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A Case for an IPA Symbol for the Dental Plosive:

The Example of Modern Burmese

Outline

Modern Burmese is said to have a dental fricative [θ]

Acoustic studies reveal it to be a dental plosive [t̪]

Dental/alveolar plosive contrast

Many other languages have this contrast

There should be a symbol for the dental stop like there is for the fricative

Historical Background

◈ The Burmese letter သ is traditionally associated with */s/.

◈ In 1776, the sound was not produced as a typical alveolar [s].

◈ Entry from 1776 *Alphabetum Barmanorum*:

◈ သ Sa. "*Ut audire est in iis, qui ex linguae impedimento non possunt pronunciare.*" (p.5)

◈ Entry from 1787 *Alphabetum Barmanorum:*

◈ "*absque sibilo; uti apud nos quoque in nonnullis auditor vitio linguæ vel educationis.*" (p.28)

◈ By 1925, the sound seems to have made the transition to a plosive.

◈ Entry from Armstrong & Pe Maung Tin's *A Burmese Phonetic Reader:*

"[G]ives the impression of a weak plosive rather than of a fricative" (p.17)

Modern Classifications

Fricative	Affricate	"Gives the impression of a weak plosive"	Plosive
Armstrong & Pe Maung Tin (1925) Aung Naing Win (2000) Bradley (2011) Burling (1967) Chang (2009) Firth (1936) Green (2005) Kato (1998) Myint Soe (1999) Okell (1994) Roop (1972) Than Than Win (1998) Watkins (2001) Wheatley (2003)	*Bradley ("slight preaffrication") *Chang *Watkins *Wheatley	*Armstrong & Pe Maung Tin *Chang *Than Than Win	Shiwaruangarote (2000) *Kato

Acoustic Investigation

- Native speakers of Yangon Burmese

- Ages 19-38 (+a 67-yr-old)

- Word-initial consonants of nouns

- Isolation and intervocalic frame

- Word-guessing game

- Four main speakers, plus two additional for palatograms and linguograms

Acoustic Investigation

Figure 1. Spectrogram of 'this son'   ဒီသား /diṭá/ spoken by F1
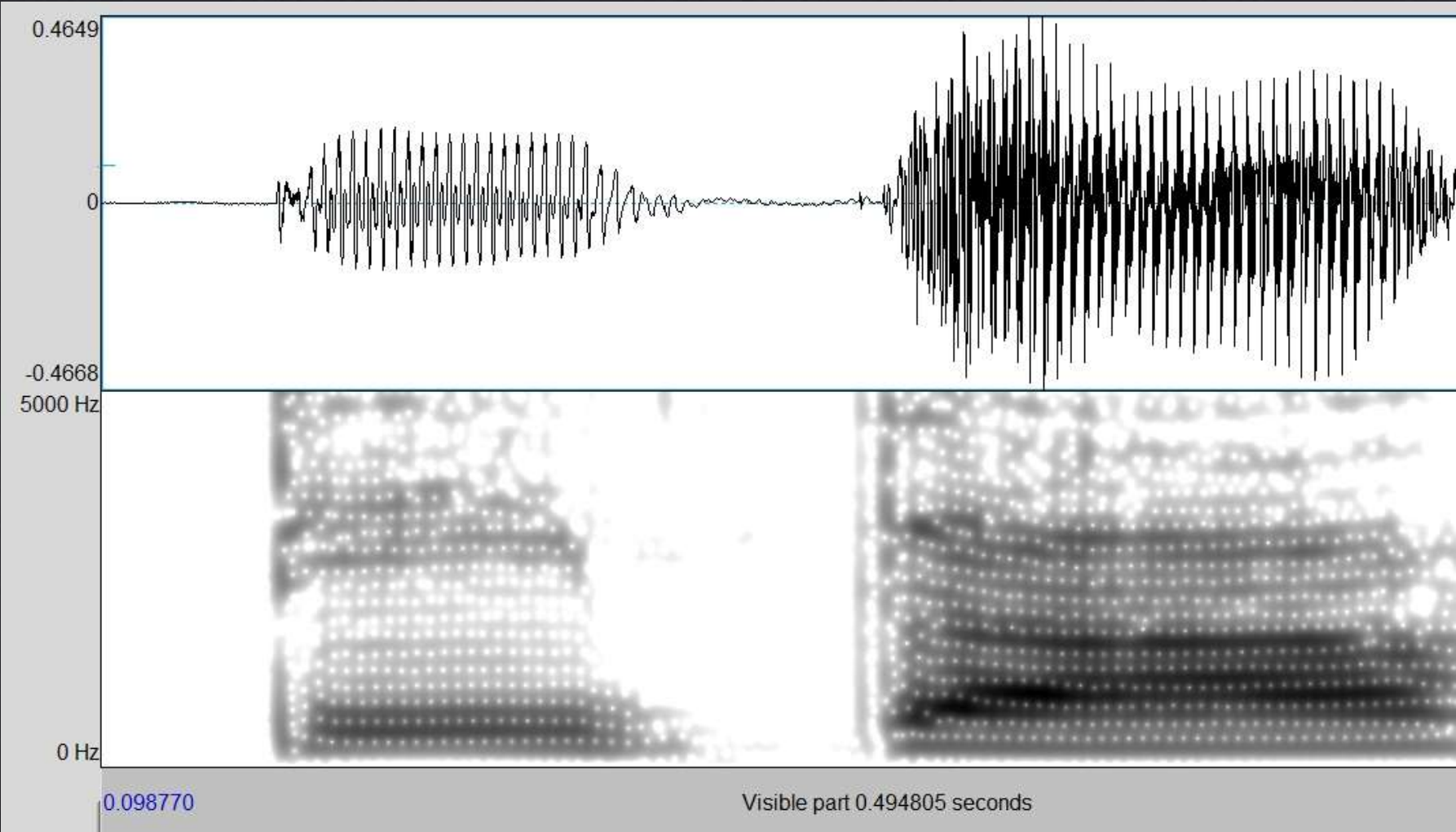
Figure 2. Spectrogram of 'this son' ဒီသာ: /diṭá/ spoken by M1

