



NOC

ANGLIS TÓW

EXPLORING MULTILINGUALISM: YOUNG RESEARCHER'S TOOLKIT FOR INVESTIGATING SPEECH, PERCEPTION, THE BRAIN, AND SOCIETY

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How many languages are spoken in the world?

Nobody has responded yet.

Hang tight! Responses are coming in.



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What percentage of the world's population is multilingual?

Nobody has responded yet.

Hang tight! Responses are coming in.



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Are you multilingual?

0%



(A)

Yes

0%



(B)

No



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What does it mean to be multilingual? Choose the best definition

modifying linguistic practices varying in degree, function, alternation, and interference



0%

Bilingualism is the regular use of two or more languages (or dialects) in everyday

Multilingualism

- 43% of world population is bilingual, 17% of people are multilingual
- There are 7168 language in the world
- However, one language becomes extinct every two-three weeks

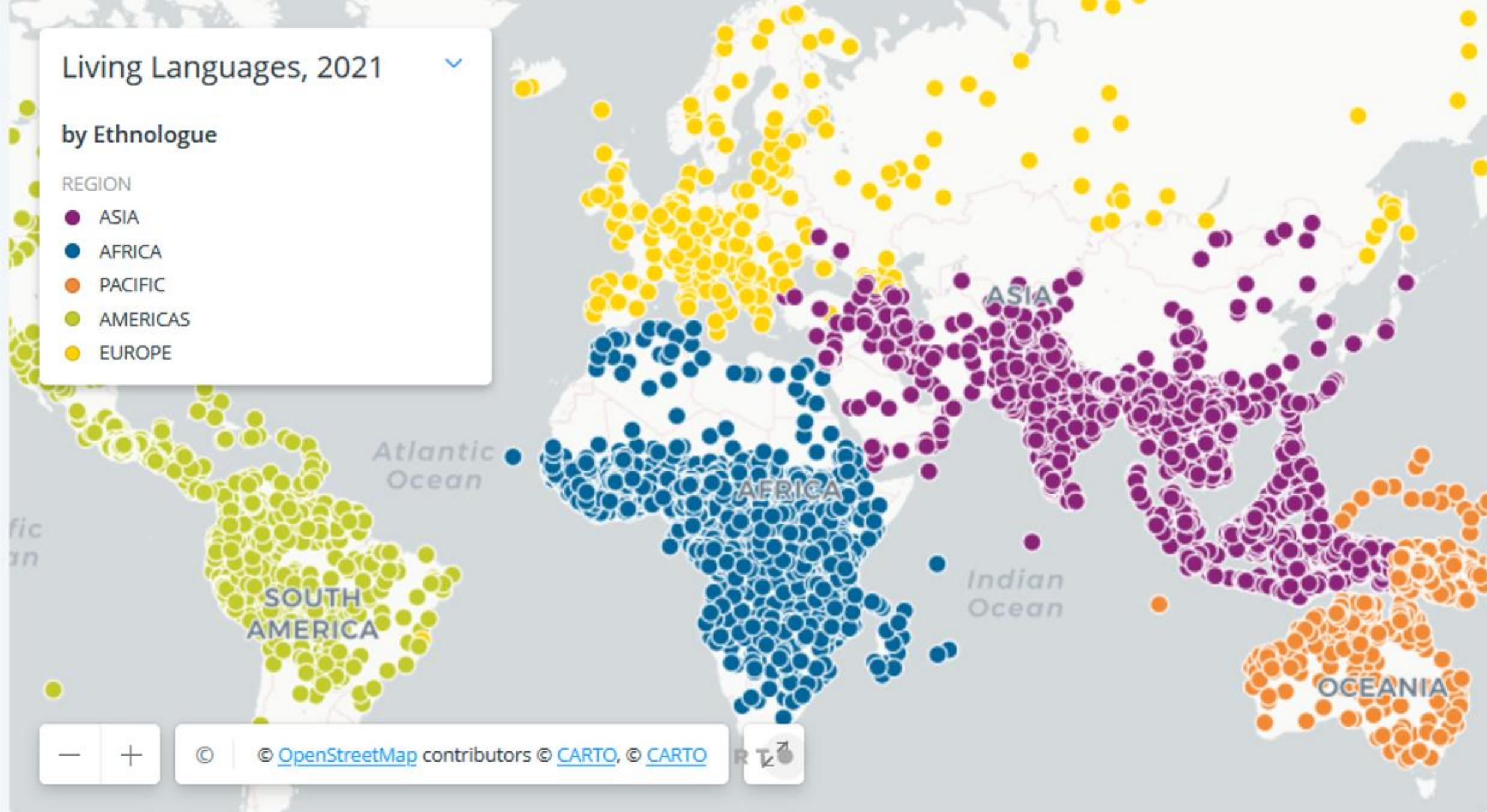


Living Languages, 2021

by Ethnologue

REGION

- ASIA
- AFRICA
- PACIFIC
- AMERICAS
- EUROPE



Map navigation controls including zoom in (+) and zoom out (-) buttons, a copyright notice for OpenStreetMap contributors and CARTO, and a refresh button.

Defining bi-/multilingualism

Perfect foreign language learning, not accompanied by loss of the native language, it results in bilingualism, nativelike control of two languages

Bloomfield (1933)

Minimal bilingual skill: contact with possible models in a second language; “receptive bilingualism”, “passive knowledge”

Diebold (1961)

The alternate use of two or more languages by the same individual; mutually modifying linguistic practices varying in degree, function, alternation, and interference

Mackey (1962)

Bilingualism is the regular use of two or more languages (or dialects) in everyday life

Grosjean (2008)

Our Projects



Norwegian

- Germanic language
- Spoken by 4.4 million people
- Polish people are the largest minority group in Norway
- Norwegian has got many dialects





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Select the Norwegian translation for "I eat breakfast early".

