	tù me ɲɹə	father	<i>txiv</i>	tsǐ
claw	<i>rau tarw</i>	ʃau tai	fear	<i>ntshai</i>	ntʃ ^h ai
clothing	<i>khaub ncaws</i>	k ^h áu ɲcài	feather	<i>plaub qaib</i>	pláu qái
cloud	<i>huab</i>	húə	few	<i>ib co</i>	ʔí cə
cold	<i>no</i>	nɔ	fight	<i>sib ntaus</i>	ʃí ntàu
come	<i>tuaj</i>	túə	fire	<i>hluav tarws</i>	ʔúə tòi
cook	<i>ua zaub mov</i>	ʔuə záu mǔ	fish	<i>tus ntse</i>	tù ntʃè

five	<i>tsib</i>	tʃí	in	<i>hawv</i>	hǎu
float	<i>tog</i>	tɔ̃			
flow	<i>ntɔws</i>	ntì	kill	<i>tua</i>	tuə
flower	<i>lub paj</i>	lú pà	knee	<i>hawv caug</i>	hǎu cạu
fog	<i>pos huab</i>	pò húə	know	<i>paub</i>	páu
foot	<i>kaw taw</i>	kai tai			
four	<i>plaub</i>	pláu	lake	<i>lub pas dej</i>	lú pà dề
freeze	<i>khov</i>	k ^h ɔ̃	laugh	<i>luag</i>	lụə
fruit	<i>txiv hmab</i>	tsǐ mə́	leaf	<i>daim nplooj</i>	dại mplôŋ
fruit	<i>txiv ntoo</i>	tsǐ ntɔŋ	leftside	<i>sab laug</i>	şá lậ
full	<i>puv</i>	pũ	leg	<i>txhais taw</i>	ts ^h ài tai
			lie	<i>dag</i>	dạ
give	<i>muab</i>	múə	live	<i>nyob</i>	ɲó
good	<i>zoo</i>	zɔŋ	liver	<i>lub siab</i>	lú şíə
grass	<i>nyom</i>	ɲɔ̃	long	<i>ntev</i>	ntě
green	<i>ntsuab</i>	ntʃúə	louse	<i>maum ntsbauv</i>	mạu ntʃ ^h ǎu
guts	<i>peev xwom</i>	pěŋ sǐ			
			man/male	<i>tus txiv neej</i>	tù tsǐ nềŋ
hair	<i>plaub hau</i>	pláu hau	many	<i>coob</i>	cónŋ
hand	<i>tes</i>	tè	meat/flesh	<i>nqaij</i>	nqâi
he	<i>tus yarwɔg</i>	tù jại	moon	<i>lub hli</i>	lú ɦi
head	<i>taub hau</i>	táu hau	mother	<i>niam</i>	ɲiə
hear	<i>hnov</i>	ɲɔ̃	mountain	<i>por roob</i>	pổ tɔŋ
heart	<i>lub plawv</i>	lú plǎi	mouth	<i>qhov ncauj</i>	q ^h ɔ̃ ɲcâu
heavy	<i>nyhav</i>	ɲǎ			
here	<i>nyawm no</i>	ɲại nɔ	name	<i>lub npe</i>	lú mpe
hit	<i>ntaus</i>	ntàu	narrow	<i>nqaim</i>	nqai
hold/take	<i>nqa</i>	nqa	near	<i>ze</i>	zɛ
horn	<i>tus kub</i>	tù kú	neck	<i>caj dab</i>	câ đá
how	<i>li cas</i>	li cà	new	<i>tsbiab</i>	tʃ ^h íə
hundred	<i>ib puas</i>	ʔí pùə	night	<i>hmo ntuj</i>	ɲɔ̃ ntù
hunt	<i>mus plob</i>	mù pló	nose	<i>qhov ntswɔg</i>	q ^h ɔ̃ ntʃi
husband	<i>tus txiv tsev</i>	tù tsǐ tʃě	not	<i>tsis</i>	tʃi
I	<i>kuv</i>	kũ	old	<i>qub</i>	quí
ice	<i>dej khov</i>	dề k ^h ɔ̃	one	<i>ib</i>	í
if	<i>yog tias</i>	jɔ̃ tiə	other	<i>lɔwm tus</i>	lị̀ tù