Acoustic Investigation

Acoustic Investigation
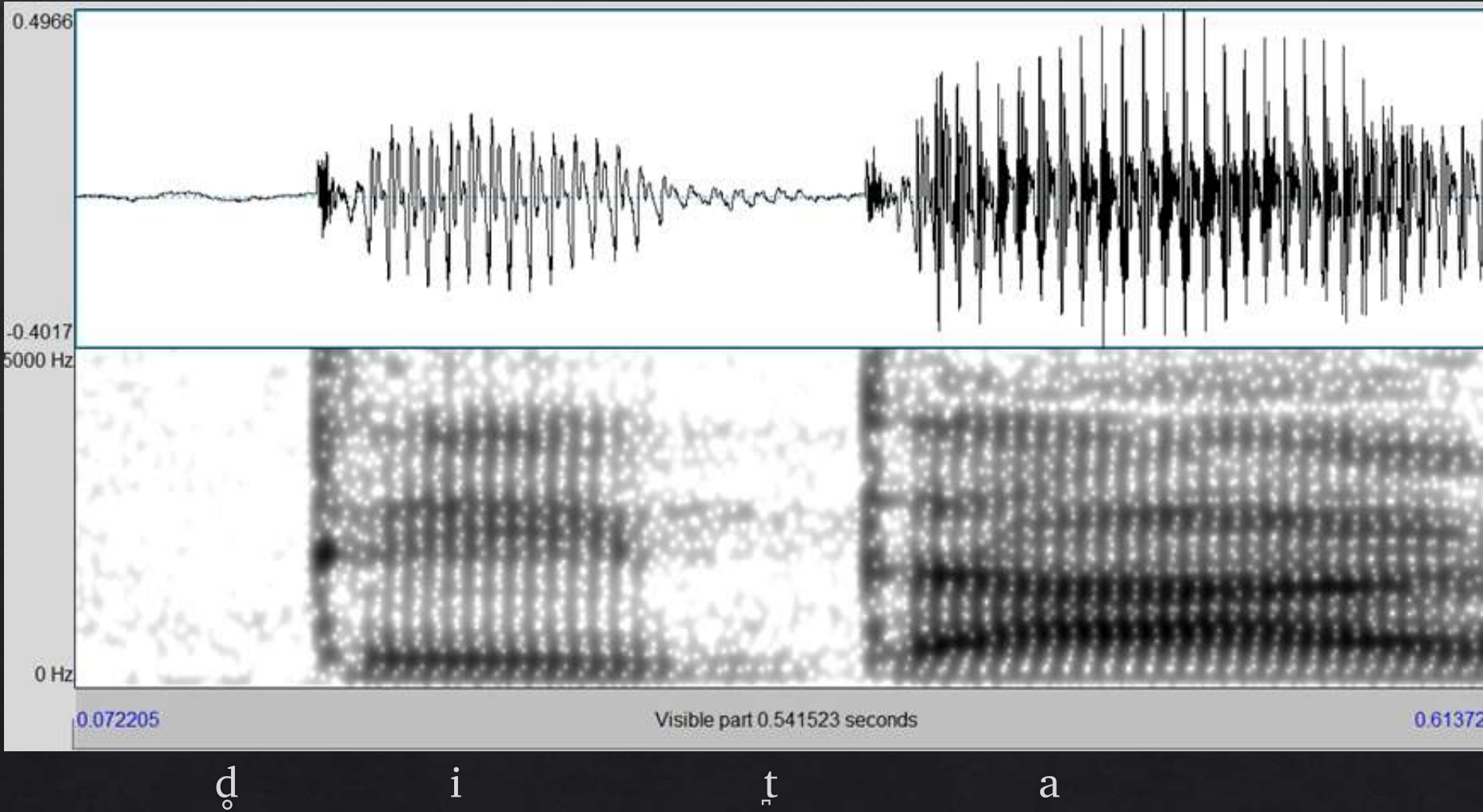
Figure 3. Spectrogram from 'this hammer' ဒီတူ /d̤ḭtu/ spoken by F1
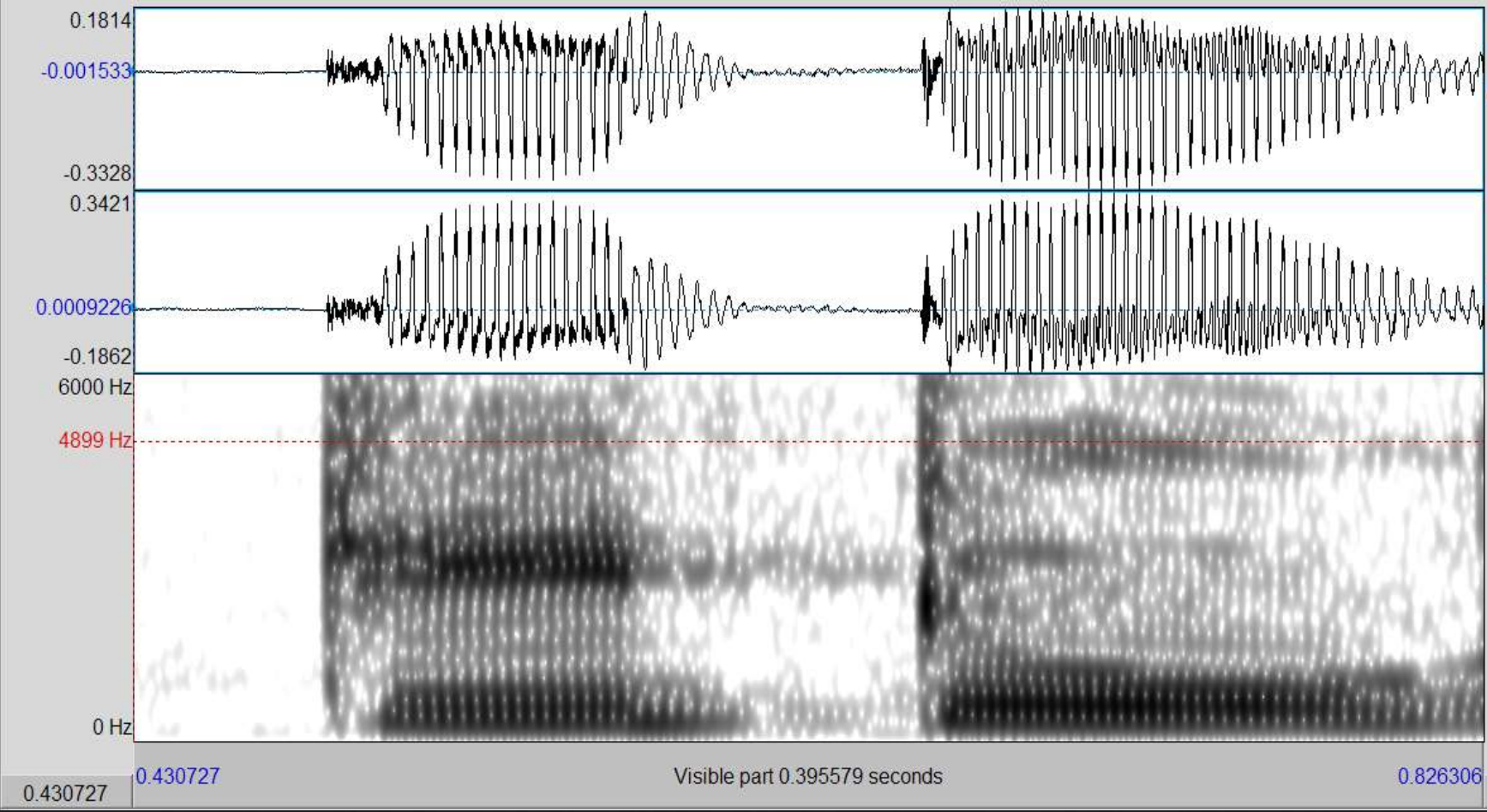
Figure 4. Spectrogram from 'this hammer' ဒီတူ /d̥itu/ spoken by M1

