Variability of Languages in Time and Space

Lecture V
Phonology

- Consonant and Vowel Inventories
- Segmental Processes
- Syllables
- Suprasegmentals

Anja Nedoluzhko

Phonological Typology

- What kinds of phoneme inventories are found?
- Helps to analyze phonological data (*I've seen this before… Typically it goes like this…*)
- What is common/uncommon?
  - 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)
- Understand markedness
  - „X is marked‟ (relative to Y): "[ʕ] is more marked than [q]" – "[q] is more marked than [k]"
- Most research on spoken languages

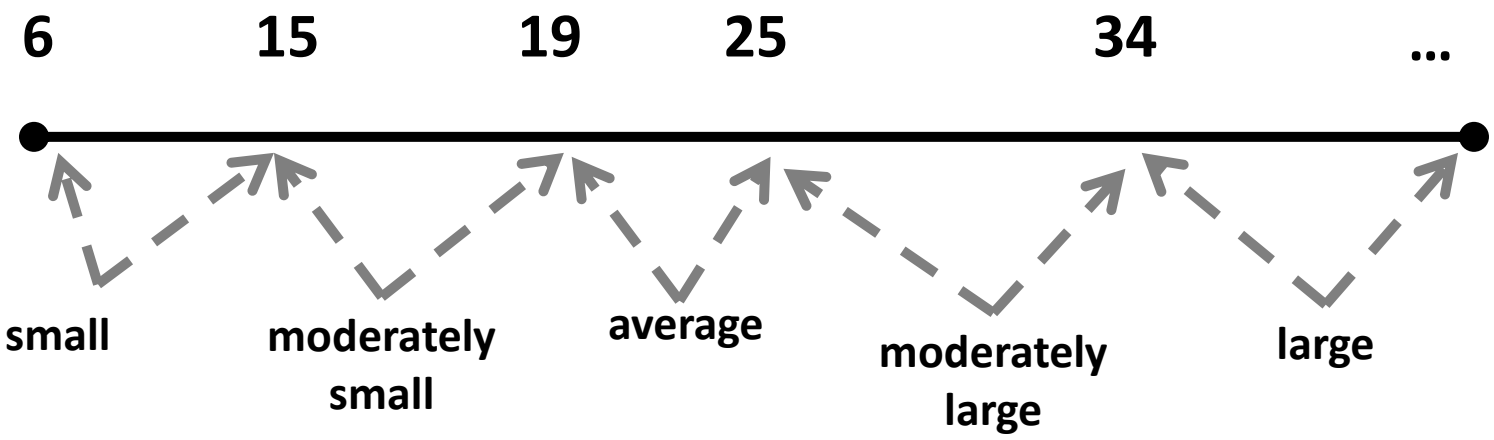
Phomenic Inventories Databases

- **SPA**, Stanford Phonology Archive (Vihman, 1974)
  - 196 languages,
  - phonological descriptions according to grammars
- **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)
  - statistical survey, phonemic inventories,
  - 564 languages
  - http://wals.info/
- **PHOIBLE** database (Moran et al. 2014, updated in 2019)
  - segment inventories of 1,672 languages
  - https://phoible.org/

Phonemes

- The smallest distinct acoustic unit in a language
- 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*
  - *di****m****, di****n****, di****ng****, di****d****, di****g****, di****sh***
  - *p****i****n, p****e****n, p****a****n, p****u****n, p****ai****n, p****i****ne, p****aw****n*

WALS: Consonant Inventories



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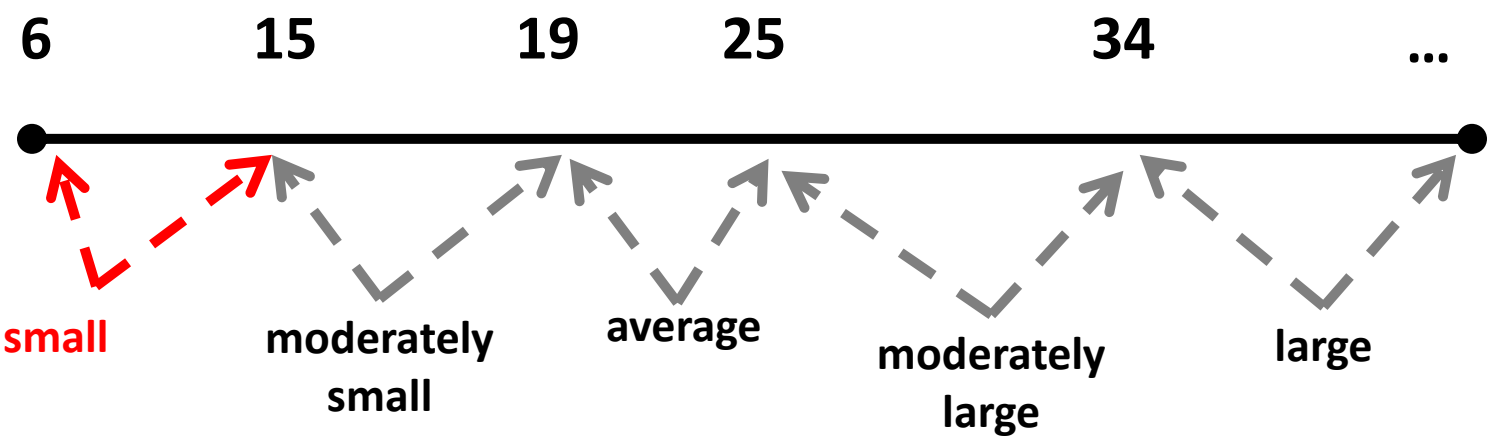


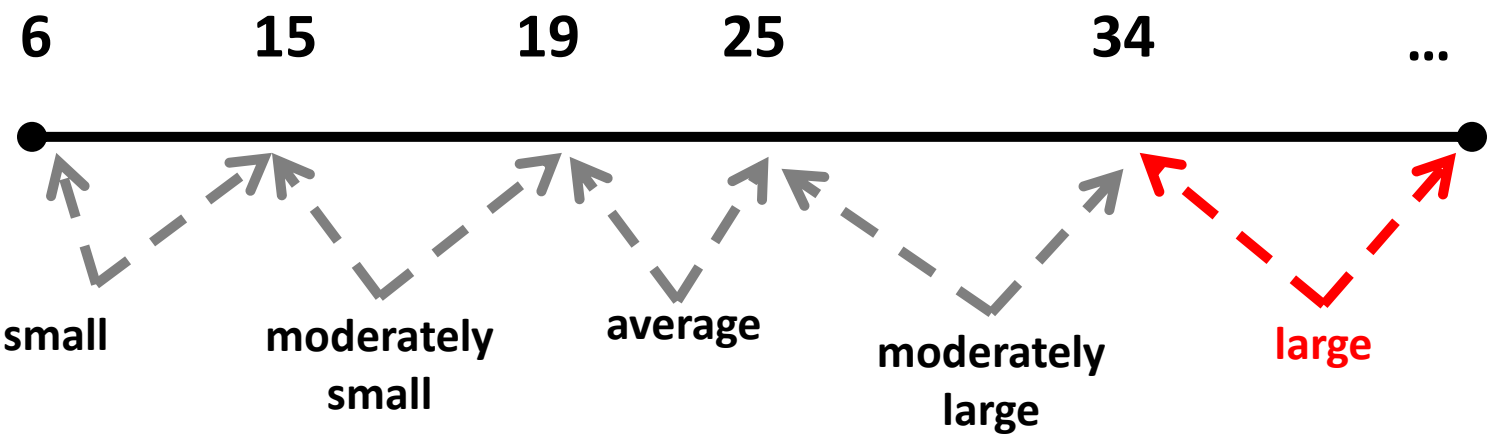
only 6 consonants
(/p, t, k, b, d, g/)

LANGUAGE | FEEDBACK

A language of Papua New Guinea

ISO 639-3	roo
Population	4,320 (Wurm and Hattori 1981).
Location	Bougainville Province, Central Bougainville district, central mountains. 28 villages.
Language Maps	Papua New Guinea, Map 13
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	North Bougainville, Rotokas
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	OLAC resources in and about Rotokas
Writing	Latin script [Latn].

