TIMBRE CONNECTIONS 2

YU / LAMONT

MARCH 8, 2018

UMASS AMHERST

REVIEW QUESTION:

WHAT'S THE DIFFERENCE BETWEEN THE TWO UKE NOTES WE RECORDED?

(use waveforms, spectrograms, spectra)

www.ling197m.krisyu.org/media/instruments/uke.wav

“MAP” WITH DR. MEI-YAU SHIH

https://www.umass.edu/tefd/map

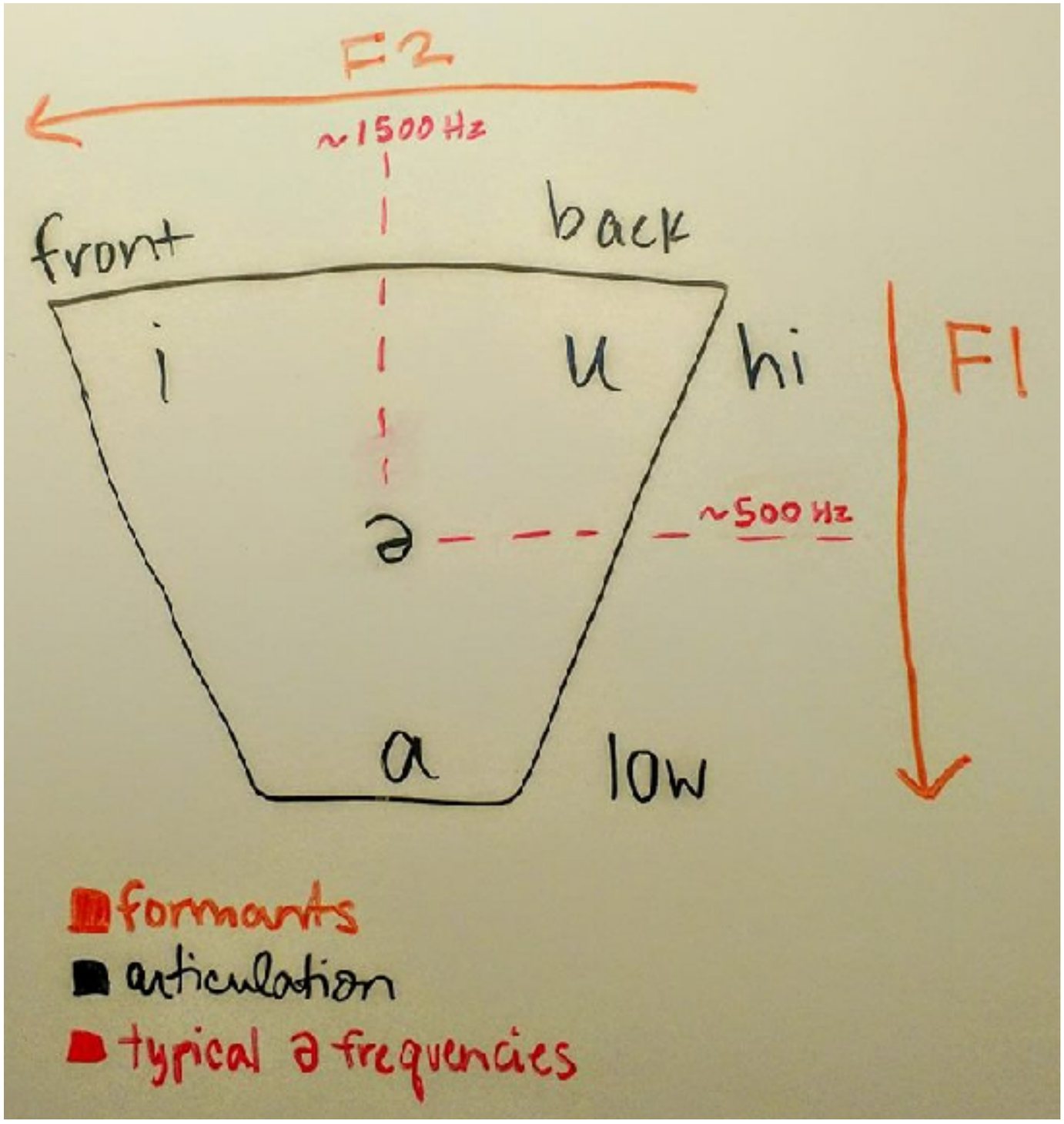
EXAM 2 PREVIEW

EXERCISE: INDEPENDENCE OF F0, FORMANTS

- Demonstrate that you can keep f0 constant, while changing formants

- Demonstrate that you can keep formants constant, while changing f0

HANDY FORMANT CHART!



Ivy Hauser

https://blogs.umass.edu/ihauser/

http://www.facebook.com/groups/ling5

HELMHOLTZ RESONATORS IN MUSIC

BOTTLE BLOWING

Will the pitch of the note you hear as we blow over the bottle go up or down as we add water into the bottle?

DJEMBE DRUMS

http://djembefola.com/board/viewtopic.php?t=3619

MAKING DJEMBE DRUMS

https://youtu.be/aLeede5z1vQ

SARASWATI VEENA (CARNATIC)

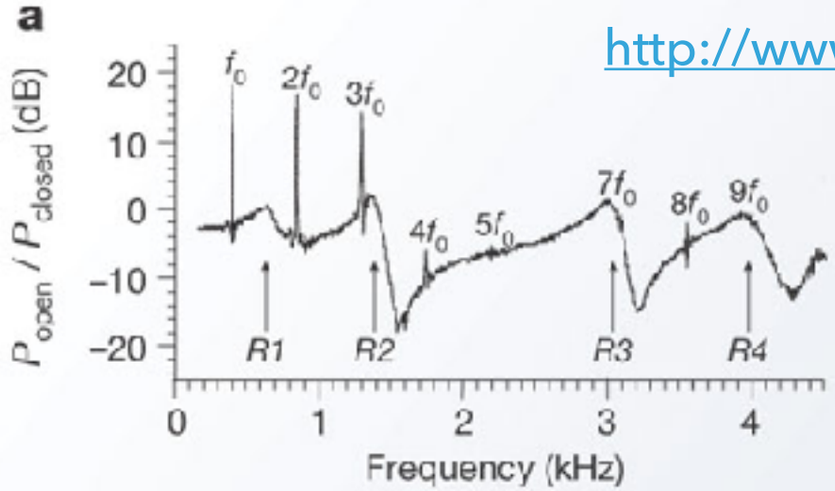
https://youtu.be/4yv4ea1pFp4?t=1m6s

RESONANCE TUNING IN SINGING

http://newt.phys.unsw.edu.au/jw/soprane.html#soundfiles

Note names: http://newt.phys.unsw.edu.au/jw/notes.html

SOPRANO FORMANTS



http://www.nature.com/nature/journal/v427/n6970/fig_tab/427116a_F1.html

FIGURE A

- What vowel is being sung here? What is the frequency of f0? The corresponding musical note?
- What are R1-R4, in terms of concepts you've learned from source-filter theory? Is there an alternative term you know for them?