Acoustic Investigation
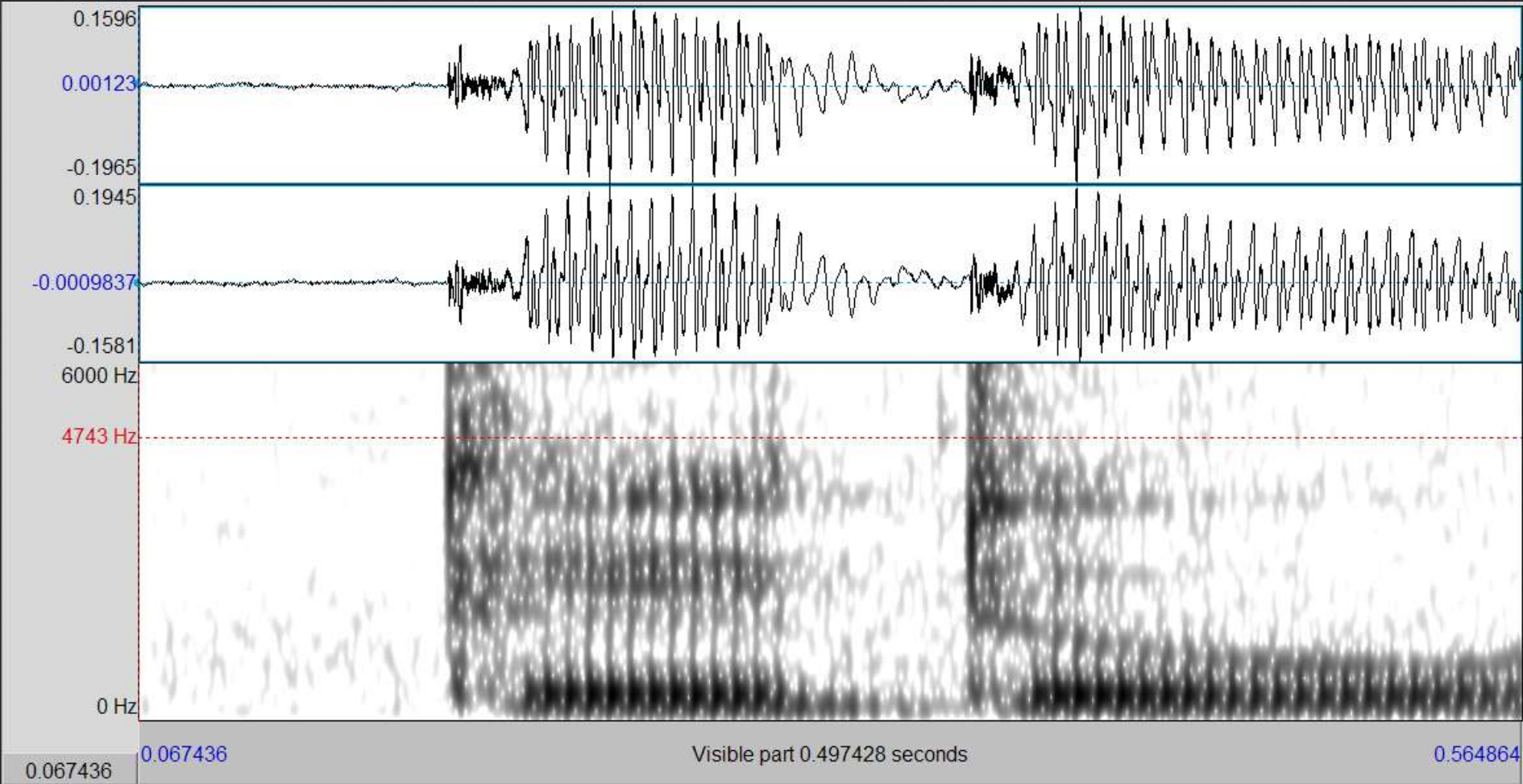
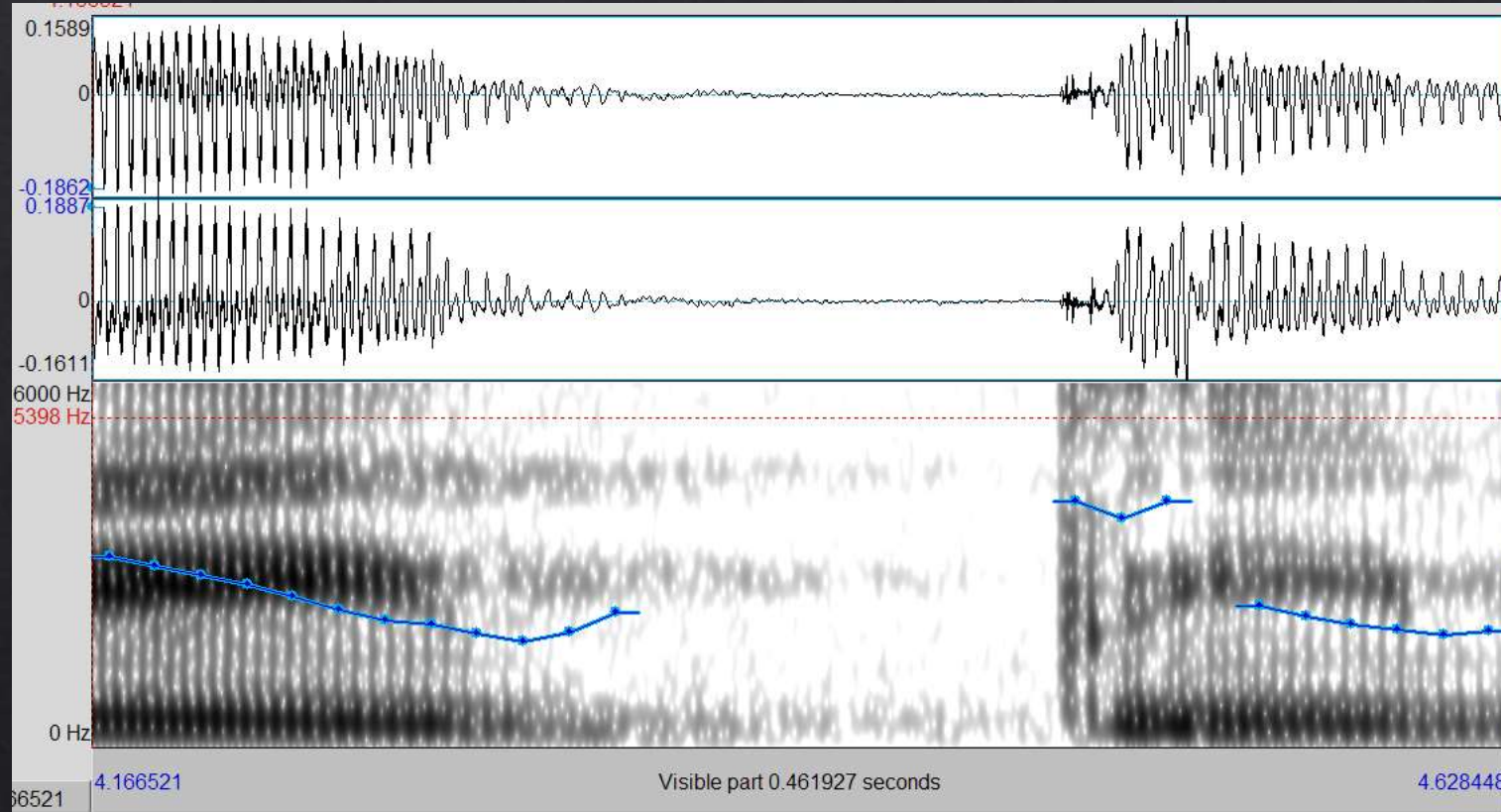Figure 5. Spectrogram from သတင်း [d̪̥ə̆d̪̥ĩ] 'news' spoken by F2

Acoustic Investigation
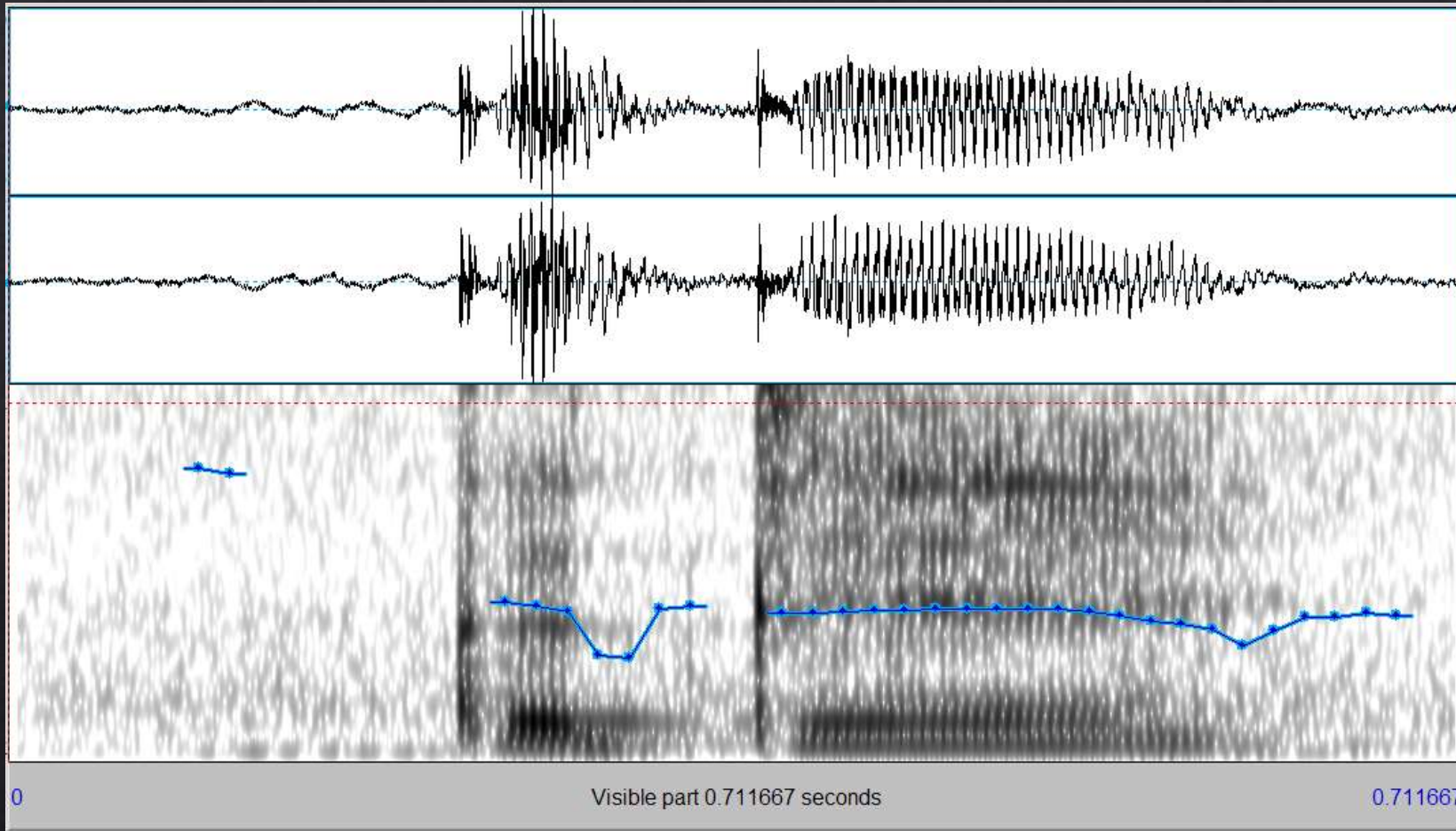
Figure 6. 67-year-old saying အဲ့ဒီသီလ 'that precept' [ʔɛ́di̠ṭila̠].