جاءتني الفطور باكرا

0%

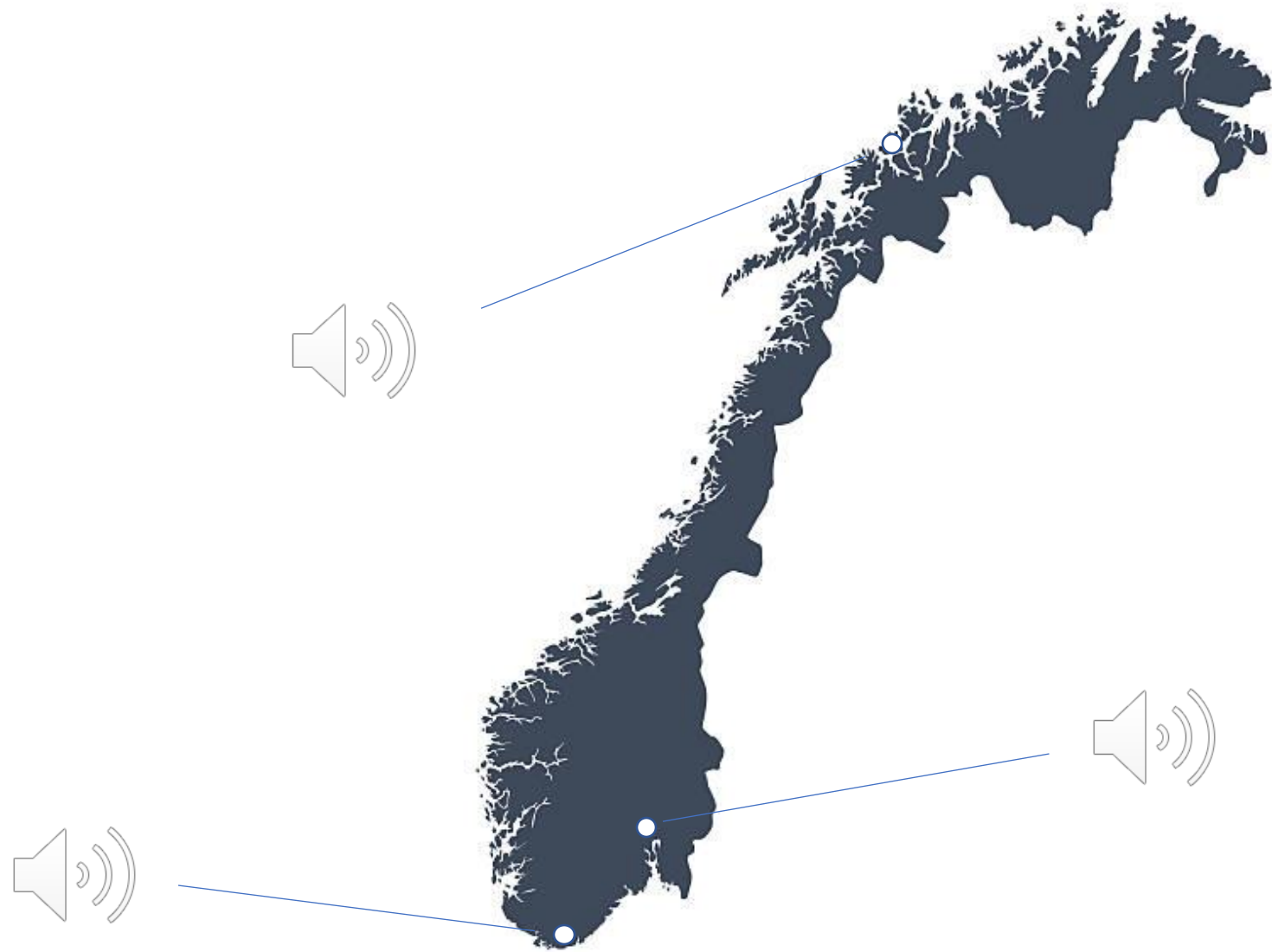
ik yt moarnsbrochje betiid

0%

jag äter frukost tidigt

0%

Norwegian dialects



English

- Spoken as L1 by 370 million speakers
- More than 1 billion L2/L3 users
- Language of the media and culture



Polish

- As many as 50 million speakers worldwide
- Popularly claimed to be one of the hardest languages to learn as L2
- There are dialects in Polish!



How we do our research

- We record people's speech production
- We study people's brain responses (EEG) to language (linguistic) signals
- We measure their perception of sounds, accents and dialects





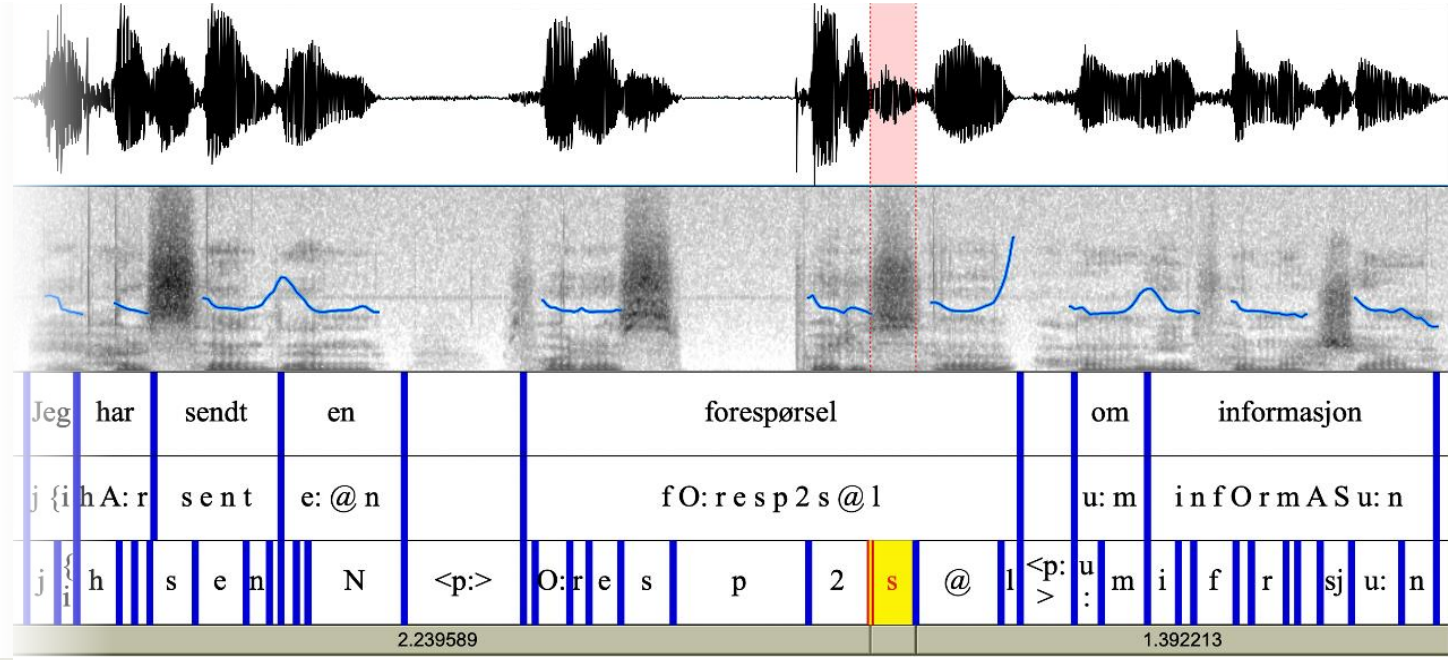
Types of Research

- Speech Production
- Speech Perception
- Language Processing in the Brain
- Language and Society

