

# Phonemes, Allophones, and the International Phonetic Alphabet



Primitives of linguistic description and foundations of linguistic theory.

# The International Phonetic Alphabet



A standard that is not quite standard enough.

# Three Important Parameters



- ❧ **Place.** Where you make it.
- ❧ **Manner.** How you make it. Its kind.
- ❧ **Voice.** What your glottis is doing when you make it.
- ❧ There are other microparameters, but these are the big ones.

# Place



## ☞ Place

- ☞ Where in the vocal tract the closest (and second closest) constriction is made.
- ☞ For example, [b] has **bilabial** place because the tightest constriction (a complete closure) is made with two lips.

# Manner



## ☞ Manner

- ☞ How the tightest constriction in the vocal tract is made.
- ☞ For example, [b] has the manner **stop** or **plosive** because it requires a complete closure.

# Voice



## ☞ **Voice**

- ☞ What the vocal folds are doing during production of a sound.
- ☞ For example, [b] is **voiced** because the vocal folds are vibrating during its production.

# Human Readable Phonetics



- ❧ Now, the [International Phonetic Alphabet \(IPA\)](#) is structured according to these three parameters.
- ❧ This wasn't always the case.
- ❧ In its current form, the IPA can plausibly be used in language technologies (but not without additional stipulations).



# The IPA



- ❧ The International Phonetic Alphabet.
- ❧ Meant as a way of transcribing physical speech sounds, not theoretical abstractions.
  - ❧ Hah! Linguists and speech scientists were so naive!
  - ❧ Now we sometimes use it for both purposes.
- ❧ Symbols are defined in terms of **articulation**, not in terms of **acoustics**.

# Whence the IPA?



- ❧ There were already alphabets and other systems for transcribing speech sounds before the IPA.
- ❧ However, the early phonetician Paul Passy saw the need for a universal system of phonetic transcription to
  - ❧ Make it easier for linguists to communicate with one another.
  - ❧ Establish world peace.
- ❧ The IPA has been more successful at the first goal than at the second.

# Paul Passy (1859-1940)



# Basic Consonants

## THE INTERNATIONAL PHONETIC ALPHABET (revised to 1993)

### CONSONANTS (PULMONIC)

	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			ɾ					ʀ		
Tap or Flap				ɽ		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.

# Non-Pulmonic Consonants



## CONSONANTS (NON-PULMONIC)

Clicks		Voiced implosives		Ejectives	
⊙	Bilabial	ɓ	Bilabial	'	Examples:
	Dental	ɗ	Dental/alveolar	p'	Bilabial
!	(Post)alveolar	ɟ	Palatal	t'	Dental/alveolar
≠	Palatoalveolar	ɠ	Velar	k'	Velar
	Alveolar lateral	ʄ	Uvular	s'	Alveolar fricative

# Co-articulated Consonants



## CONSONANTS (CO-ARTICULATED)

**M** Voiceless labialized velar approximant

**W** Voiced labialized velar approximant

**ɥ** Voiced labialized palatal approximant

**ç** Voiceless palatalized postalveolar (alveolo-palatal) fricative

**ʒ** Voiced palatalized postalveolar (alveolo-palatal) fricative

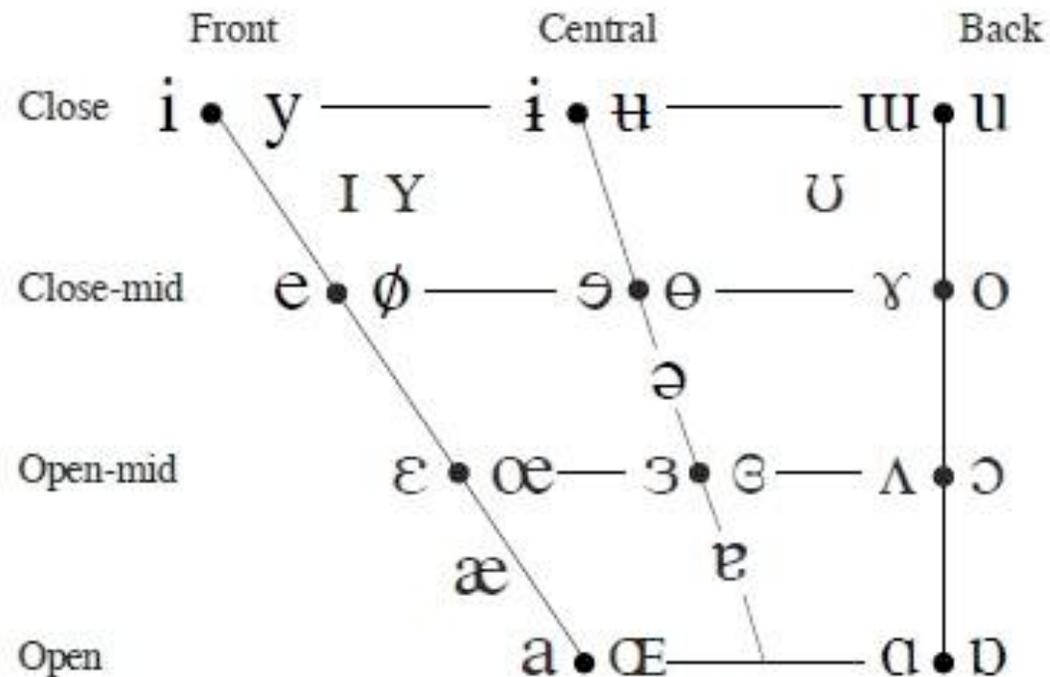
**ħ** Simultaneous x and ʃ (disputed)

