

Natural Language Processing

Phonetics, Phonology

- Phonetics is the study of human sounds.
- Phonology is the classification of the sounds within the system of a particular language or languages. Phonetics is divided into three types according to the
 - production (articulatory),
 - transmission (acoustic) and
 - perception (auditive) of sounds.
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- Three categories of sounds must be recognised at the outset: phones (human sounds), phonemes (units which distinguish meaning in a language), allophones (non-distinctive units).

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Phonetics, Phonology

- Production (articulatory):
 - How speech sounds are articulated. Description and classification of speech sounds.
- Transmission (acoustic):
 - How speech sounds are generated and how they are transmitted. The relationship between articulation and acoustic output.
- Perception (auditive):
 - How human ears perceive speech sounds

Phonetics, Phonology

- - Phones:
 - An individual sound of speech; an elementary sound unit.
 - [k], [b], [f], [u], [d]
 - Phonemes:
 - The smallest sound unit in a language that distinguishes word meanings.
 - /p/, /b/, /e/
 - Allophones:
 - is a variant of a phoneme.
 - [p^h] as in “pin” and [p] as in “spin”
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IPA

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2020)

CONSONANTS (PULMONIC)

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	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			

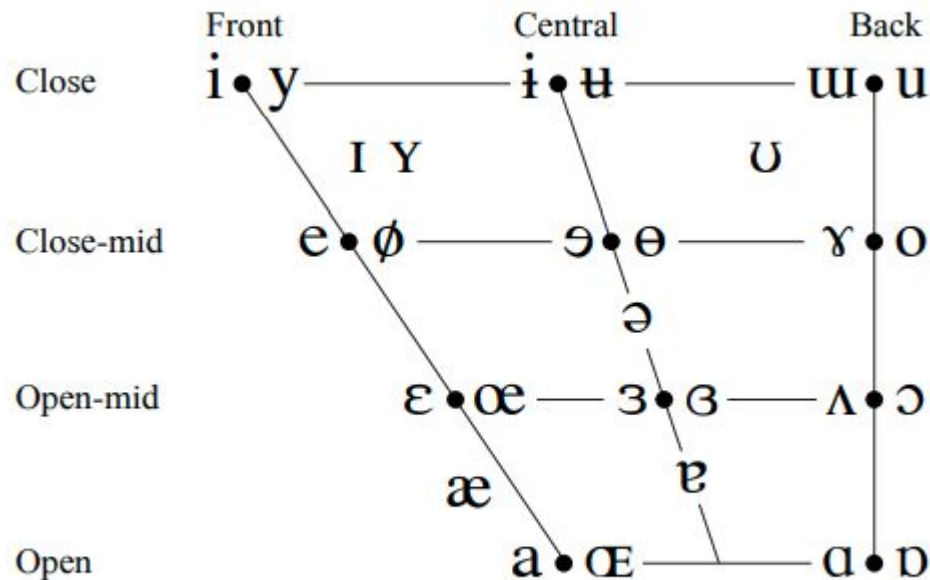
Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

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CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
◌ ɸ Bilabial	ɓ Bilabial	' Examples:
◌ ǀ Dental	ɗ Dental/alveolar	p' Bilabial
◌ ǃ (Post)alveolar	f Palatal	t' Dental/alveolar
◌ ǂ Palatoalveolar	ɡ Velar	k' Velar
◌ ǁ Alveolar lateral	ɠ Uvular	s' Alveolar fricative

