Poznański Festiwal
Nauki i Sztuki

Exploring linguistic diversity through sounds of the world's languages

Badanie różnorodności językowej w dźwiękach języków świata

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QR code to the presentation slides


NOWNESS
Jul'Hoansi


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Clicks

Mlaski

Glottal stops

Głoski krtaniowe


WILLIAM & HARRY
ON DIANA


WILLIAM & HARRY
ON DIANA

What is speech?

Czym jest mowa?

I. What is speech?

- Speech refers to the acoustic signal that humans produce using the vocal tract.

- Speech consists of systematic or categorical changes in the fluctuations of air particles, which are perceived by humans as sequences of sounds.

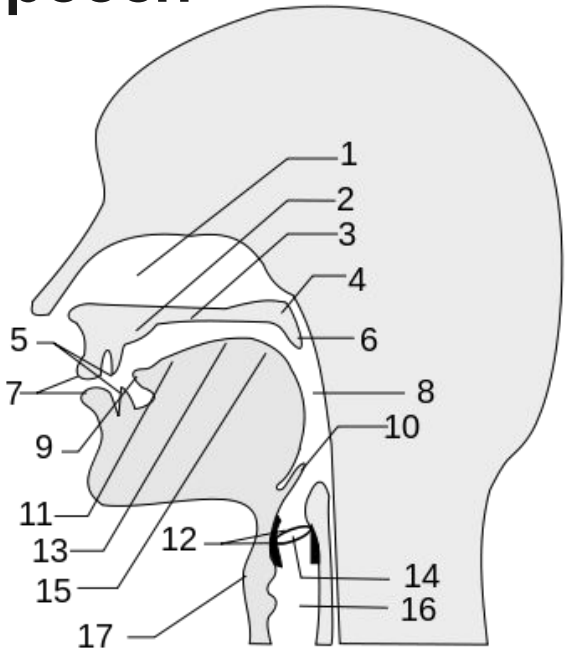
- A sound is the smallest meaningful unit produced by humans during speech.
  - ‘cat’ vs ‘hat’ (k] is a sound, and [h] is a sound in English)
  - Interactive International Phonetic Alphabet

I. What is speech?

- Speech usually communicates meaning, but not always
    - “colorless green ideas sleep furiously.” - Noam Chomsky 1957
        - (meaningful words, but not meaningful sentence)
    - Simlish (sounds like English speech, but contains non-meaningful words)

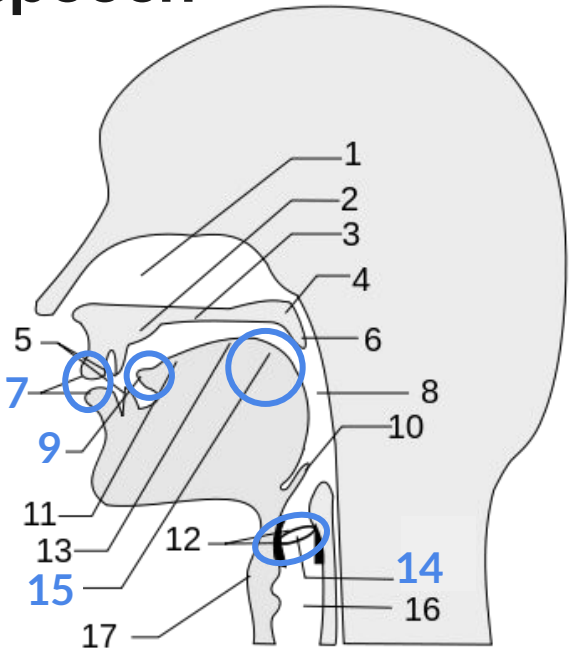
II. The beautiful architecture of speech

- There are many active and passive articulators which are used to produce sounds in human language
- What are some body parts (articulators) that we use to produce speech?



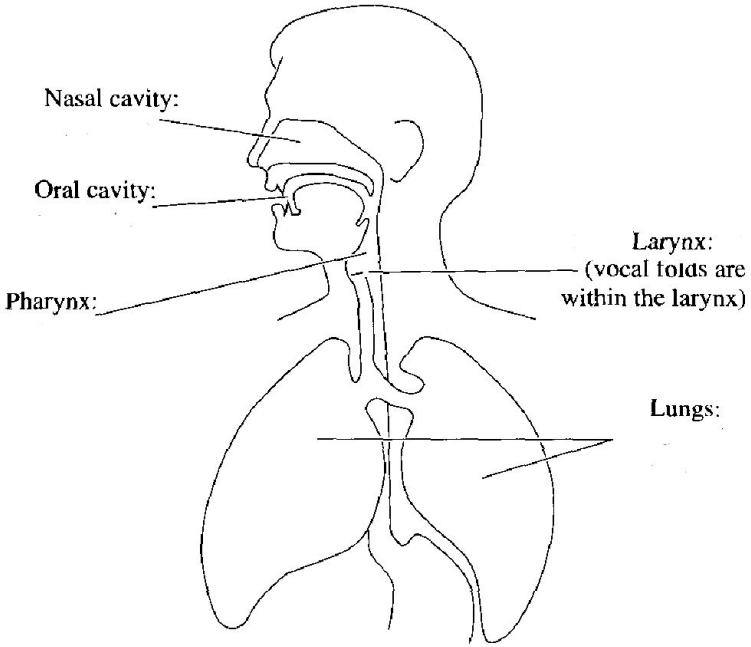
II. The beautiful architecture of speech

