



SSC: The Science of Talking **Sounds of the World's Languages**

Michael Ashby



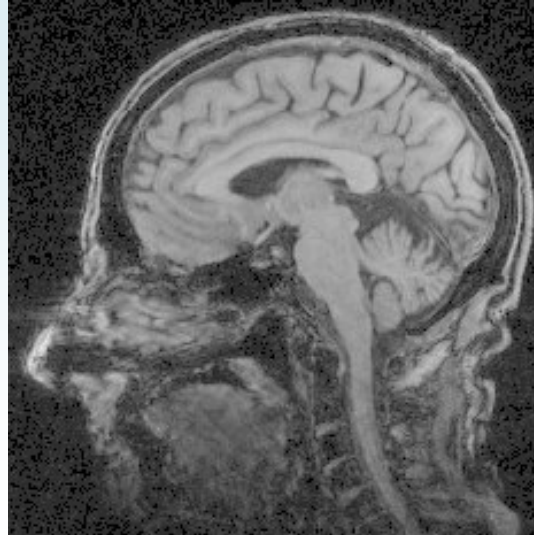
How many languages are there in the world?

How many distinctive speech sounds are there in English?

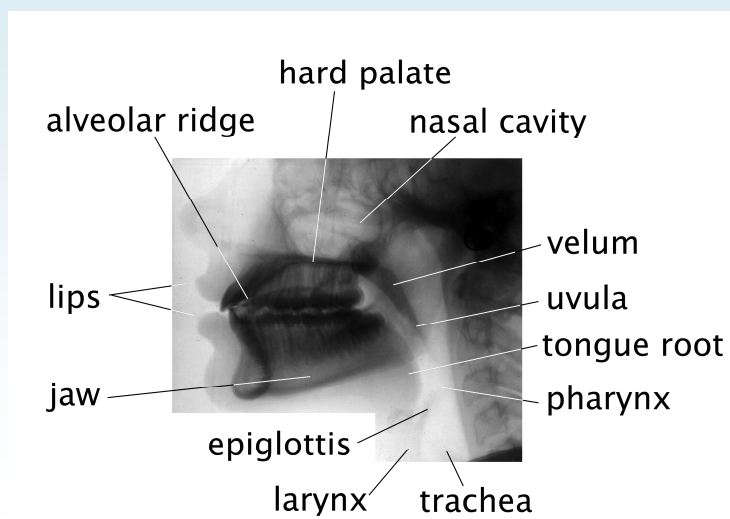
Is English a typical language? In what ways (if any) is it unusual?

How many distinctive speech sounds are there in all the languages of the world considered together?

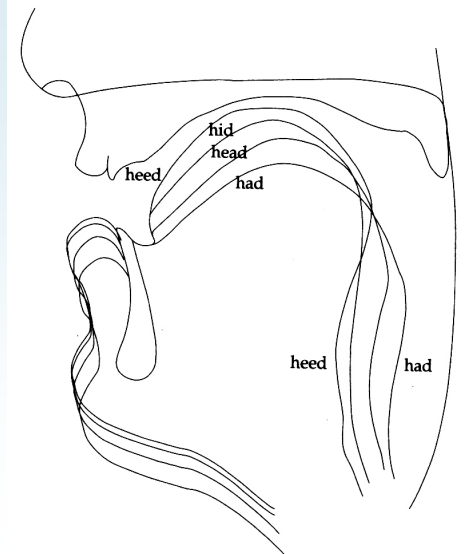
MRI mid-sagittal view



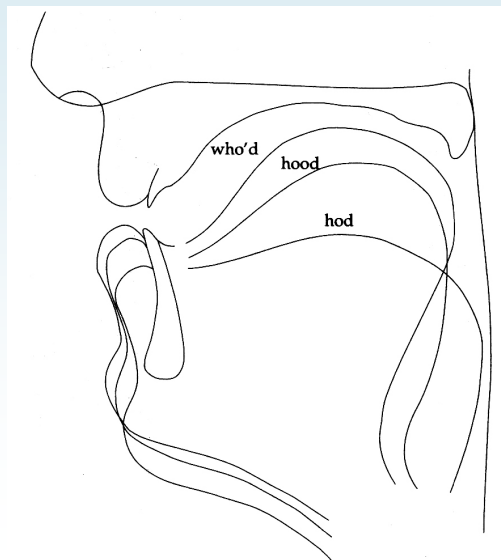
Lateral X-ray of the vocal tract



Tongue shapes in front vowels



Tongue shapes in back vowels



A very quick look at vowels

- English has a big vowel system, but doesn't use...
- Front rounded vowels such as [y]
 - (French, German,...)
- Nasalized vowels such as [ẽ]
 - (French, Polish, Hindi, ...)
- Unrounded back vowels such as [ʊ]
 - Korean, Turkish



Contrastive back rounding in Korean

ㅈ [ʷrʊmtɕʰaŋ]	'threat'
ㅉ [urʊm]	'cry' (n)

- How will a rounded front vowel [y] differ acoustically from an unrounded vowel with the same tongue position [i] ?

