PITCH: LANGUAGE & MUSIC CONNECTIONS, I

YU / LAMONT

FEBRUARY 13, 2018

UMASS AMHERST

INTERVAL PERCEPTION TEST RESULTS

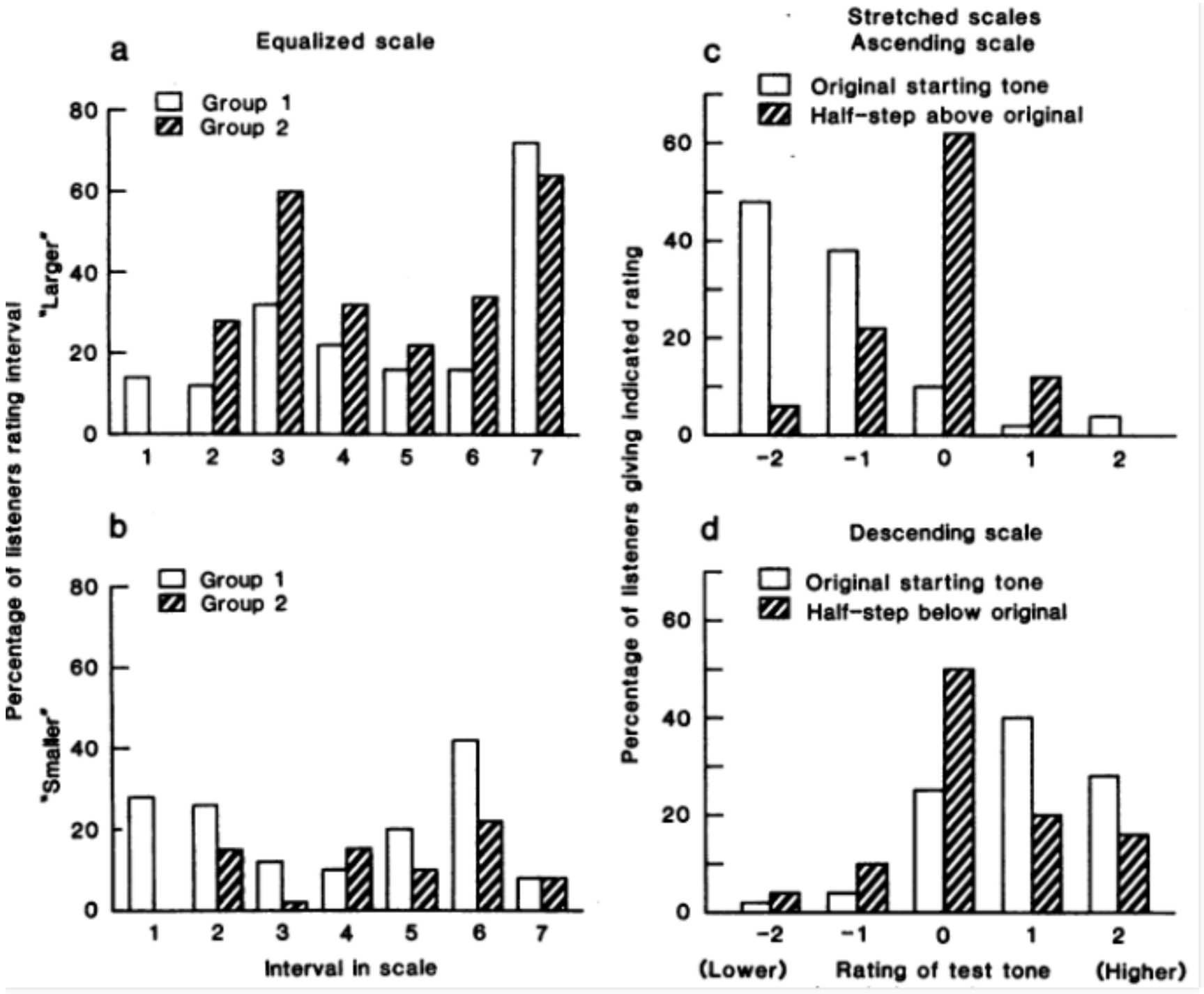
The unequal spacing of the notes in a scale forms the basis for an interesting demonstration of the effects of our knowledge of musical pitch on perception. Shepard and Jordan (1984: abstract):

> Judgments of relations between tones in a sequence derived from the major diatonic scale (do, re, mi, . . .) by systematic distortions (either equalization or stretching of intervals) reveal that Western listeners interpret the tones relative to that musical scale even when they try to judge the purely physical relations between the tones.

Patel (2008: 22):

> The interesting result was that participants judged the 3rd and the 7th intervals to be larger than the others. These are precisely the intervals that are small (1 semitone) in a Western musical scale, suggesting that listeners had assimilated a novel scale to a set of internal sound categories. It is especially notable that these learned internal interval standards were applied automatically, even when instructions did not encourage musical listening.

SHEPARD AND JORDAN (1984)



http://science.sciencemag.org/content/226/4680/1333

REVIEW: WHISTLED SPEECH AND INTONATIONAL MELODIES

Whistling in America

by Reid McKinney - Monday, February 12, 2018, 1:13 AM

I had only been acquainted with the articulated whistling of the Canary Islands, but tonal whistling sounds like it would be very effective. Is our own whistling related to any linguistic messaging? We seem to have different whistles for getting attention and summoning a person or animal. There's also the infamous "wolf-whistle" that seems universally recognized in American culture. Reading about the whistled speech of other places makes me wonder if there is a linguistic root to these unique whistles or if they're an unrelated cultural behavior.