1. Nasal cavity
2. Alveolar ridge
3. Hard palate
4. Velum
5. Teeth
6. Uvula
7. Lips
8. Pharynx
9. Tongue tip
10. Epiglottis
11. Tongue blade
12. Larynx
13. Tongue body
14. Glottis
15. Dorsum **(back of the tongue)**
16. Subglottis



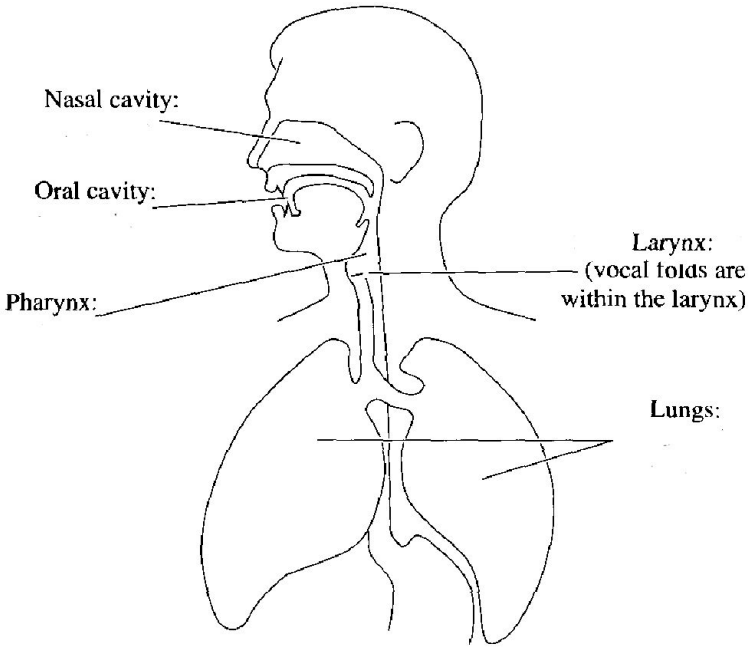
II. The beautiful architecture of speech

- How is speech produced?



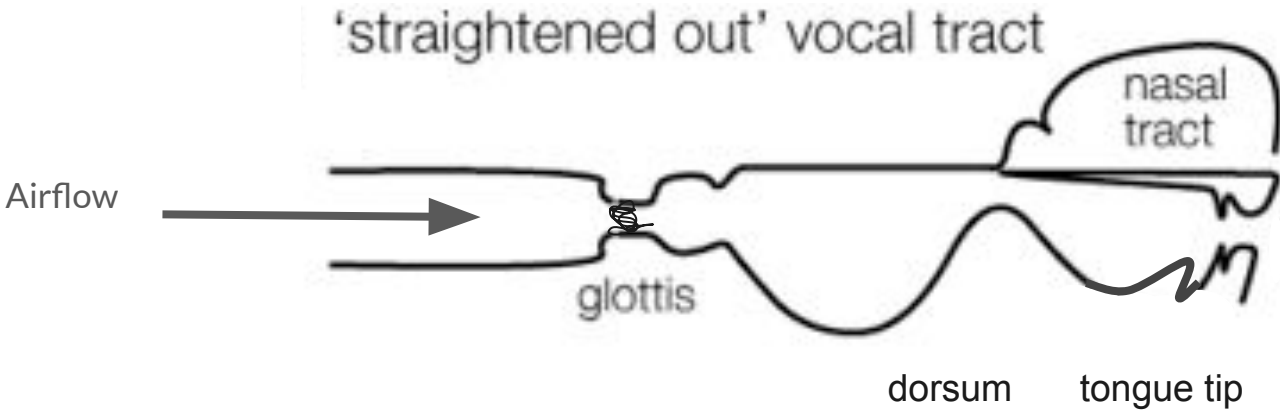
II. The beautiful architecture of speech

- Most speech produced by humans is the result of air being pushed outward from the lungs
- But as we will see during this talk, not all sounds of human language are produced using the lungs.



II. The beautiful architecture of speech

- If we visualise the vocal tract as a tube, or as a musical instrument, the air goes in from the left side, and can be constricted at multiple points on its way
    - Primary constrictors of airflow include the glottis, tongue, velum, lips