VOWELS



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Articulation



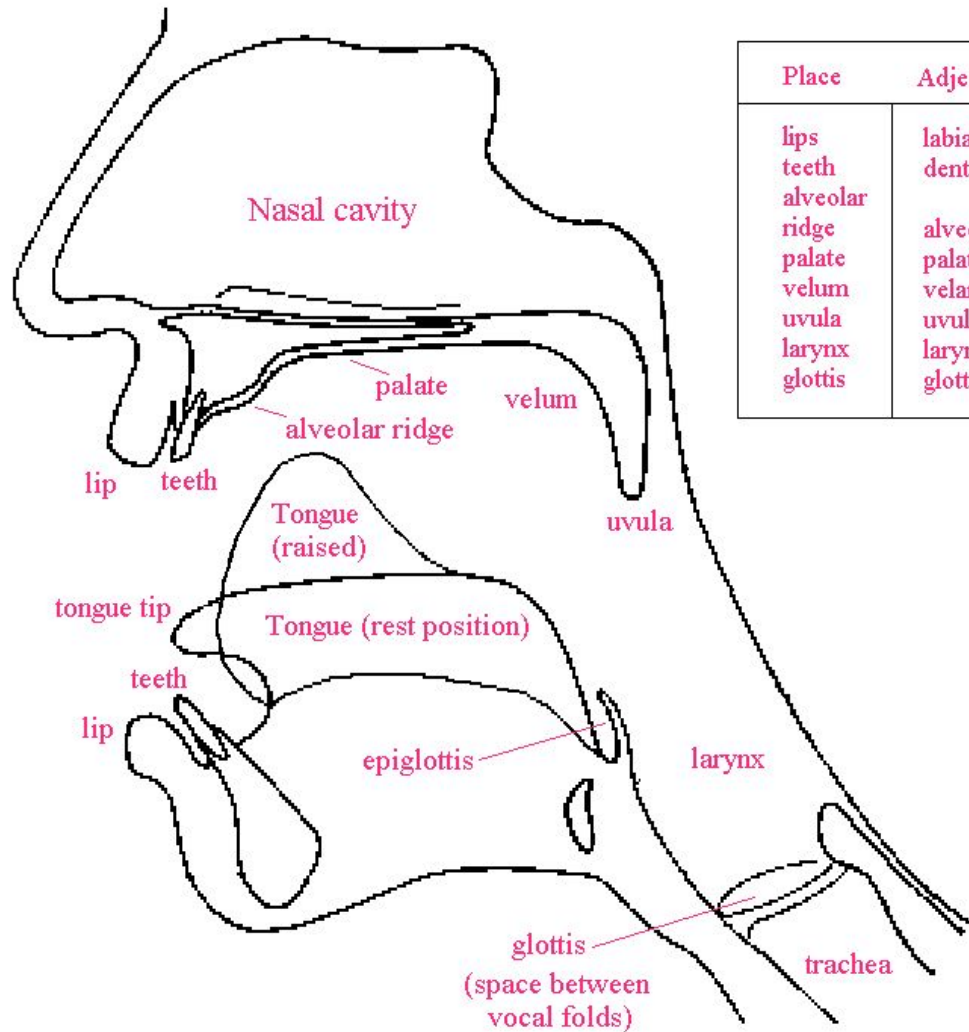
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graph TD; A[Articulation] --> B[Places]; A --> C[Manners];
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- Places

- lips (labial)
- teeth (dental)
- alveolar ridge (alveolar)
- hard palate (palatal)
- soft palate (velar)
- uvula (uvular)
- pharynx (pharyngeal)
- larynx/glottis (glottal)