WALS: Consonant Inventories

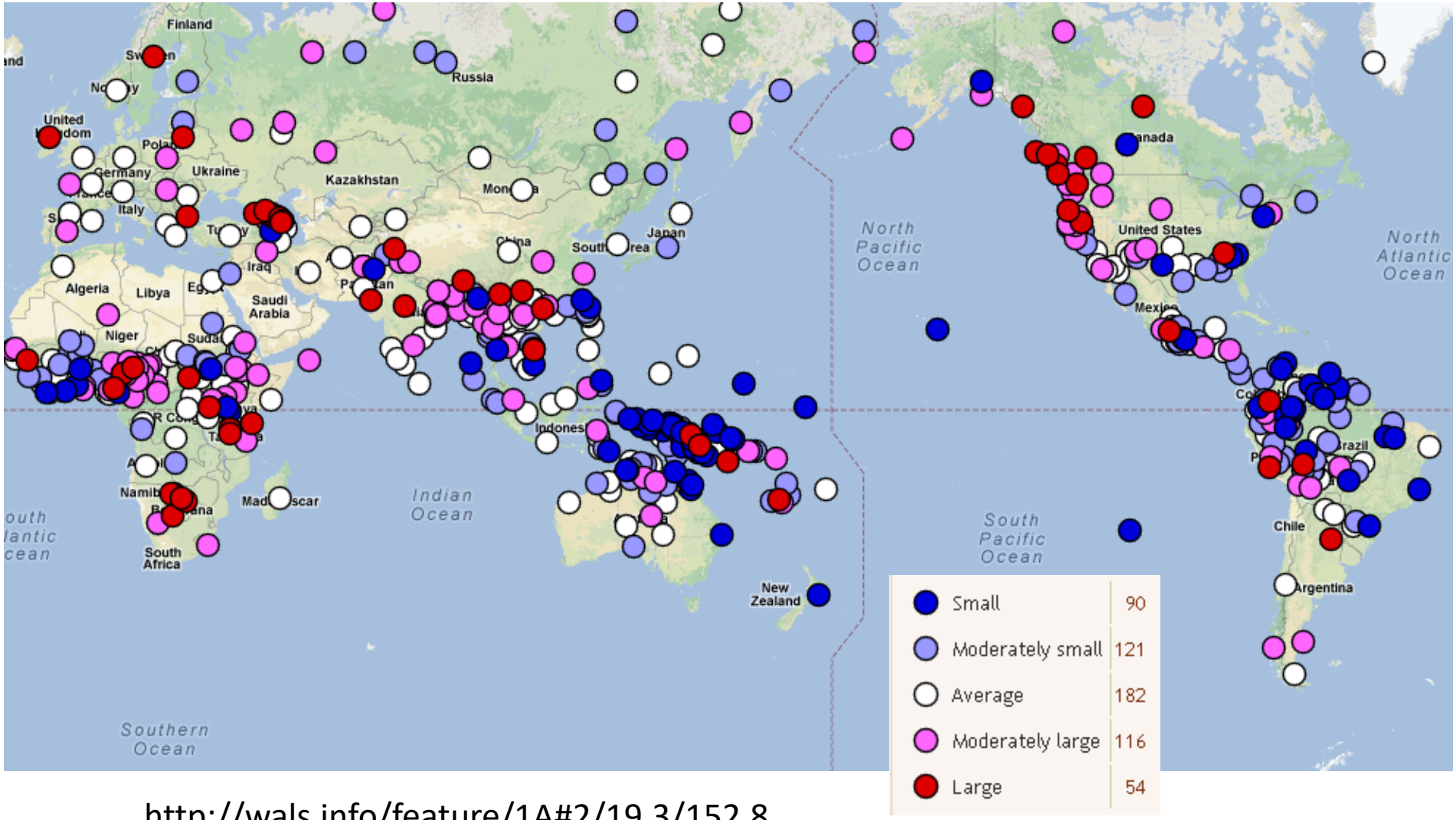


- !Xóõ (Taa, Lone Tree)
- spoken in Botswana
- Tuu languages

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

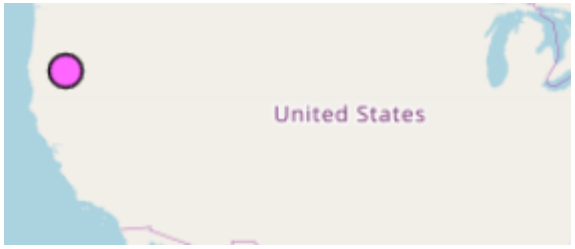
- Hypothesis (Lindblom - Maddieson, 1988): There is an overall relationship between the size of a consonant inventory and the kind of consonants it includes.

Languages with special consonants by consonant inventory size

C's inventory size	special C's	glottalized C's
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%

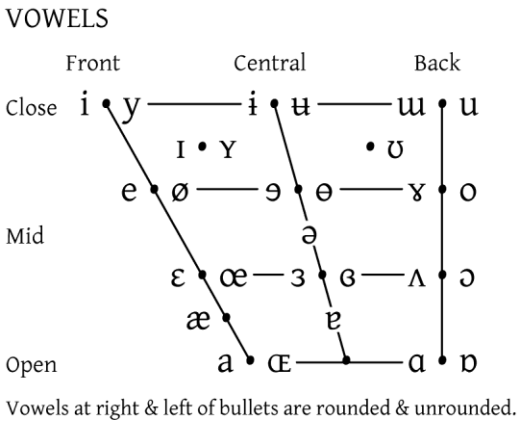
Typology for Consonant Inventories

- 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/ > /ɦ/)
- 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)



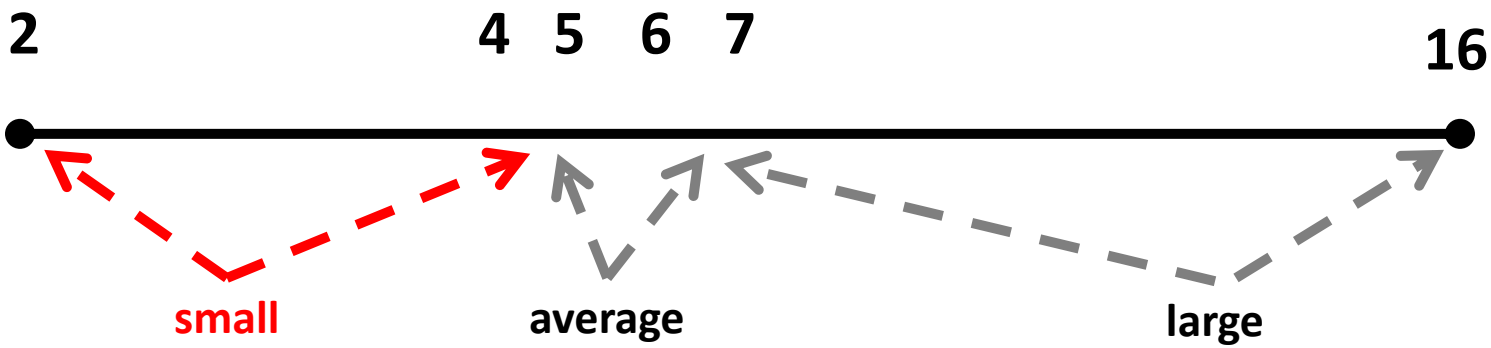
Vowel Quality Inventories

- Three scales
  - Front – Central – Back
  - Close – Mid – Open
  - Rounded - Unrounded



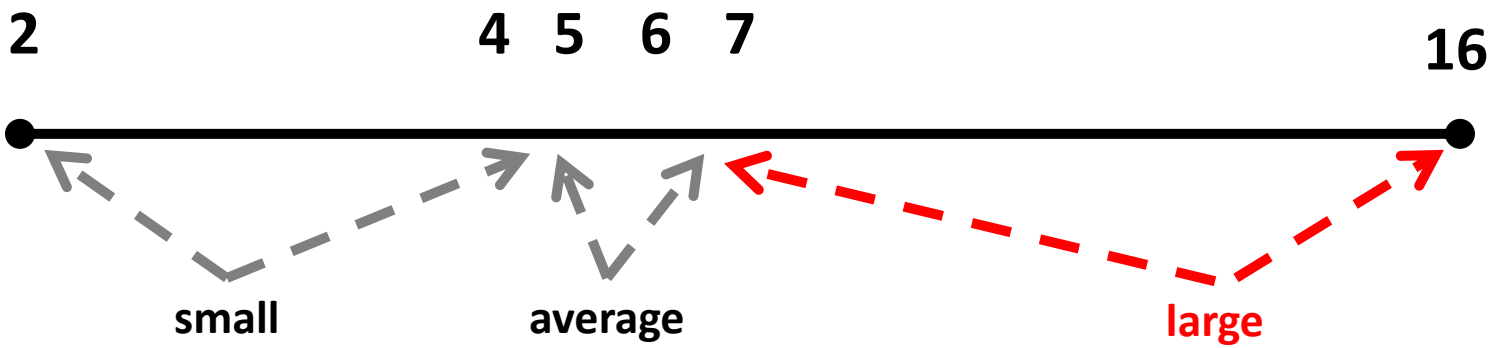
- Typological issues
  - e.g. Front rounded vowels > back unrounded vowels (inventories like English are unusual)
- No correlation between vowel and consonant inventories (Justeson-Stephens, 1984)