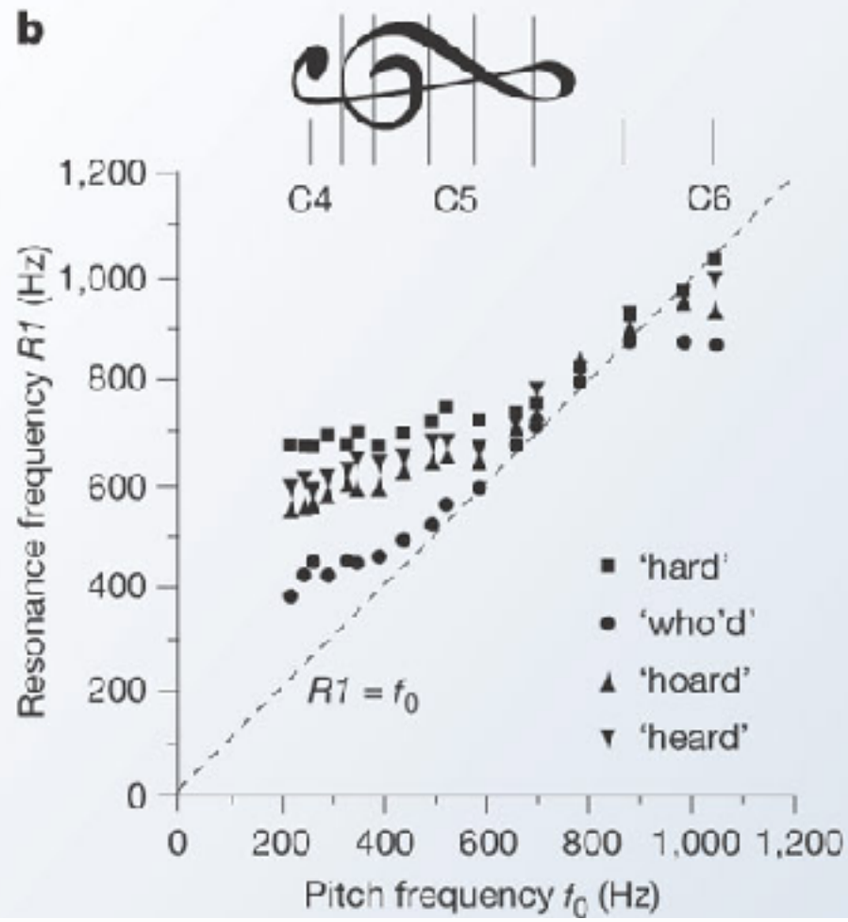


FIGURE B

- What is another word for "R1" that we've learned? Does it correlate with vowel height or backness?
- Order the vowels from lowest to highest in height based on the R1 values given at f0 = 200 Hz. Do the same for the R1 values given at f0 = 800 Hz.
- What happens to the R1 values of the different vowels as f0 gets higher?

a, The ratio of the spectrum measured with the mouth open, to that with the mouth closed (P_{open}/P_{closed}) when the vowel in the word 'hard' is sung at A4. Several harmonics of the voice signal with fundamental frequency f_0 = 440 Hz can be seen. The maxima in the broad band signal corresponding to the resonances *R1, R2, R3* and *R4* are indicated by arrows. **b,** The lowest resonance frequency, *R1*, as a function of the pitch frequency f_0. The pitch is indicated in musical terms by the rotated treble clef at the top of the figure.

MOZART'S QUEEN OF THE NIGHT ARIA

http://www.youtube.com/watch?v=dpVV9jShEzU

MOZART'S QUEEN OF THE NIGHT ARIA

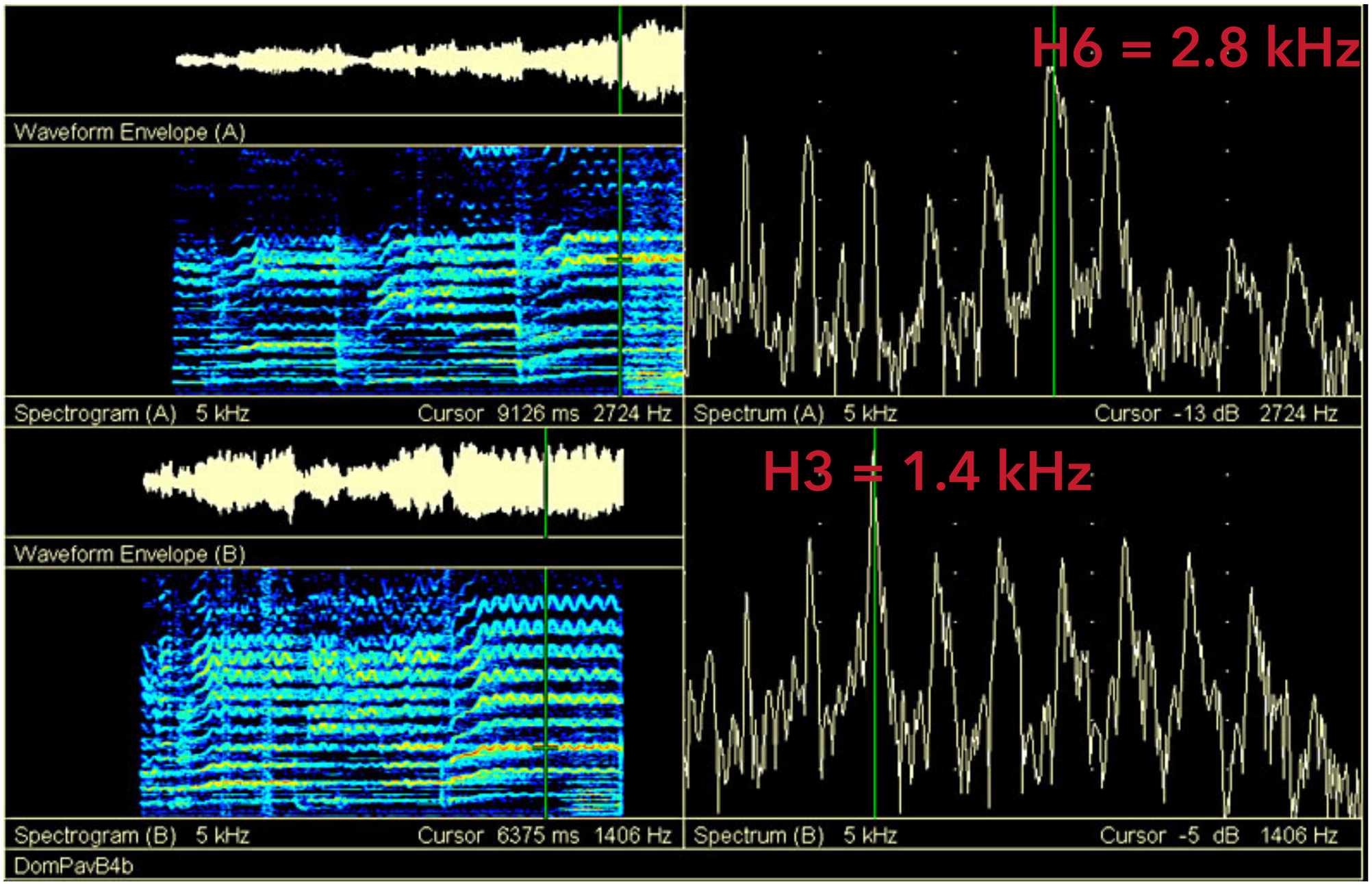
GERMAN TEXT

Der Hölle Rache kocht in meinem Herzen,
Tod und Verzweiflung flammet um mich her!
Fühlt nicht durch dich Sarastro
Todesschmerzen,
So bist du meine Tochter nimmermehr.
Verstossen sei auf ewig,
Verlassen sei auf ewig,
Zertrümmert sei'n auf ewig
Alle Bande der Natur
Wenn nicht durch dich!
Sarastro wird erblassen!