Speech production

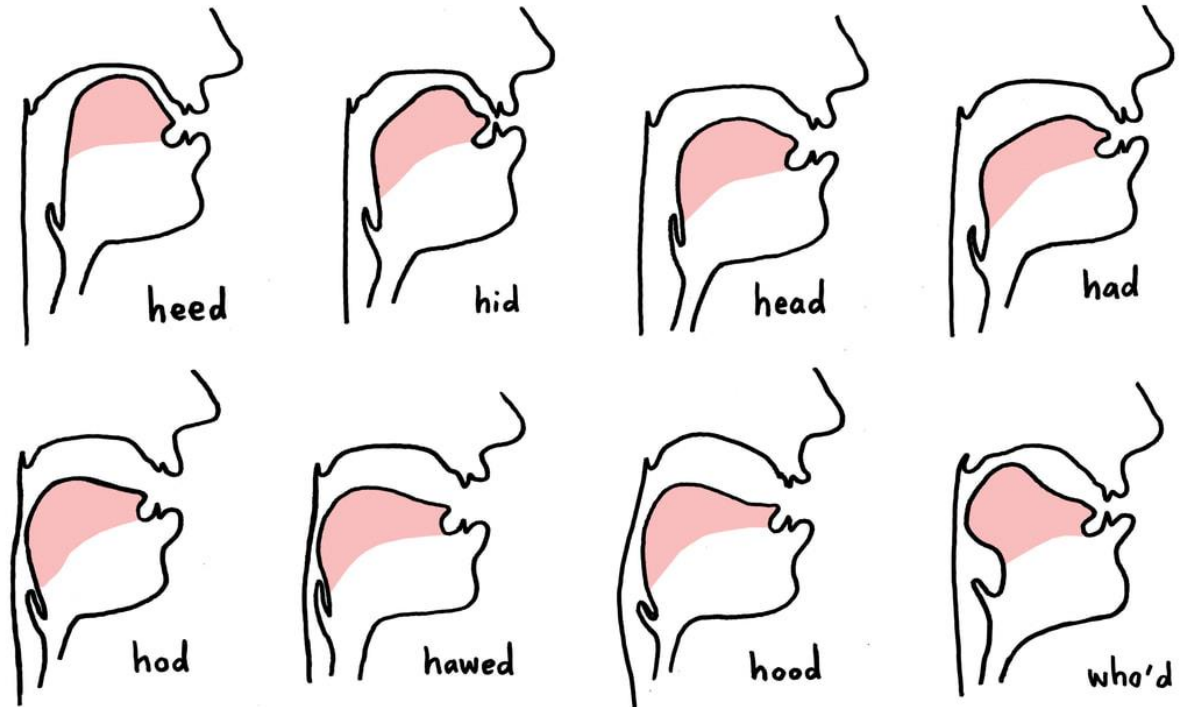


- Every language uses a different set of sounds (phonemes). Learning new languages expands your phonemic inventory
- In the CLIMAD and ADIM projects, we are interested in how learners produce and perceive new sounds in their first language (L1), second language (L2) and third language (L3)



What is speech? And what parts of speech do we investigate?

