

# Variability of Languages in Time and Space

## **Lecture 2**

## **Phonology**

- Phonological Typology
- Phonetics and Phonology
- Consonant and Vowel Inventories
- Segmental Processes
- Linguistic quiz to the end

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# Phonological Typology - Motivation




- What kinds of phoneme inventories are there?
- Helps to analyze phonological data (*I've seen this before... Typically it goes like this...*)
- What is common/uncommon, **markedness**
  - Odden 2013: „It is very difficult to refuse a claim of the form „X is more common than Y,” except if a very detailed numerical study is undertaken.” (p. 207)
  - „X is marked” (relative to Y): “[ʃ] is more marked than [q]” – “[q] is more marked than [k]”
- Implicational relations
  - e.g. nasal vowels → oral vowels

*Most research on spoken languages! Written forms may sometimes help.*

# Markedness

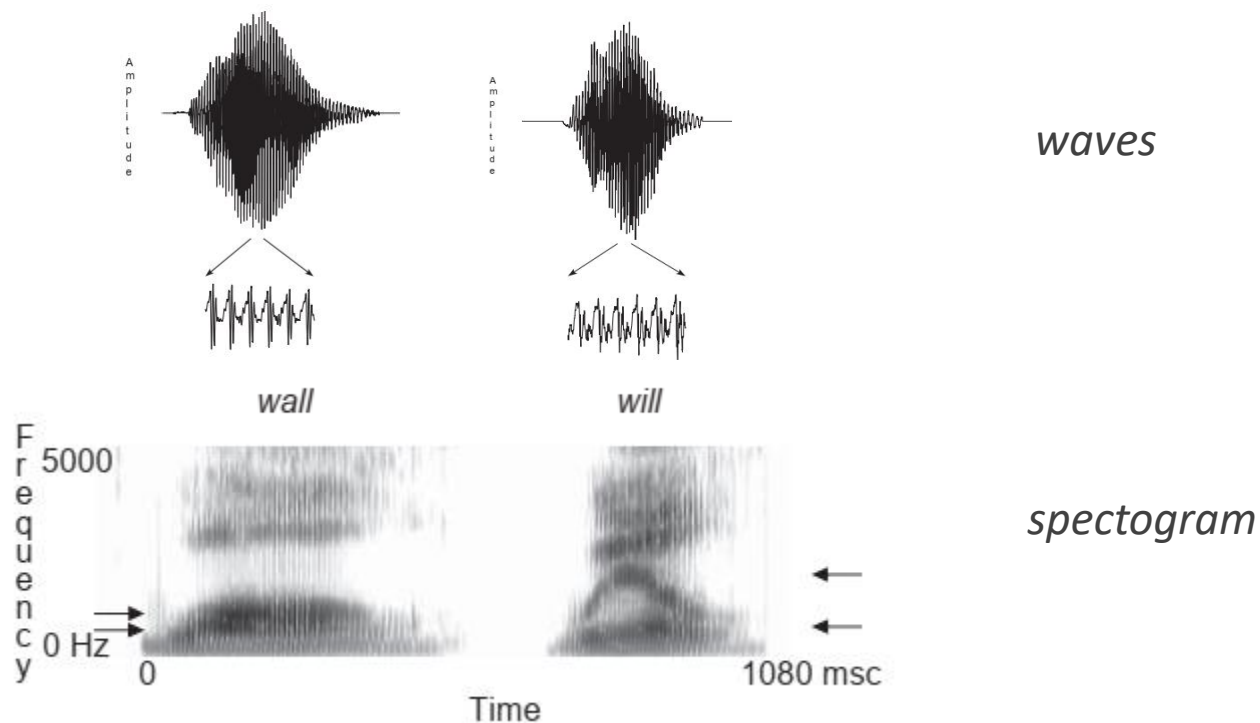
**X is marked (relative to Y):**

- [ʕ] is more marked than [q]
- [q] is more marked than [k]
- pharyngeals are marked sounds (relative to other sounds of the world's languages)

velar		uvular		pharyngeal
				
ŋ		ɴ		
Ⓚ	ɡ	Ⓚ	ɢ	
χ	ʁ	χ		ħ
ʁ		ʁ		ʕ

# Phonetics and Phonology

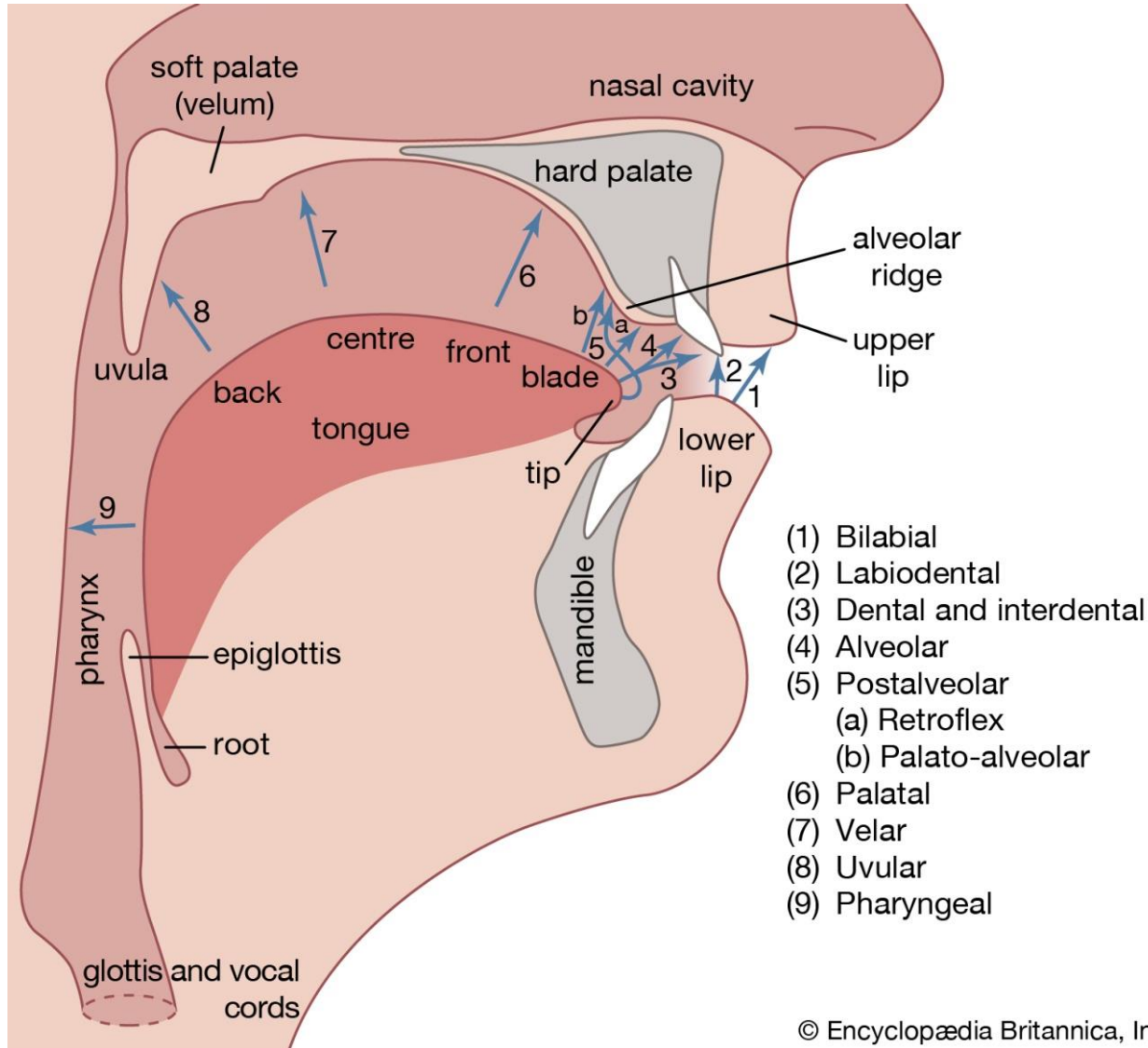
- **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds



# Phonetics and Phonology

- **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds
  - Articulatory properties of language sounds

# Articulatory Phonetics



# Phonetics and Phonology

- **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds
  - Articulatory properties of language sounds
  - Transcription: International Phonetic Alphabet (IPA)
    - There are systematic limits on possible speech sounds in human language

# International Phonetic Alphabet (IPA)

CONSONANTS (PULMONIC)

© 2018 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b		t d			ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ	n			ɳ	ɲ	ŋ	ɴ		
Trill	ʙ		r						ʀ		
Tap or Flap		ⱱ	ɾ			ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative			ɬ ɮ								
Approximant		ʋ	ɹ			ɻ	j	ɰ			
Lateral approximant			l			ɭ	ʎ	ʟ			

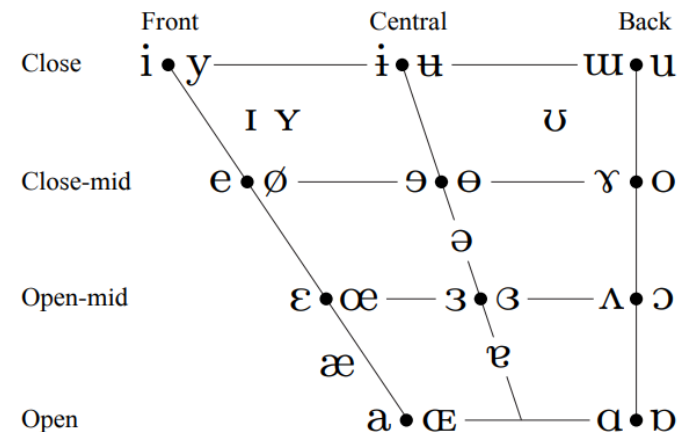
Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
◌ ɸ Bilabial	ɓ Bilabial	ʼ Examples:
ɗ Dental	ɗ Dental/alveolar	pʼ Bilabial
! (Post)alveolar	ɟ Palatal	tʼ Dental/alveolar
ɰ Palatoalveolar	ɡ Velar	kʼ Velar
Alveolar lateral	ɠ Uvular	sʼ Alveolar fricative

OTHER SYMBOLS

VOWELS





# Phonetics and Phonology

- **Phonetics** – the manifestation of language sound
  - Acoustic properties of language sounds
  - Articulatory properties of language sounds
  - Transcription: International Phonetic Alphabet (IPA)
    - There are systematic limits on possible speech sounds in human language
- **Phonology** – the study of sound systems
  - the symbolic perspective on sound
  - sounds (phonemes) are cognitive abstractions, which represent but are not the same as physical sounds

# Phonemes

- The smallest distinct acoustic unit in a language
- A phoneme does not convey meaning but distinguishes meaning of larger units
- At the beginnings and ends of syllables vs. in the middle: consonants and vowels
  - ***p**in, **t**in, **k**in, **f**in, **th**in, **s**in, **sh**in*
  - *dim, din, ding, did, dig, dish*
  - *pin, pen, pan, pun, pain, pine, pawn*

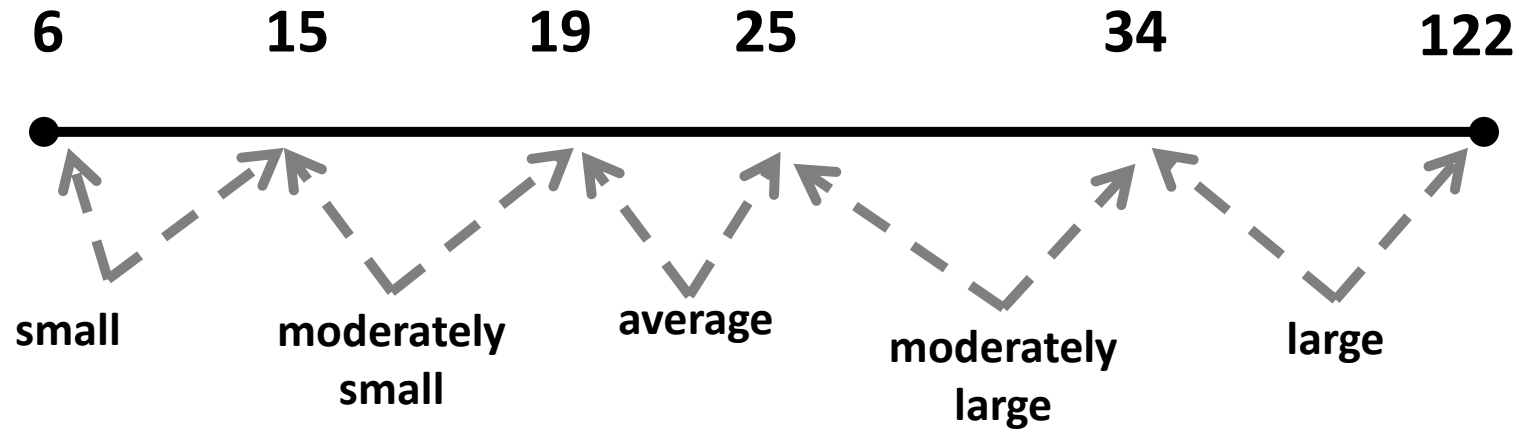
# Let's Try It In Practice

- Are the following statements from phonetics or from phonology?
  - The sounds in the word *frame* change continuously
  - The word *frame* is composed of four segments
  - Towards the end of the word *frame*, the velum is lowered
- Why is it undesirable to use the most precise representation of the physical properties of a spoken word in discussing rules of phonology?
- Give the phonetic symbols for
  - Dental nasal
  - Labio-dental fricative
- How many phonemes are there:
  - *sit, judge, trap, fish, bite, ball, up, ox, through, often*