Hört, Rachegötter,
Hört der Mutter Schwur!

http://www.thoughtco.com/der-holle-rache-lyrics-724325

F2 TUNING IN B4, CELESTE AIDA, [O]



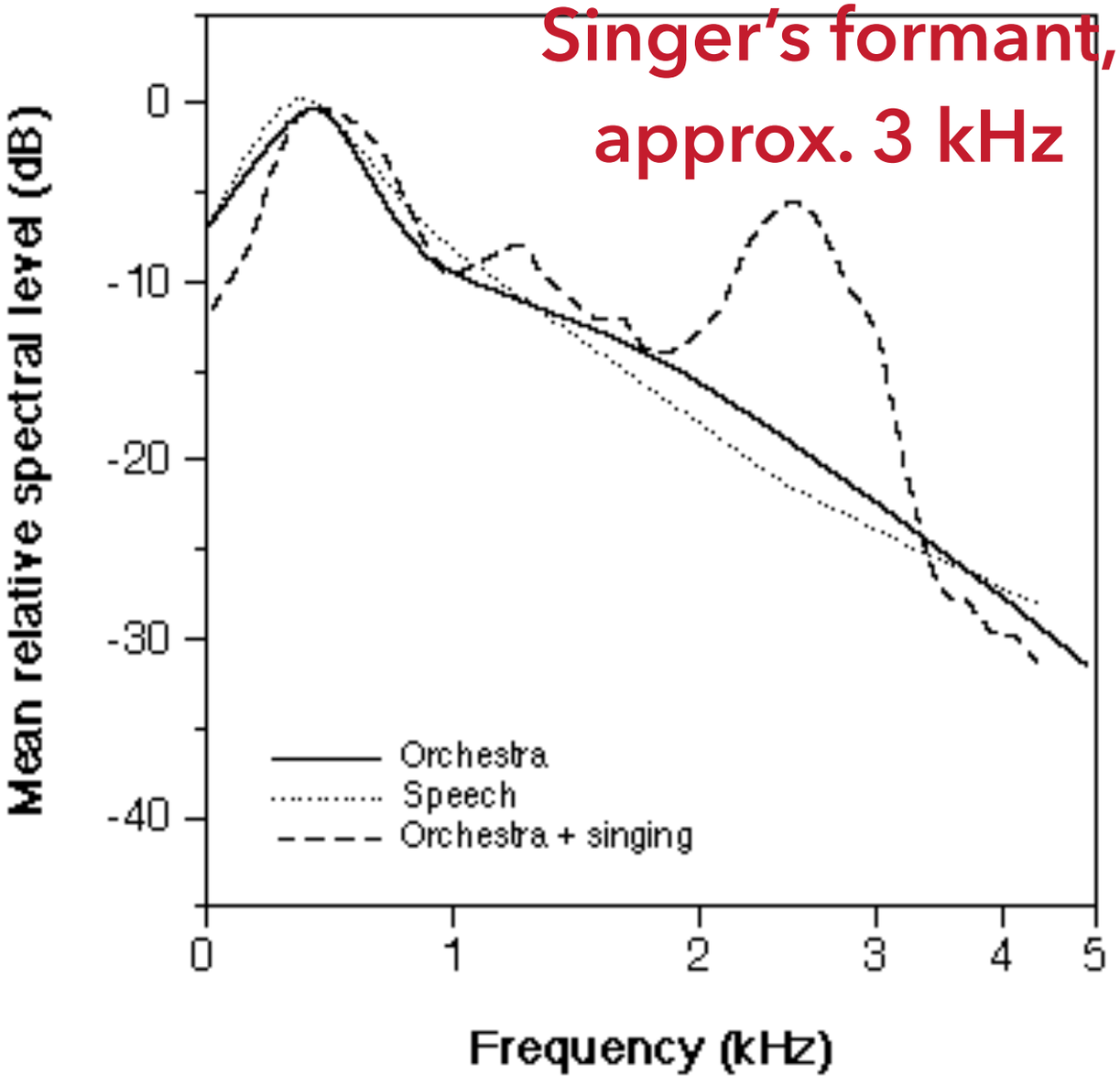
Domingo: singer's formant

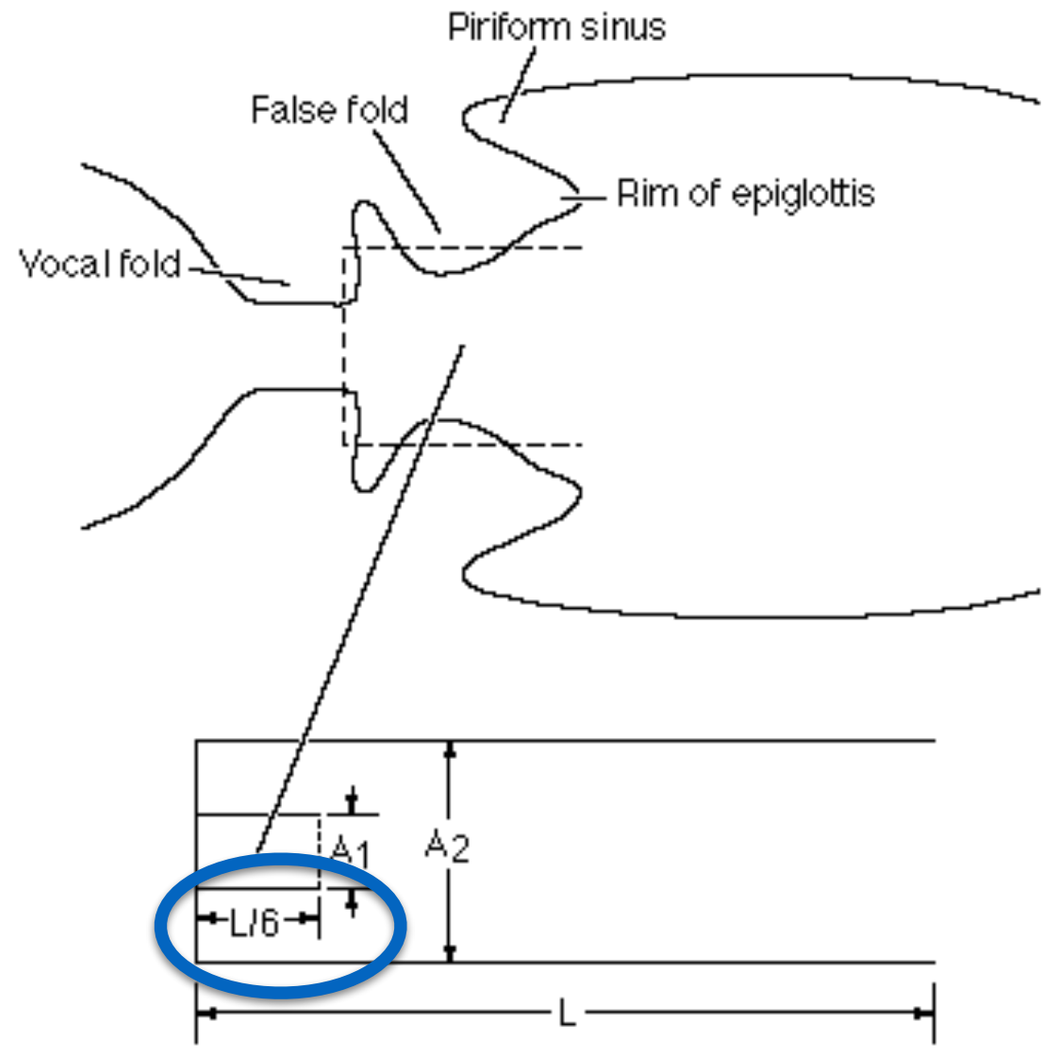
Pavarotti:
F2 = 1400 Hz!!
Raised 500 Hz

http://www.vocevista.com/technology.html

http://www.voiceinsideview.com/docs/Miller%20chapter%201.pdf

THE SINGER'S FORMANT

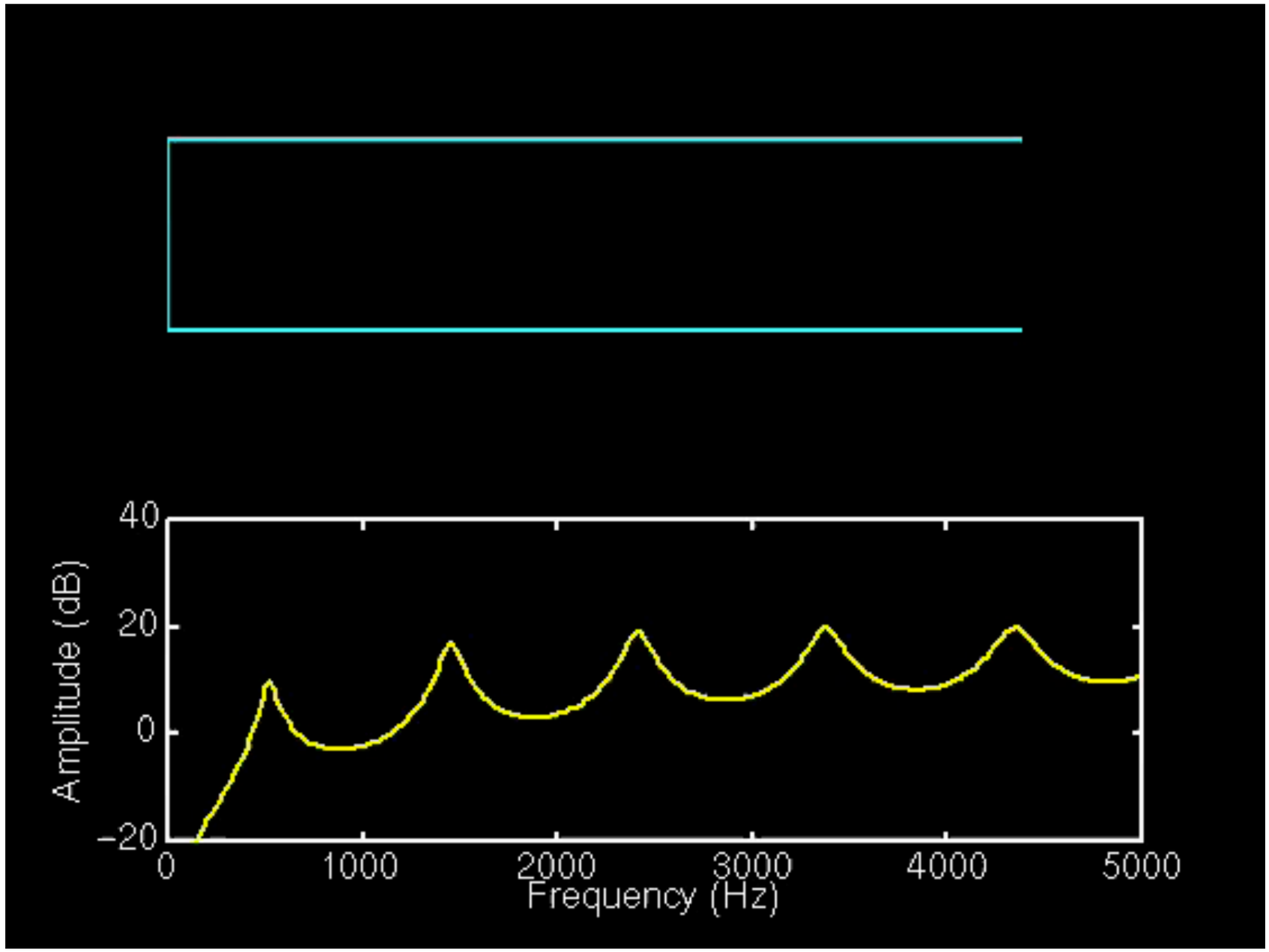




http://www.ncvs.org/ncvs/tutorials/voiceprod/tutorial/singer.html

http://www.speech.kth.se/prod/publications/files/qpsr/1995/1995_36_2-3_083-096.pdf

THE SINGER'S FORMANT



http://www.ncvs.org/ncvs/tutorials/voiceprod/tutorial/singer.html

PAVORATTI'S FINAL B4, CELESTE AIDA: 4:18

http://www.youtube.com/watch?v=XP1vp_G9mLc

VOCAL TRACT RESONATORS IN MUSIC: BENDING IN HARMONICA PLAYING