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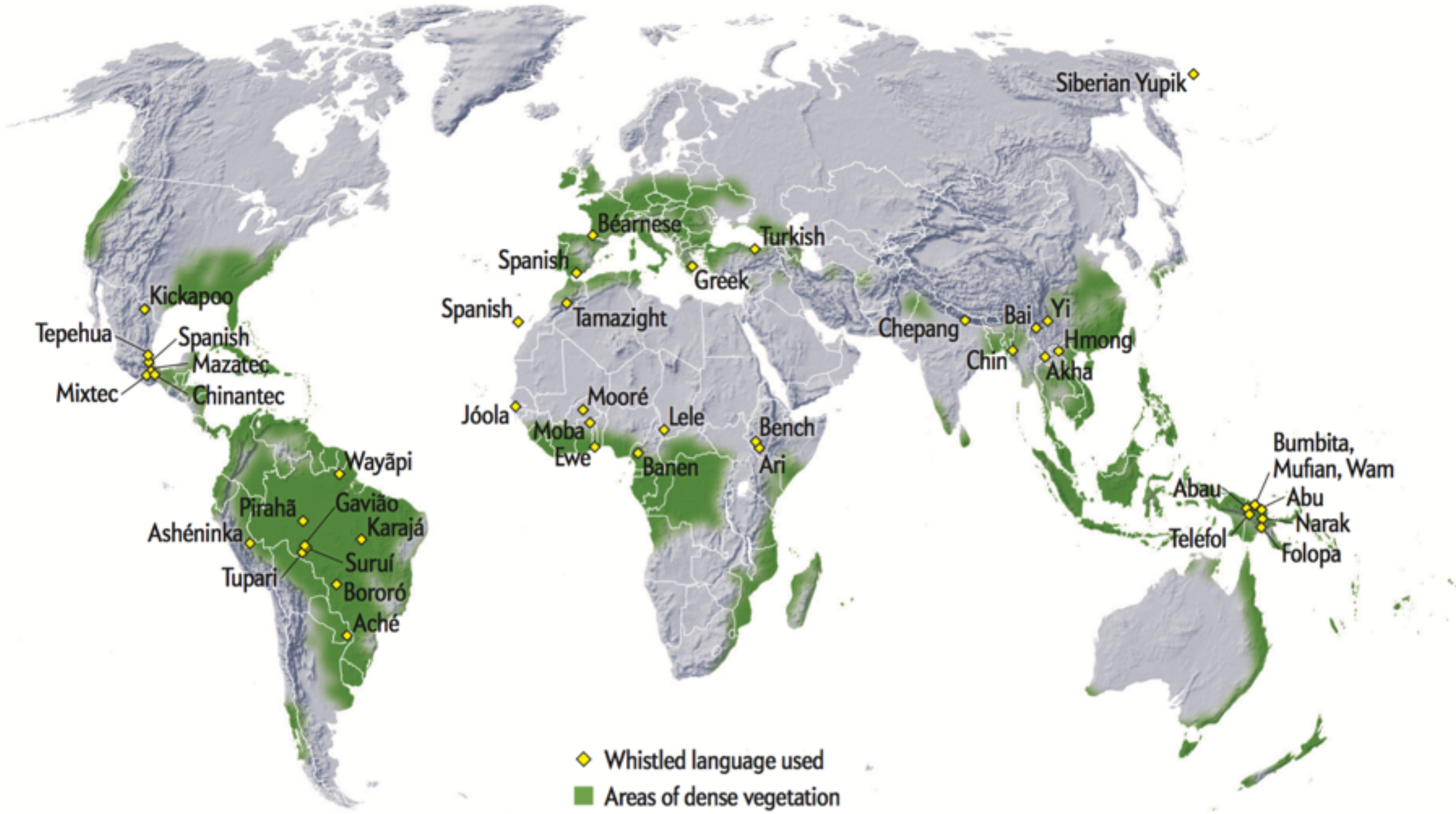
RESOURCES ON WHISTLED SPEECH

- **Scientific American: Whistled speech**
  - https://umass.box.com/s/f0rp74od97ruf4mqfk2mwoc44jfbo8z6
- **World Whistles Research Association:**
  - http://www.lemondesiffle.free.fr/
- **Whistled Greek examples:**
  - https://www.scientificamerican.com/sciam/assets/Image/karaoke-greek-Meyer.swf
  - Note: requires Flash player!
- **Other examples/discussion:**
  - http://languagelog.ldc.upenn.edu/nll/?p=32850

Where the World Speaks in Whistles

In the past 15 years the number of known whistled languages has expanded to about 70 from the dozen or so initially identified by anthropologists, missionaries, travelers, and the like. The ones that have been studied or recorded are noted on the map. As research continues, more whistled languages will be discovered, provided that their traditional ways of living are not threatened by modernity. Often they are used to communicate over long distances in mountainous and forested areas.



WHISTLED/HUMMED SPEECH: YOUR TURN!

SENTENCE HERE, TO BE DETERMINED

- **Come up with a situational context where you would say this sentence.**
- **Whistle/hum the way you would utter the sentence in that context to your partner**
- **Partner: try your best to guess what the situational context might be**

GEOGRAPHIC DISTRIBUTION OF TONE LANGUAGES

Pitch vs. Geography

by Noelle McManus - Sunday, February 11, 2018, 2:02 PM

One thing I found interesting about Patel's article is the chart included on page 41 that shows languages with 5 level tones. Three are from Africa, one is from Asia, and one is from North America. It's fascinating how cultures that likely never interacted with each other formed languages with such similar characteristics.

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Geographic distribution of African level tone languages

by Chin Wah Yip - Monday, February 12, 2018, 5:35 PM

One thing that interests me most in this excerpt is the geographic distribution of African tone languages according to their number of level tones on P.43. I love how it shows the relationship between language distribution and the possible historical change in languages. The way that languages with higher number of level tones are surrounded by that with lower number of level tones makes me wonder how language contact and language change could be performed in such a systematic way.

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Why Africa and Southeast Asia?

by Emmett Vorspan-Stein - Monday, February 12, 2018, 10:54 PM

I wonder if there has been any conclusive research (I'm sure there have been plenty of studies done) into the reason why most tonal languages are spoken in Africa and Southeast Asia. Given that the majority of the world's languages are tonal, it seems like finding the answer to this question would be of interest to many linguists. A theory I might postulate is that the quantity of tonal languages within Africa would be a result of the fact that this is the birth place of human linguistic ability, and thus, like with fauna, Africa might boast the highest level genetic (linguistic) diversity. If this is the case, then I would wonder if there is any evidence for why tonal languages might have arisen, and what benefit they provide human communication.

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Tonal Languages

by Pavithra Devarajan - Monday, February 12, 2018, 11:24 PM

I think the map of Africa displaying the different regions where tonal languages are spoken was very interesting. I have always wondered how tonal languages form, and why there are so many in Asiatic areas. In India, Punjabi is probably the most recognizable tonal language, and while I speak Tamil that is not tonal, I have always wondered why some languages are tonal and why some aren't.

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TONE LANGUAGES AND HUMIDITY?

Climate, vocal folds, and tonal languages: Connecting the physiological and geographic dots

Caleb Everett, Damián E. Blasi, and Seán G. Roberts

PNAS 2015; published ahead of print January 20, 2015, https://doi.org/10.1073/pnas.1417413112

Edited by E. Anne Cutler, University of Western Sydney, Penrith South, New South Wales, Australia and approved December 24, 2014 (received for review September 9, 2014)

Significance

The sound systems of human languages are not generally thought to be ecologically adaptive. We offer the most extensive evidence to date that such systems are in fact adaptive and can be influenced, at least in some respects, by climatic factors. Based on a survey of laryngology data demonstrating the deleterious effects of aridity on vocal cord movement, we predict that complex tone patterns should be relatively unlikely to evolve in arid climates. This prediction is supported by careful statistical sampling of climatic and phonological data pertaining to over half of the world's languages. We conclude that human sound systems, like those of some other species, are influenced by environmental variables.