Vowel Quality Inventories

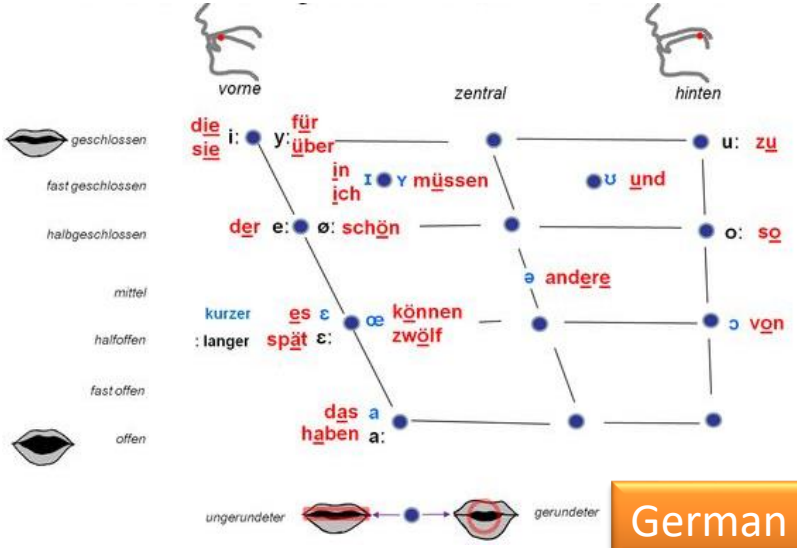


Yimas (Papua New Guinea): 2

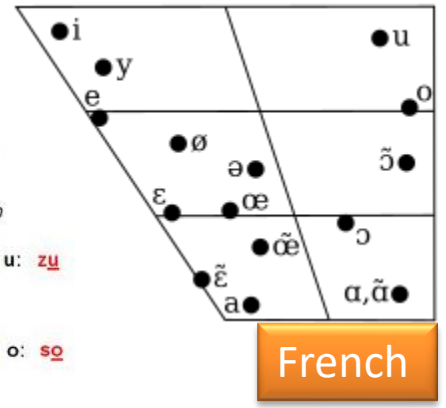
Vowel Quality Inventories



Yimas (Papua New Guinea): 2

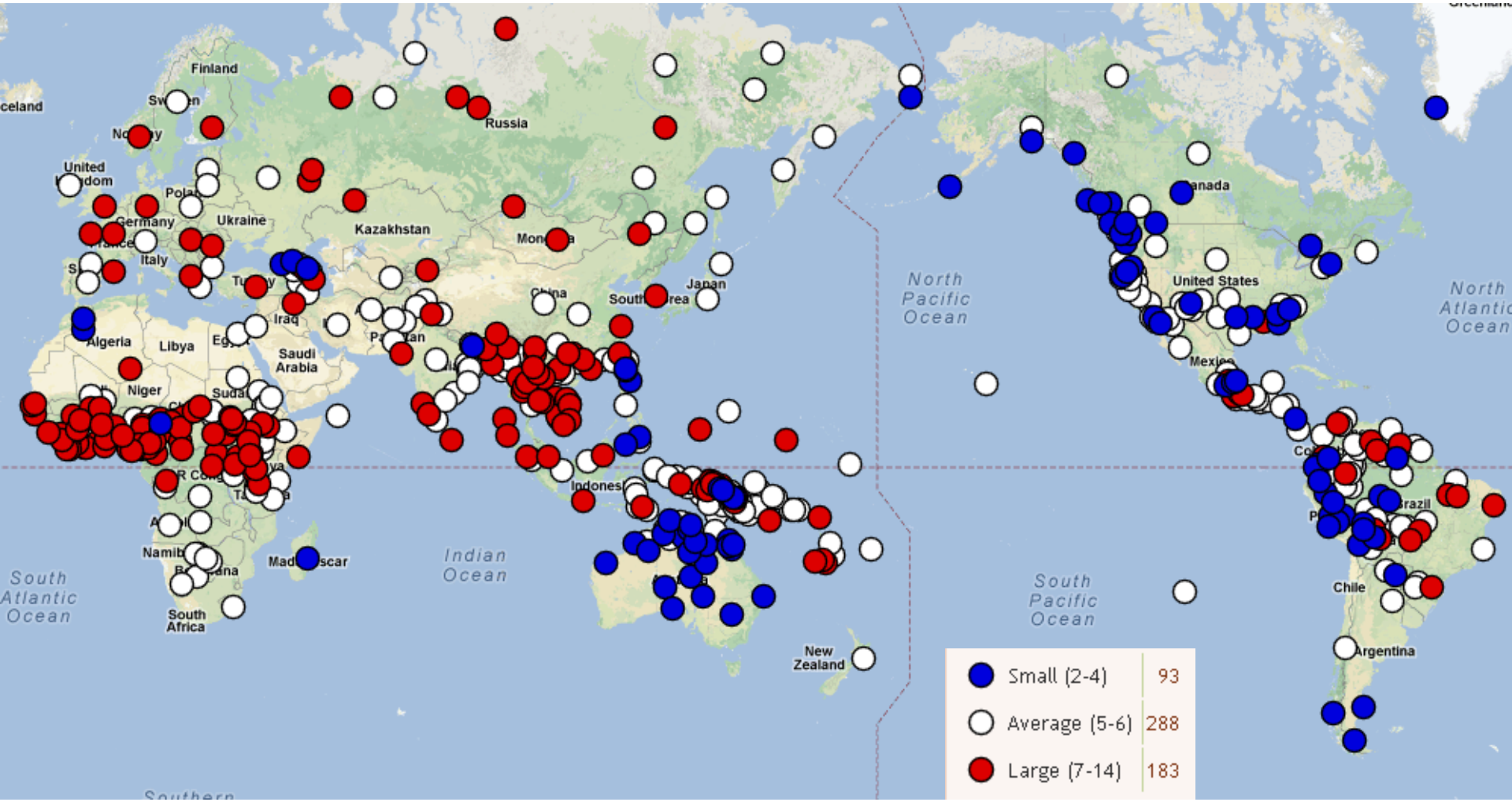


German



French

Vowel Quality Inventories



https://wals.info/chapter/2

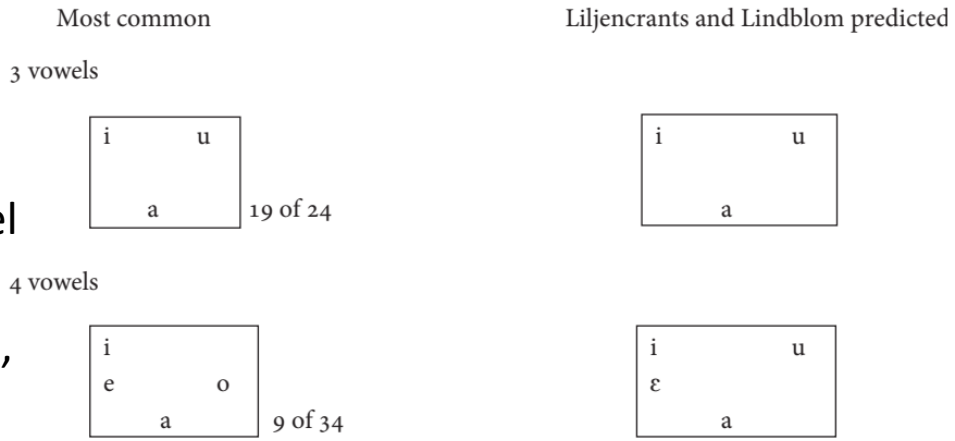
Why such inventories and not others?

- 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

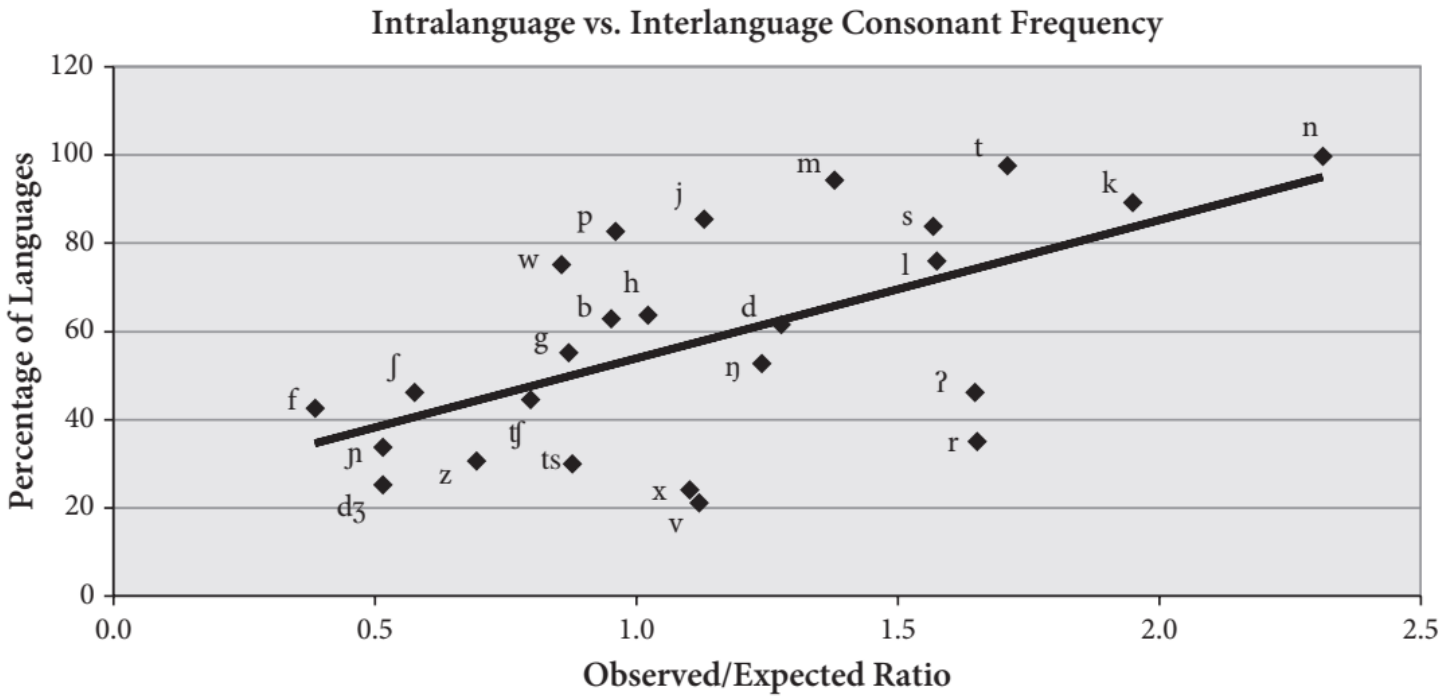
> Phoneme inventories are preferable to the extent they possess contrasts that are maximally distinct in the perceptual domain.

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



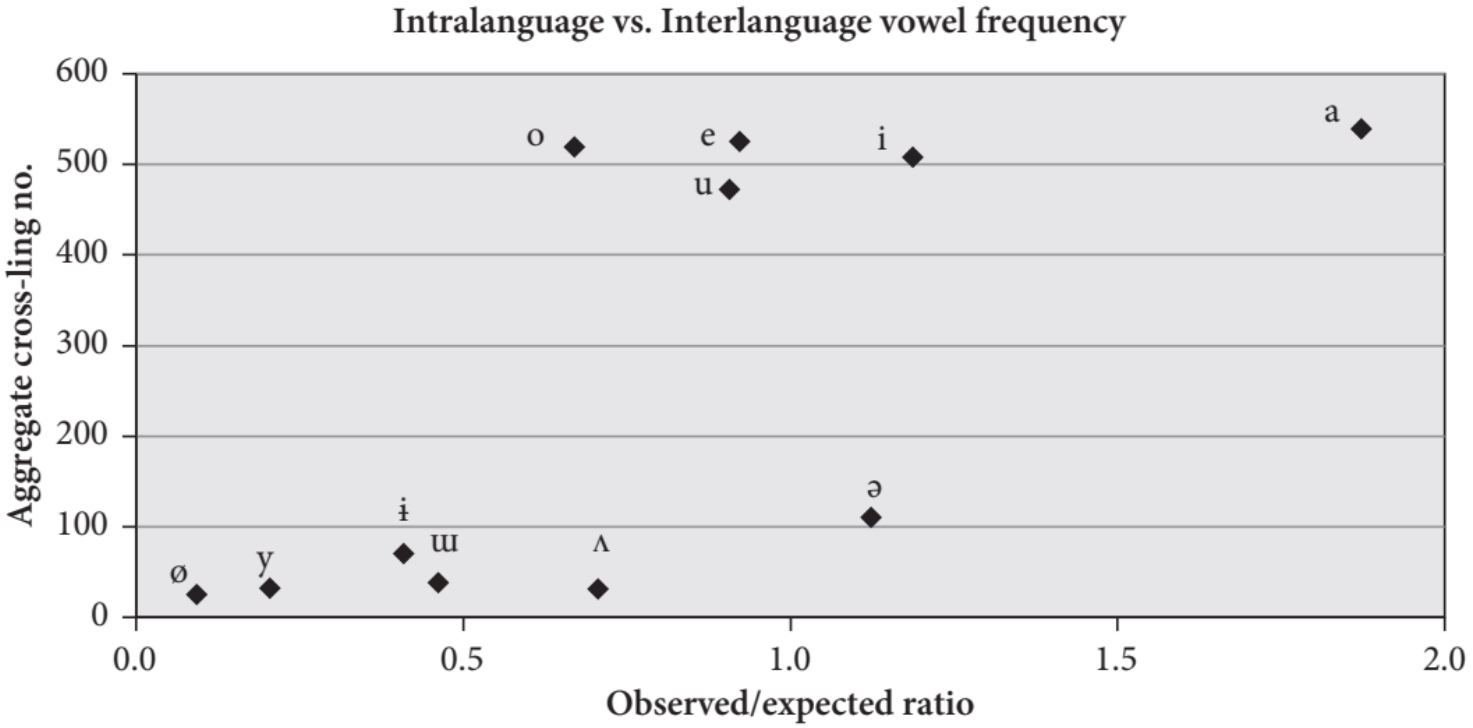
Frequency Distributions Within Languages: Consonants

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



Frequency Distributions Within Languages: Vowels

- schwa 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: a 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
  - sparked an extensive literature exploring the phonetic and phonological motivations shaping phoneme inventories
- Constantly evolving nature of the lexicon leads to changes in intralanguage 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* [bæg**z**])
- Long-distance assimilation (e.g. harmony)
- Dissimilation (*pilgrim* ← lat. *peregrinus*)
- Fortition, Lenition, Deletion and compensatory lengthening (*p[ə]ˈtato, p[Ø]ˈtato*)
- Epenthesis (e.g. *oputimisuto* in Japanese as syllable repair, etc.)
- Metathesis (more sporadic, more diachronic)

Nom. sg.	Dim. (nom.sg.)	Loc.sg.	
stol	stol^{j}ik	stol^{j}e	'table'