More general review article:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2689615/

BLOW AND DRAW REEDS

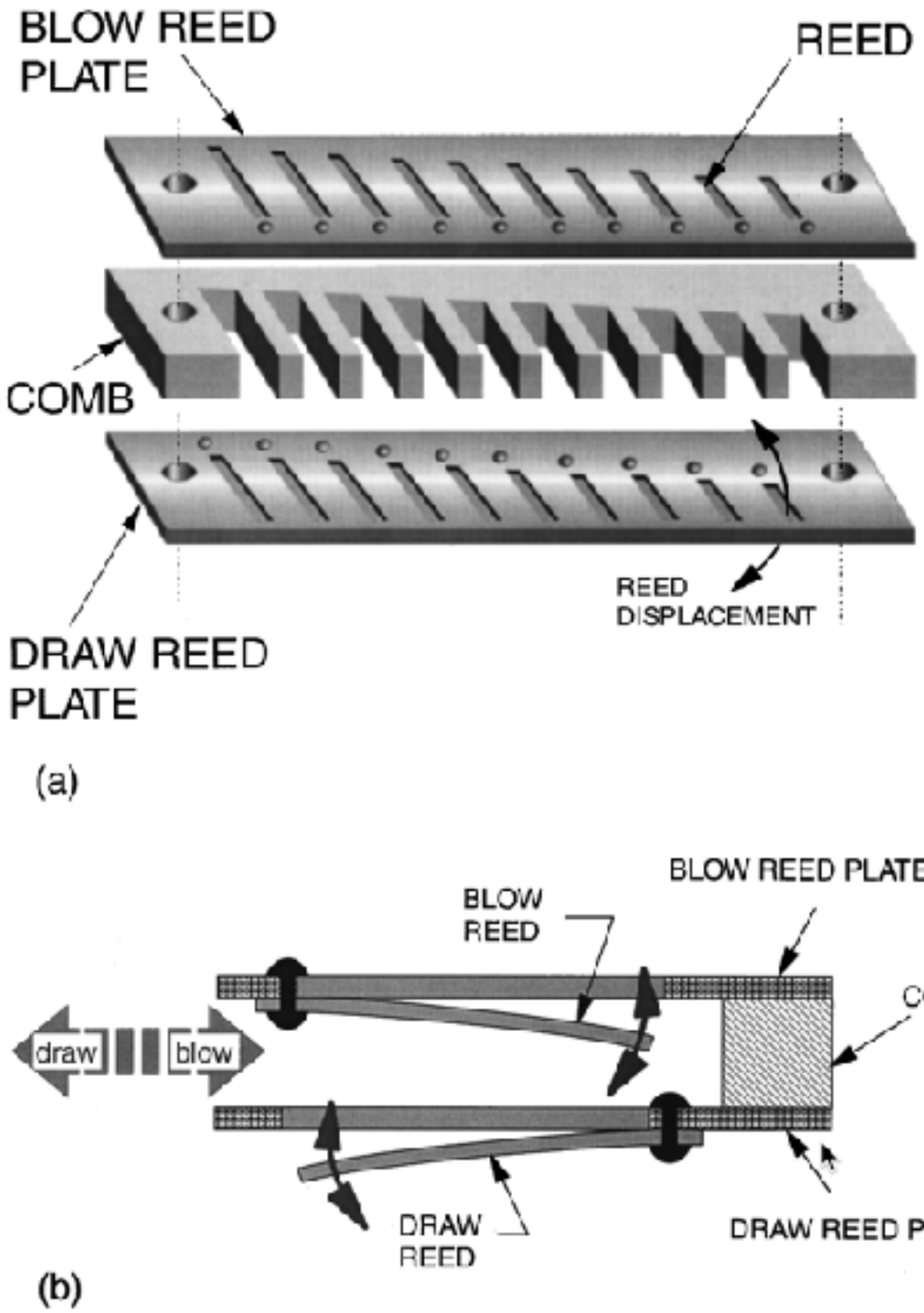


FIG. 1. (a) Exploded view of the ten hole diatonic harmonica showing the upper, blow reed plate, the lower, draw reed plate and the separating comb. Upper and lower covers of the reed plates are not shown. Reeds are mounted on the inside surface of the blow reed plate and the outside of the draw reed plate. Thus blowing closes the blow reed into the blow reed plate and opens the draw reed out of the draw reed plate. The reverse occurs on drawing. It is the closing reed that speaks on natural playing. (b) Schematic, cross sectional view of reeds and plates of a hole of a diatonic harmonica. Reeds vibrate in slots cut out of the reed plate. Blowing into the hole closes the blow reed and opens the draw reed. Drawing closes the draw reed and opens the blow reed.