http://www.pnas.org/content/early/2015/01/14/1417413112

TONAL LANGUAGES AND HUMIDITY

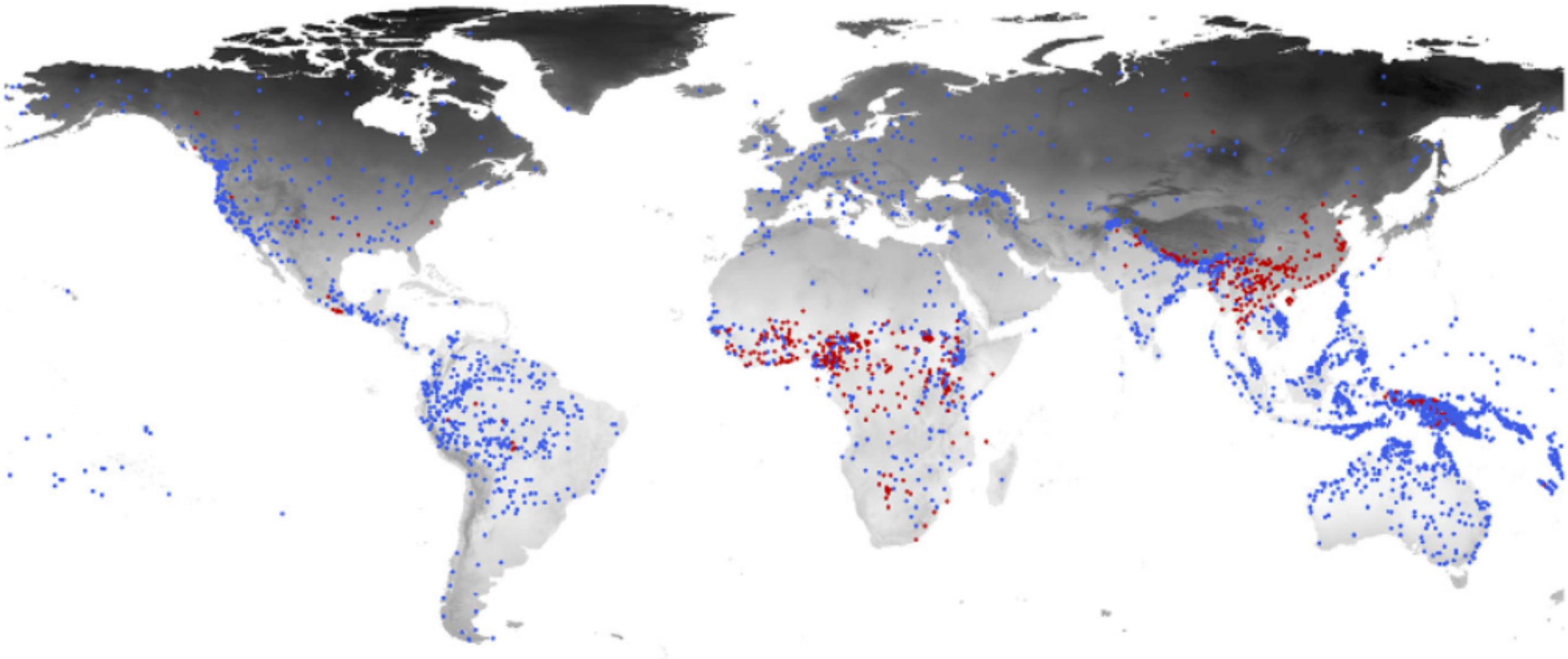
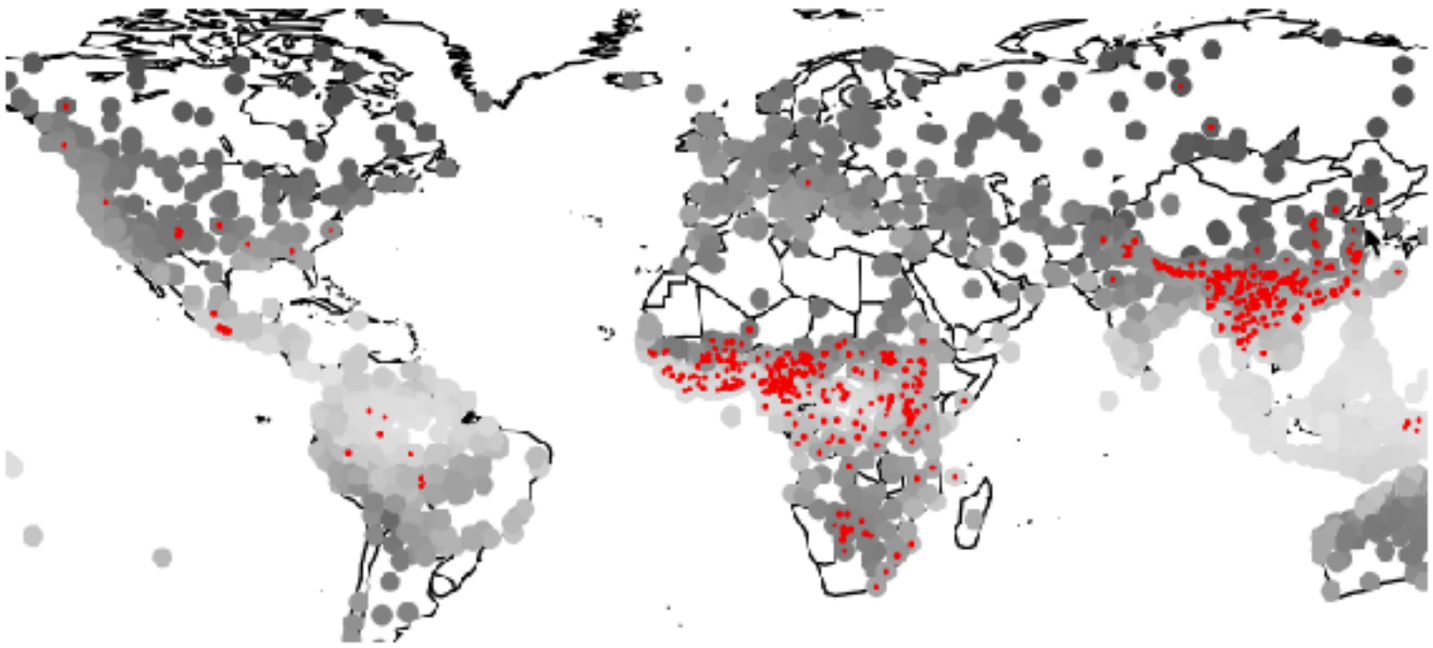


Fig. S1. Distribution of languages with complex tone (red dots) and without complex tone (blue dots) in the ANU database. Darker shading on map corresponds to lower MAT.

http://www.pnas.org/content/pnas/suppl/2015/01/15/1417413112.DCSupplemental/pnas.201417413SI.pdf

TONAL LANGUAGES AND HUMIDITY: REACTION

Tone and Humidity: FAQ



Sean

27 January, 2015

Cultural Evolution, Reviews, Science, spurious correlations

Everett, Blasi & Roberts (2015) review literature on how inhaling dry air affects phonation, suggesting that lexical tone is harder to produce and perceive in dry environments. This leads to a prediction that languages should adapt to this pressure, so that lexical tone should not be found in dry climates, and the paper presents statistical evidence in favour of this prediction.