Acoustic Investigation

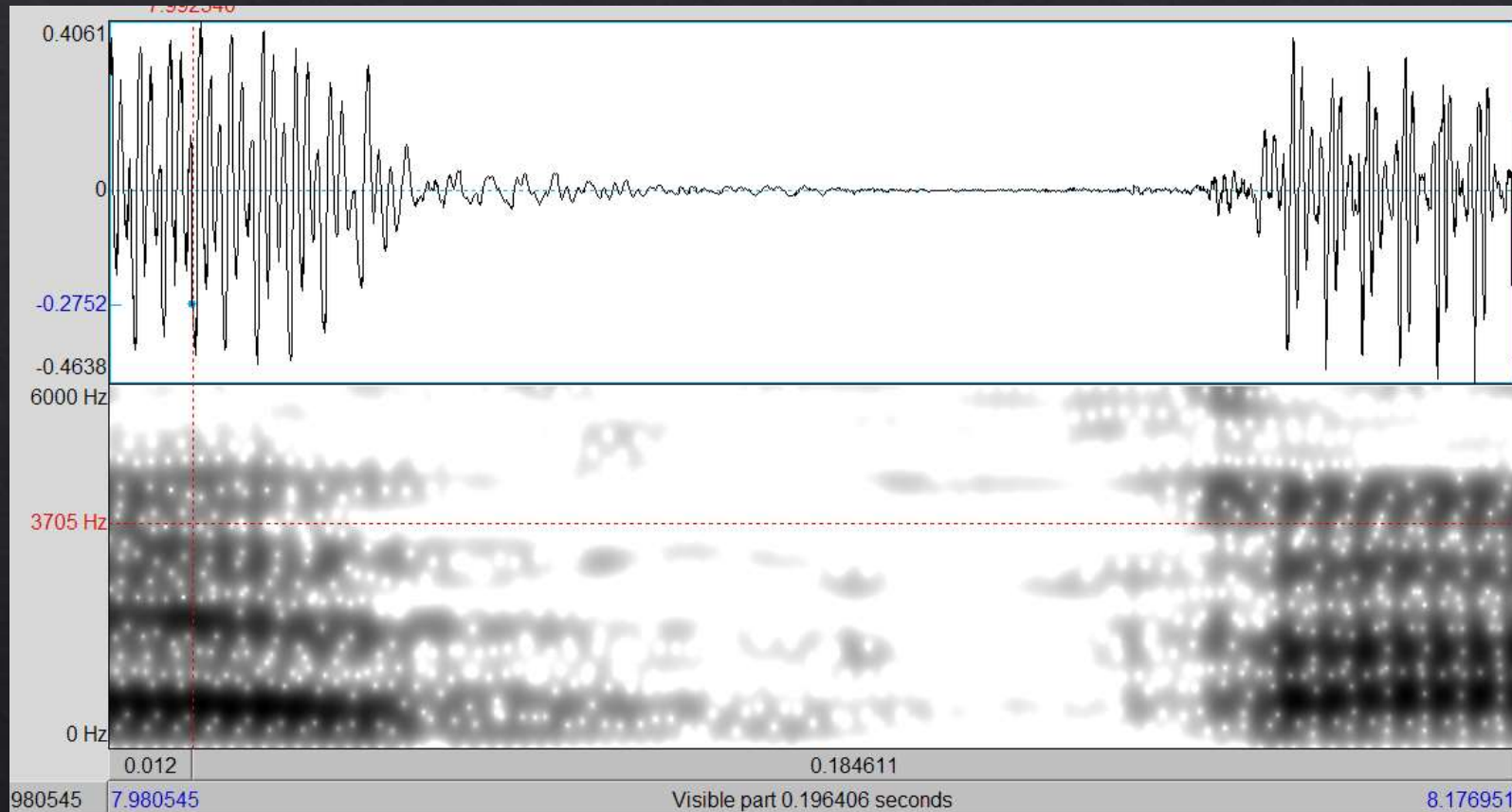i   ṭ   i

Acoustic Investigation 2 – Illustration of the IPA

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Figure 8. Dental plosive in the word ၵ္ၵ္ [t̪u] 'him' from the recorded passage (line 2).

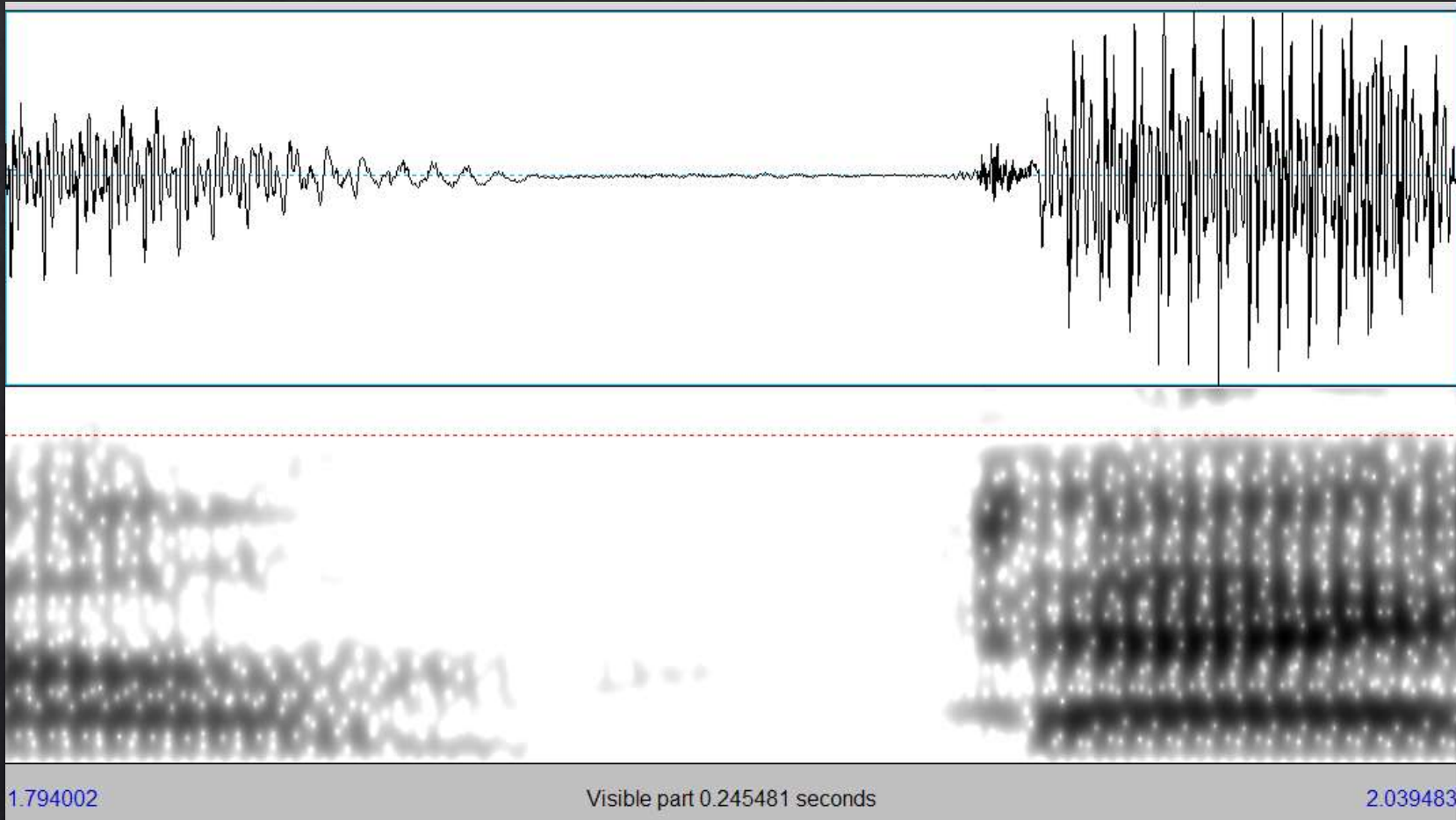1.444290   Visible part 0.271853 seconds   1.716143