http://purintun.com/harp_bending_attributes_article.pdf

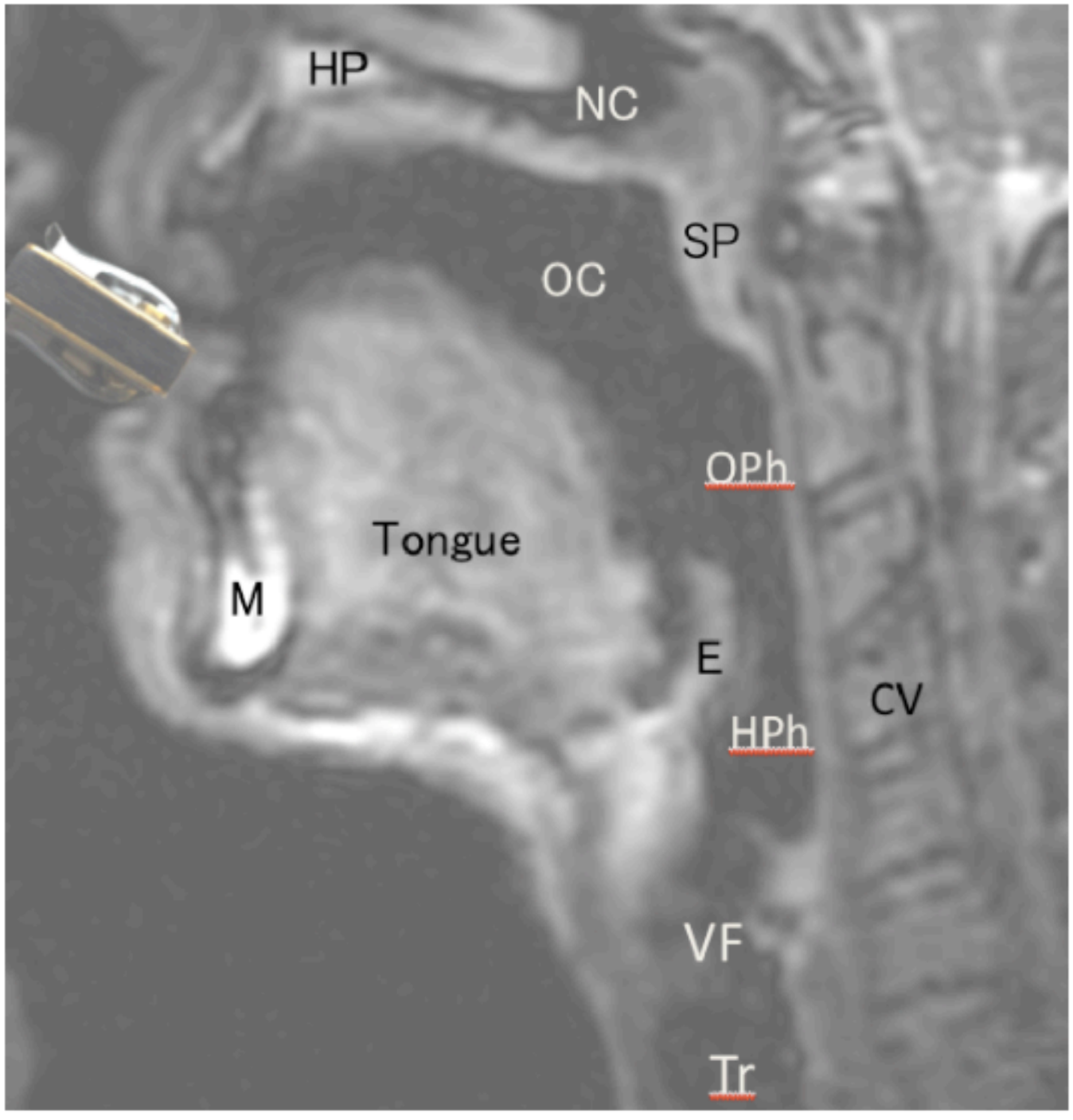
BENDING: JAMES COTTON SOLO

https://youtu.be/8hEYwk0bypY?t=2m49s

BENDING: INSIDE THE ORAL CAVITY