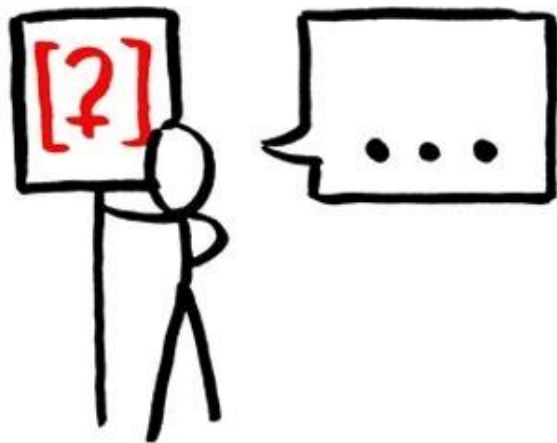
- Manners

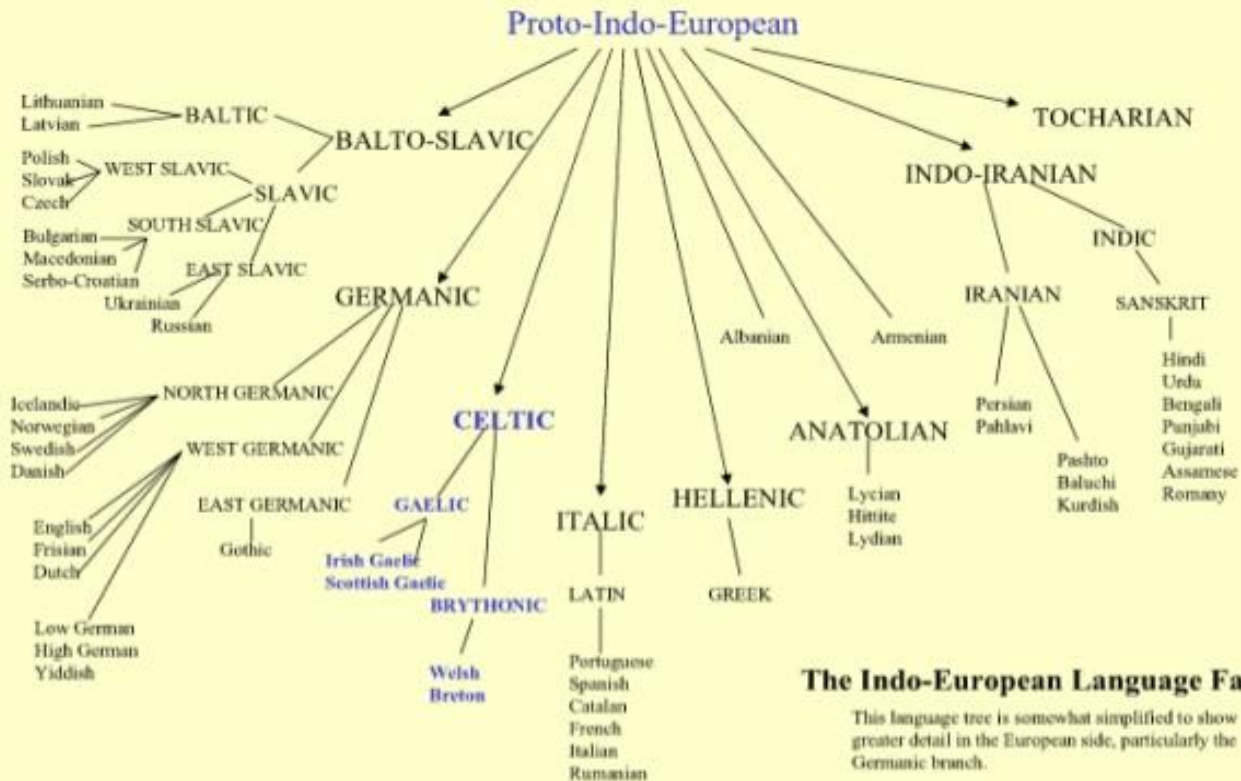
- stop/plosive
- fricative
- nasal
- lateral
- glide/approximant
- trill
- tap/flap