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	ml^{j}áko

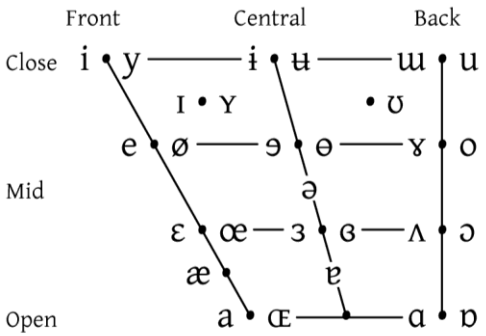
Example of Assimilation: Vowel Harmony

- 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

FRONT		BACK	
e	ö	a	o
i	ü	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’
háborúról	‘about war’
bűn	‘guilt’
bűntelen	‘guiltless’
bűnről	‘about guilt’
út	‘way’
útról	‘about way’
keserű	‘bitter’
keserűség	‘bitterness’
keserűsó	‘bitter salt’
kör	‘ring’

körút	‘ring way’
körről	‘about ring’
bátor	‘brave’
bátorságról	‘about braveness’
bátortalan	‘not brave’
föld	‘field’
földtelen	‘fieldless’
burgonya	‘potato’
burgonyaföld	‘potato field’
sötét	‘dark’
sötétség	‘darkness’

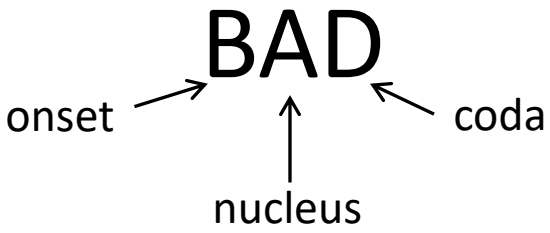
1. Which words are compounds and why?
2. Which of the following words can be divided into parts?

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

3. Translate into Hungarian:

guiltlessness, about field, about potato, wayless

Syllable Structure



A Syllable is:

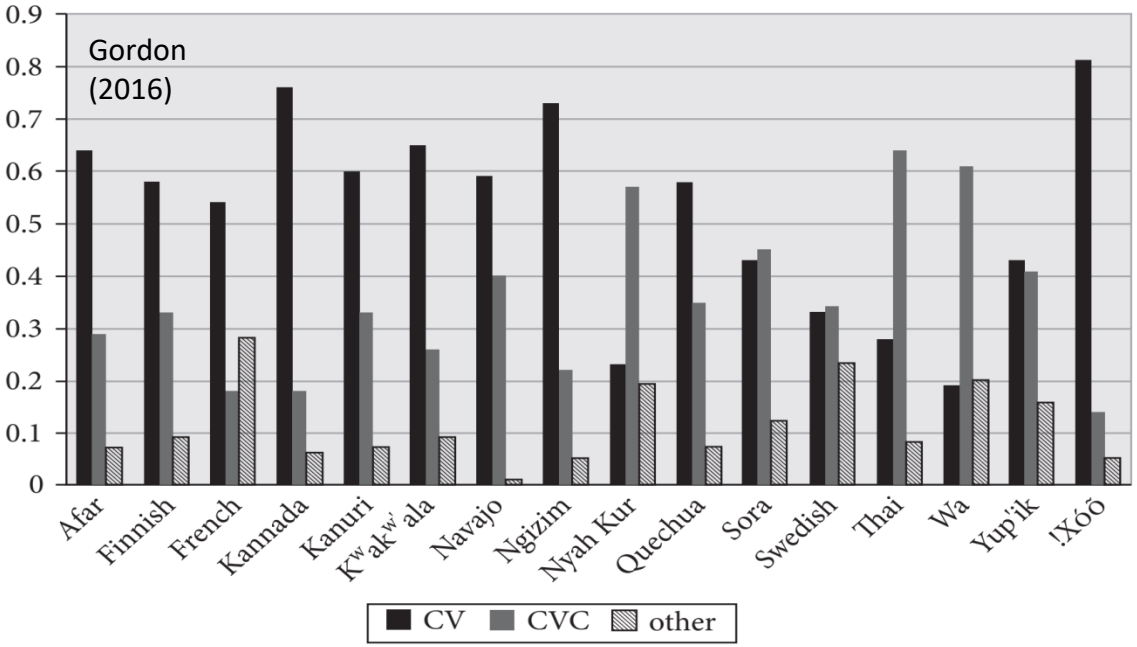
- Well-recognized unit in linguistic analysis
- Explains the number of rhythmic units
- This number is usually equal to the number of vowels (but *little, eagle*)
- Easy concept: If listeners differ in syllabifying particular words, it is generally the case that both possible syllabifications can be permitted (pastry = past.ry or pas.try)

Canonical Syllable Patterns

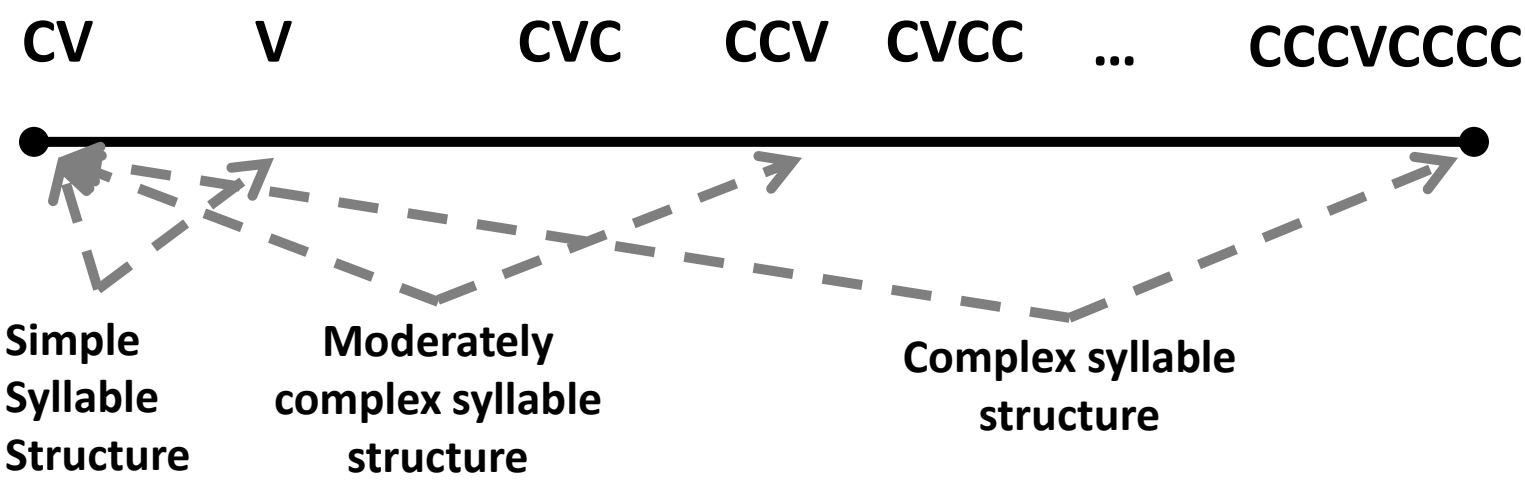
- Which syllable types are permitted in a language, sequencing of segments within syllables
- May be different in different positions (in onset vs. in cora)
  - Italian: allows more than one **C** in onset position (pro.fon.do ‘deep’, tro.no ‘throne’, blat.ta ‘cockroach’) but only a single **C** in coda position (san.to ‘saint’, pal.ko ‘platform’, tor.ta ‘cake’)
  - Khalkha Mongolian: allows only a single **C** in the onset, but permits two **C**s in coda position (mai**ɮ**s ‘cypress’, **ɔ**ims ‘sock’, nomx-t^{h} ‘to become tame’, i**ɮ**s-t^{h} ‘sandy’, **ʃ**arx-**ʧ**^{h} ‘coroner’, taws-t^{h} ‘salty’)

Canonical Syllable Patterns

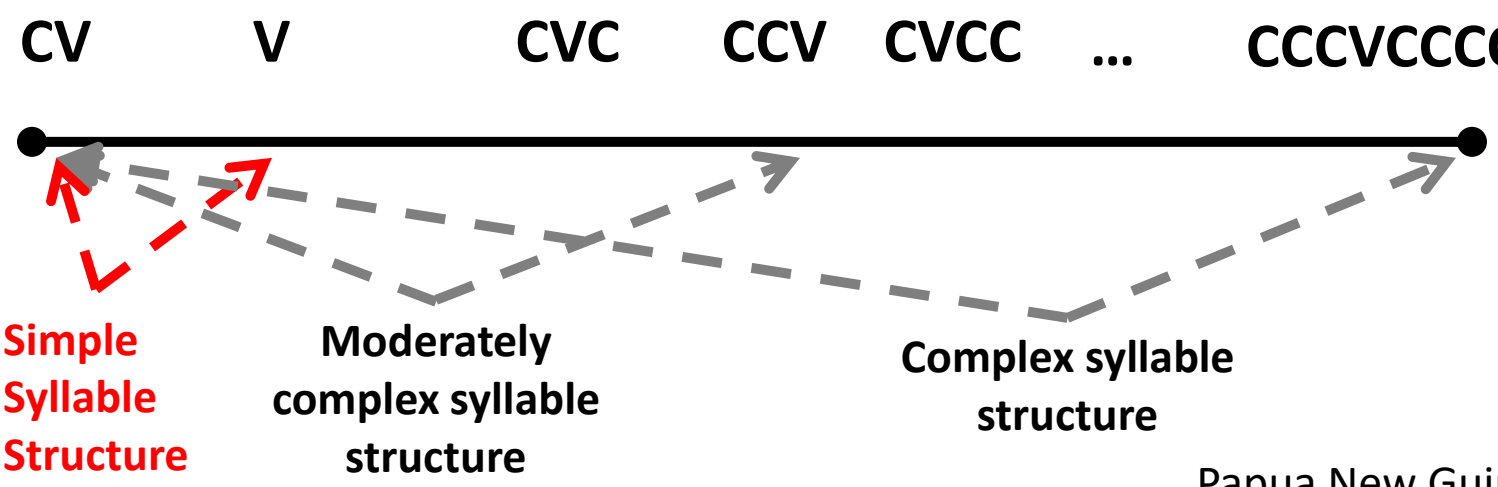
- CV – the most basic syllable, also within a language
- CV > CCV > CCCV and CV > V (markedness of the onset)
- CVC > CCV > CVCC > CVCCC
- CV > CVC > CCV