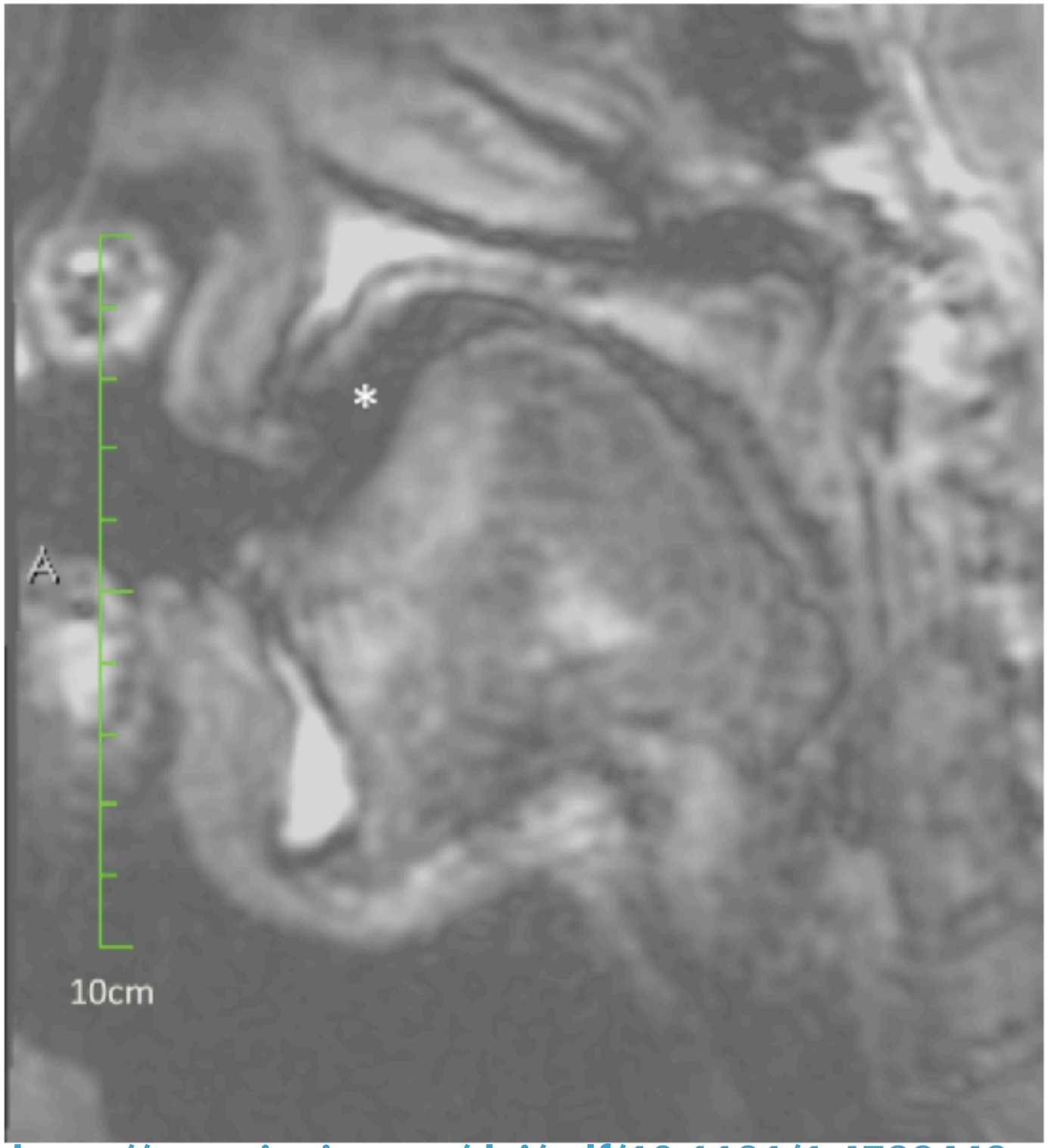
https://youtu.be/gTEXSb6duVs?t=2m14s

NORMAL DRAW NOTE ON 3RD HOLE



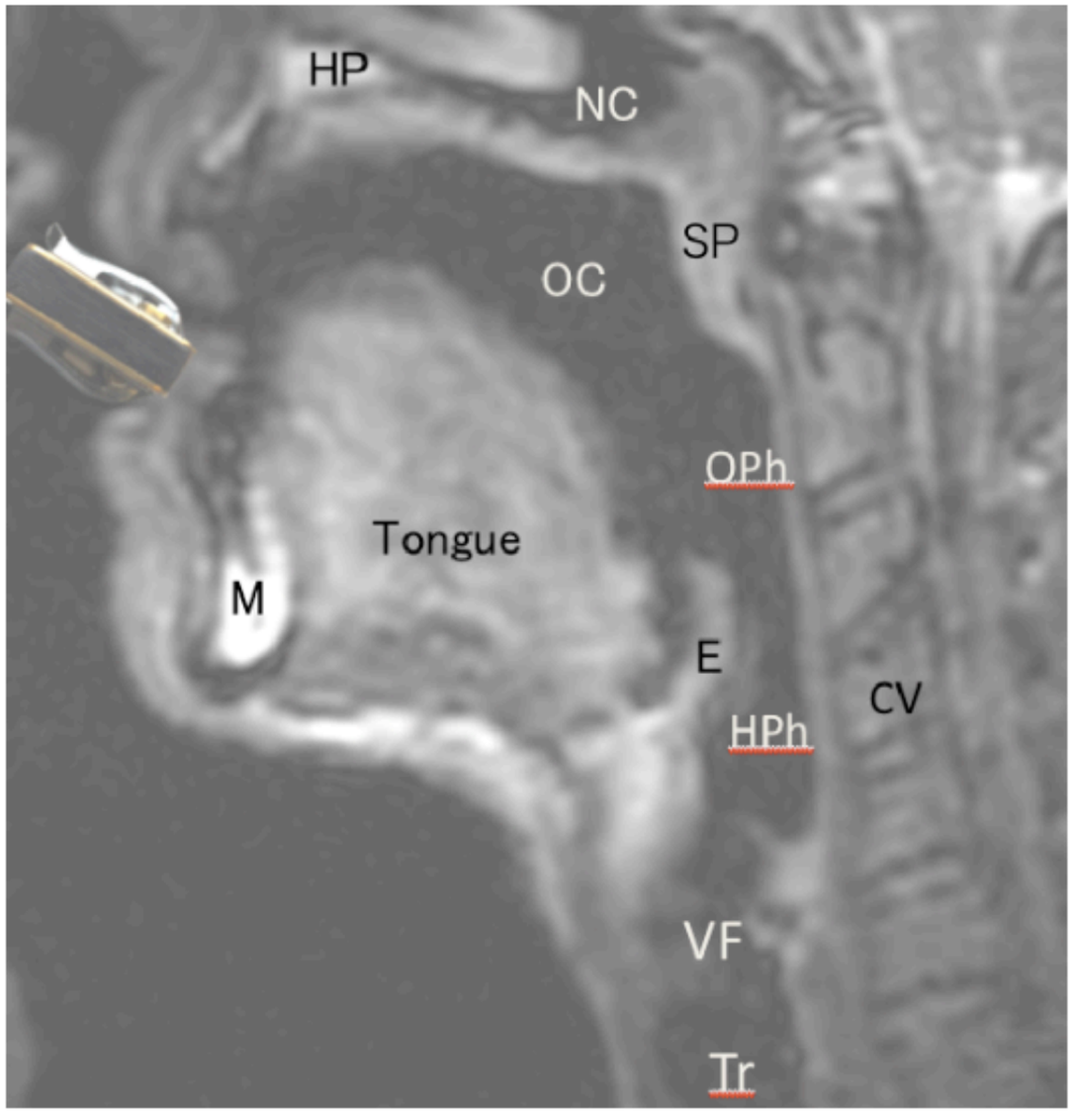
https://asa.scitation.org/doi/pdf/10.1121/1.4799443