Below are some frequently asked questions about the study (see also the previous blog post explaining the statistics).

http://www.replicatedtypo.com/tone-and-humidity-faq/10286.html

TONE IN CONTEXT

Patel Reading

by Alexandra Halaby - Wednesday, February 7, 2018, 5:20 PM

On pg.44 there was a sentence describing tone languages that was kind of funky to me. If I heard what it was describing perhaps it would make more sense. Something like, a tone is high or low only in relation to its immediate neighbors, so that "high" tone near the end of the sentence may actually be lower in pitch than the "low" tone near the beginning."

One of the things I found really interesting was Ladd and his students findings: "Ladd suggests that speech tones are scaled relative to two reference frequencies corresponding to the top and bottom of an individual's speaking range. This range can vary between speakers, and can be elastic within a speaker, for example, growing when speaking loudly or with strong positive affect." pg. 45 We can hear that everyone's voice sounds difference from ours and other people we know, but I've never thought about our voices having different ranges!

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Re: Patel Reading

by Melissa Karp - Thursday, February 8, 2018, 10:03 AM

Hi Alexandra,

I also thought it was really cool and it kinda goes along with the idea that pitch is really just a psychological perception. Things will be low or high frequency to us depending on how we perceive them, not necessarily on their physical frequency.

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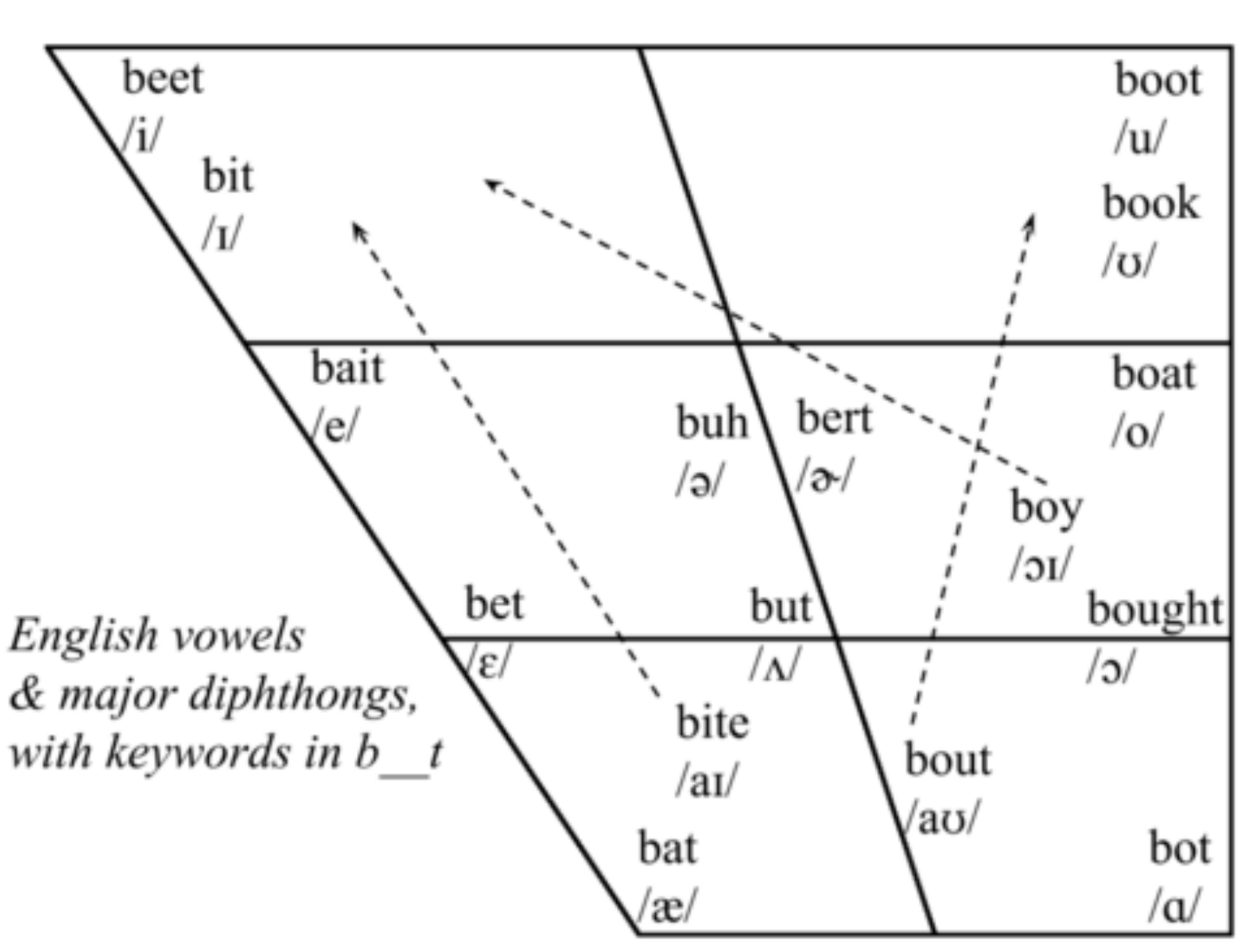
VOWELS IN CONTEXT

Do this vowel identification task:

https://goo.gl/forms/e303MVWEU6TKKhyz1

Do not click to see explanation yet on the webpage!