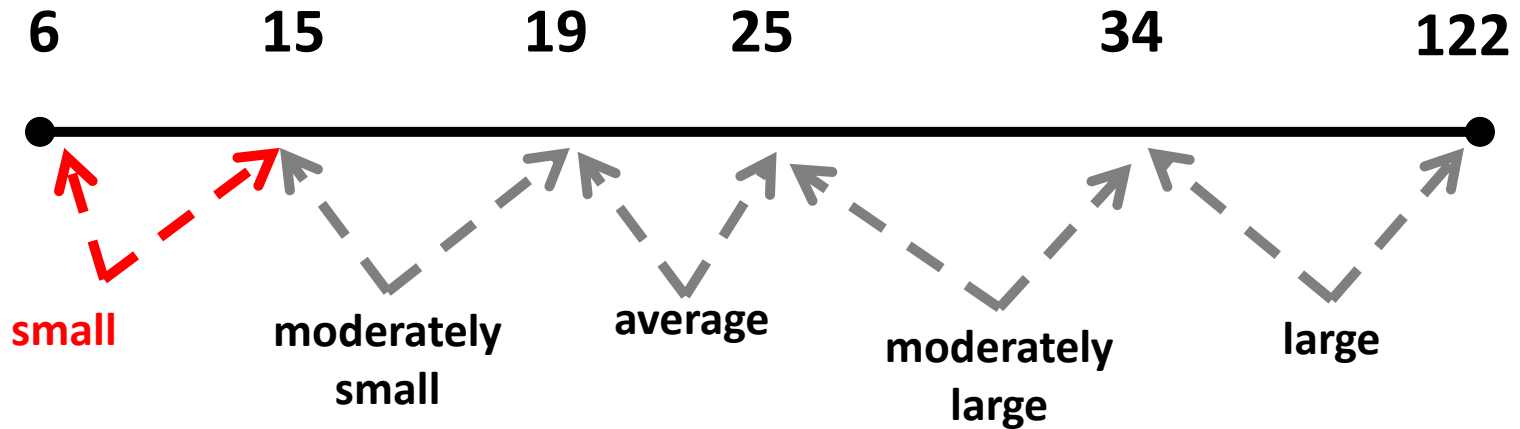
# Phonemic Inventories Databases

- **SPA**, Stanford Phonology Archive (Vihman, 1974)
  - includes descriptions of phonemes, allophones and comments on phonological contexts for 197 languages.
  - phonological descriptions according to the *Handbook of Phonological Data From a Sample of the World's Languages* (Crothers et al 1979)
- **UPSID**, UCLA Phonological Segment Inventory Database (Maddieson 1984, 1997)
  - statistical survey, phonemic inventories,
  - 451 languages in the last version
  - <http://web.phonetik.uni-frankfurt.de/upsid.html>
- Phonemic inventories within **WALS** (Maddieson 2013)
  - 564 languages
  - <http://wals.info/>
- **PHOIBLE** database (Moran et al. 2014, updated in 2019)
  - segment inventories of 1,672 languages
  - <https://phoible.org/>

# WALS: Consonant Inventories



# WALS: Consonant Inventories



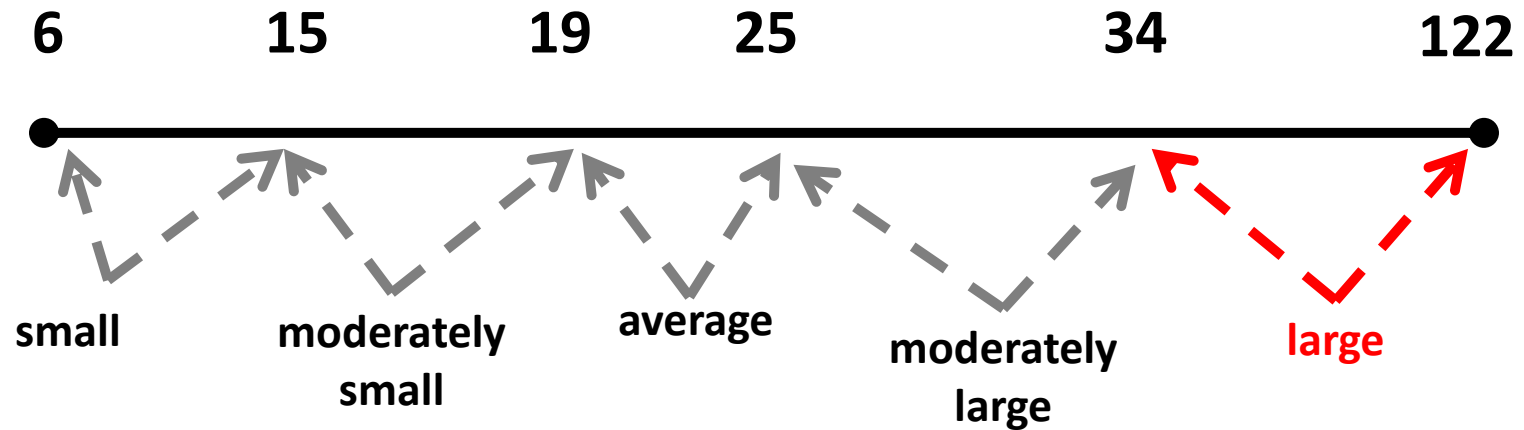
only 6 consonants  
( /p, t, k, b, d, g/ )

Rotokas



LANGUAGE	FEEDBACK
A language of <u>Papua New Guinea</u>	
ISO 639-3	<a href="#">roo</a>
Population	4,320 (Wurm and Hattori 1981).
Location	Bougainville Province, Central Bougainville district, central mountains. 28 villages.
Language Maps	<a href="#">Papua New Guinea, Map 13</a>
Language Status	5 (Developing). Statutory language of provincial identity in Bougainville Autonomous Region (2007, Education Plan, Section 1.1.3), not yet implemented (2012).
Classification	<a href="#">North Bougainville, Rotokas</a>
Dialects	Aita, Atsilima, Pipipaia.
Typology	SOV.
Language Development	Literacy rate in L1: 50%–75%. Literacy rate in L2: 50%–75%. Dictionary. Grammar. NT: 1982.
Language Resources	<a href="#">OLAC resources in and about Rotokas</a>
Writing	Latin script ( <a href="#">Latn</a> ).