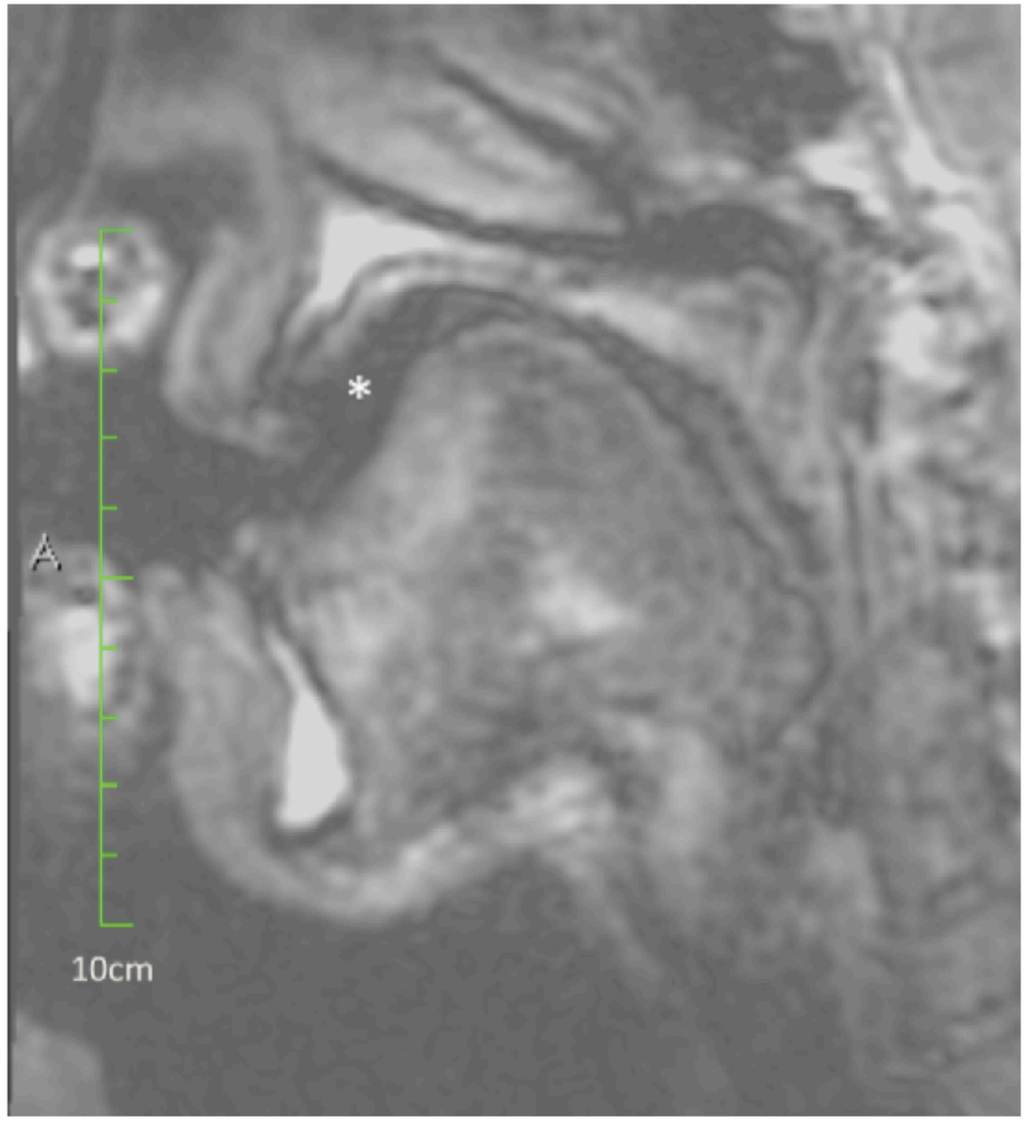
BEND DOWN THREE SEMITONES



https://asa.scitation.org/doi/pdf/10.1121/1.4799443

BEND DOWN THREE SEMITONES



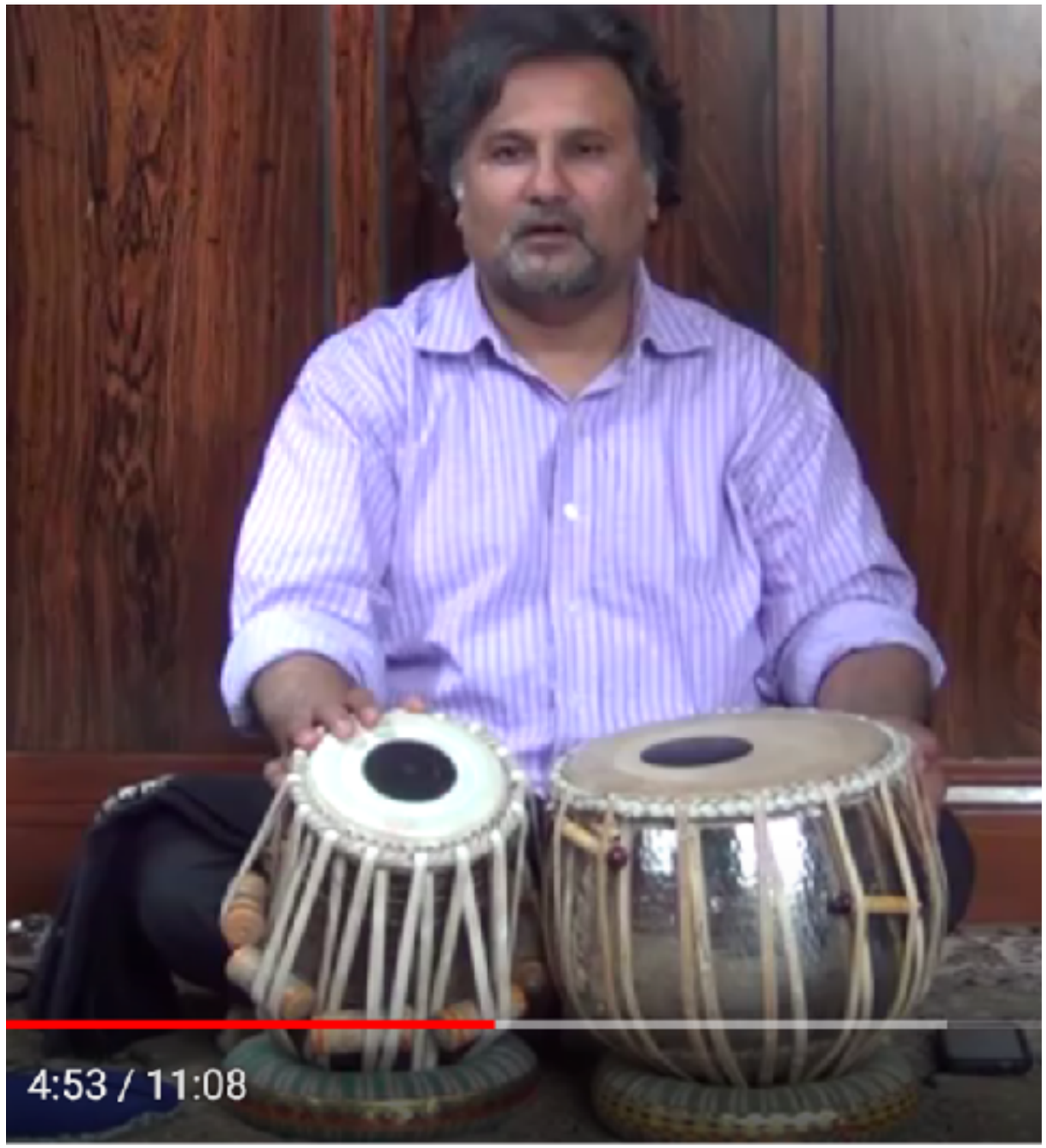


When playing the 3 hole draw bent notes, the body of the tongue elevates and humps up toward the hard palate. As the bend deepens, the tongue retracts and the apex of the elevation shifts more and more back toward the pharynx. This process creates a progressively larger cavity in the anterior part of the mouth between the elevated body of the tongue and the lips (Figure 2). Simultaneously, the width of the pharynx