II. The beautiful architecture of speech

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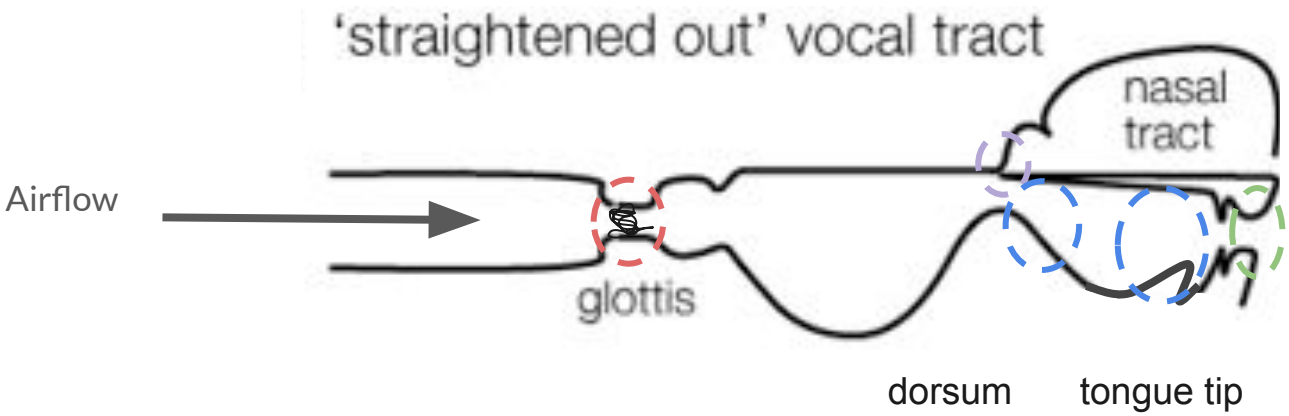
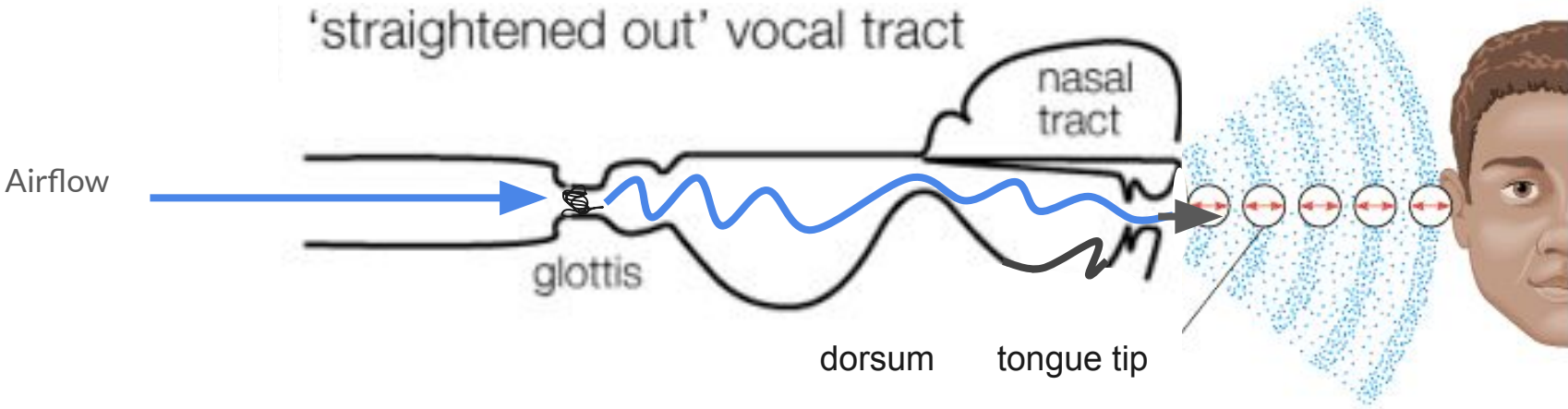


II. The beautiful architecture of speech

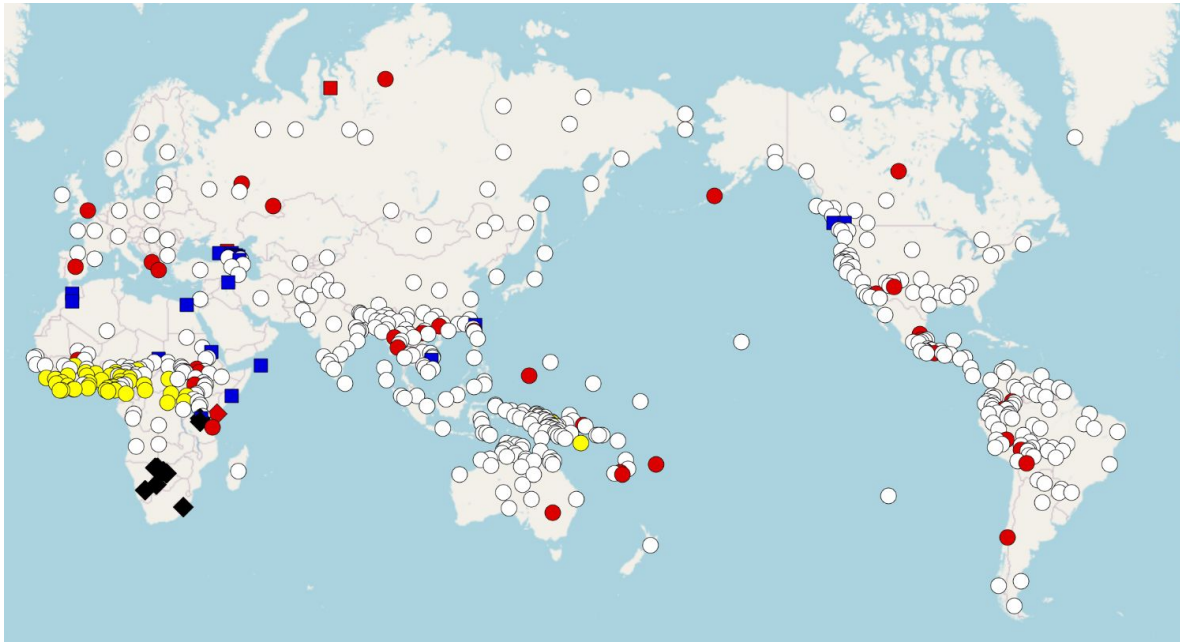
- The air flows through the glottis and is affected by the shape of the vocal tract, resulting in changes in air pressure that we then recognize as speech sounds