# WALS: Consonant Inventories

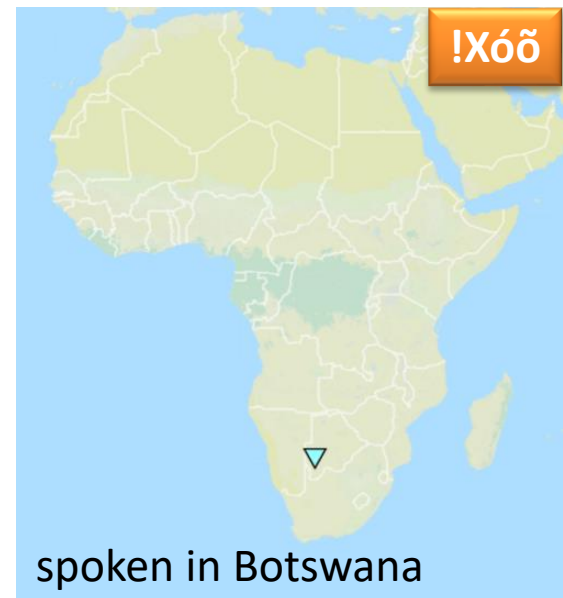


- !Xóõ (Taa, Lone Tree)
- spoken in Botswana
- Tuu languages

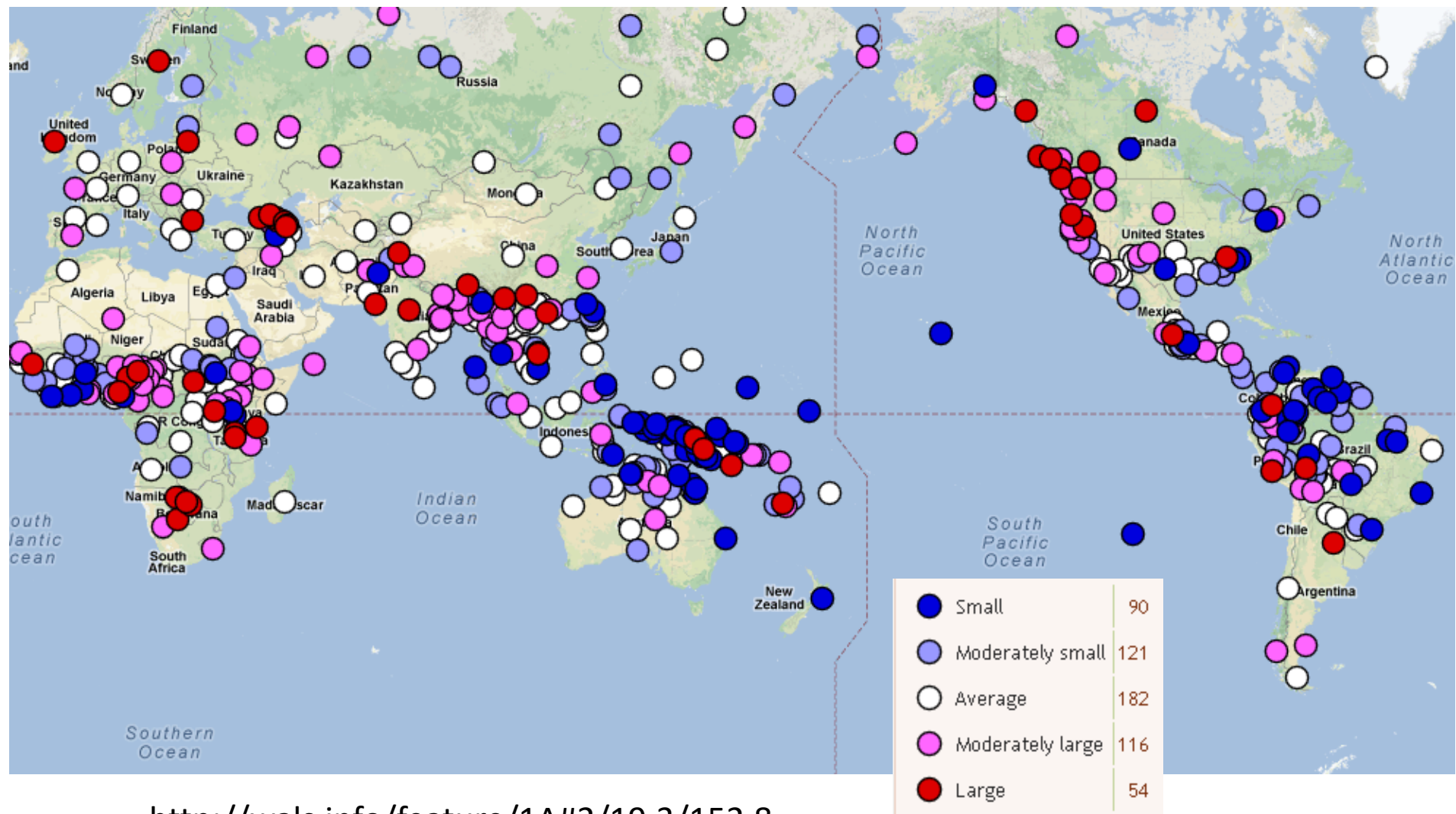
*122 consonants*

(mainly because it has a very large number of different click sounds with which a word may begin)

*Click sounds? How to pronounce them?*  
<https://www.youtube.com/watch?v=31zzMb3U0iY>



# WALS: Consonant Inventories



<http://wals.info/feature/1A#2/19.3/152.8>



# Typology for Consonant Inventories: Correlations

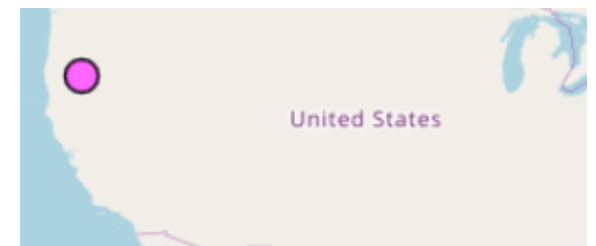
- Hypothesis (Lindblom - Maddieson, 1988): There is an overall relationship between the size of a consonant inventory and the kind of consonants it includes.