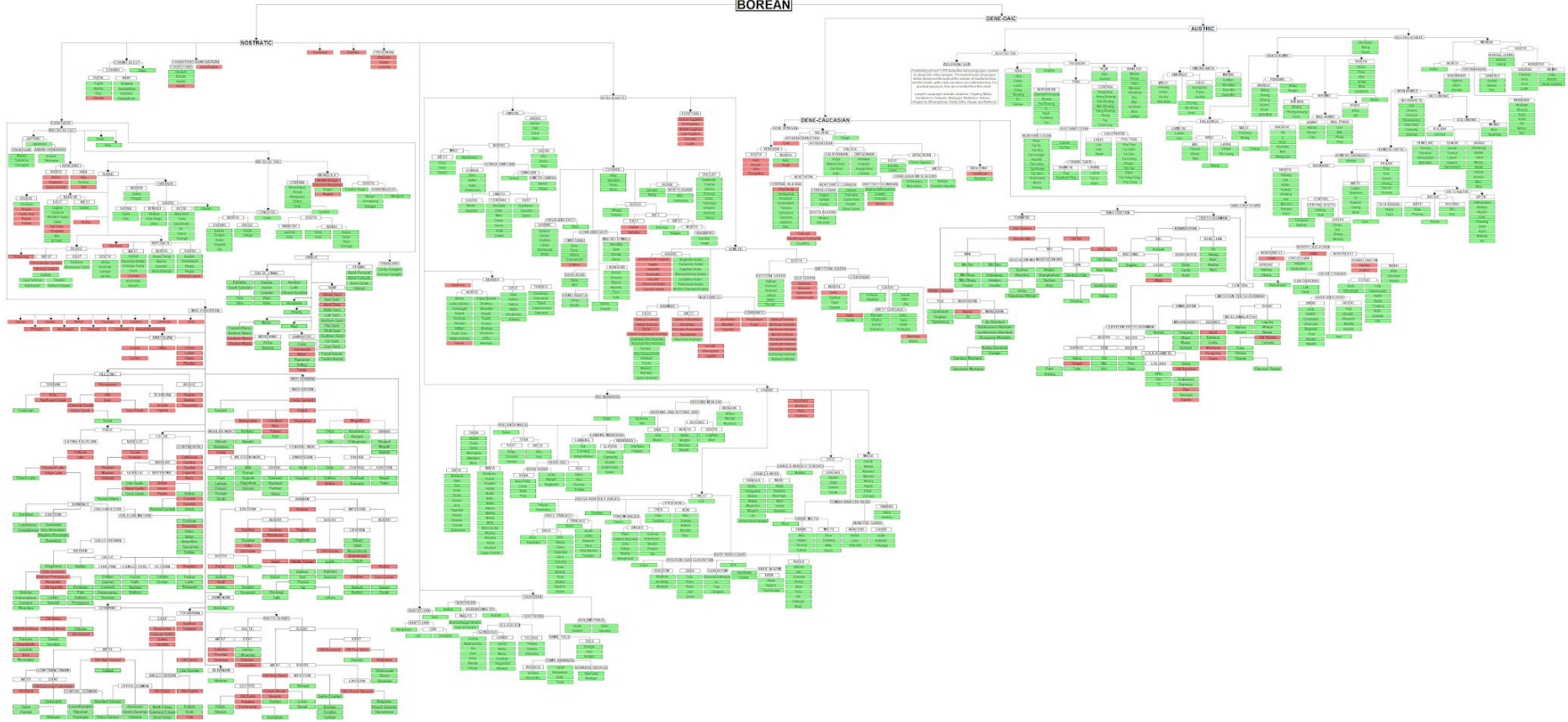
Place	Adjective
lips	labial
teeth	dental
alveolar ridge	alveolar
palate	palatal
velum	velar
uvula	uvular
larynx	laryngeal
glottis	glottal