Consonants

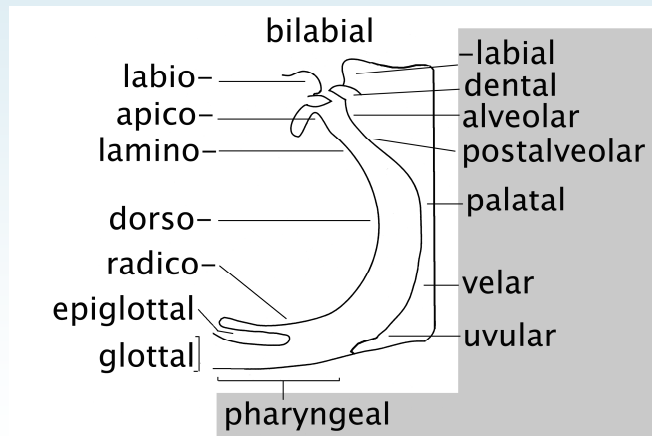
CONSONANTS (PULMONIC)

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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			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

Terminology for place of articulation



Familiar consonant, unfamiliar context

English only permits the velar nasal [ŋ] at the *ends* of syllables

Syllable-initial velar nasal in Filipino (Tagalog)

[ŋiti] 'smile'

Exotic places (of articulation)

pharyngeal (constriction of pharynx)
-Arabic

retroflex (tongue tip curled back)
- in many languages of the Indian sub-continent



The pharyngeal place of articulation

[ħ] voiceless pharyngeal fricative

Egyptian Arabic

[s^ʰabaħilχeir] 'good morning'

Exotic manners (of articulation)

trills (also called rolls)

a flexible articulator is made to vibrate in a flow of air, interrupting the airflow several times

alveolar trill (Spanish, Italian, ...)

Spanish [rosa] 'rose'



Uvular trills



French singer
Edith Piaf (1915-1963),
recorded in 1960

Can we trill anything else?

Bilabial trill [ʙ] in Kele

[^mʙulim] 'face'

Taps and flaps

alveolar tap [ɾ] - Spanish *pero* 'but'

retroflex flap [ɽ] – heard in American English
dirty

With Sound From Africa, the Phonetic Alphabet Expands

By MICHAEL ERARD

Published: December 13, 2005

For the first time in 12 years, the International Phonetic Association is amending its official alphabet. A sound called the labiodental flap will be granted its own letter, one that looks something like a v with a hook.

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**THANK YOU
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àvúrúngù

OFFICIAL
RECOGNITION A
sound present in more

The sound, a buzz sometimes capped by a faint pop, is present in more than 70 African languages. It is produced by the lower lip moving back and forward, flapping on the inside of the upper teeth.

pínín *bad soil*
aívíl *oily sauce*
víkti *harden*
pəvaw *escape*
keváv *whiten*



V

biw *sudden explosion
of fire*
piw *pull something
till it breaks*
viw *see something pass
quickly*
viw *hearing
something pass by*
wiw *something attached*



pəvaw *escape
quickly*
pəwaw *noise in
forest*





Double articulation

Two articulations of the same type at the same time

Labial-velar plosives [kp gb] in Yoruba

[ɔgbɔ̃] 'wisdom'

[akpa] 'arm'



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Non-pulmonic airstreams

Ejectives

The closed glottis is used like a piston to compress air

[p' t' k'] in Amharic

[k'əddədə] 'he tore it' 

[kəbbəbə] 'he encircled' 

implosives

downward (suction) movement of the larynx,
with the vocal folds vibrating on an
outwards flow of lung air

b d g



Clicks

A sucking noise (an oral suction stop)
superimposed on a stream of pulmonic
sounds

[☉ | ! ≠ ||]

Many click accompaniments (voiced,
nasalized, ...) leading to big click systems