*Languages with special consonants by consonant inventory size*

<u>C's inventory</u> size	<u>special C's</u>	<u>glottalized C's</u>
small	8.7%	8.7%
moderately small	13.1%	10.7%
average	22.1%	21.5%
moderately large	27.4%	39.3%
large	40.7%	66.7%

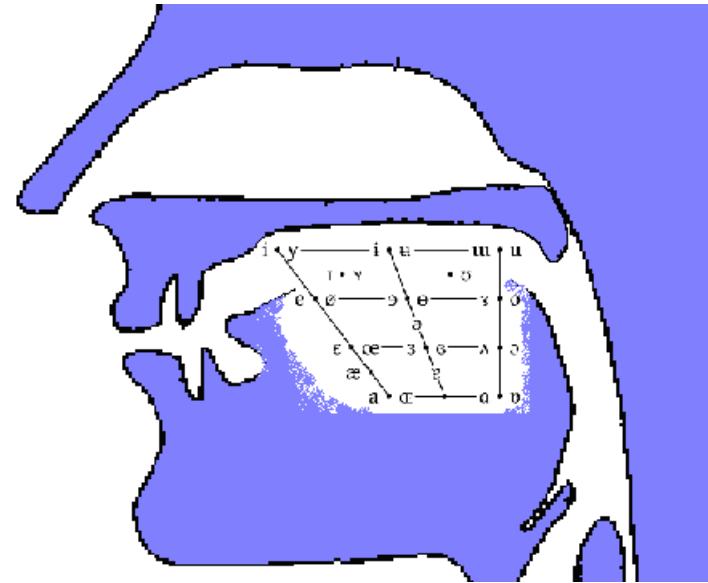
# Typology for Consonant Inventories

- Place of articulation: labial, alveolar, velar > alveopalatal (pol. *zioło*) > uvular, dental, retroflex (pol. *żaba*) > pharyngeal
- Place of articulation: Most languages have one laryngeal consonant  
(/h/ > /ʔ/ > /ħ/)
- Manner of articulation: Stops > fricatives, nasals
- Most languages have at least one fricative (Klamath only /s/)
- Most languages have glides /w j/ – but in some languages, /w j/ do not contrast with high vowels
- Most languages have at least one nasal (some n. American languages lack them)

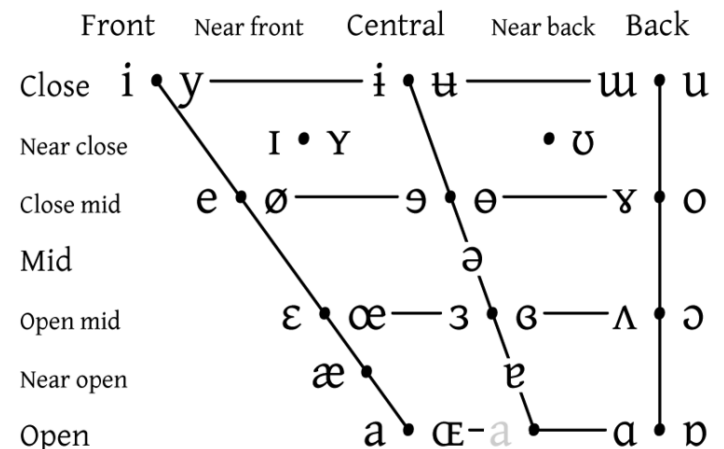


# Vowel Quality Inventories

- Three scales
  - Front – Central – Back
  - Close – Mid – Open
  - Rounded - Unrounded
- Typological issues
  - e.g. Front rounded vowels > back unrounded vowels (inventories like English are unusual)
- No correlation between vowel and consonant inventories (Justeson-Stephens, 1984)

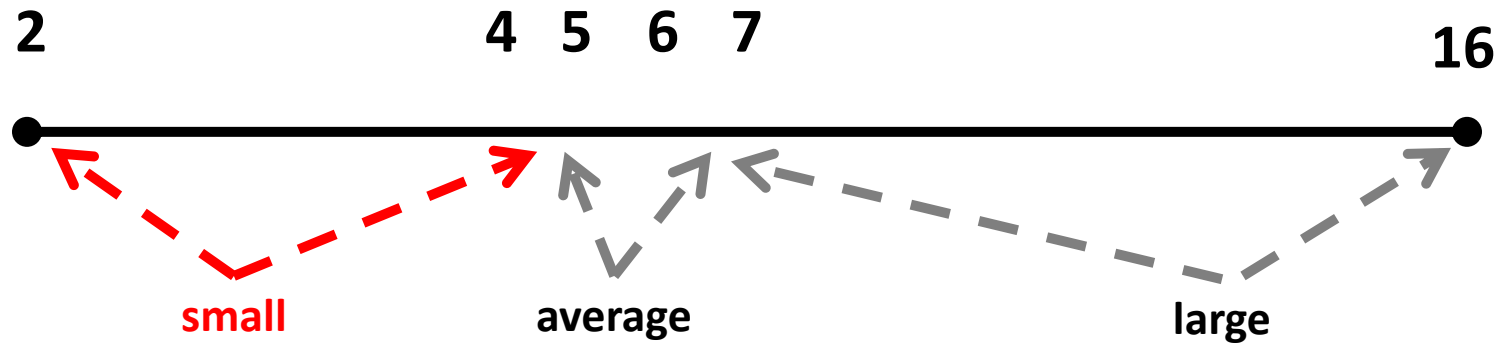


VOWELS



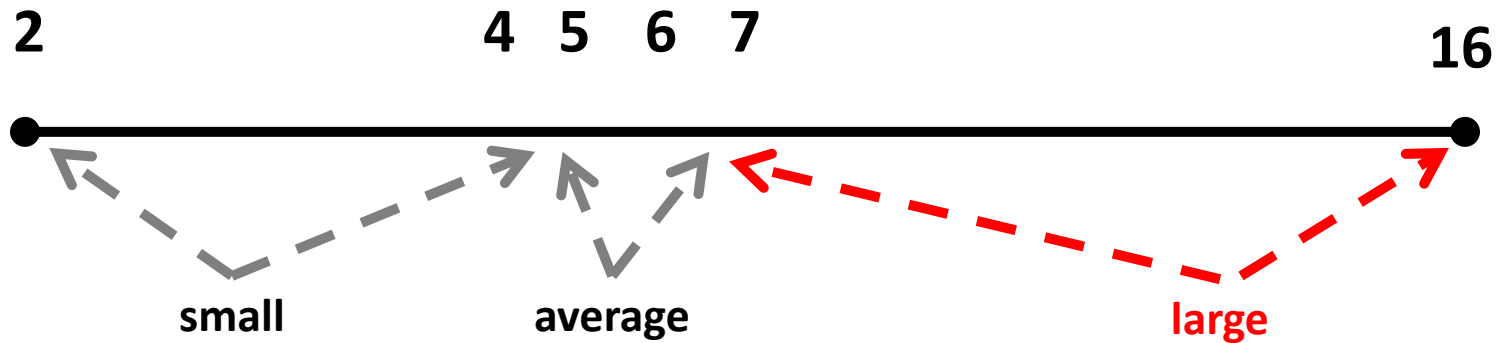
Vowels at right & left of bullets are rounded & unrounded.