person	<i>tus tib neeg</i>	tù tí neŋ
pierce	<i>tbo</i>	t ^h o
play	<i>ua si</i>	ʔuə ʃi
pull	<i>rub</i>	tú
push	<i>thəwɔb</i>	t ^h ái
rain	<i>los nag</i>	lò nà
red	<i>liab</i>	líə
right/correct	<i>yog</i>	jɔ
rightside	<i>sab xis</i>	ʃá sì
river	<i>tus dej</i>	tù dé
road	<i>txoj kev</i>	tsô kě
root	<i>hauv paus</i>	hǎu pàu
rope	<i>txoj hlua</i>	tsô ʔuə
rotten	<i>lwj</i>	lî
rub	<i>txhuam</i>	ts ^h uə
salt	<i>ntsev</i>	ntʃě
sand	<i>suab zeb</i>	ʃúə zé
say	<i>hais</i>	hài
scratch	<i>txhuam</i>	ts ^h uə
sea	<i>dej hiaɔ txwɔ</i>	dê hiə tsǐ
see	<i>pom</i>	pɔ
seed	<i>lub noob</i>	lú nóŋ
seven	<i>xya</i>	ça
sew	<i>xawɔs</i>	sài
sharp	<i>ntse</i>	ntse
shoot	<i>tua</i>	tuə
short	<i>qeg taub</i>	qɛ táu
sing	<i>hu nkauj</i>	hu ŋkâu
sister	<i>tus muam</i>	tù mɥə
sit	<i>zaum</i>	zəu
skin	<i>daim tarwɔ</i>	dai tái
sky	<i>lub ntuj</i>	lú ntû
sleep	<i>pɔw</i>	pi
small	<i>me</i>	me

smell	<i>hnia</i>	niə
smoke	<i>haus luam yeeb</i>	hàu lɥə jéŋ
smooth	<i>nplua</i>	mpluə
snake	<i>tus nab</i>	tù ná
snow	<i>te</i>	te
some	<i>ib co</i>	ʔí cɔ
spear	<i>hmuv</i>	mũ
spit	<i>nto</i>	ntɔ
split	<i>faib</i>	fái
squeeze	<i>sib ntxim</i>	ʃí ntsj
stab	<i>nkaug</i>	ŋkəu
stand	<i>sawɔ</i>	ʃǎi
star	<i>hnub qub</i>	nú qú
stick	<i>tus pas</i>	tù pà
stone	<i>pob zeb</i>	pó zé
straight	<i>ncaj</i>	ncâ
suck	<i>nqus</i>	ŋqù
sun	<i>lub hnub</i>	lú nù
swell	<i>o</i>	ʔo
swim	<i>ua luam dej</i>	ʔuə lɥə dɛ
tail	<i>ko tw</i>	kɔ ti
ten	<i>kaɔwm</i>	kəi
that	<i>tus tov</i>	tù tǎ
there	<i>toɔ</i>	tǎ
they	<i>larwɔ</i>	lǎi
thick	<i>tuab</i>	túə
thin	<i>nyias</i>	niə
think	<i>xaw</i>	sǎ
this	<i>tus no</i>	tù nɔ
thou	<i>koj</i>	kô
three	<i>peb</i>	pé
throw	<i>txawɔb</i>	tsái
tie	<i>khi</i>	k ^h i
tongue	<i>tus nplaig</i>	tù mplai
tooth	<i>tus kaus nyhiaɔ</i>	tù kàu ɲǎ
tree	<i>tsob ntoo</i>	tsó ntɔŋ