Syllable Structures in Languages

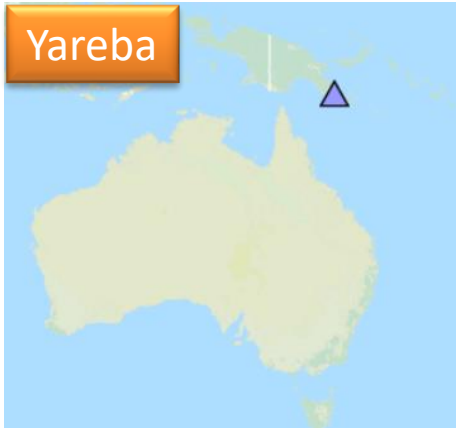


Simple Syllable Structures

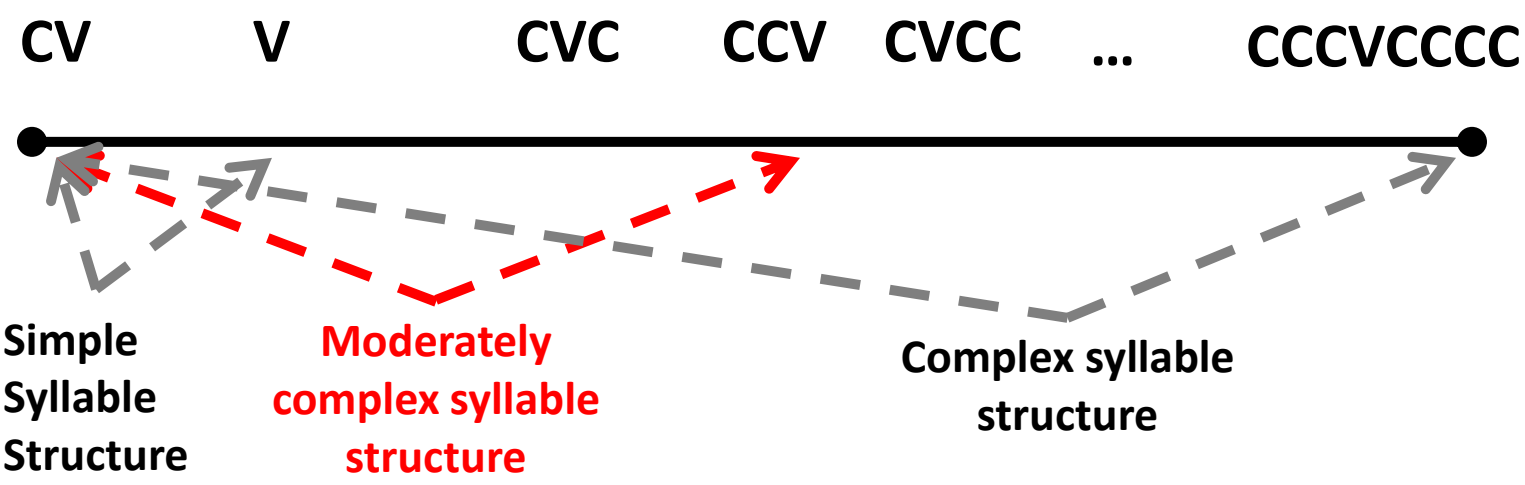


it is permitted not to have an initial consonant

Papua New Guinea



Moderately Complex Structures



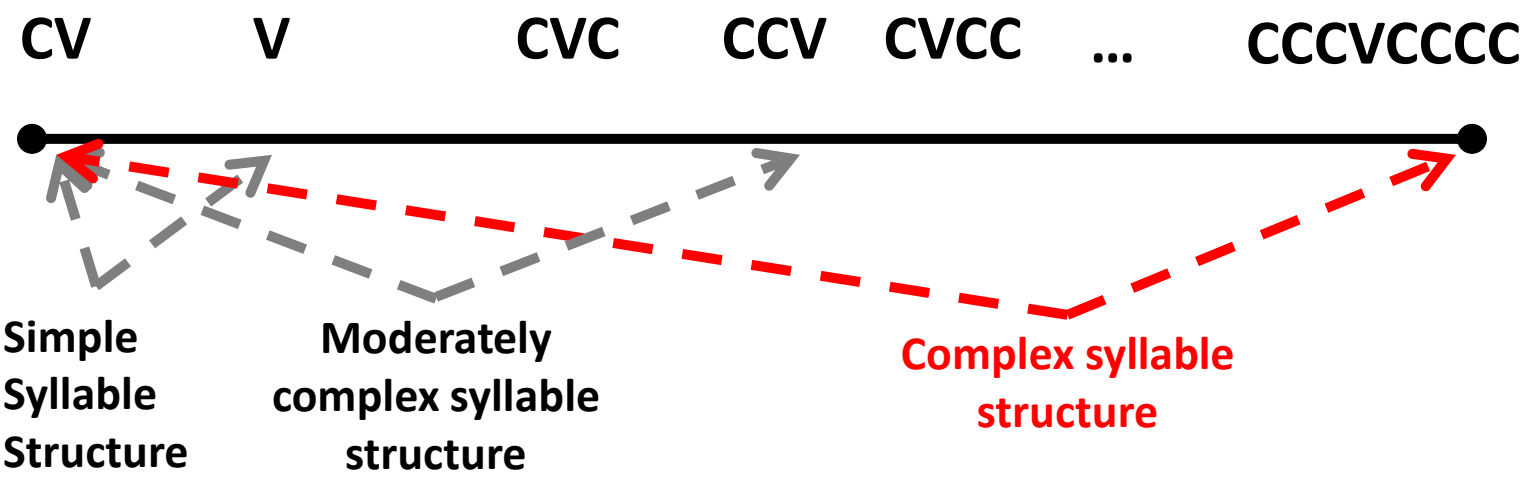
the most elaborate syllable permitted is CCVC

/bwak/ ‘(his) father’

the only possible second consonant in a sequence of two is /w/

There are strict limits on what kinds of combinations are permitted: The second of two consonants is commonly limited to being one of a small set belonging to either “liquids” (*r, l*) or “glides” ([w] in en. *wet*)

Complex Syllable Structures



English

(C)(C)(C)V(C)(C)(C)(C)

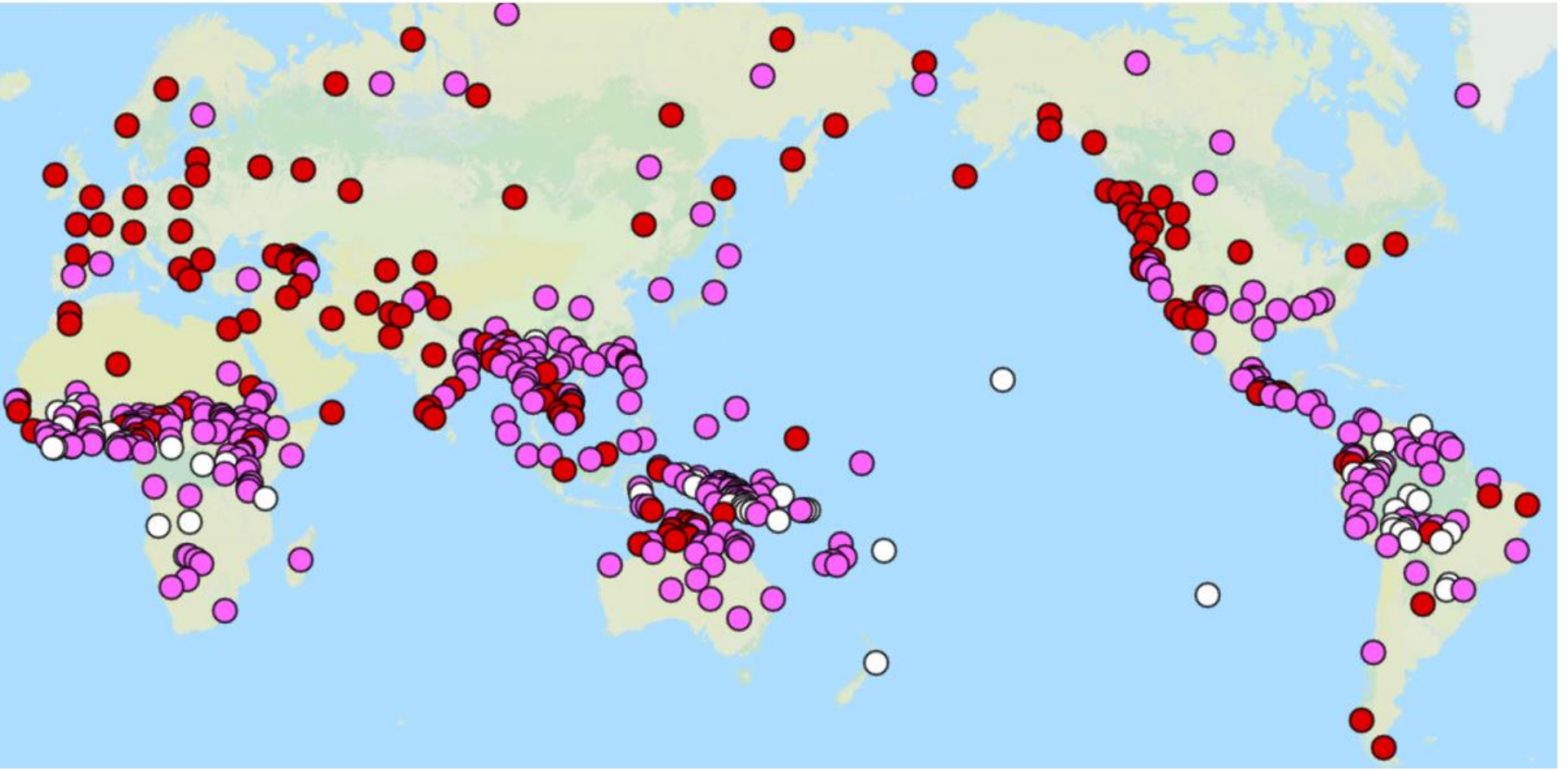
strengths /stɹɛŋkθs/

texts /tɛksts/

Distribution in WALS

Value	Representation
Simple syllable structure	61
Moderately complex syllable structure	274
Complex syllable structure	151
Total:	486

http://wals.info/feature/12A#2/16.6/153.1



Correlations Between Syllable Complexity and Other Properties

- Maddieson (2007), based on data from WALS:

  finds a positive correlation between complexity of syllable structure and the number of consonants such that languages permitting more complex syllable types tend to have a greater number of consonants.

small consonant inventories ↔ simple syllable structure

large consonant inventories ↔ complex syllable structures

		Syllable structure			
		Simple	Moderate	Complex	*Total*
Consonants	Small	20	42	16	*78*
	Mod. small	13	70	17	*100*
	Average	16	90	55	*161*
	Mod. large	3	56	37	*96*
	Large	8	15	23	*46*
	Total	*60*	*273*	*148*	*481*

Gordon (2016)

Syllable Structures: Japanese

Given word in Japanese borrowed from English:

redzonansu, oputimisuto, pen, endzin, medo in dz'apan, janki, noto-bukku, cupu, n'ujoku-tajmudzu, sekus'on, mota, dokuta, dzigudzagu, tikketto, indakus'on, s'okku, s'oppu, burokku, baransu, uisuki, majru, ojru, surogan, rajburari, ibuningu, bandaridzumu, intab'u, pasento, massadzi, ba, suta, atorakus'on, oba-koto, supido, dz'anaridzumu