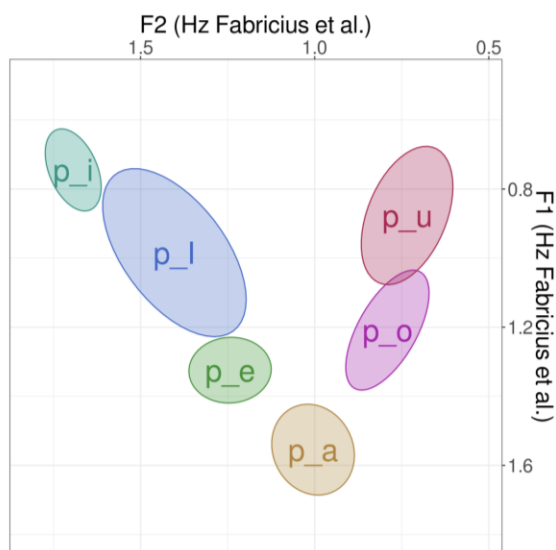
Vowels



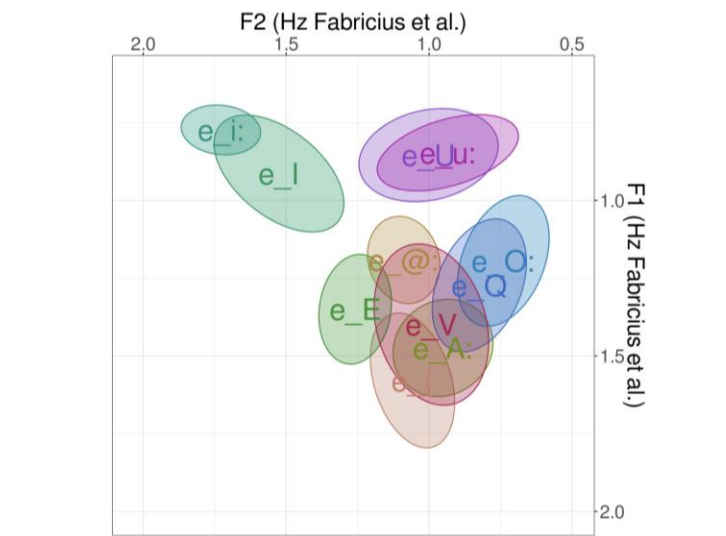
www.voicescienceworks.org

Vowel Distributions

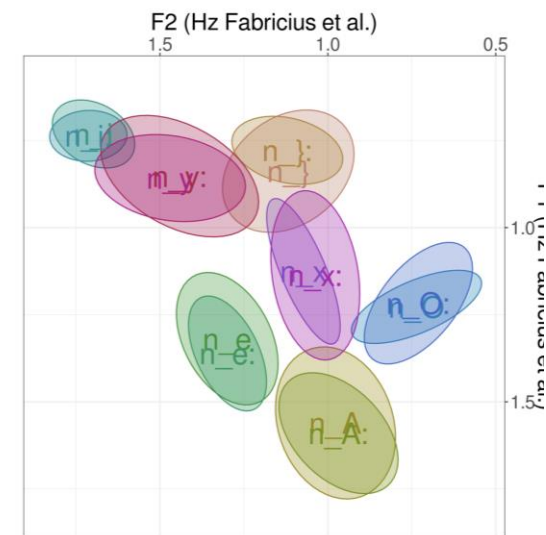
- L1 Polish



- L2 English

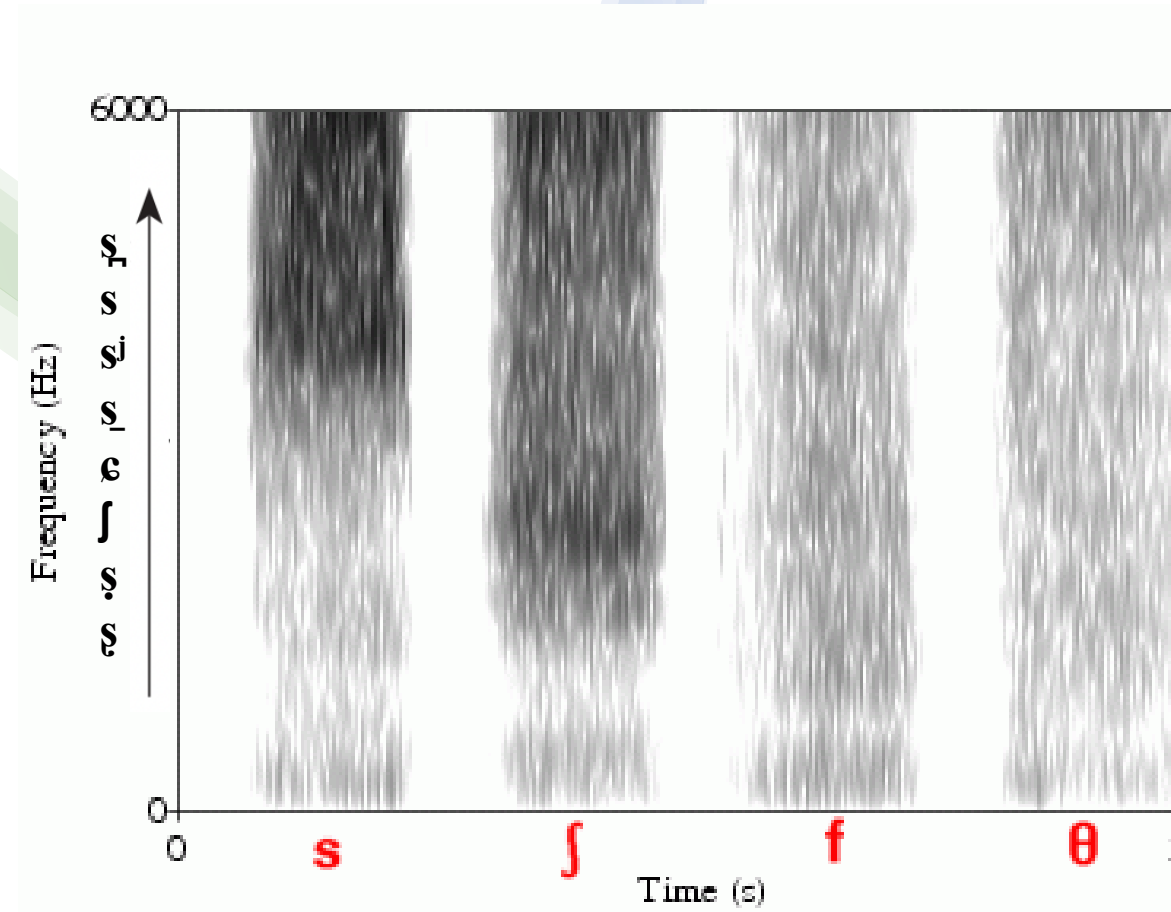


- L3 Norwegian



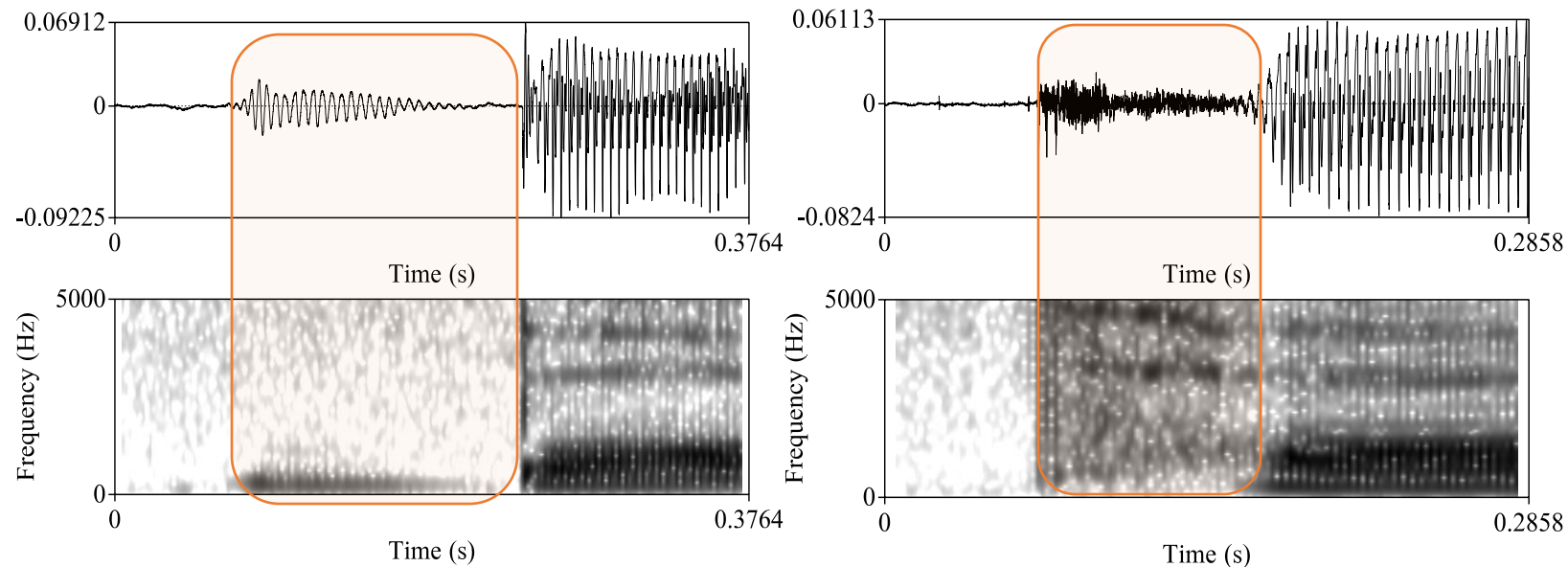
Sibilant Soundssss

- Sibilants are sounds that make a high-pitched hissing noise like a snake or a shushing sound
- Examples:
 - Polish 's', 'sz', 'ś/si'
 - English 's', 'sh'
 - Norwegian 's', 'rs', 'skj', 'sj', 'kj'



Stop Consonants

- /p, t, k, b, d, g/
- Voicing Onset Time (VOT) is a linguistic term that refers to the time interval between the release of a consonant (like /p/, /t/, or /k/) and the onset of vocal cord vibration, which produces the sound of a following vowel
- VOT is often used in the study of phonetics to describe and analyse speech sounds



Speech production research

- How do we record?
- Procedures
- Equipment
- What do we record?
- Tasks:
 - Lists of words, lists of sentences
 - Text reading
 - Picture description
 - Story telling, etc



Speech
Production
(stimuli creation)

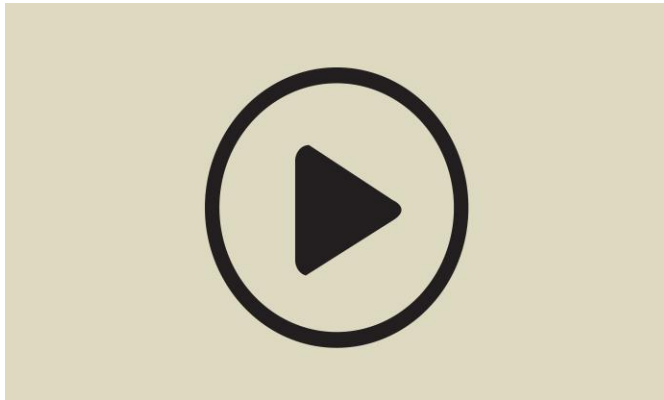
Language	Phoneme	Word	Sentence
PL	s ₁	rys <u>u</u> je	Pisarz rysuje słowami.
PL	sz	mysz <u>y</u>	Sowy słyszą myszy z daleka.
PL	si	prosi	Szofer prosi o klucze do samochodu.
EN	s ₂	viru <u>s</u> es	The doctor sees viruses with the microscope.
EN	sh	fish <u>ing</u>	Our family goes fishing twice a year.
NO	s ₃	le <u>s</u> er	De leser nyheter i sosiale medier.
NO	rs	for <u>s</u> økte	Jeg forsøkte å reparere bilen min selv.
NO	sj	dros <u>j</u> e	Jeg tok en drosje til flyplassen.
NO	skj	tesk <u>j</u> e	Jeg vil ha en teskje sukker i kaffen min.
NO	kj	bek <u>j</u> ente	Jeg traff min gamle bekjente på gaten.