t̪   u
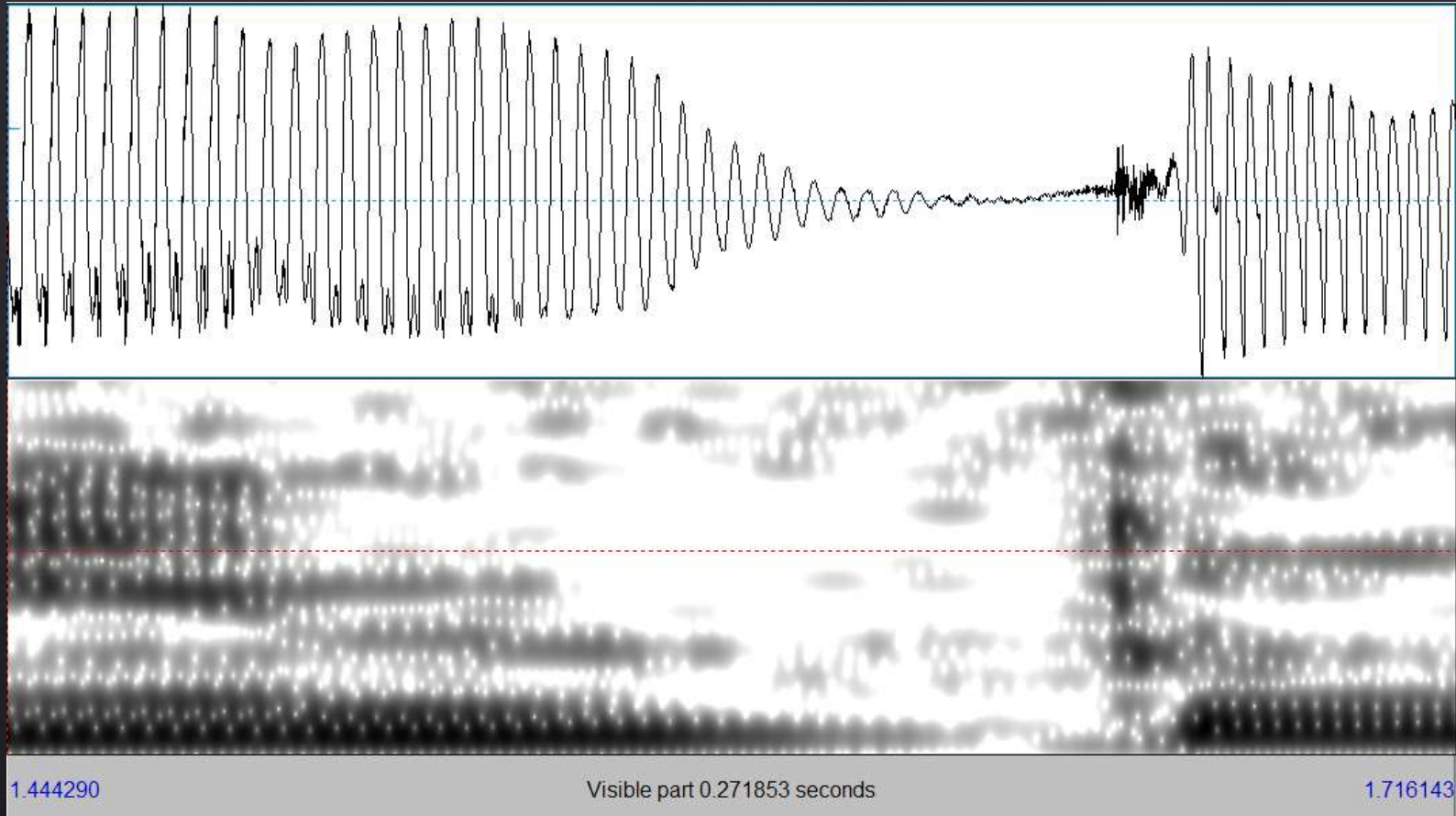
Figure 9. Alveolar plosive (unaspirated) in the word တိုက် [taɪʔ] 'push, blow' from the recorded passage (line 4).

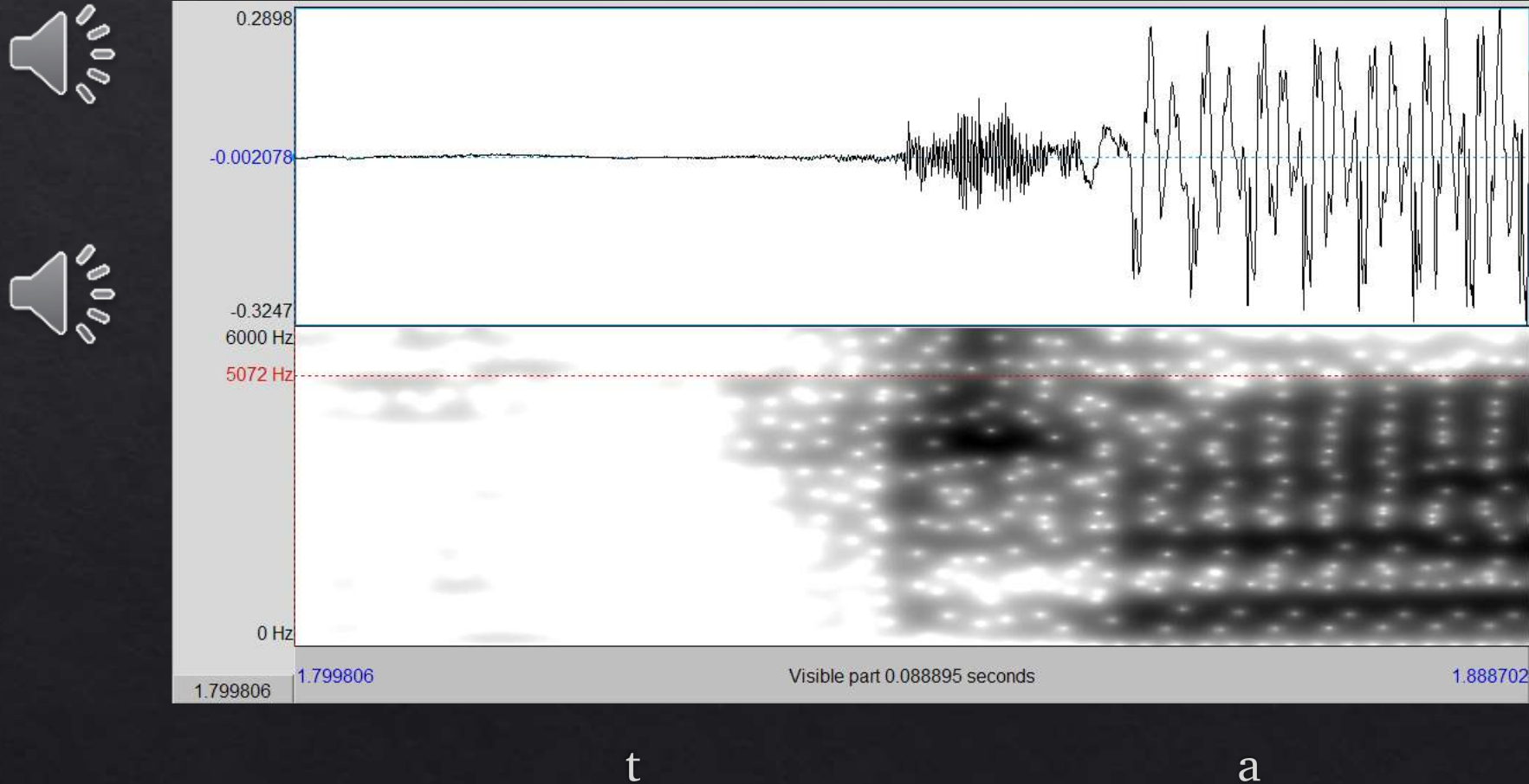# Acoustic Investigation – Illustration of the IPA