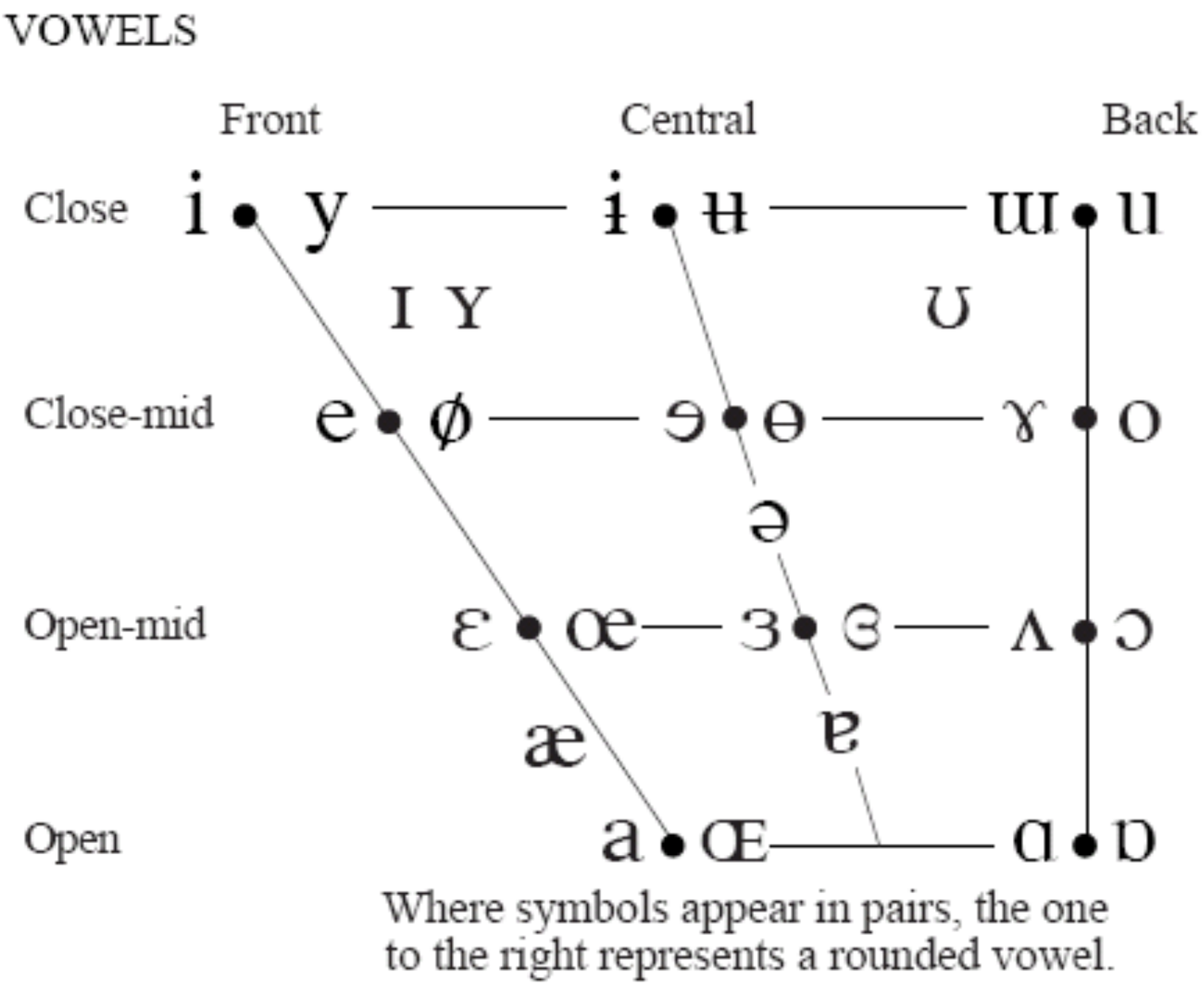
PREVIEW: VOWELS OF ENGLISH



http://allthingslinguistic.com/post/67308552090/how-to-remember-the-ipa-vowel-chart