Methodology (Peppa Task)

- Each language mode induced via the Peppa (video watching and retelling) Task in the respective language

L3 Norwegian:

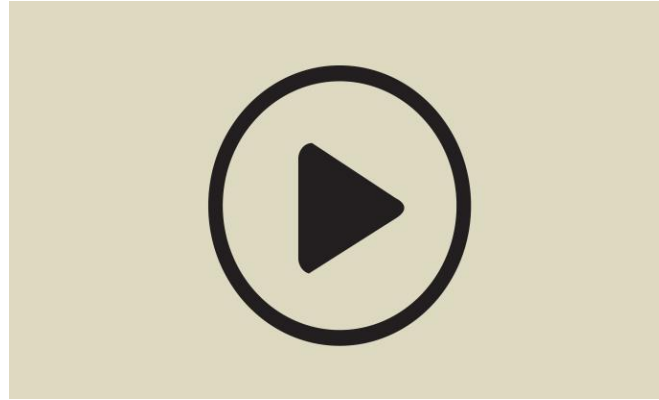
“Se denne korte videoen veldig nøye.”



“Fortell med dine egne ord hva som skjedde i avsnittet du så.”

L2 English:

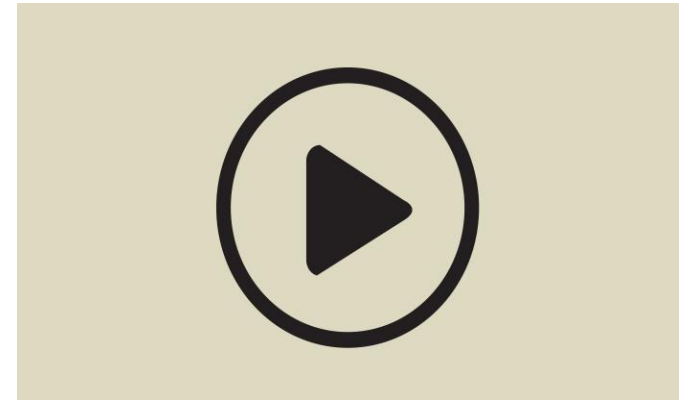
“Watch the movie clip very closely.”



“In your own words, tell us what happened in the video you saw.”

L1 Polish:

“Obejrzyj dokładnie krótki fragment kreskówki.”



“Opowiedz własnymi słowami co wydarzyło się w obejrzanym przez ciebie fragmencie.”



Speech perception

- Speech perception is the process of recognizing and understanding spoken language
- It is the ability to interpret and make sense of the sounds we hear, recognizing words, phrases, and the meaning conveyed through speech
- It's like our brain's special ability to figure out what someone is saying

Rated (DIS-)SIMILARITY TASK: procedure

Participants: experimental trilingual group    & control bilingual group  

Task: grade the perceived similarity between Norwegian and Polish or between Norwegian and English sounds on a 7-point scale.

very dissimilar 1 - 2 - 3 - 4 - 5 - 6 - 7 very similar

Focus on the consonant in the middle.

example NO token 1A



example NO token 2A



example NO token 3A



example NO token 3A



example PL token 1B



example EN token 2B



example PL token 3B





example EN token 4B




DISCRIMINATION TASK IN L3 Norwegian

Categorical Discrimination task (e.g., A1 A2 B1): Which of the words is different?

A1 *garla /ga|ɑ/ 

A2 *garla /ga|ɑ/ 

B1 *gala /gala/ 

Oddity paradigm

All twelve possible combinations were presented randomly over trials within a test

A1A2B1, A1B1A2, B1A1A2, A1B1B2, B1A1B2, B1B2A1

A2A1B1, A2B1A1, B1A2A1, A1B2B1, B2A1B1, B2B1A1

where:

- A1 and A2 – a retroflex embedded in a token read by two different speakers
- B1 and B2 – a non-retroflex embedded in a token read by two different speakers
- each trial consisted of **three tokens read by three different speakers**