Acoustic Investigation – Illustration of the IPA

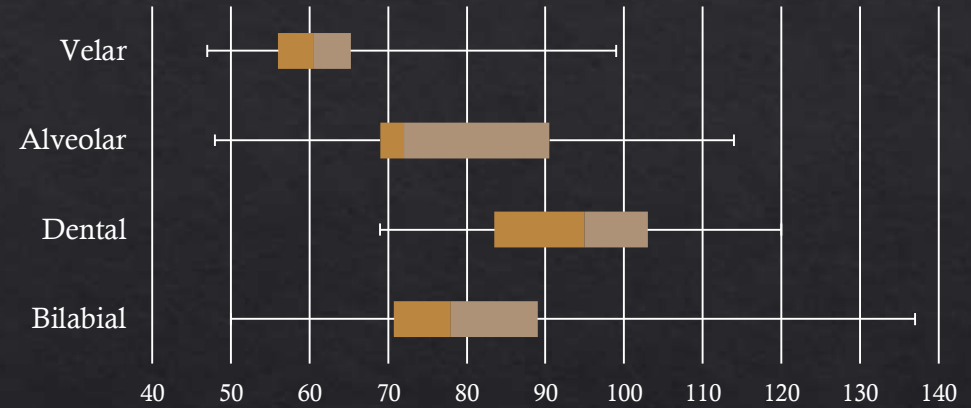Figure 10. Alveolar plosive (unaspirated) in the word တတ် [taʔ] 'be able' from the recorded passage (line 3).
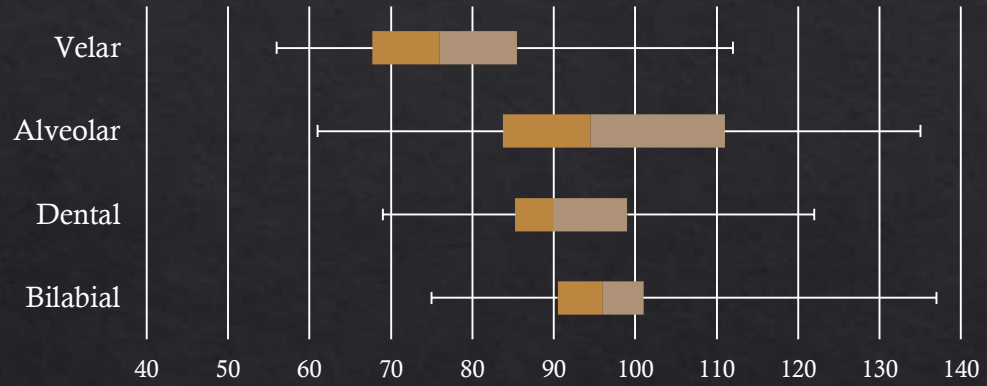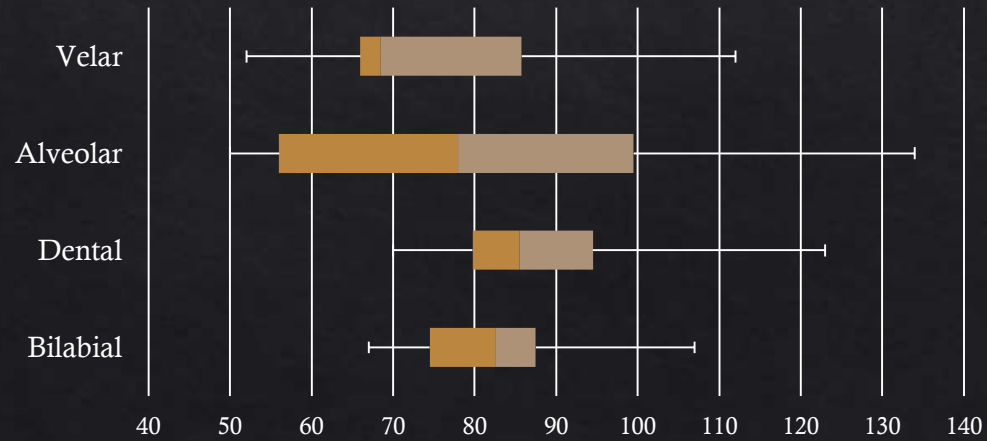

t   a

Stop Closure Duration

n= ~20 per place of articulation

Female 1

Male 1

Female 2   n=30-46

Male 2

Release Noise
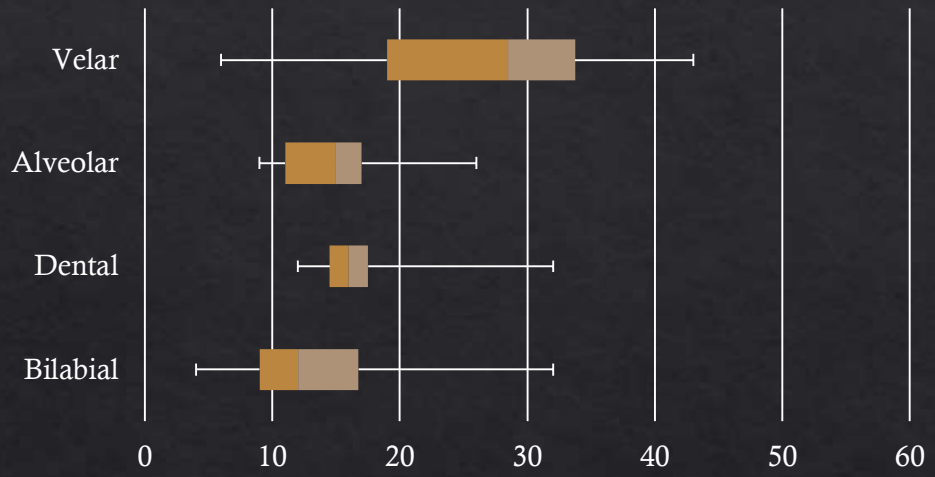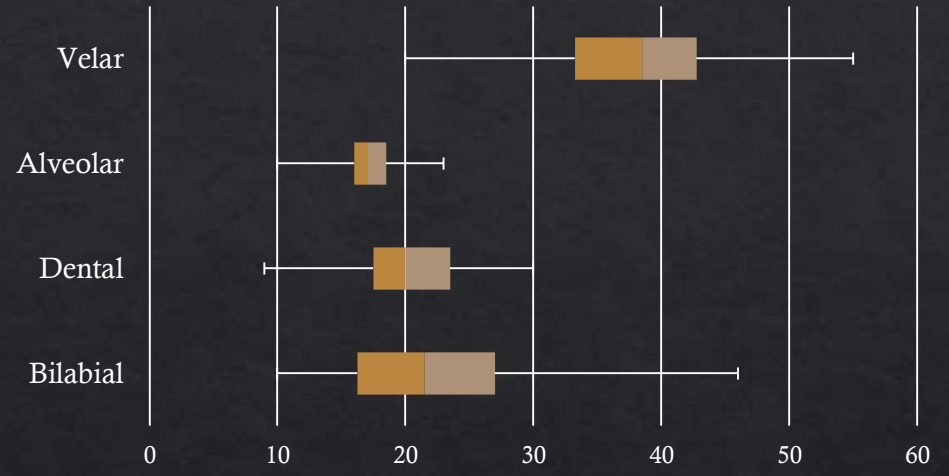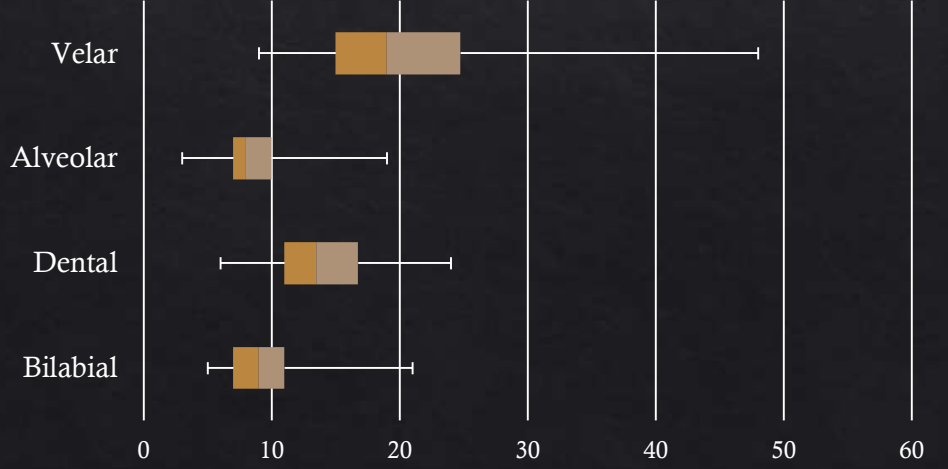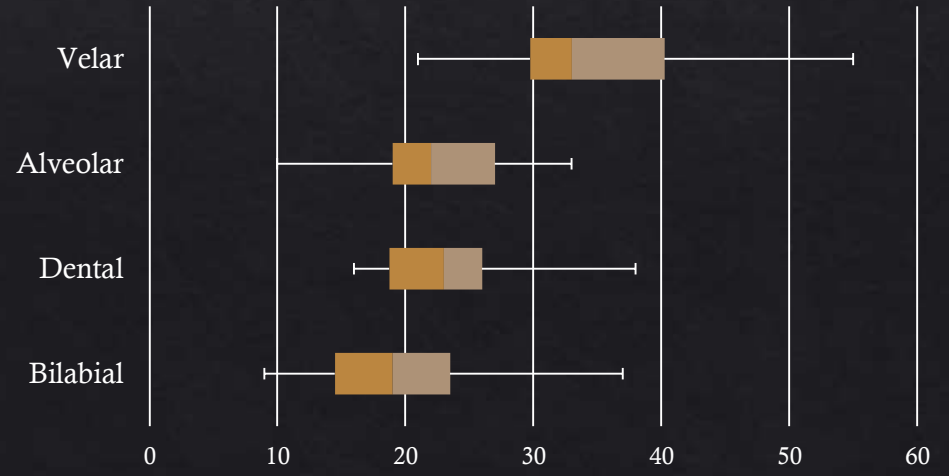
Articulatory Investigation: Palatography

Conclusion: Dental Plosive

The Modern Burmese သ is realized as an unaspirated stiff laminal denti-alveolar plosive [t̪].