Exotic sounds

Rzadkie dźwięki

Uncommon consonants in languages across the world

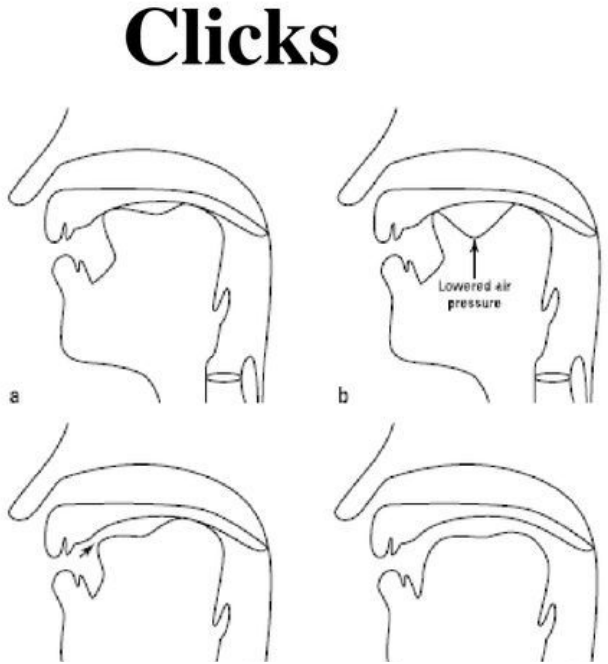


World Atlas of Language Structures

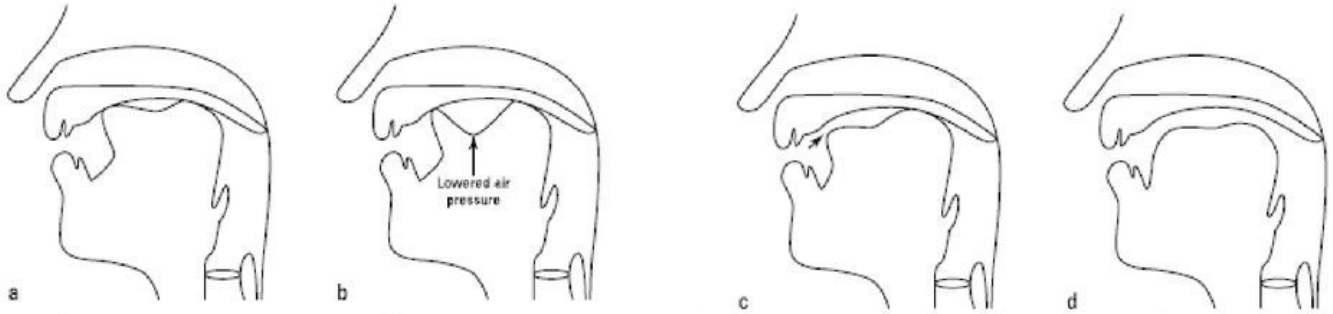
III. Clicks (Xhosa & Zulu)

- click sounds, are produced without the lungs (meaning you can breathe through the nose while you produce them)

- Nama
- !Xhosa
- Zulu



III. Clicks (Xhosa & Zulu)




Denim

III. Production Exercise: Clicks

ʘ - bilabial click

[1:13-1:29] (split into 3)

III. Production Exercise: Clicks

ǀ - dental click

[01:29-1:49]

III. Production Exercise: Clicks

|| - lateral click

[1:50-2:05]

III. Glottal Stop (English, Arabic, Hawaiian)

- Sounds that stop the airflow at the glottis are also used in many languages
- Glottal stops are essential for producing other exotic sounds
  a. Implosives (Thai)
  b. Ejectives (peruvian languages e.g. Quechua)

- Uh-oh; bottle (UK), turtle, “get me a drink would ya”
- American English (glottal stop) [?] (Pop science inspiration 0:30-5:20)

Exercise 2: Glottal Stop Production

great	[greɪʔ]
quiet	[kwaɪəʔ]
my seat	[maɪsiːʔ]
put it on a pot	[pʊʔɪʔɔnəpɒʔ]
find out	[faɪndaʊʔ]
that arm anyway or	[ðæʔɑːmeniweɪəsʌmθɪŋlaɪ
something like that	kðæʔ]
day	/deɪ/
um but	[ʌmbəʔ]
not just	[nɒʔdʒəstˀ]
be	/biː/
my seat	[maɪsiːʔ]
I hate to say it	[aɪheɪʔtəseɪəʔ]
different about it	[dɪfrənʔəbaʊʈɪʔ]

great

[greɪt] vs. [greɪʔ]

my seat

[maɪsiːt] vs. [maɪsiːʔ]

quiet

[kwaɪət] vs. [kwaɪəʔ]

um but

[ʌmbət] vs. [ʌmbəʔ]

put it on a pot

[pʊtɪtɒnəpɒt] vs. [pʊʔɪʔɒnəpɒʔ]

I hate to say it

[aɪheɪttəseɪɪt] vs. [aɪheɪʔtəseɪɪʔ]

day

[deɪ]