# Vowel Quality Inventories

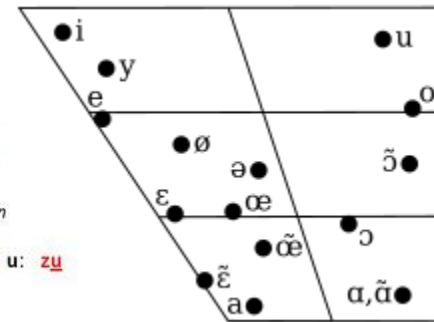
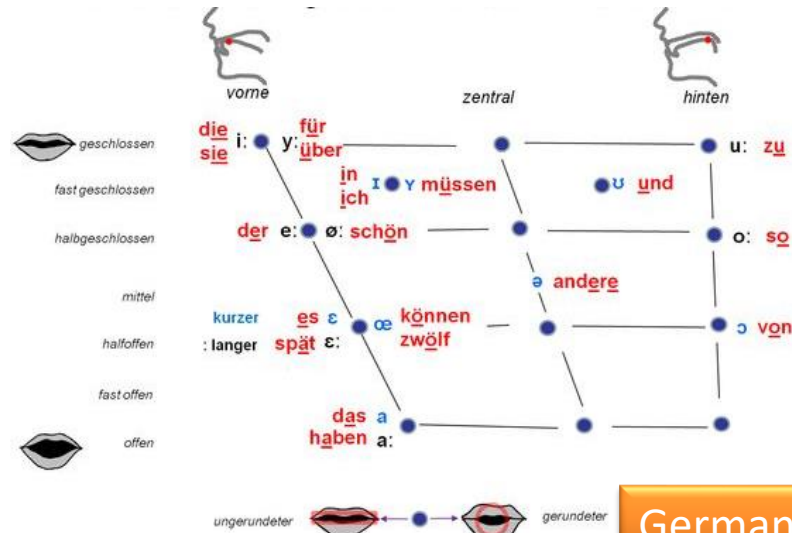


Yimas (Papua New Guinea): 2

# Vowel Quality Inventories



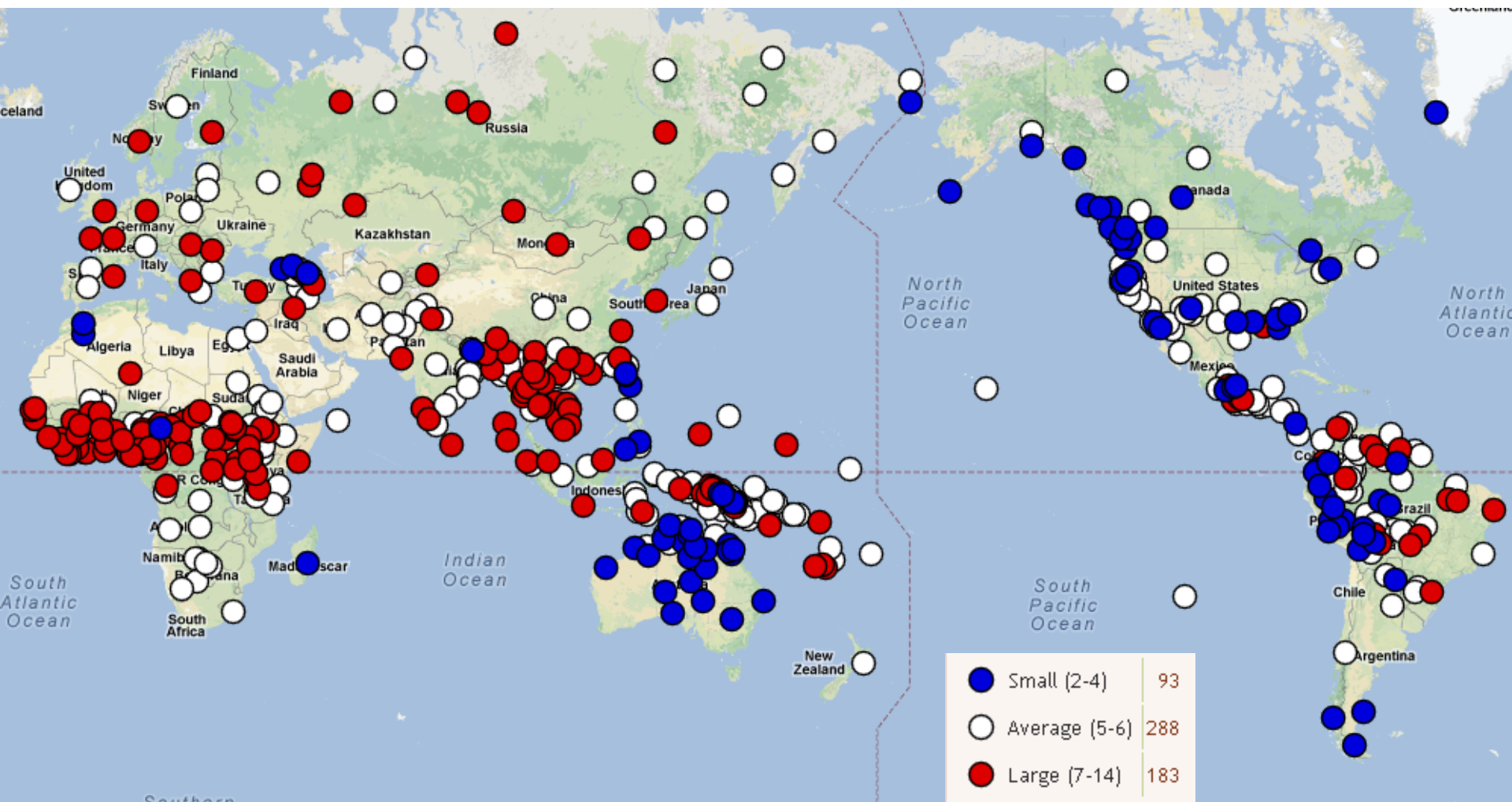
Yimas (Papua New Guinea): 2



French

German

# Vowel Quality Inventories



<https://wals.info/chapter/2>

# Why such inventories and not others?

- Looking for cross-linguistic biases in the distribution of phonemes
- Most of research proposes explanations based on speech production and/or perception

– *Perceptual factors*  
 – *Articulatory factors*

} often compete

*(maximization of perceptual distinctness and minimization of articulatory effort)*

- Liljencrants and Lindblom (1972): Adaptive Dispersion Theory

Phoneme inventories are preferable to the extent they possess contrasts that are maximally distinct in the perceptual domain.