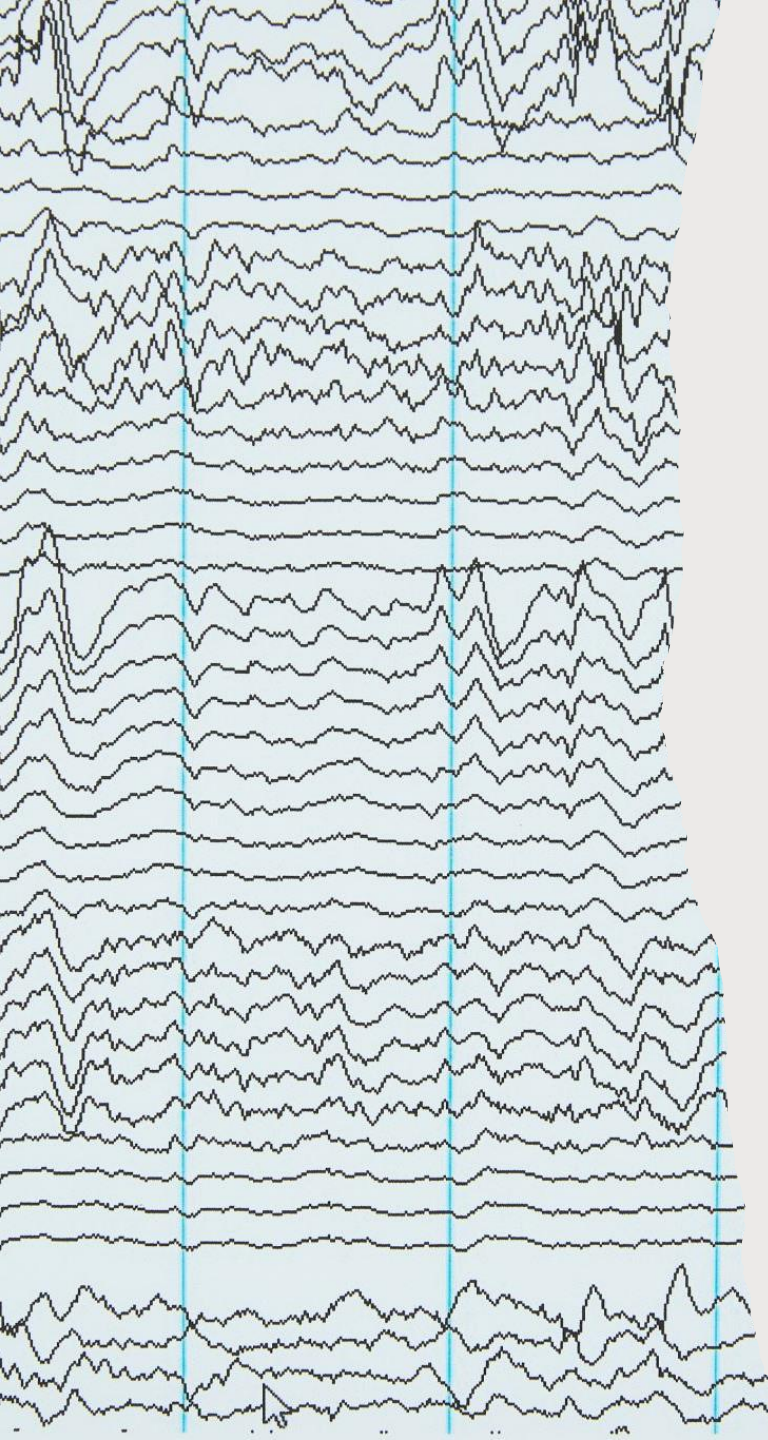
Discrimination task

Which word is different? Sound 1, 2 or 3?

• Example 1  Correct answer: 1

• Example 2  Correct answer: 3

• Example 3  Correct answer: 2



The Brain - EEG

- Electroencephalography (EEG) studies
- Speech perception in EEG
- Measures brain activity time-locked to specific stimuli (=sounds)
- Involves placing electrodes on the head
- Averaged across trials and participants



Procedure

600 /i/ 60 /ɛ/

600 /ɪ/ 60 /ʊ/

600 /i/ 60 /y/

gating task: to assess the participants' speech-specific capabilities, which have been demonstrated to affect non-native phoneme discrimination (Díaz et al., 2016)



consent,
surveys



the ERP
preparation



ERP stimuli presentation
during cartoon watching

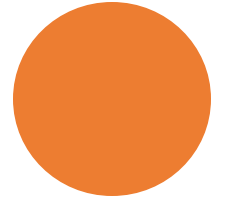


gating task,
proficiency tests



Our experiment

- Participants watched a cartoon while sounds in Polish, English and Norwegian were presented via earphones



Our experiment

- Aim: to examine non-native phonological contrasts perception and processing in L2 and L3
- RQ: Will phonological contrasts be equally easy to detect and process in L2 English and L3 Norwegian?
- Predictions: We predict the MMN to be stronger in native when compared with non-native speech

Different locations,
different results...

2 groups – diverse acquisition
settings

- Formal learners in Poland
- Naturalistic learners in Norway

The setting where we learn influences
our ability to perceive phonemes



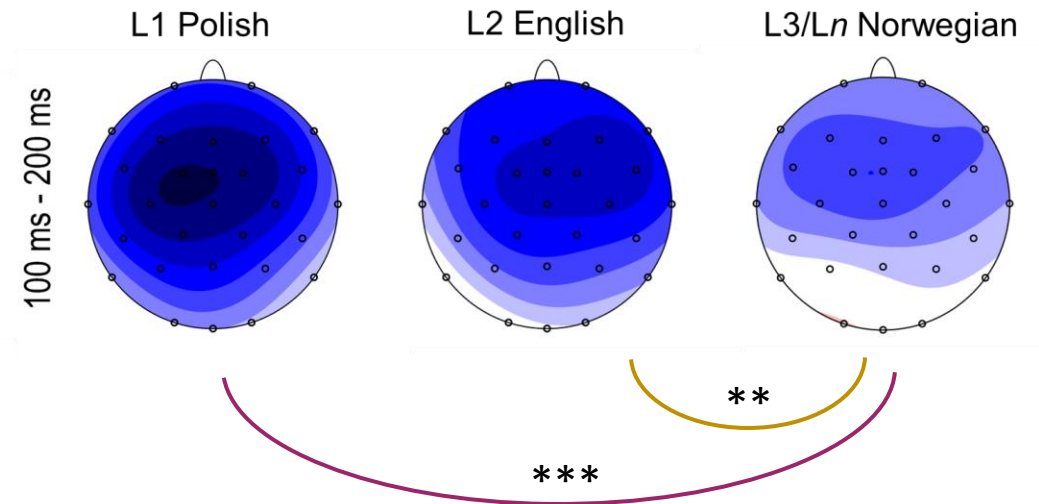
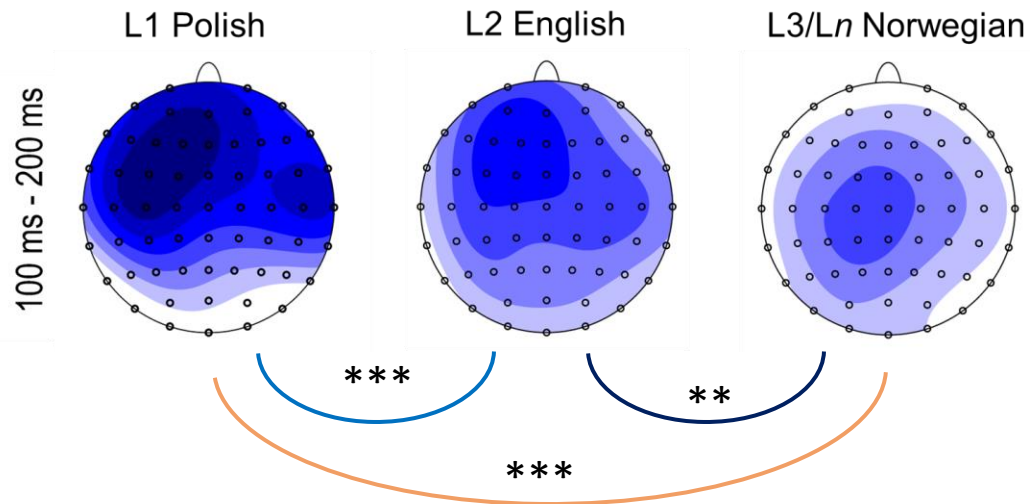
-2 μ V 0 μ V 2 μ V

ERP RESULTS: MMN



FORMAL L3 LEARNERS (AMU)

NATURALISTIC L3 LEARNERS (UiT)



a linear mixed effects analysis

Language and Society

- Is language used differently by different groups of people?