1. *Find their English equivalents.*
2. *Translate to Japanese:*

elevator, seal, yard, bolt, cook, trust, crane, knob, viktor, clerk, lucky, colour, supper, error

Note: dz – a single phoneme [dz], like c [ts] in Czech

Suprasegmentals

- Vowels and consonants: segments of which speech is composed.
- Segments are composed together to form syllables
- Suprasegmentals are superimposed on the syllables. These are other features that are known as:
  - Stress
  - Length
  - Tones

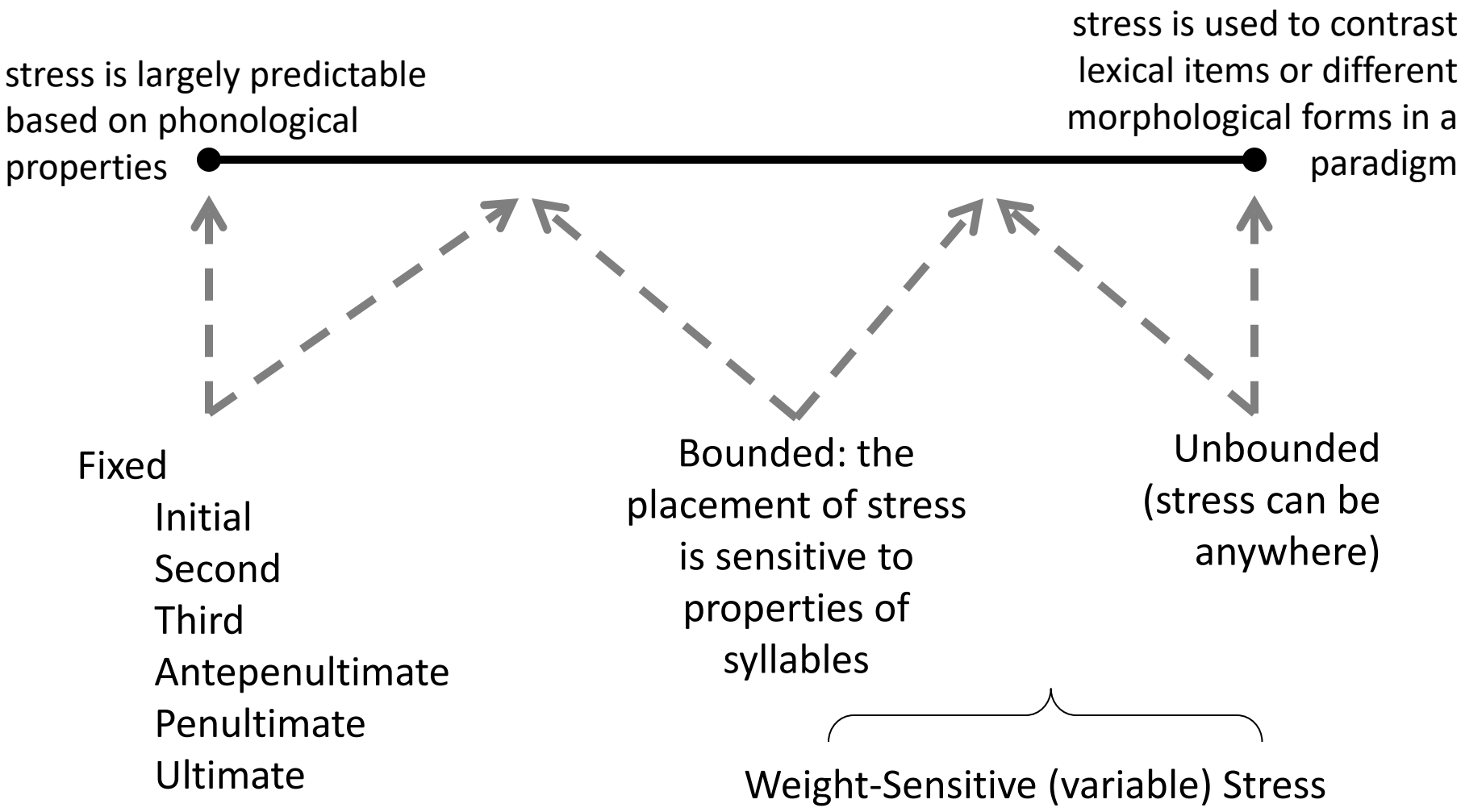
Suprasegmentals: Stress

- manifested by different acoustic properties
  - increased duration,
  - higher fundamental frequency
  - increased intensity
- Consonants and vowels in stressed syllables may undergo various fortition processes in stressed syllables ↔ Consonants and vowels in unstressed syllables may conversely display lenition effects

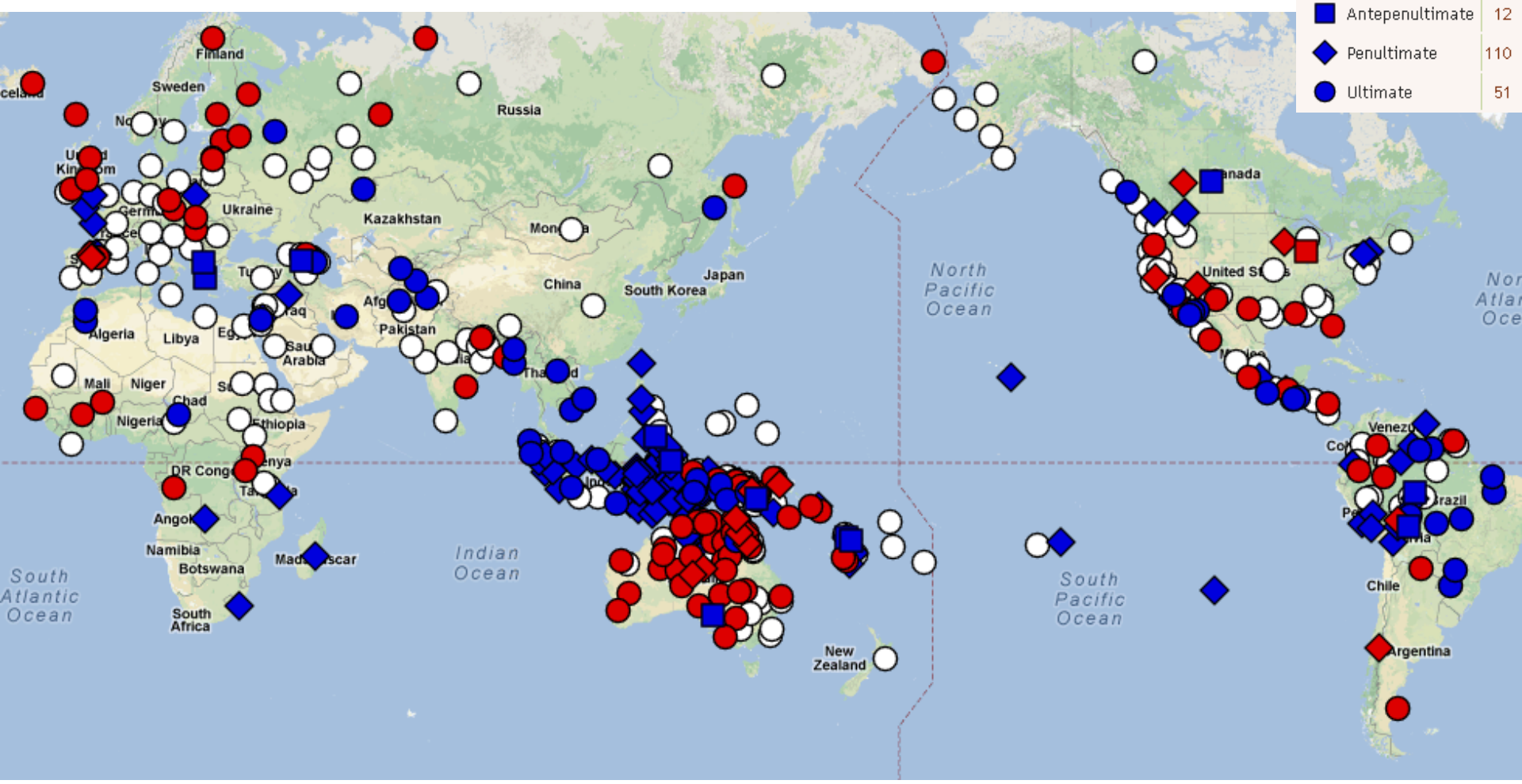
Databases on Stress Patterns

- StressTyp , **StressTyp2** (Goedemans et al. 2015) is a typological database containing information on stress and accent patterns in over 750 of the world's languages with nearly every language family represented.
  - http://st2.ullet.net/
- **WALS** (World Atlas of Language Structures), info on 502 languages
  - https://wals.info/

Suprasegmentals: Stress



WALS: Fixed Stress Locations



WALS: Fixed Stress Locations

- *Czech*
- *Finnish*
- *Icelandic*
- *Hungarian*
- *Greek*
- *Macedonoian*
- *Polish*
- *Welsh*
- *Basque*

Value	Representation
No fixed stress (mostly weight-sensitive stress)	220
Initial: stress is on the first syllable	92
Second: stress is on the second syllable	16
Third: stress is on the third syllable	1
Antepenultimate: stress is on the antepenultimate (third from the right) syllable	12
Penultimate: stress is on the penultimate (second from the right) syllable	110
Ultimate: stress is on the ultimate (last) syllable	51
Total:	502