◈ May be realized interdentally when the speaker is asked to focus on the sound.

◈ Patterns with other plosives in becominga slack plosive or an approximant when weakened.

Implications:

◈ Transcriptions of Modern Burmese should use [t̪] for သ, not [θ], [t̪θ], etc.

◈ Instructional materials should be modified to reflect the Burmese dental plosive is not the same as English *th* [θ ð].

Phonemic Status – Allophone

- Some linguists include a "voiced" version in their charts of Burmese phonemes, e.g. Wheatley 2003, Watkins 2001 /ð/.

  - Wheatley notes: "but for a very few cases […] ð is a result of word or phrase internal sandhi" (p.199)

  - The few cases he cites (words beginning with the word သို့ [d̥o̥], used only in formal register conjunctions) may be explained by the following dictionary entry:

    - "short form of ဤသို့ [ʔi.d̥o̥] and ထိုသို့ [tʰo.d̥o̥] 'in like manner'" (Myanmar Language Commission, p.505)

- There are no minimal pairs.

- Therefore, [d̥] is an allophone of /t̥/.

Phonemic Status
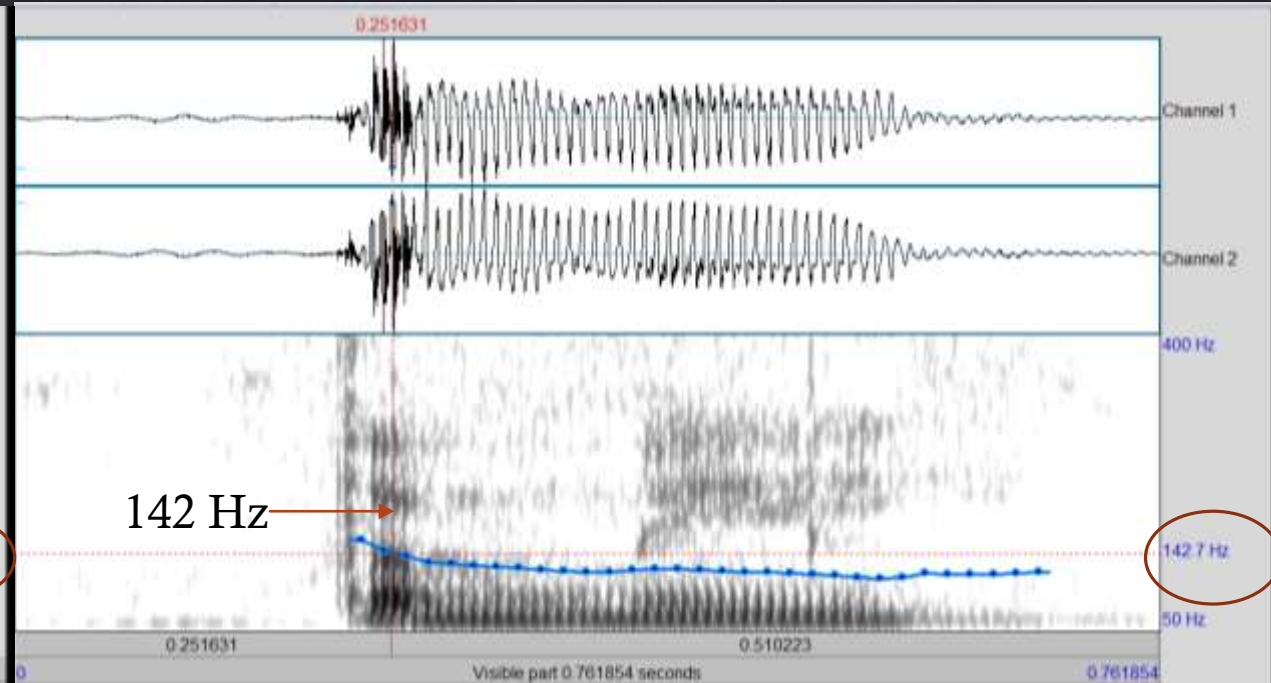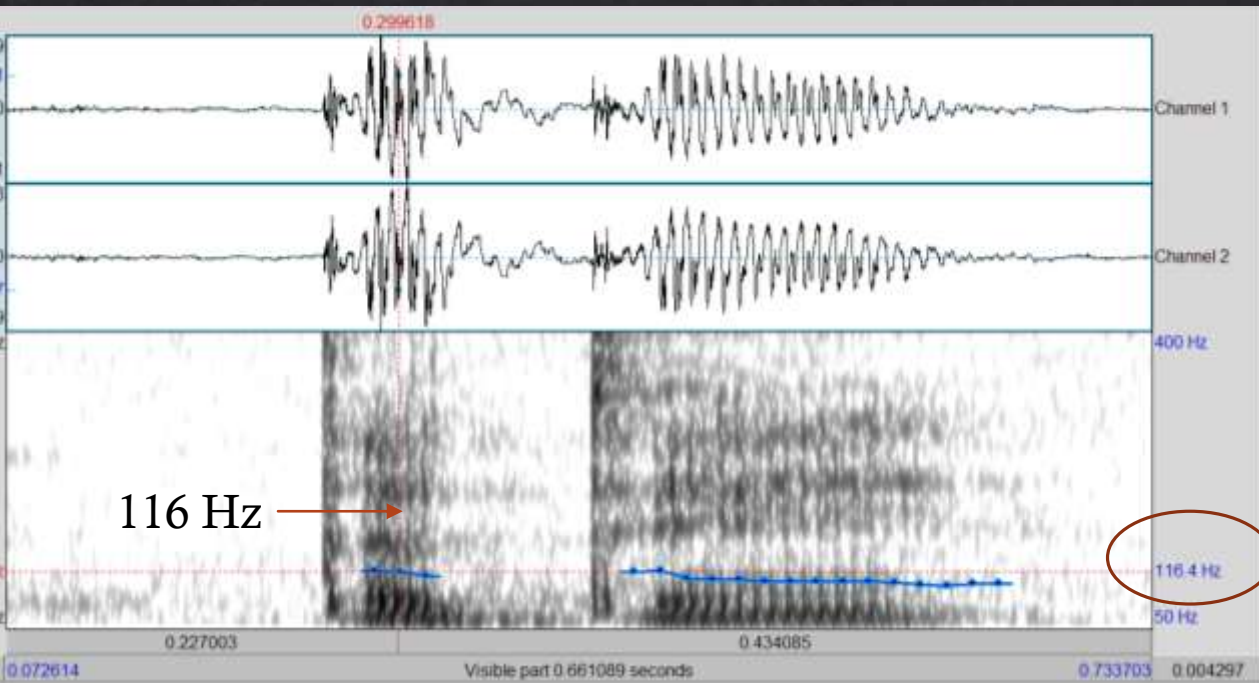
Speaker M2 saying သတင်း [d̪ə̆d̪ĩ] 'news' (on the left) and သမီး [t̪ə̆mi̤] 'daughter'

Other Dialects

◈ Myeik dialect (Kato & Khin Pale 2012)