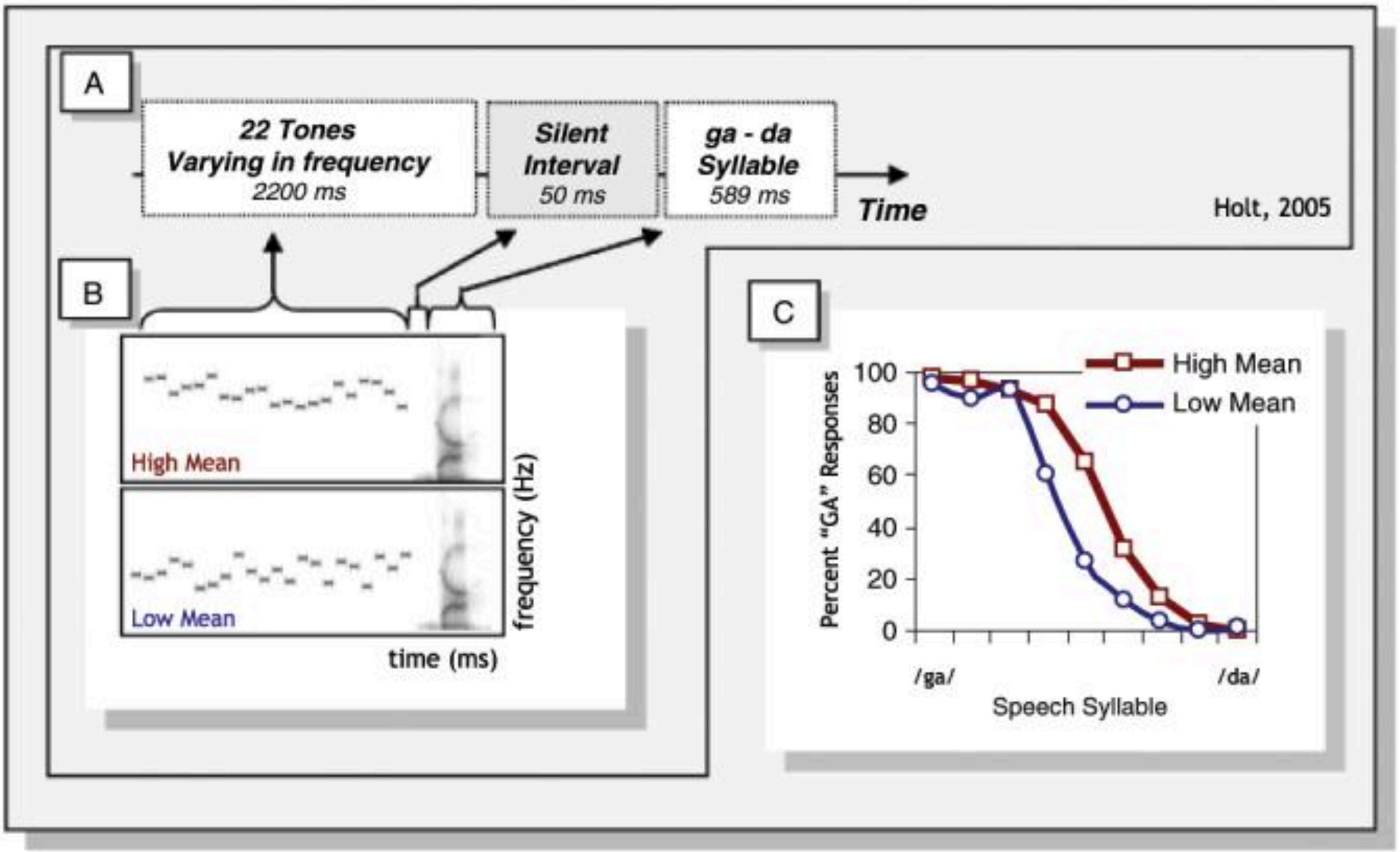
GRETCHEN MCCULLOCH, INTERNET LINGUIST

PREVIEW: VOWELS OF THE WORLD



https://www.internationalphoneticassociation.org/content/ipa-vowels

BEYOND SPEECH: GENERAL CONTEXT EFFECTS



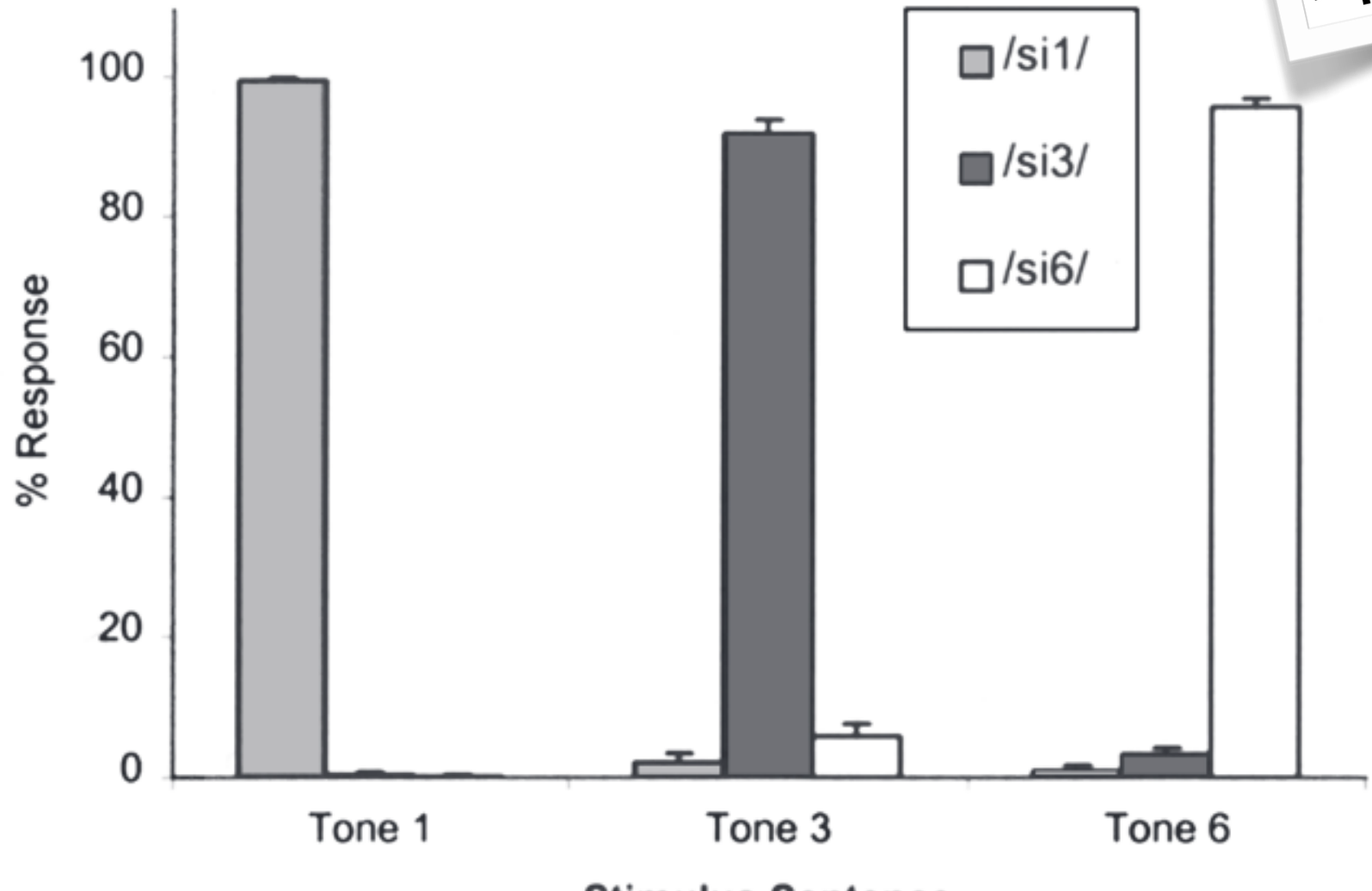
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2593873/

CANTONESE TONE PERCEPTION: WONG & DIEHL (2003)

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.110.9606&rep=rep1&type=pdf

Figure 2. Identification responses in Experiment 2 (tone identification with a precursor sentence). Target tones in the Tone 1, Tone 3, and Tone 6 stimulus sentences were mostly identified as /si1/, /si3/, and /si6/, respectively.

We could try to replicate this in Praat!



ABSOLUTE PITCH

HOMEWORK (BESIDES PATEL EXCERPT)

Pitch discrimination test:

http://musicianbrain.com/pitchtest/

Absolute pitch test:

http://musicianbrain.com/aptest/

ABSOLUTE PITCH IN TONAL/NON-TONAL LAS

Absolute Pitch in Speakers of Tonal Languages versus Nontonal Languages
by Ayden Moczydlowski - Monday, February 12, 2018, 11:58 PM

It is interesting that speakers of tonal languages have better absolute pitch, considering how their tones are different due to comparison rather than due to consistant pitch between speakers. In this way, one might think that speakers of tonal languages might have better skill with musical intervals than with absolute pitch.

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STABILITY IN PITCH OF WORDS IN TONAL LANGUAGES

Across Sessions						
□	5	4	4	0	1	1
◇	5	5	3	1	1	0
Within Sessions						
○	5	4	6	0	0	0
×	6	4	3	1	1	0
	0-.25	.25-.5	.5-.75	.75-1.0	1.0-1.25	1.25-1.5

PITCH DIFFERENCE
(FRACTIONS OF A SEMITONE)

□ **First reading; Day 1 vs. Day2**
◇ **Second reading; Day 1 vs. Day 2**
○ **First vs. Second Reading; Day 1**
× **First vs. second reading; Day 2**

Table 1. Pitch difference scores produced by native speakers of Mandarin on reading out the same list of Mandarin words on different occasions. The table displays, for each comparison, the number of subjects whose pitch difference scores fell into each 0.25 semitone bin.

http://deutsch.ucsd.edu/psychology/pages.php?i=215

AP IN TONE VS. NON-TONAL LANGUAGE SPEAKERS

recognizing pitch

by Megan Schelb - Monday, February 12, 2018, 10:41 PM

I think the study which tested the recognition of pitch given to Chinese and American groups was really interesting. Since the Chinese participants used a tone language, their musical training meant more. So, 60% of Chinese musicians showed advanced placement whereas only 14% of English musicians showed advanced placement. I think that this is really interesting. It is almost as if using a tone language primed the person to better absorb pitch information in music.