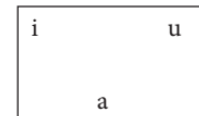
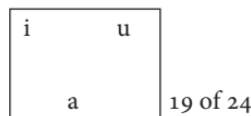
- A number of other theories

- Dispersion Focalization Theory (Schwartz et al. 1997)
- Lindblom and Maddieson model (1988)
- Stevens's Quantal Theory (1972, 1989)

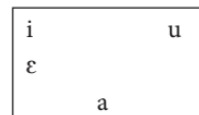
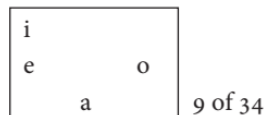
Most common

Liljencrants and Lindblom predicted

3 vowels

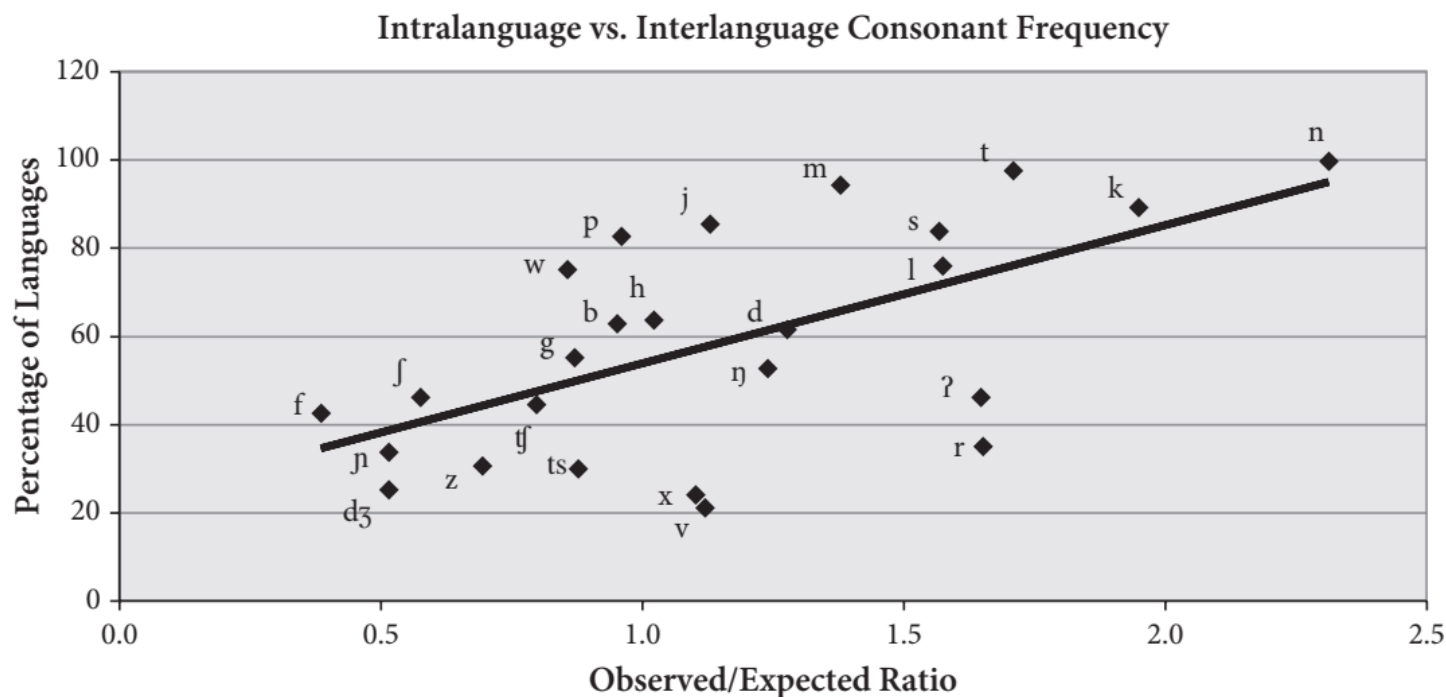


4 vowels



# Frequency Distributions Within Languages: Consonants

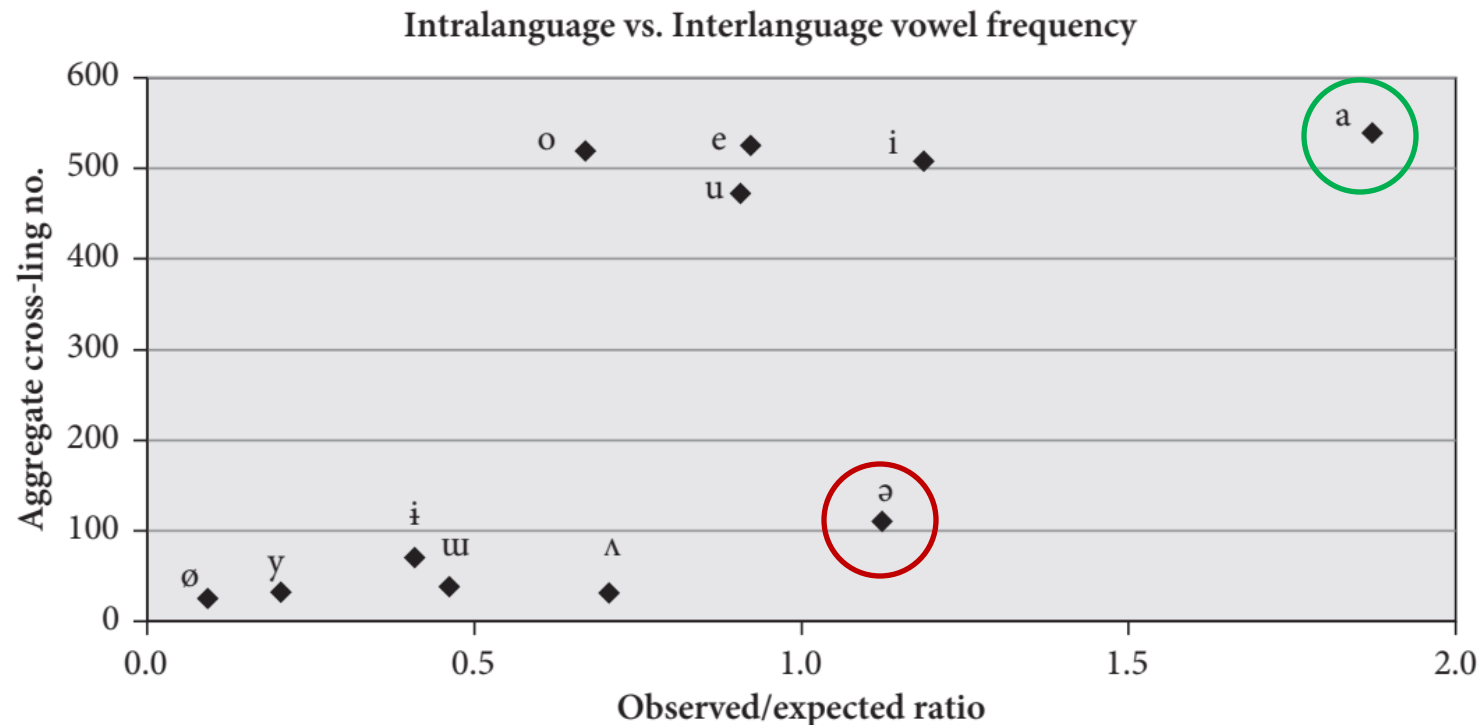
There is a strong correlation between the typologically most common consonants and their frequency within languages