◈ Danu

◈ Rakhine (example below: သံ [t̪ʰæ̃]   တောင် [tɔo])
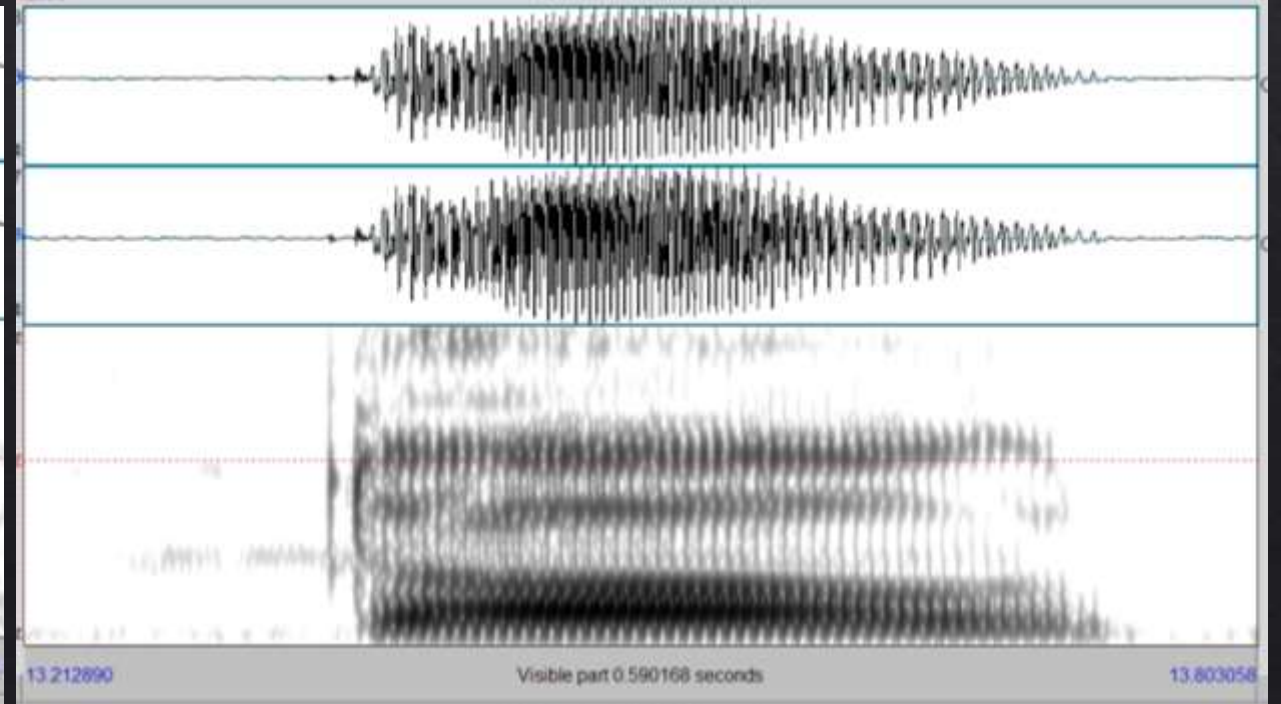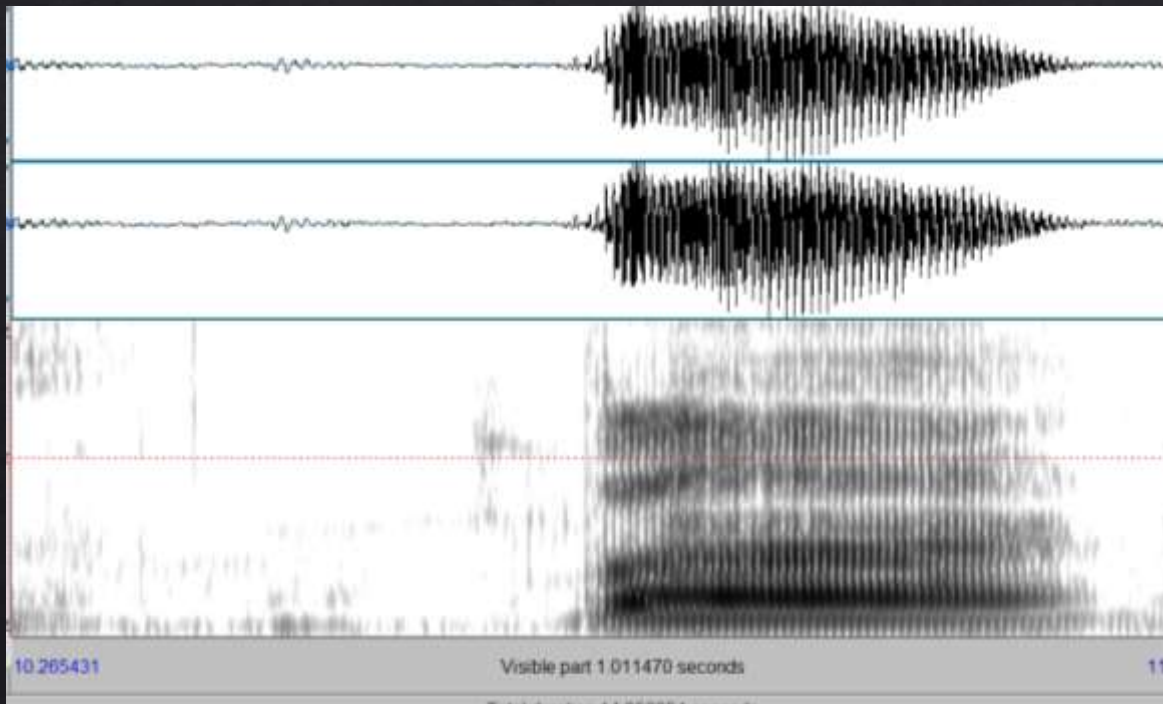
Phonemic Status

Contrast alveolar plosive /t/ with /ʈ/

1. တန်   [tæ̃]   'to be worth, worthy'   1. သန်   [ʈæ̃]   'to be strong, proficient'

2. တီး   [tî]   'to play (instrument)'   2. သီး   [ʈî]   'to bear fruit'

3. တင်   [tĩ]   'to raise, lift up'   3. သင်   [ʈĩ]   'to teach, learn'

4. တိုက်   [taɪʔ]   'building'   4. သိုက်   [ʈaɪʔ]   'nest; buried treasure'

5. တဲ   [tɛ́]   'hut'   5. သဲ   [ʈɛ́]   'sand'

6. တာ   [ta]   'to measure'   6. သာ   [ʈa]   'to exceed; be pleasant'

Phonemic Status

Contrast alveolar fricative /s/ with /ʈ/

1. အစစ်   [ʔə̆sɪʔ]   'real, genuine'
2. စံ   [sæ̃]   'standard, model'
3. စီး   [sî]   'to ride'
4. အစား   [ʔə̆sá]   'food'

1. အသစ်   [ʔə̆ʈɪʔ]   new'
2. သံ   [ʈæ̃]   'iron, metal'
3. သီး   [ʈî]   'to bear fruit'
4. အသား   [ʔə̆ʈá]   'meat, flesh'

Other World Languages

Australian	24	Arrernte, Bunaba, Diyari		Penutian	2	Nez Perce, Wappo
Niger-Congo	22	Swahili KiMvita, Kadugli, Elwana		Arawak	2	Baniwa, Cabiyari
Nilo-Saharan	13	Luo, Dinka, Shilluk		Afro-Asiatic	1	Dahalo
Dravidian	7	Malayalam, Toda, Irula		Equatorial (S.Am)	1	Trumai
Hokan	2	Diegueno, Pomo		Uto-Aztecan	1	Tohono O'odham
Indo-European	2	Southern Irish English, Swedish*		Yele-W. New Britain	1	Yele
				Araucanian	1	Mapudungun

Southeast Asian Languages Reported to Contrast Dental and Alveolar Plosive(s)

Sino-Tibetan

- Burmese
- Para Naga
- Tangshang Naga
- Koki Naga
- Falam Chin
- Geker/Gekho
- Kayah
- Kayan - some dialects
- Paku Shokho

- Palaychi
- Gebah
- Kayaw
- Western Pwo Karen
- Bwe Karen?
- Sgaw Karen-some dialects?

Austronesian

- Javanese
- Muna
- Kulisusu

Others?

New Symbol Needed?

UCLA Phonological Segment Inventory Database:

- ◈ Contrast in dental/alveolar plosives over 2x as common as dental/alveolar fricatives

IPA Principle 4a:

- ◈ "When two sounds occurring in a given language are employed for distinguishing one word from another, they should wherever possible be represented by two distinct symbols without diacritics."

If it's possible for the fricatives to have their own symbols, then why not for the plosives?

Proposed IPA Symbols

[τ]   voiceless dental plosive

[δ]   voiced dental plosive

◈ Not Roman, but Greek is second choice

◈ Some resemblance to [t d]

◈ Already in Unicode

◈ Lowercase

◈ Correspond to Classical Greek sounds

Thank You

Questions, Comments,

Suggestions for additions/revisions to our list of languages?

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