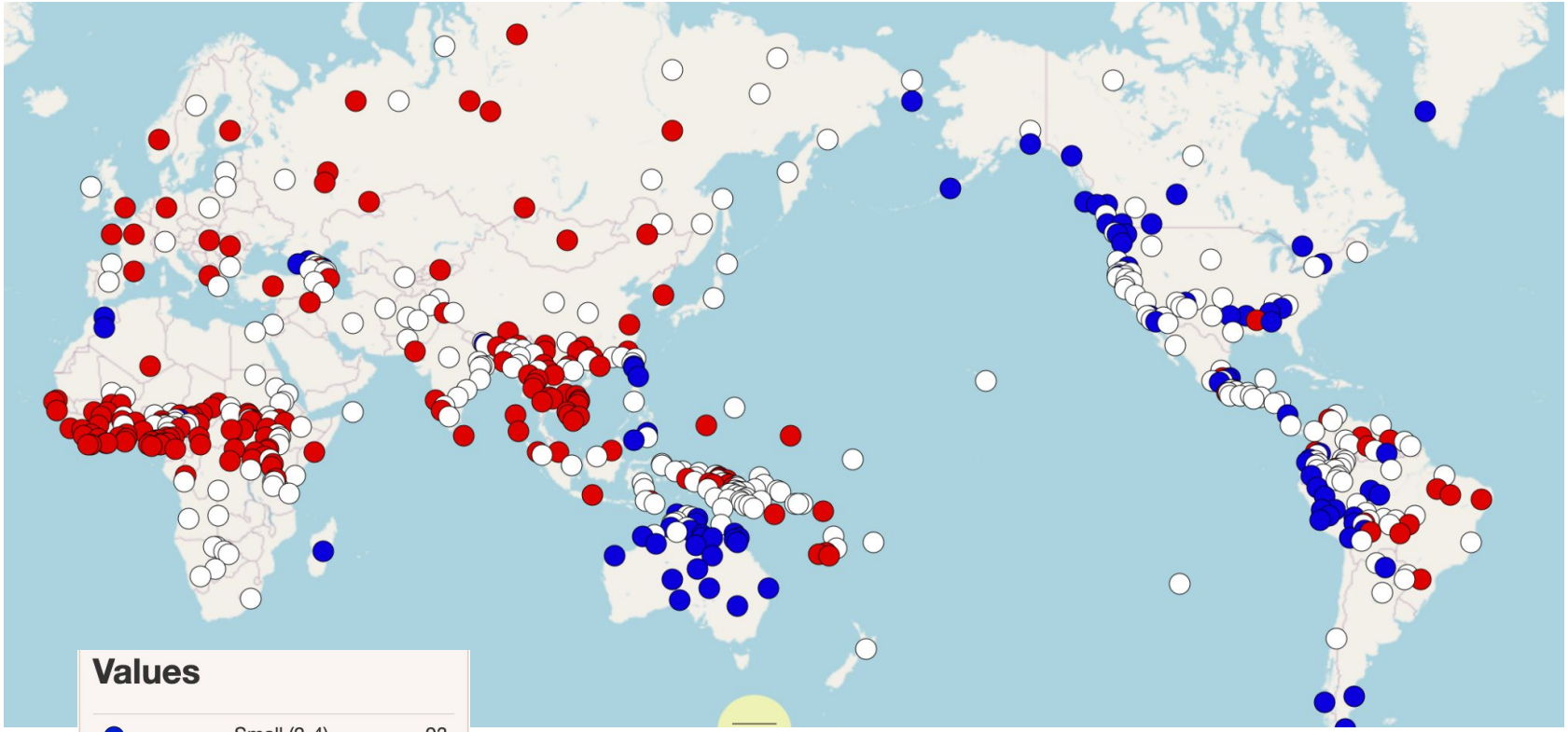
date

[deɪʔ]

Vowels

Samogłoski

Vowel systems of world languages



Vowel Dimensions

- How do vowels differ?

Vowel Dimensions

- i-a (height)

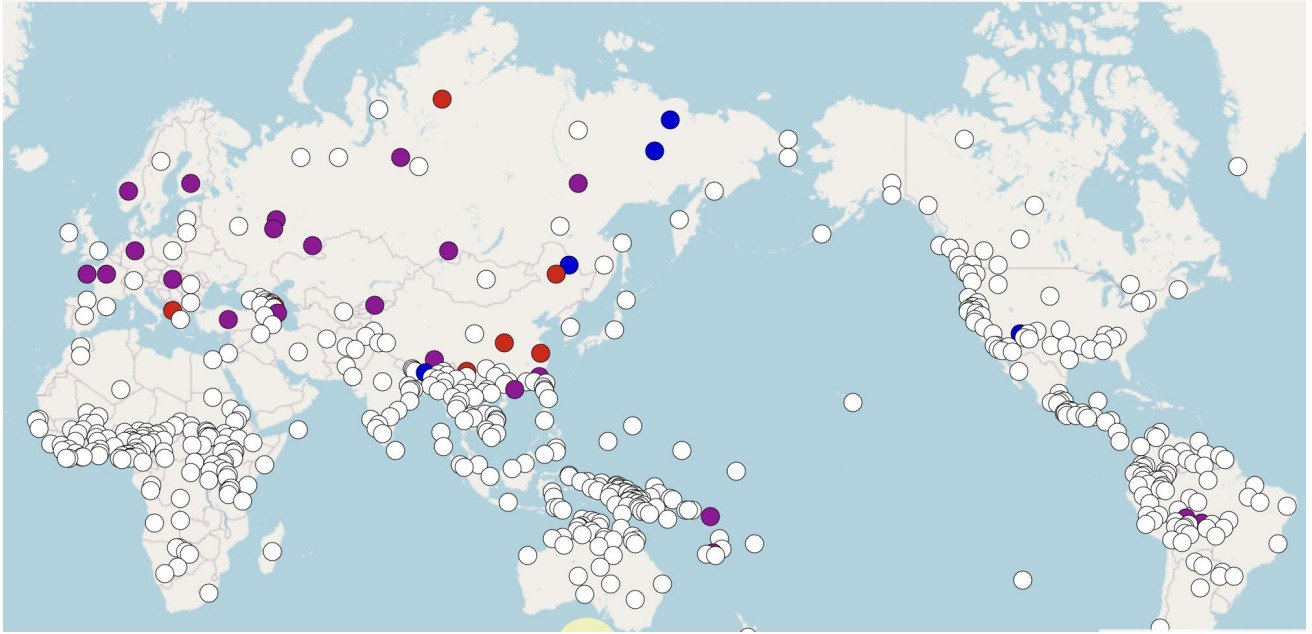
- i-u (rounding and backness)
- i-y (rounding) *(front rounding feature is rare across languages)*

- i-ɯ (backness)
- e - ę (nasality)