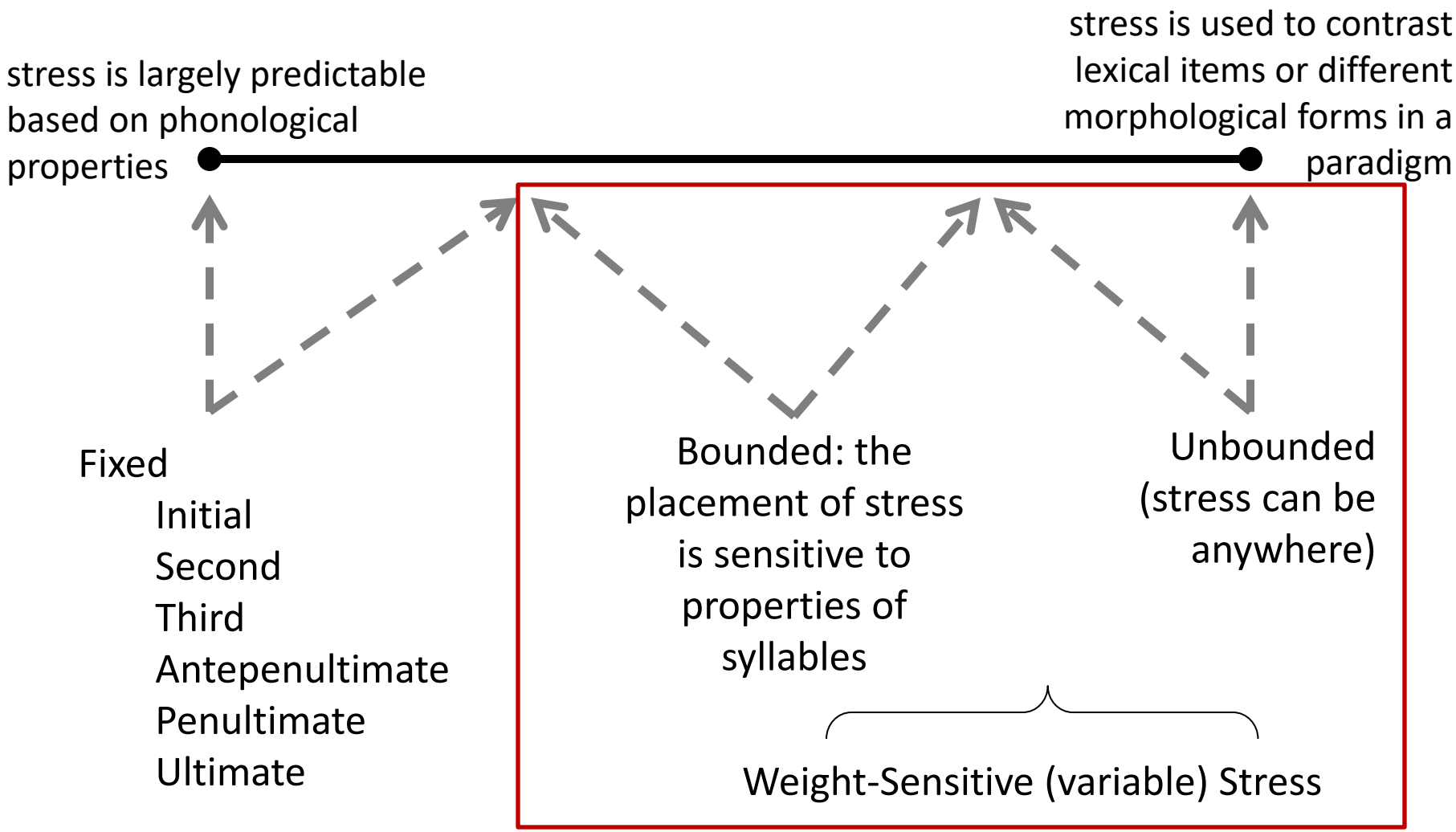
Mapudungun/Araucanian

ṯiˈpanto ‘year’, *eˈlumuˌyu* ‘give us’.

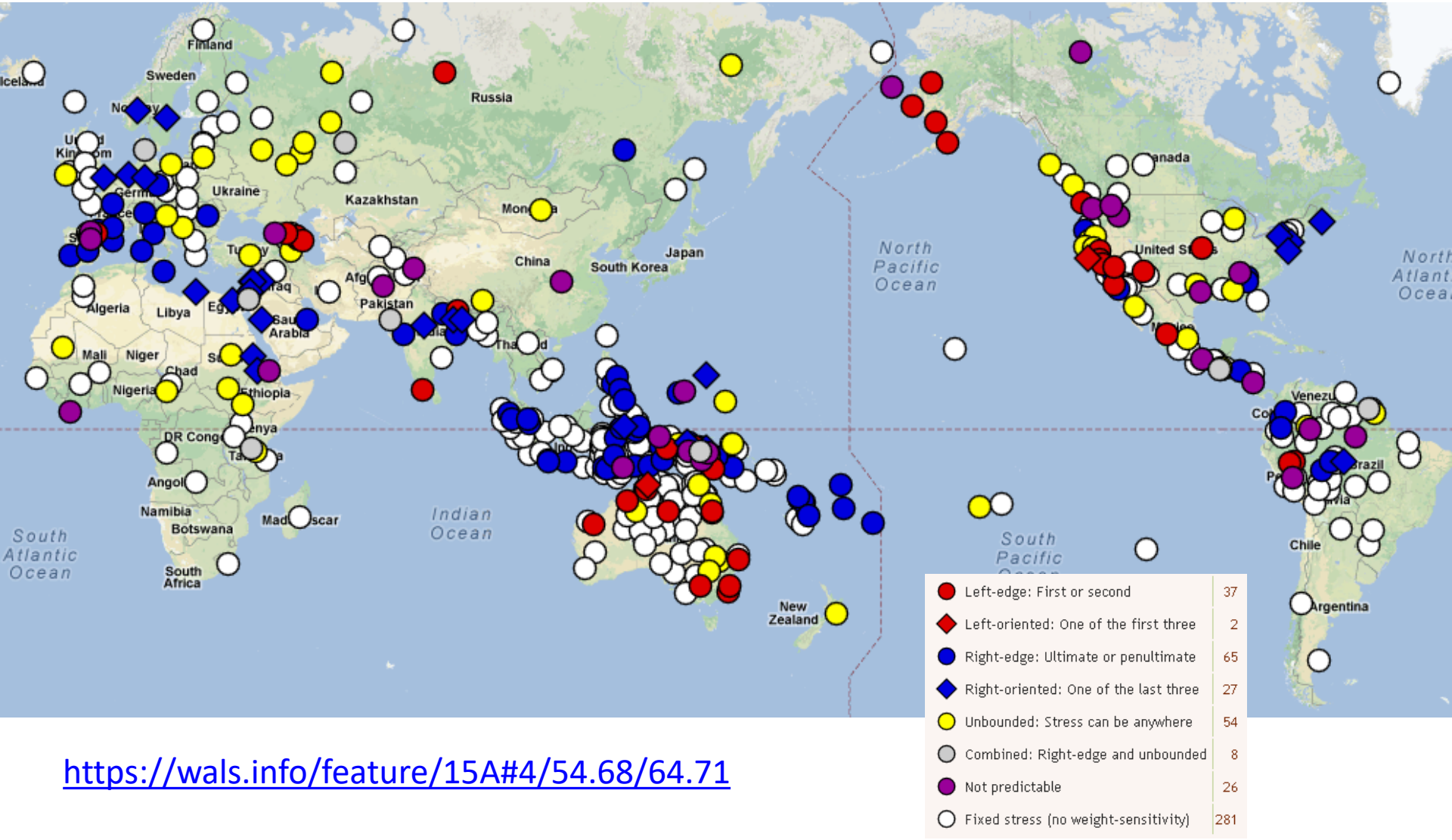
Winnebago, also known as **Ho-Chunk language** (*Hoocąk, Hocąk*)
Siouan language family

hochiˈchinik ‘boy’, *waghiˈghi* ‘ball’

Suprasegmentals: Stress



Weight-Sensitive Stress



https://wals.info/feature/15A#4/54.68/64.71

Weight-Sensitive Stress: Unbounded

Russian

дорога

vowel reduction

(1) dor**O**ga /dər**O**gə/
‘a road’

(2) dorog**A** /dərʌg**A**/
‘dear’

a) <u>to contrast lexical items:</u>

b) <u>to contrast different morphological forms in a paradigm:</u>

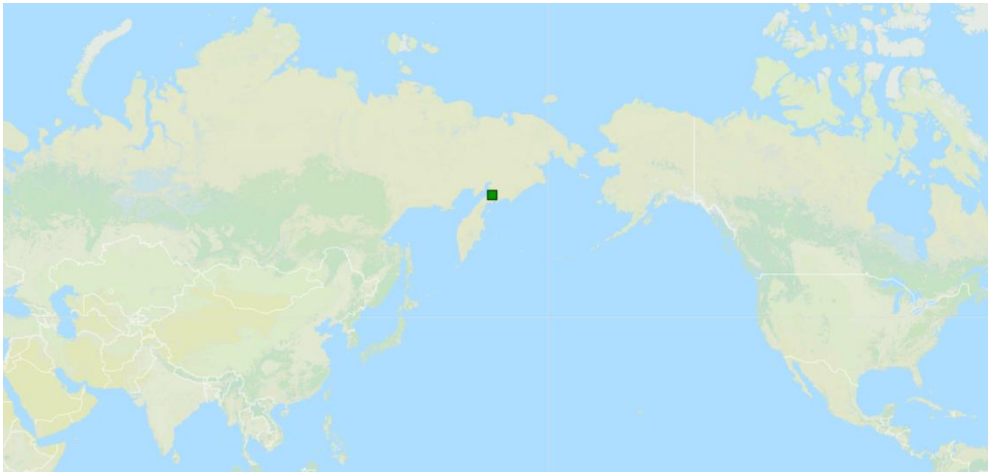
		a	b	c	d	e	f
Единственное число	И	карта	стол	море	вино	волк	губа
	Р	карты	стола	моря	вина	волка	губы
	Д	карте	столу	морю	вину	волку	губе
	В	карту	стол	море	вино	волка	губу
	Т	картой	столом	морем	вином	волком	губой
	П	о карте	о столе	о море	о вине	о волке	о губе
Множественное число	И	карты	столы	моря	вина	волки	губы
	Р	карт	столов	морей	вин	волков	губ
	Д	картам	столам	морям	винам	волкам	губам
	Т	картами	столами	морями	винами	волками	губами
	П	о картах	о столах	о морях	о винах	о волках	о губах

mO**r**’e – ‘a sea’ (Nom.Sg.)
mor’**A** – ‘seas’ (Nom. Pl)

Weight-Sensitive Stress: Bounded

tátul	—	fox
nətɣálqin	—	hot
nuráqin	—	far
ɣálɣən	—	skin
néqəqin	—	quick
nəsáqqin	—	cold
tapláɹjətkən	—	he sews shoes
kámɣətək	—	roll up
ʔítək	—	be
paqátkuk	—	run
nílɣəqinat	—	white
púnta	—	liver
qetúmɣən	—	relative
píwtak	—	fall
nəmítqin	—	skillful
túmɣətum	—	friend
tátka	—	walrus
káttil	—	forehead
qalpúqal	—	rainbow
kəpírik	—	hold in arms
təvítatətkən	—	I work
píntəvəlɹək	—	throw at each other

Alyutor or **Alutor** is a language of Russia that belongs to the Chukotkan branch of the Chukotko-Kamchatkan languages



Formulate the stress rules and put the stress for the following words:

Alyutor

sawat - lasso
pantawwi - boots
nəktəqin - solid
nəminəm - bouillon

Suprasegmentals: Vowel Length

Within languages that make length distinctions, short segments tend to vastly outnumber their long counterparts.