# Frequency Distributions Within Languages: Vowels

Schwa [ə] occurs with greater frequency within languages than three of the cardinal vowels /e, o, u/, even though schwa is considerably less common across languages.



# Phoneme Inventories: Summary

- Although there are a large number of sounds attested in languages of the world, most languages only employ a relatively small subset of them to make contrasts.
- There are certain consonants and vowels that are much more common than others both cross-linguistically and within languages
  - There is an extensive literature about the phonetic and phonological motivations for phoneme inventories
- Constantly evolving nature of the lexicon leads to changes in intra-language frequency distribution of phonemes.

# Phonological Rule Typology:

## Segmental Processes

- A more complex problem than segment inventory typology, requires more language-particular commentary and analysis.
- All spoken languages have phonological rules, but not all rules are found in every language.
  - may be in certain language families but not in the others, e.g. rounding harmony common in Turkic languages
- Most phenomena affecting segments may be explained by minimizing articulating effort and enhancing perceptual salience.

# Segmental Processes

- Assimilation (*bags* [bægz])      Nom. sg.    Dim. (nom.sg.)    Loc.sg.  
   stol            stoljik            stolje    ‘table’
- Long-distance assimilation (e.g. harmony)
- Dissimilation (*pilgrim* ← lat. *peregrinus*)
- Fortition, Lenition, Deletion and compensatory lengthening (*p[ə]’tato*, *p[Ø]’tato*)
- Epenthesis (e.g. *oputimisuto* in Japanese as syllable repair, etc.)
- Metathesis (more sporadic, more diachronic)

VC metathesis in Late Common Slavic (Townsend and Janda 1996: 60–1)

Late Common Slavic	Gloss	Polish	Bulgarian
gôrdŭ	‘enclosure’	grod	grad
golvá	‘head’	gwowa	glavá
sólma	‘straw’	wwoma	sláma
melkó	‘milk’	mleko	mljáko

# Let's Try It In Practice

- What phonological rules are observed here?
- What order do they apply in?

Polish

<i>Singular</i>	<i>Plural</i>		<i>Singular</i>	<i>Plural</i>	
klup	klubi	'club'	trup	trupi	'corpse'
dom	domi	'house'	snop	snopi	'sheaf'
zwup	zwobi	'crib'	trut	trudi	'labor'
dzvon	dzvoni	'bell'	kot	koti	'cat'
lut	lodi	'ice'	grus	gruzi	'rubble'
nos	nosi	'nose'	vus	vozi	'cart'
wuk	wugi	'lye'	wuk	wuki	'bow'
sok	soki	'juice'	ruk	rogi	'horn'
bur	bori	'forest'	vuw	vowi	'ox'
sul	sol	'salt'	buj	boji	'fight'
fum	fumi	'noise'	zur	zuri	'soup'

# Example of Assimilation: Vowel Harmony

- A type of long-distance assimilatory phonological process involving vowels
- A vowel or vowels in a word are changed to sound the same (thus "in harmony")
- In languages with vowel harmony, there are constraints on which vowels may be found near each other
- Many agglutinative languages have vowel harmony

**gün**  
'day'

**ay**  
'month'

**günler**  
'days'

**aylar**  
'months'

**L A R**

FRONT

BACK

e

ö

a

o

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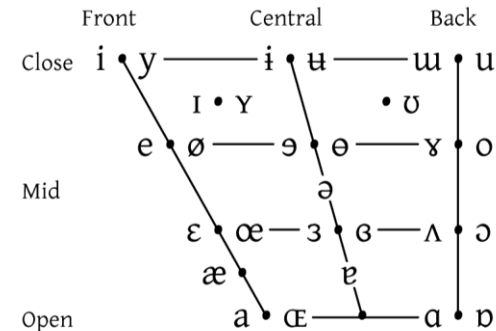
ı

u

Turkish

# Vowel Harmony

- Vowel harmony
  - Front-back (Turkish, Hungarian)
  - Height (N. Salentino)
  - Rounding (Turkish)
- Variations in Rounding Harmony
  - Kirghiz – all vowels assimilate in rounding to preceding vowels except that [a] does not assimilate to [u]
  - Turkish – only high vowels undergo, all round vowels trigger
  - Sakha (Yakut) – high vowels undergo, round vowels trigger; nonhigh vowels undergo if same height as trigger
  - Mongolian – only nonhigh vowels undergo, only nonhigh vowels trigger
  - Yawelmani – vowels undergo if same height as trigger



# Vowel Harmony in Hungarian

háború	‘war’	körút	‘ring way’
háborúról	‘about war’	körről	‘about ring’
bűn	‘guilt’	bátor	‘brave’
bűntelen	‘guiltless’	bátorságról	‘about braveness’
bűnről	‘about guilt’	bátortalan	‘not brave’
út	‘way’	föld	‘field’
útról	‘about way’	földtelen	‘fieldless’
keserű	‘bitter’	burgonya	‘potato’
keserűség	‘bitterness’	burgonyaföld	‘potato field’
keserűsó	‘bitter salt’	sötét	‘dark’
kör	‘ring’	sötétség	‘darkness’

1. Which words are compounds and why?
2. Which of the following words can be divided into parts?

földtan, földnek, háborúellenes, Budapest, burgonyalevél, óraütés, hőálló, bűnöző.

3. Translate into Hungarian:  
*guiltlessness, about field, about potato, wayless*



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