Front rounded vowels

Samogłoski przednie zaokrąglone

Distribution of rounded front vowels around the world (Purple)

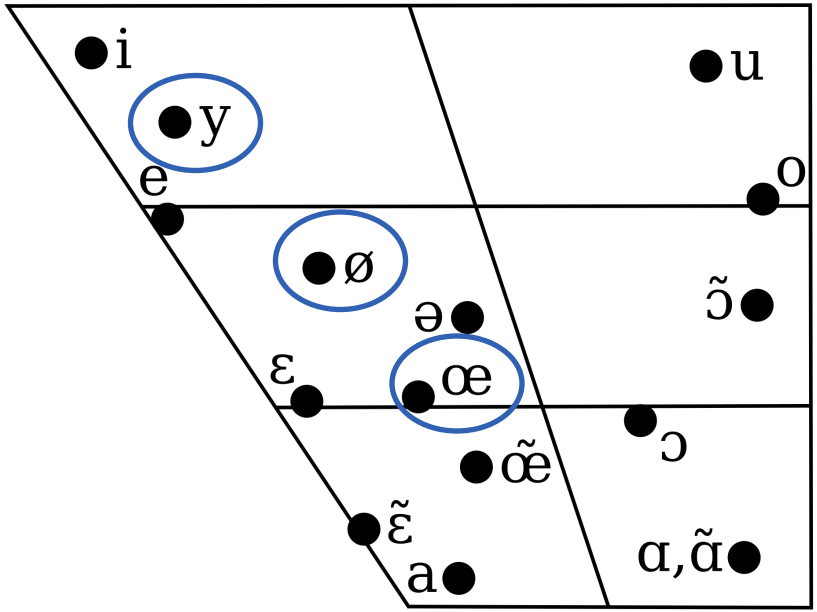


Values

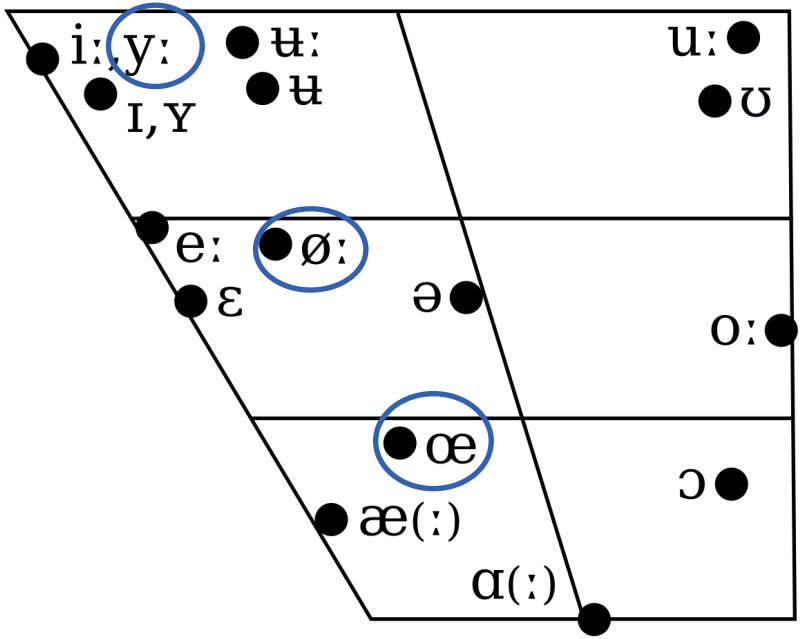
○	None	525
●	High and mid	23
●	High only	8
●	Mid only	6

III. Front Rounded Vowels: French, Norwegian (German)

French



Norwegian



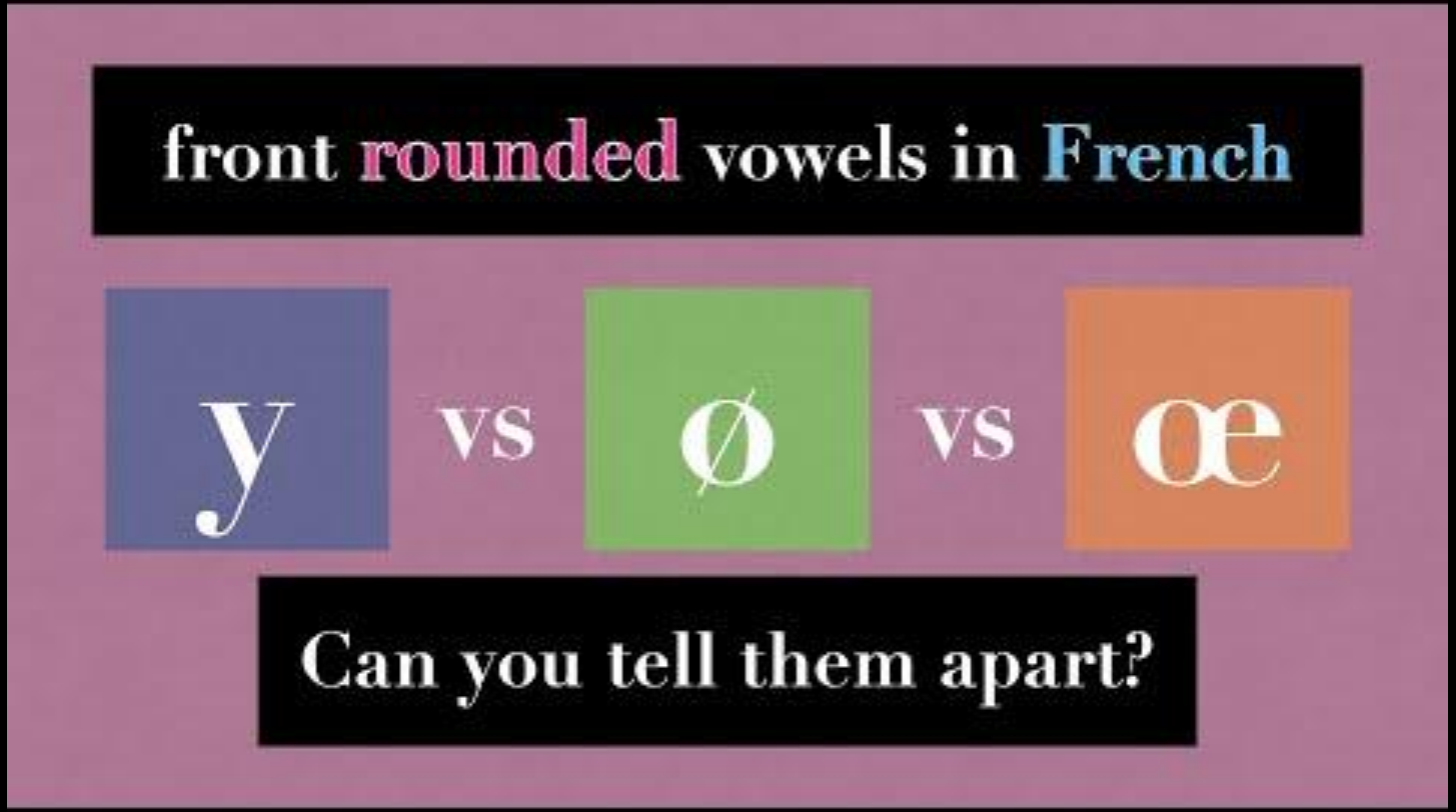
Production Exercise: Front Rounded Vowels