< Trash



Visual settings



Edit



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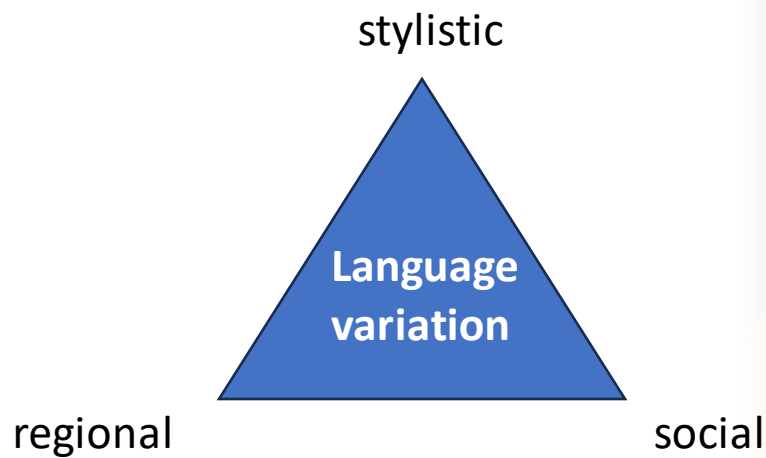
How many languages do you think are spoken around the world?

5



Language and Society

- Yes, language is used differently by different people, e.g. coming from different parts of a country, having different educational background, family history etc.



For example

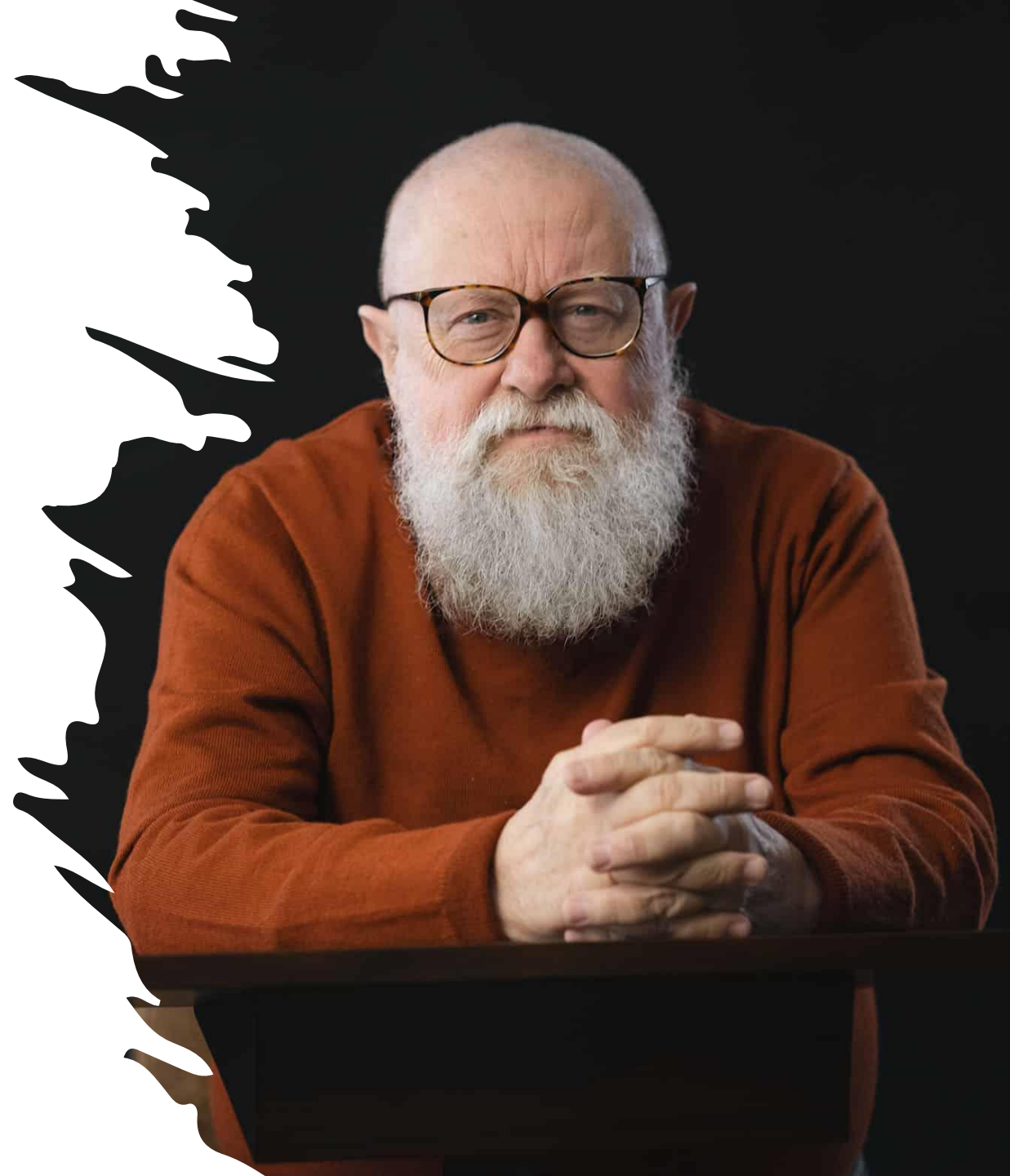


For example

3.30 PLN

Prescriptivism vs. Descriptivism

- We now try to describe the language as is really used
- We do not study what is more grammatical (or less)
- This approach started to gain on popularity in the 1960s in the US



Language and Society (1960s, NYC)

- In 1960s, William Labov researched how English is spoken in New York
- It turned out that young, old, men, women, people with different ethnicity etc. speak English differently, e.g. some pronounce the word-final /r/ in *four*



Our research

- Polish – English – Norwegian
- Words -> Reading -> Spontaneous
- Sociolinguistic questionnaire



Results from Norway

- We studied whether and how Polish people living in Norway learn Norwegian dialects
- It turned out that people use the dialect more when they have got many Norwegian friends, when they had lived in Norway for long
- Younger people used more dialect, too
- We haven't found evidence that age, occupation or level of education play a role