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http://deutsch.ucsd.edu/psychology/pages.php?i=215

DEUTSCH ET AL. (2005)

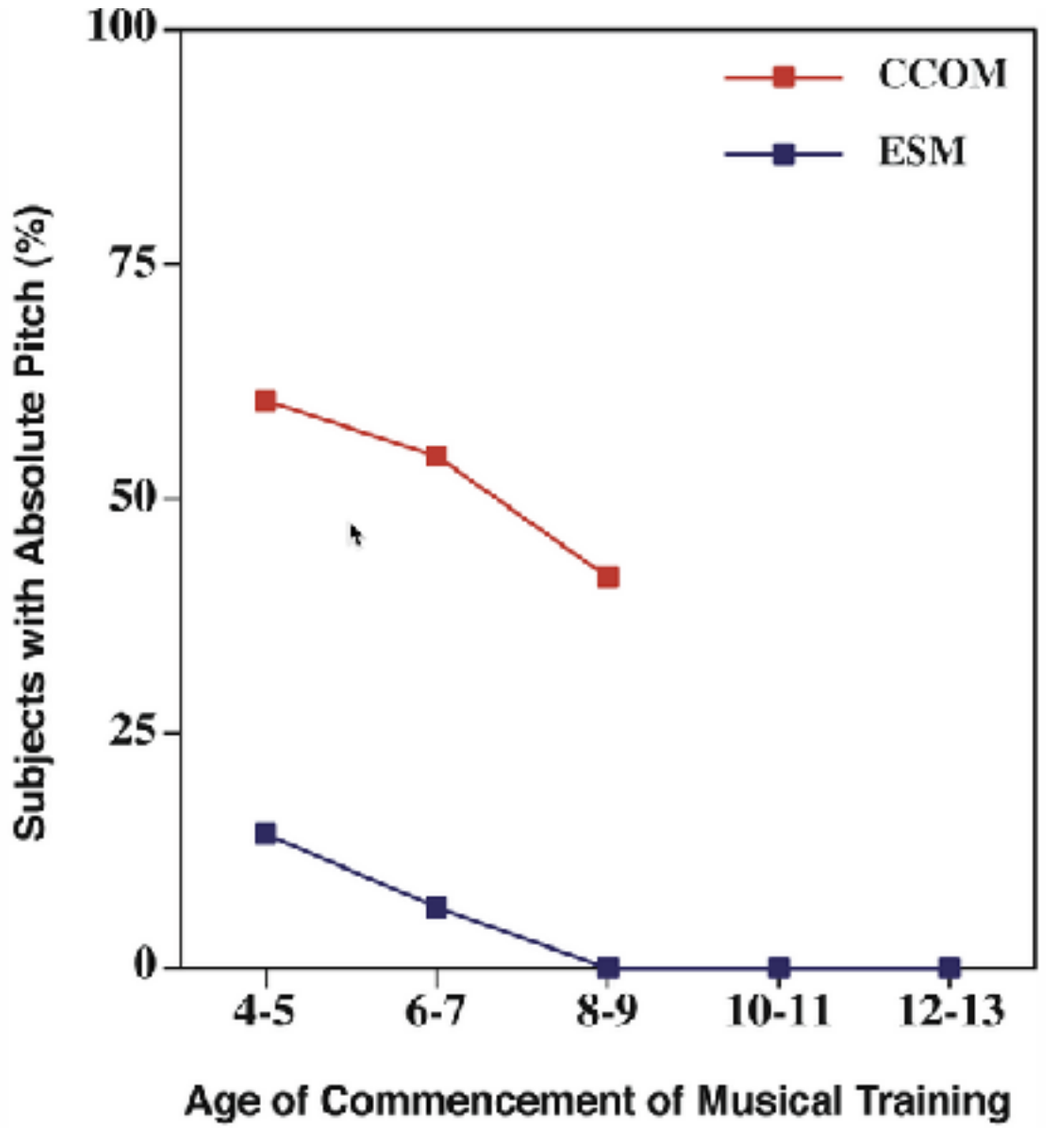

Figure 2. Percentages of subjects who obtained a score of at least 85% correct on the test for absolute pitch. CCOM: students at the Central Conservatory of Music, Beijing, China; all speakers of Mandarin. ESM: students at Eastman School of Music, Rochester, New York; all nontone language speakers.

http://deutsch.ucsd.edu/pdf/JASA-2006_119_719-722.pdf

DEVELOPING PITCH/TONAL ABILITIES

Perfect Pitch

by Emmett Vorspan-Stein - Monday, February 12, 2018, 11:00 PM

I previously knew that tonal language communities have a higher incidence of perfect pitch, but I did not realize the difference was so drastic. I'd be very interested to learn at what age perfect pitch develops within tonal language speakers who also play instruments, and specifically if adult speakers of tonal and non-tonal languages who display perfect pitch tend to develop it in the same general time window.

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DEVELOPING PITCH/TONAL ABILITIES

Pitch labelling can be trained more successfully in children than in adults. With one week of training, adults learned to attach a label to a *single* tone and to produce or identify that tone well above chance [43]. Children of 5–6 years of age and adults were similarly trained for single-tone AP [44], and the accuracy of the 5–6 year-old group far exceeded that of the adult group and a group of younger children, strongly supporting the critical period hypothesis, at least for single-tone acquisition.