- Step 1 (Height):
  - Say [i]
  - i-y-ej-e-(æ)-a

- Step 2 (Rounding):
  - Say [i]
  - Smile
  - Round your lips (make a circle with your lips while saying [i])
  - Smile
  - Round lips

- Step 3:
  - Think [i] (position your tongue as if you were going to say [i])
  - Round your lips
  - Say [i] with rounded lips (i.e. [y])

III. Perception Exercise: Front Rounded Vowels



Our research

Nasze badania

NCN and GRIEG projects

- Cross-linguistic influence in multilingualism across domains: Phonology and syntax (**CLIMAD**)
- Across-domain investigations in multilingualism: Modeling L3 acquisition in diverse settings (**ADIM**)

Methods

- **Participant profile measures**

–background questionnaire, language learning history, proficiency measures

- **Morpho-syntactic experiments**

–grammaticality judgement tasks

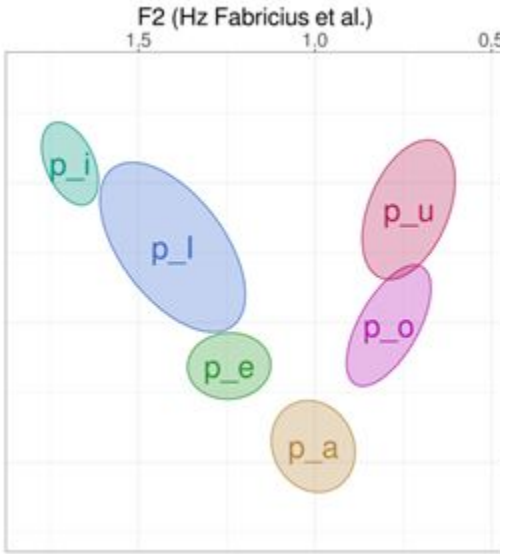
- **Phonetic/phonological experiments**

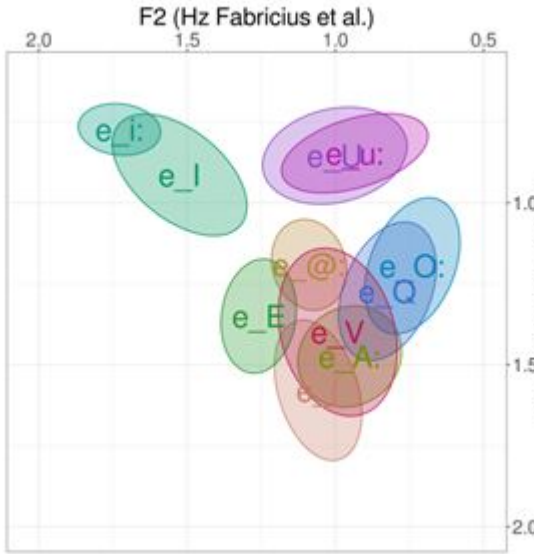
–production and perception tests

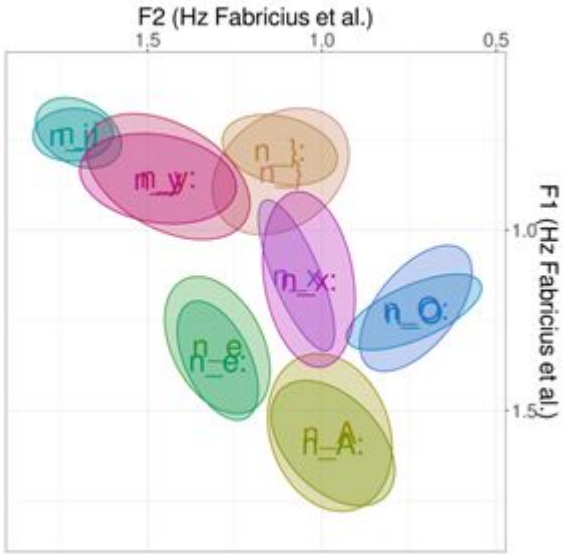
- **On-line methods of brain imaging (EEG)**