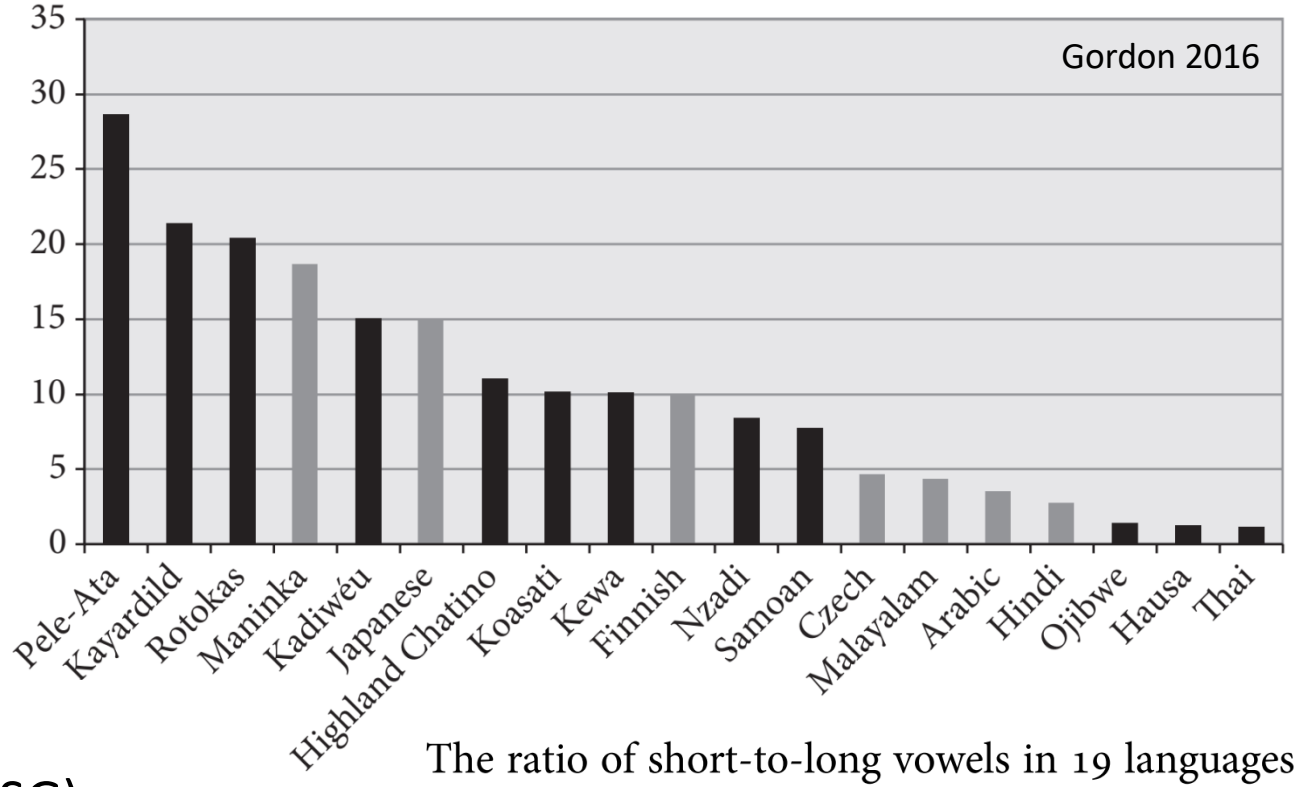
Estonian

saada /saːta/ – ‘to get’
saada /saˑta/ – ‘send!’
sada /sata/ – ‘hundred’

Arabic, Sanskrit, Japanese, Hebrew, Finnish, Hungarian, Italian, Czech etc.

Czech

šipku – ‘arrow’
šípku – ‘rosehip’ (Gen, SG)

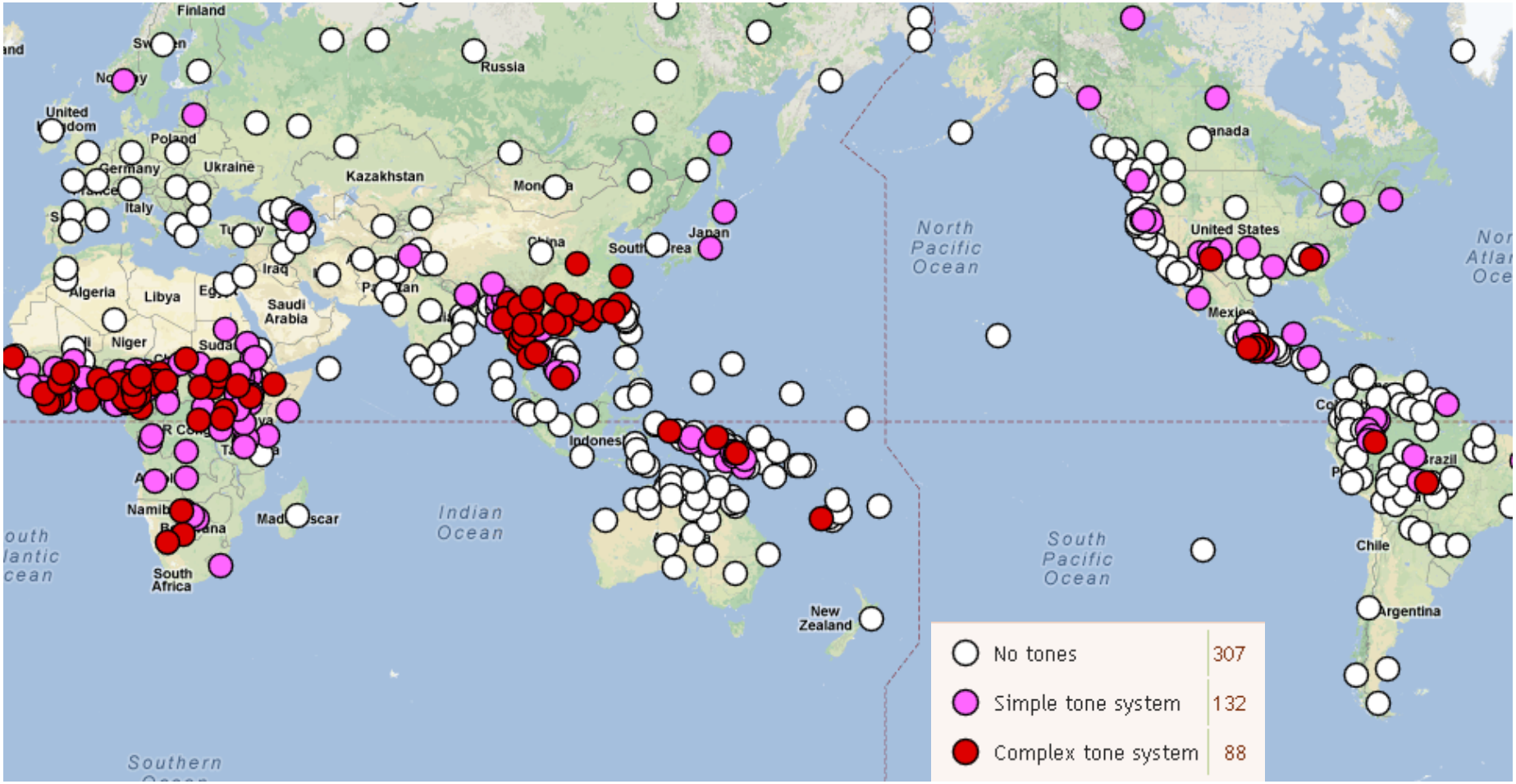


The ratio of short-to-long vowels in 19 languages

Suprasegmentals: Tone

- The use of different pitch patterns to distinguish individual words or the grammatical forms of word
- Up to 60–70% of the world's languages are tone languages (surprisingly sharp disagreements: different numbers in different classifications, cf. Maddieson's (2013) in WALS)
- Tone languages are not distributed evenly throughout the world (widespread in Africa, Central America, and Southeast Asia)

WALS: Tones in languages



Suprasegmentals: Tone

No Tones — **Simple tone systems** — **Complex tone systems**

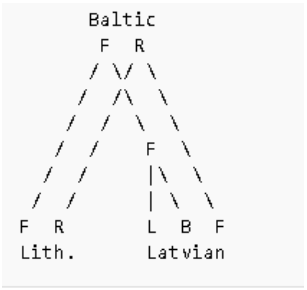
English, Czech, German, Hebrew, Arabic, Finnish, French, …

Serbian

+ length,
+ variable stress

short falling ⟨ȉ⟩,
short rising ⟨ì⟩;
long falling ⟨î⟩
long rising ⟨í⟩

ne znam = /nèznām/ - ‘I don’t know’



Lithuanian, Latvian

Stressed syllables containing a long vowel, diphthong, or a sonorant coda—may have one of two tones, falling (acute) tone or rising (circumflex) tone

/kʰáá/ - ‘to trade’
/ kʰ āā/ - ‘to get stuck’
/kàà/ - ‘galangal’
/kàá/ - ‘leg’
/káà/ - ‘leg’

Thai

Ideal tone language: Every syllable in a word is differentiated solely on the basis of tone
Reality: most tone languages have constraints on the distribution of tones (e.g. limited to roots and certain affixal domains)

Serbian ↔ Russian Accents and Tones

Serbian	Russian		Serbian	Russian
говòрити	говор**и**ть [govor**i**ti] ‘speak’		беспòвратно	бесповор**о**тно [bespovor**o**tno] ‘irreversibly’
мухòловка	мухол**о**вка [muchol**o**vka] ‘flytrap’		мрâз	мор**о**з [mor**o**z] ‘frost’
мêд	мёд [mjed] ‘honey’		крòтки	кр**о**ткий [kr**o**tkij] ‘gentle’
брôд	брод [brod] ‘ford’		седòбради	седобор**о**дый [sedobor**o**dyj] ‘grey-bearded’
брòда	бр**о**да [br**o**da] ‘ford’, GSg		бèзумни	без**у**мный [bez**u**mnyj] ‘mad’
брáда	бород**а** [borod**a**] ‘beard’		вȕчица	волч**и**ца [volč**i**ca] ‘she-wolf’
брâв	б**о**ров [b**o**rov] ‘hog’		бȕха	блох**а** [bloch**a**] ‘flea’
красòта	красот**а** [krasot**a**] ‘beauty’		тȕсти	т**о**лстый [t**o**lstyj] ‘fat’
блâто	бол**о**то [bol**o**to] ‘bog’		влáкно	волокн**о** [volokn**o**] ‘fibre’
злâто	з**о**лото [z**o**loto] ‘gold’		слàби	сл**а**бый [sl**a**byj] ‘weak’

1. Translate from Russian into Serbian: г**о**род [g**o**rod] ‘town’, голов**а** [golov**a**] ‘head’, кол**о**да [kol**o**da] ‘block’, безголовый [bezgol**o**vyj] ‘headless’, голор**у**кий [golor**u**kij] ‘barehanded’ , золоторогий [zolotor**o**gij] ‘gold-horned’, волк [volk] ‘he-wolf’, грех [grech] ‘sin’, в**е**ра [v**e**ra] ‘belief’, сестр**а** [sestr**a**] ‘sister’, глот**а**ть [glot**a**t’] ‘swallow’
2. Translate from Serbian into Russian:

врàна вèдро зàмка òбрезати
нёбо вёдро нòски

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