**k̟p̟** **t͡s** Affricates and double articulations may be joined by a tie bar

# Basic Vowels



## VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

# Suprasegmentals



SUPRASEGMENTALS		TONE	
' Primary stress	" Extra stress	<i>Level tones</i>	<i>Contour-tone examples:</i>
ˌ Secondary stress	[,founə'tɪʃən]	ě ǀ Top	ě ǀ Rising
eː Long	eˑ Half-long	é ǀ High	ê ǁ Falling
e Short	ě Extra-short	ē ǀ Mid	ě ǀ High rising
· Syllable break	˘ Linking (no break)	è ǀ Low	ě ǀ Low rising
INTONATION		ě ǂ Bottom	ē ǁ High falling
Minor (foot) break		<i>Tone terracing</i>	è ǁ Low falling
Major (intonation) break		↑ Upstep	ě ǀ Peaking
↗ Global rise	↘ Global fall	↓ Downstep	ě ǁ Dipping

# Modifiers



DIACRITICS Diacritics may be placed above a symbol with a descender, e.g.  $\underset{\circ}{\underset{\cdot}{j}}$

$\overset{\circ}{\phantom{t}}$ Voiceless	$\underset{\circ}{n}$ $\underset{\circ}{d}$	$\overset{\cdot\cdot}{\phantom{b}}$ Breathy voiced	$\underset{\cdot\cdot}{b}$ $\underset{\cdot\cdot}{a}$	$\underset{\square}{\phantom{t}}$ Dental	$\underset{\square}{t}$ $\underset{\square}{d}$
$\underset{\vee}{\phantom{t}}$ Voiced	$\underset{\vee}{s}$ $\underset{\vee}{t}$	$\underset{\sim}{\phantom{b}}$ Creaky voiced	$\underset{\sim}{b}$ $\underset{\sim}{a}$	$\underset{\sqcup}{\phantom{t}}$ Apical	$\underset{\sqcup}{t}$ $\underset{\sqcup}{d}$
$\overset{h}{\phantom{t}}$ Aspirated	$t^h$ $d^h$	$\underset{\sim}{\phantom{t}}$ Linguolabial	$\underset{\sim}{t}$ $\underset{\sim}{d}$	$\underset{\square}{\phantom{t}}$ Laminal	$\underset{\square}{t}$ $\underset{\square}{d}$
$\underset{\circ}{\phantom{t}}$ More rounded	$\underset{\circ}{\text{ɔ}}$	$\overset{w}{\phantom{t}}$ Labialized	$t^w$ $d^w$	$\underset{\sim}{\phantom{e}}$ Nasalized	$\underset{\sim}{e}$
$\underset{\epsilon}{\phantom{t}}$ Less rounded	$\underset{\epsilon}{\text{ɔ}}$	$\overset{j}{\phantom{t}}$ Palatalized	$t^j$ $d^j$	$\overset{n}{\phantom{d}}$ Nasal release	$d^n$
$\underset{+}{\phantom{t}}$ Advanced	$\underset{+}{u}$	$\overset{y}{\phantom{t}}$ Velarized	$t^y$ $d^y$	$\overset{l}{\phantom{d}}$ Lateral release	$d^l$
$\underset{-}{\phantom{t}}$ Retracted	$\underset{-}{e}$	$\overset{\text{ɣ}}{\phantom{t}}$ Pharyngealized	$t^{\text{ɣ}}$ $d^{\text{ɣ}}$	$\overset{\text{̚}}{\phantom{d}}$ No audible release	$d^{\text{̚}}$
$\overset{\cdot\cdot}{\phantom{t}}$ Centralized	$\overset{\cdot\cdot}{e}$	$\underset{\sim}{\phantom{t}}$ Velarized or pharyngealized	$\underset{\sim}{t}$		
$\overset{\times}{\phantom{t}}$ Mid-centralized	$\overset{\times}{e}$	$\underset{\text{̥}}{\phantom{e}}$ Raised	$\underset{\text{̥}}{e}$ ( $\underset{\text{̥}}{j}$ = voiced alveolar fricative)		
$\underset{\text{̥}}{\phantom{t}}$ Syllabic	$\underset{\text{̥}}{n}$	$\underset{\text{̬}}{\phantom{e}}$ Lowered	$\underset{\text{̬}}{e}$ ( $\underset{\text{̬}}{\beta}$ = voiced bilabial approximant)		
$\underset{\text{̚}}{\phantom{t}}$ Non-syllabic	$\underset{\text{̚}}{e}$	$\underset{\text{̠}}{\phantom{e}}$ Advanced Tongue Root	$\underset{\text{̠}}{e}$		
$\underset{\text{̠}}{\phantom{t}}$ Rhoticity	$\underset{\text{̠}}{\text{ə}}$ $\underset{\text{̠}}{\text{a}}$	$\underset{\text{̡}}{\phantom{e}}$ Retracted Tongue Root	$\underset{\text{̡}}{e}$		