https://asa.scitation.org/doi/pdf/10.1121/1.4799443

TIMBRE CATEGORIES IN INDIAN TABLA DRUMMING

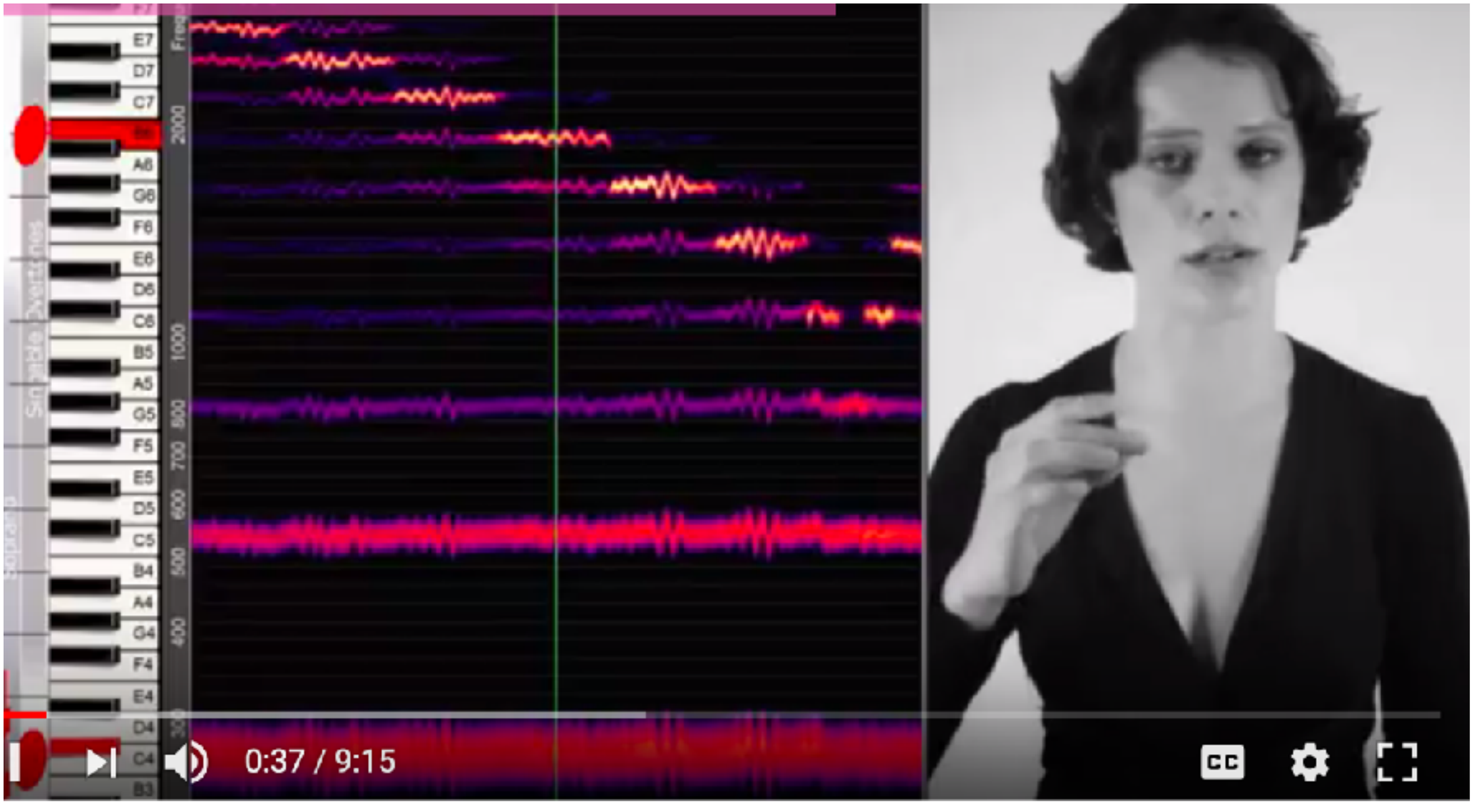
NAMED TIMBRE DIFFERENCES



https://youtu.be/C6G4pZgE88A?t=2m40s

OVERTONE AND UNDERTONE SINGING

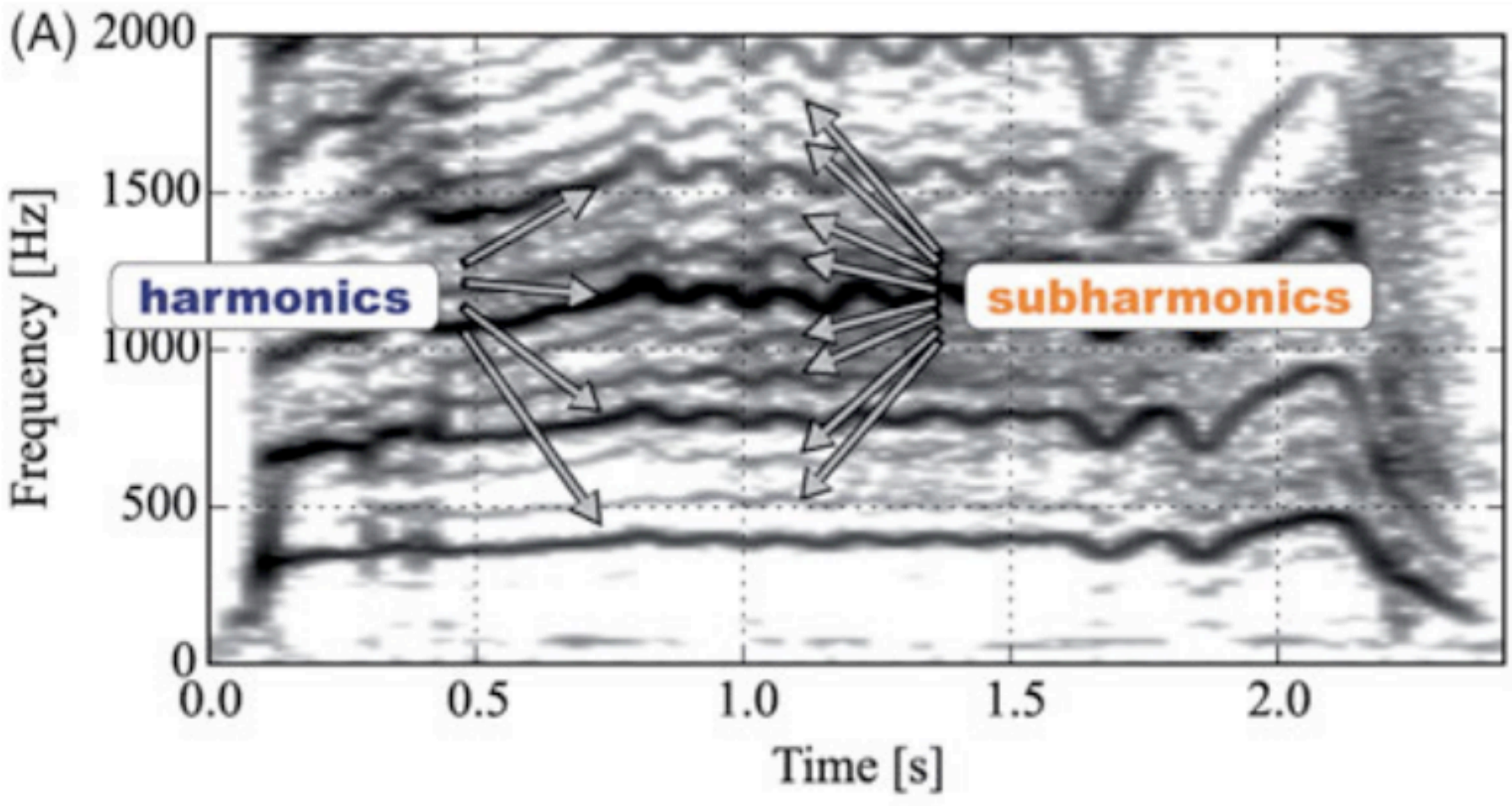
OVERTONE SINGING



Explanation: https://www.youtube.com/watch?v=UHTF1-IhuC0

UNDERTONES: SUBHARMONICS

Subharmonics in Freddie Mercury's singing: http://bass2yang.com/freddie-mercury-and-subharmonics/



UNDERTONES: KARGYRAA SINGING IN HÖÖMII

Female throat singing by Choduraa Tumat

https://youtu.be/JN36FVTazjs

Very low subharmonics:

https://www.youtube.com/watch?v=kiBtqWaluhI&list=RDkiBtqWaluhI&t=9

VENTRICULAR FOLD VIBRATION

https://www.sciencedirect.com/science/article/pii/S089219970100008X

Voice Source Characteristics in Mongolian "Throat Singing" Studied with High-Speed Imaging Technique, Acoustic Spectra, and Inverse Filtering ☆

Per-Åke Lindestad [a], Maria Södersten [a], Björn Merker [b], Svante Granqvist [c]

Show more

https://doi.org/10.1016/S0892-1997(01)00008-X

Abstract

Mongolian "throat singing" can be performed in different modes. In Mongolia, the bass-type is called Kargyraa. The voice source in bass-type throat singing was studied in one male singer. The subject alternated between modal voice and the throat singing mode. Vocal fold vibrations were observed with high-speed photography, using a computerized recording system. The spectral characteristics of the sound signal were analyzed. Kymographic image data were compared to the sound signal and flow inverse filtering data from the same singer were obtained on a separate occasion. It was found that the vocal folds vibrated at the same frequency throughout both modes of singing. During throat singing the ventricular folds vibrated with complete but short closures at half the frequency of the true vocal folds, covering every second vocal fold closure. Kymographic data confirmed the findings. The spectrum contained added subharmonics compared to modal voice. In the inverse filtered signal the amplitude of every second airflow pulse was considerably lowered. The ventricular folds appeared to modulate the sound by reducing the glottal flow of every other vocal fold vibratory cycle.

Laryngyscopy and Tuvan throat singing:

https://youtu.be/za8N1DLMuR0