IPA: Articulation



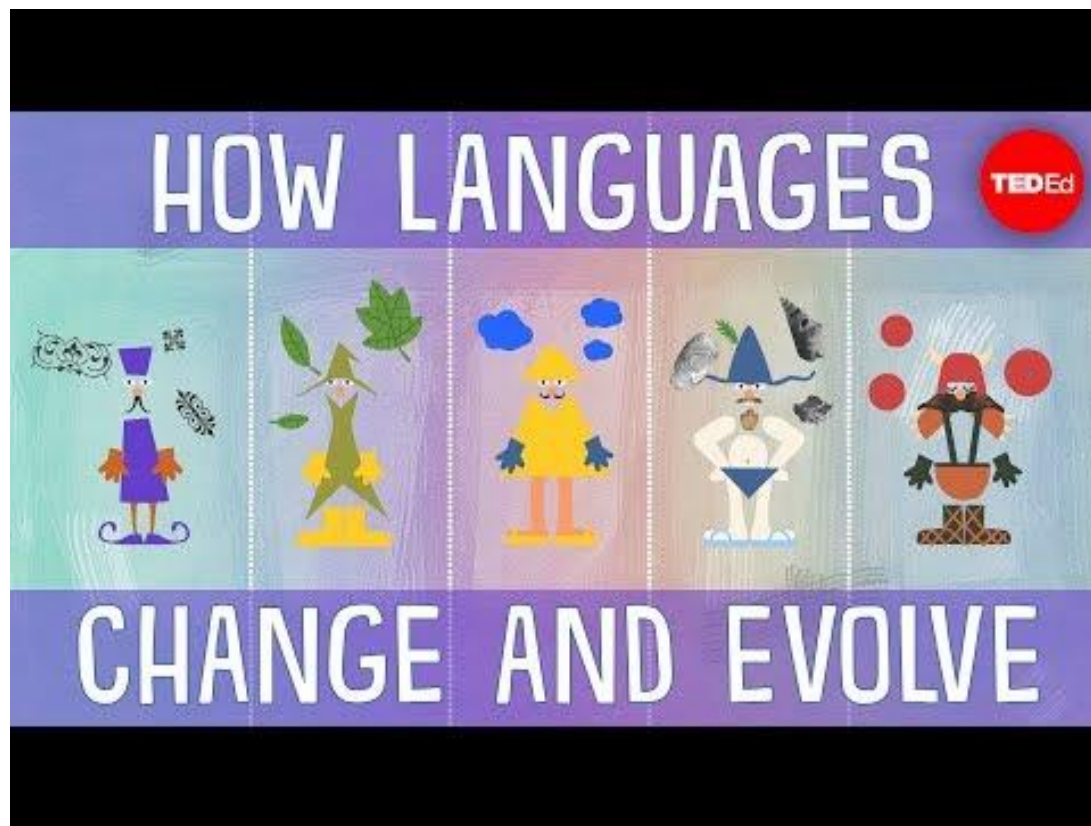


BOREAN



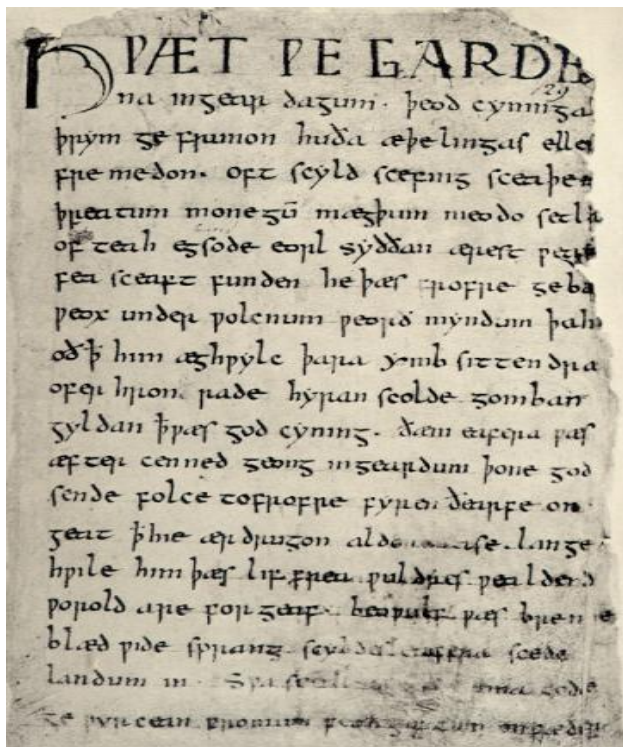
<https://upload.wikimedia.org/wikipedia/commons/1/14/BoreanLanguageTree.png>

Language Family



Introduction

- What language?



- Old English
- 8th-11th Century

Beowulf

Hwæt! We Gardena in geardagum, þeodcyninga,
þrym gefrunon, hu ða æþelingas ellen fremedon.
Oft Scyld Scefing sceaþena þreatum, monegum
mægþum, meodosetla ofteah, egsode eorlas.
Syððan ærest wearð feascraft funden, he þæs
frofre gebad, weox under wolcnum,
weorðmyndum þah, oðþæt him æghwylc þara
ymb sittendra ofer hronrade hyran scolde,
gomban gyldan. þæt wæs god cyning!

Listen! We of the Spear-Danes in the days of yore, of
those clan-kings, heard of their glory, how those nobles
performed courageous deeds. Often Scyld, Scef's son,
from enemy hosts from many peoples seized
mead-benches; and terrorised the fearsome Heruli
after first he was found helpless and destitute, he then
knew recompense for that, he waxed under the clouds,
throve in honours, until to him each of the bordering
tribes beyond the whale-road had to submit, and yield
tribute. That was a good king!

<http://thehistoryofenglish.com/mp3s/beowulf.html>