turn	<i>lem</i>	lə	who?	<i>leej tʰwɔŋ</i>	lêŋ tʰj
twenty	<i>nees nkaum</i>	nèŋ ŋkəu	wide	<i>dav</i>	dǎ
two	<i>ob</i>	ʔó	wife	<i>tus niam tsev</i>	tù nǐə tsě
			wind	<i>cua</i>	cuə
vomit	<i>ntuəv</i>	ntǔə	wing	<i>tis</i>	tì
			wipe	<i>so</i>	ʂo
walk	<i>mus kev</i>	mù kě	with	<i>nrog</i>	ŋʈo
warm	<i>sov</i>	sǒ	woman	<i>tus poj niam</i>	tù pǒ nǐə
wash	<i>ntxua</i>	ntsua	woods	<i>cov ntoo</i>	cǒ ntɔŋ
water	<i>dej</i>	dê	work	<i>ua hauj lwm</i>	ʔuə hâu lǐ
we	<i>peb</i>	pé	worm	<i>cua nab</i>	cuə ná
wet	<i>ntub</i>	ntú			
what?	<i>dab tsi</i>	dá tsi	ye	<i>nej</i>	nê
when?	<i>thaum tʰwɔŋ</i>	tʰəu tʰj	year	<i>xyoo</i>	ɕoŋ
where?	<i>qhov tʰwɔŋ</i>	qʰǒ tʰj	yellow	<i>daj</i>	dâ
white	<i>darwb</i>	dái			

		Palatal	
[c]	có	<i>coob</i>	many
[c ^h]	c ^h ǎ	<i>chav</i>	room
[ɲc]	ɲcâ	<i>ncaj</i>	straight
[ɲc ^h]	ɲc ^h ɔ pa	<i>ncho pa</i>	smoke
[ɲ]	ɲɔ	<i>nyom</i>	grass
[ɲ]	ɲǎ	<i>nyhav</i>	heavy
[ɕ]	ɕa	<i>xya</i>	seven
[j]	ji	<i>yim</i>	eight

		Velar	
[k]	kai	<i>kaom</i>	ten
[k ^h]	k ^h i	<i>kbi</i>	tie
[ŋk]	ŋkau	<i>nkaug</i>	stab
[ŋk ^h]	ŋk ^h au	<i>nkhaus</i>	curve

		Uvular	
[q]	qe	<i>qe</i>	egg
[q ^h]	q ^h ǔə	<i>qbuav</i>	dry
[Nq]	Nqa	<i>nqa</i>	bring
[Nq ^h]	Nq ^h i dẽ	<i>nqbis dej</i>	thirsty

		Glottal	
[ʔ]	ʔí	<i>ib</i>	one
[h]	húə	<i>huab</i>	cloud

		— 13 RIMES —	
[i]	ʔí	<i>ib</i>	one
[i]	hî	<i>hwj</i>	kettle
[u]	hu	<i>hu</i>	call
[e]	pé	<i>peb</i>	we
[ɔ]	pǒ	<i>poɔ</i>	throw
[a]	pa	<i>pa</i>	breath
[iə]	ʔíə	<i>iab</i>	bitter
[uə]	húə	<i>huab</i>	cloud
[ai]	hài	<i>bais</i>	say
[ai]	p ^h ǎi	<i>phawv</i>	large
[au]	pàu	<i>haus</i>	drink
[eŋ]	féŋ	<i>feeb</i>	minute
[ɔŋ]	póŋ	<i>poob</i>	fail

		— 7 TONES —	
[á]	pá	<i>pab</i>	help (v)
[â]	pâ	<i>paj</i>	flower
[a]	pa	<i>pa</i>	breath
[ǎ]	pǎ	<i>pav</i>	tie (v)
[à]	pà	<i>pas</i>	stick
[ạ]	pə	<i>pag</i>	girl's name
[a̤]	pə	<i>pam</i>	blanket