Levitin and Rogers (2005) review of absolute pitch

https://www.sciencedirect.com/science/article/pii/S1364661304002943

AGE OF ONSET OF MUSICAL TRAINING

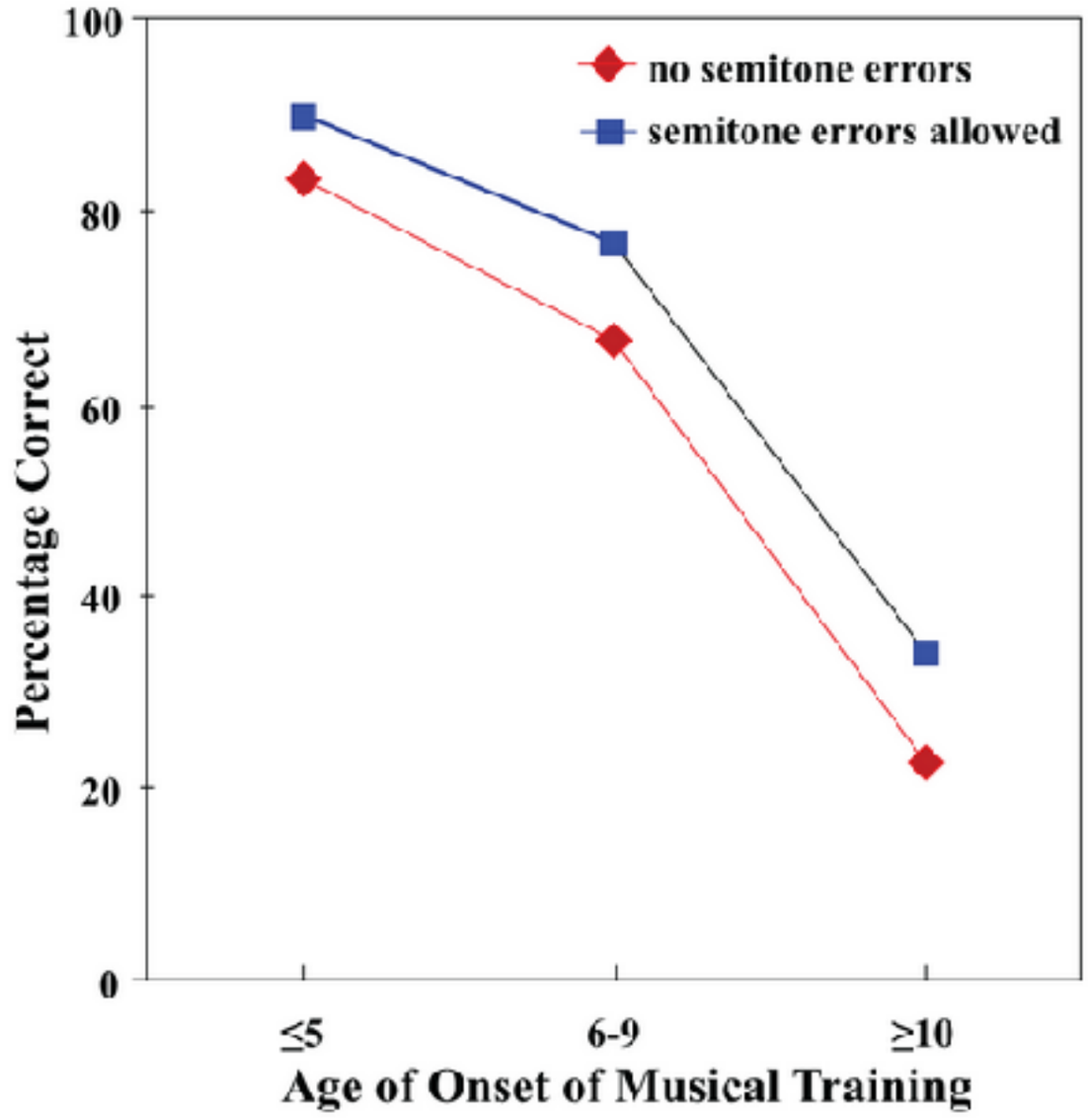

Figure 4. Average percentage correct on the test for absolute pitch among students at the Shanghai Conservatory of Music.

http://deutsch.ucsd.edu/psychology/pages.php?i=215

MUSICAL EXPERIENCE AND LANGUAGE LEARNING

Linguistic and Musical Tones

by Chin Wah Yip - Monday, February 12, 2018, 5:12 PM

Maddieson's investigation on tone spacing, such as the minimum interval of level tones is between 1 and 2 semitones, is very interesting to me since I have never seen linguistic tones in a musical way although I speak a tonal language since I was born and had music training for a long time. This also reminds me of a video in which a Cantonese speaker is trying to teach Cantonese tones with a piano, replacing different tones with musical notes (whole tone and grace notes). This makes me wonder, can learners learn tone languages better with the help of music intervals?

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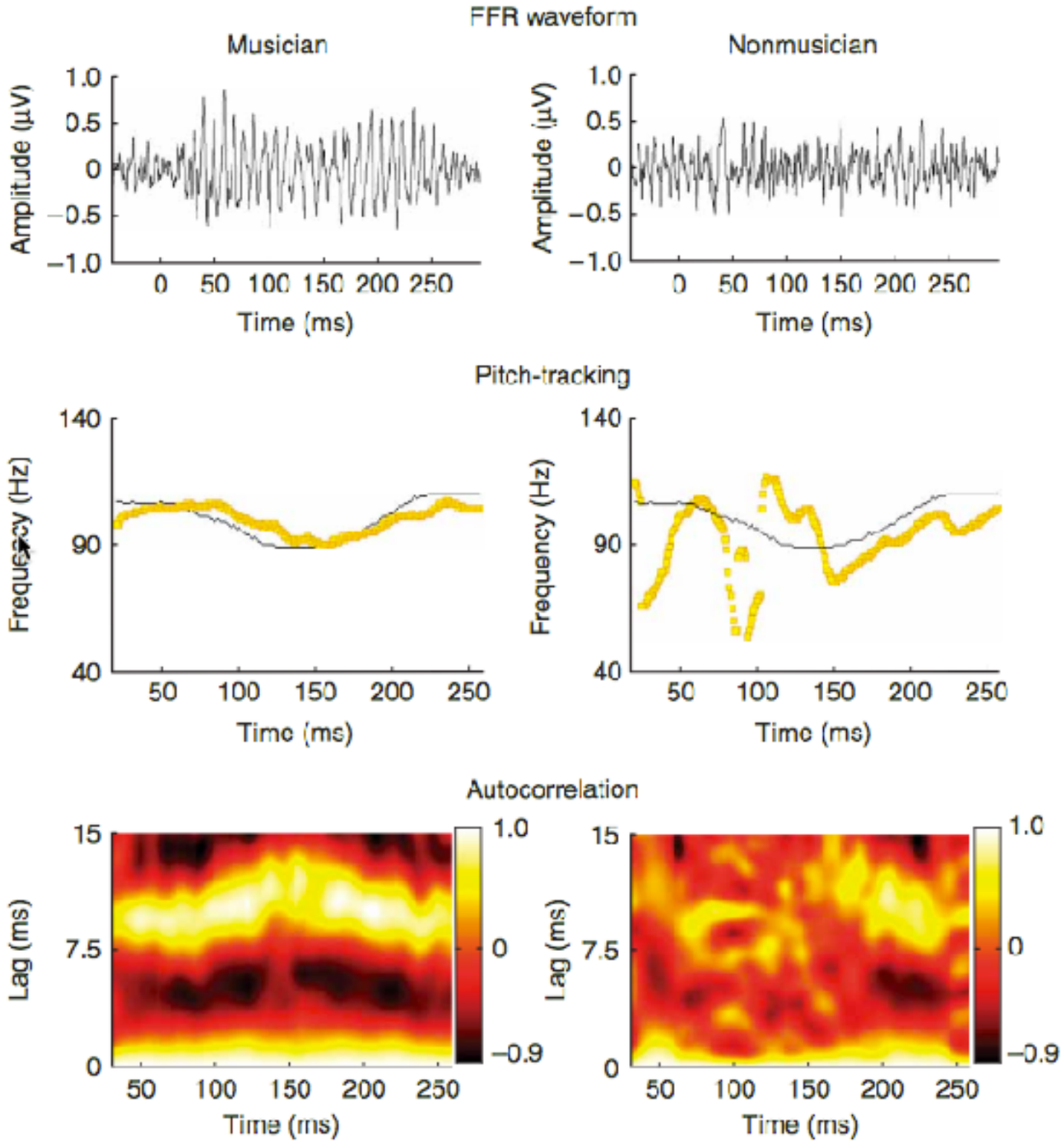
MUSICAL EXPERIENCE "TUNES" AUDITORY SYSTEM



http://www.brainvolts.northwestern.edu/documents/WongetalNatureNeurosci2007.pdf