Take home message



Different research methods are used to investigate multilingual speech



Multilingualism is a norm, not an exception



Multilingualism is a spectrum



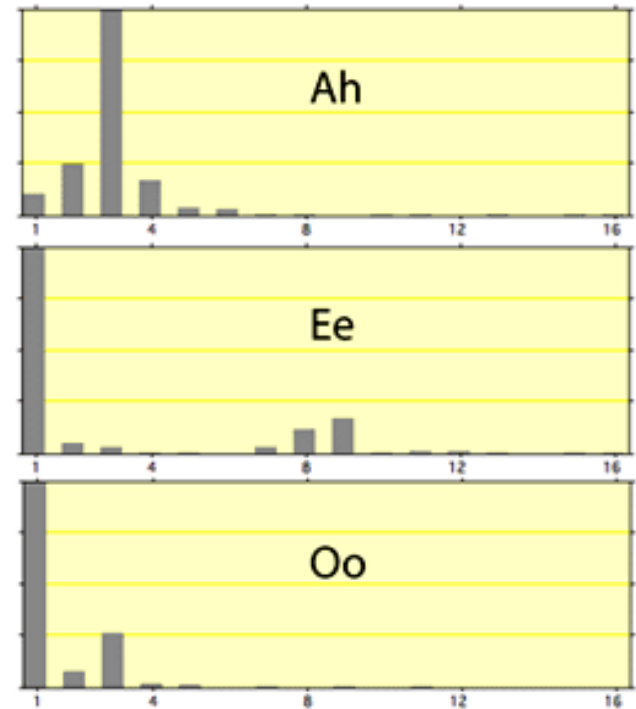
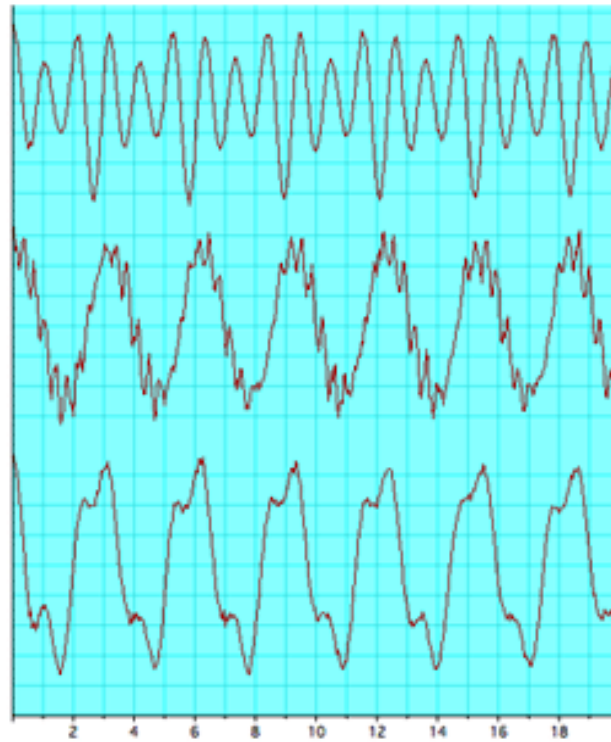
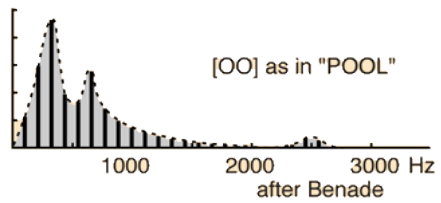
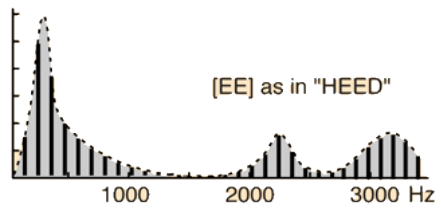
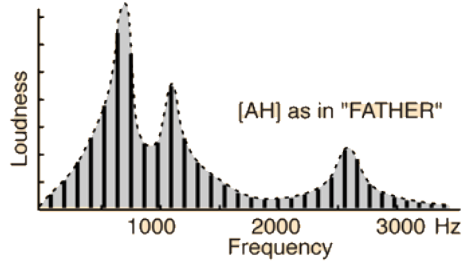
Multilingualism is a dynamic process

Thank you! Tusen takk!



Norway
grants

Vowels Acoustics

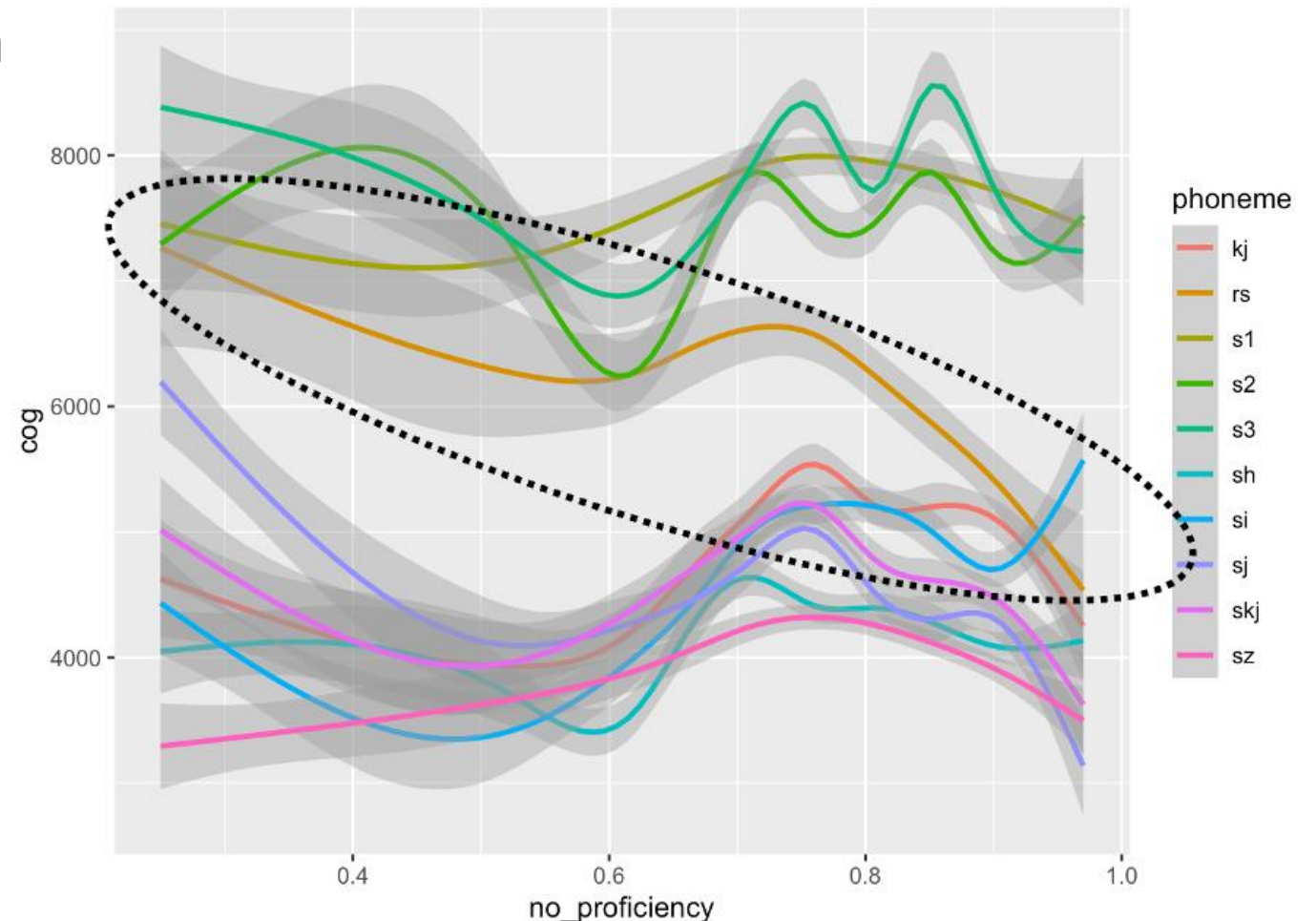


Speech Production (data analysis)

<rs> pronounced as [s] at
with low levels of Norwegian
proficiency and pronounced
as [ʃ] in high levels of
Norwegian proficiency

[include audio files for low
level <rs>, high level <rs>, L1
Norwegian <rs>]

L3 <rs> at various levels of Norwegian proficiency





ERP RESULTS



FORMAL L3 LEARNERS (AMU)

NATURALISTIC L3 LEARNERS (UiT)