–event related potentials (ERPs) to analyze brain activity related to automatic processes involved in language processing

Results: vowels in L1 Polish, L2 English, L3 Norwegian







Conclusions

Multilingual learners tend to keep their vocalic systems apart

- language-specific phonological categories in L3
- L2 less stable, subject to variability

There are interactions between the three vocalic subsystems in multilinguals

- prevailingly L1->L3, but some L2->L3

Different factors condition interactions between pairs of adjacent vowels

- main predictor - intensity of use

Conclusions

- Multilingualism is a norm, not an exception
- Multilingualism is a spectrum
- Multilingualism is a dynamic process
- A multilingual person:

– is not a sum of monolinguals;

– it is a synergy that creates a new linguistic quality

Dziękujemy!
Thank you!
Takk!

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Extras

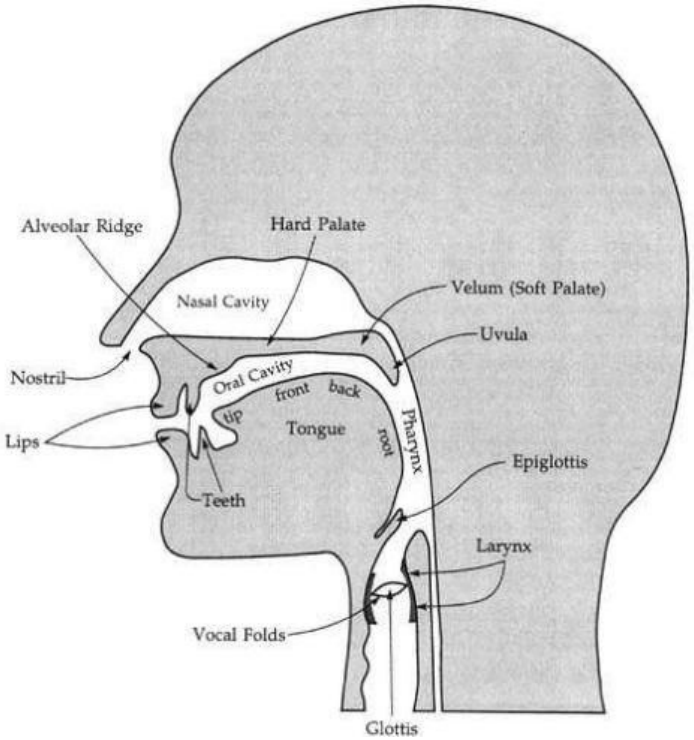
Extrasy

Exercise 2

In one single moment your whole life can turn 'round
I stand there for a minute staring straight into the ground
Looking to the left slightly, then lookin’ back down
World feels like it’s caved in – proper sorry frown
Please let me show you where we could only just be, for us
I can change and I can grow or we could adjust
The wicked thing about us is we always have trust
We can even have an open relationship, if you must
I look at her she stares almost straight back at me
But her eyes glaze over like she’s lookin’ straight through me
Then her eyes must have closed for what seems an eternity
When they open up she’s lookin’ down at her feet
So then I move my hand up from down by my side
It's shakin’, my life is crashing before my eyes
Turn the palm of my hand up to face the skies
Touch the bottom of her chin and let out a sigh
‘Cause I can’t imagine my life without you and me
There’s things I can’t imagine doin’, things I can’t imagine seeing
It weren't supposed to be easy, surely
Please, please, I beg you please
She brings her hands up towards where my hands rested
She wraps her fingers round mine with the softness she’s blessed with
She peels away my fingers, looks at me and then gestures
By pushin’ my hand away to my chest, from hers

The beautiful architecture of speech

There are many active and passive articulators which are used to produce sounds in human language

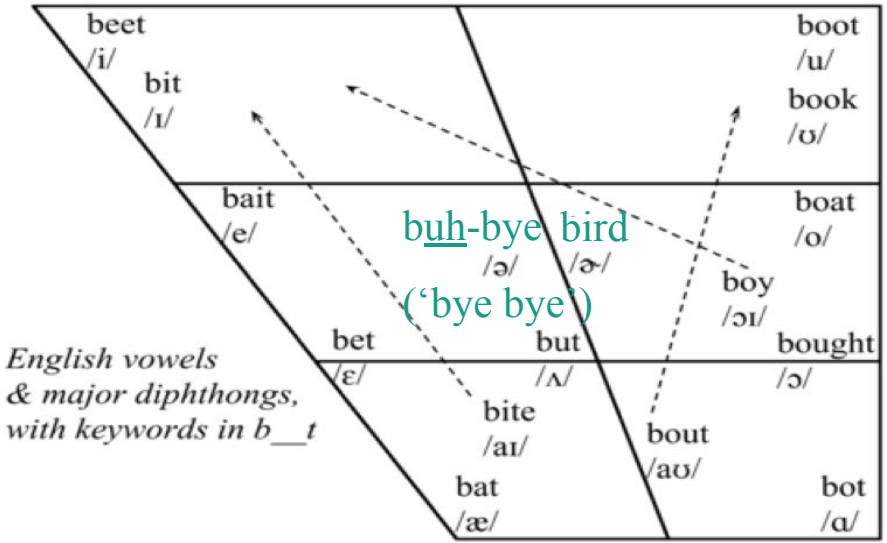


The English glottal Stop and unreleased [t] with Hadar

- 0:30-5:20

Brief Description of English and Polish vowels

English



Polish