

ɑ	ɒ	ɓ	ɔ	ɞ	ɔ̄	ɔ̄	ə	ə	ɜ	ɛ	ɛ	ɜ	ɛ	ɟ	ɠ
ɡ	ɡ	ɣ	ɣ	ɥ	ɦ	ɦ	ɨ	ɨ	ɨ	ɨ	ɨ	ɨ	ɨ	ɨ	ɨ
ŋ	ɲ	ɳ	ɴ	ɵ	œ	ω	φ	ɭ	ɭ	ɭ	ɭ	ɭ	ɭ	ɭ	ɭ
ʋ	ɣ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ	ɟ

NON-ENGLISH CONSONANTS

Length

Place


Airstream

Voicing

Manner

Practice

Length

- Many languages contrast short and long (**geminate**) consonants
 - To make: hold consonant longer
 - Voiceless stops/affricate: hold silence longer
 - Transcribe long with triangle-colons
 - t: b: f: ts:
 - Many languages spell with double consonant
 - Italian 'pizza' / ts: / [pit**s**:a]
 - 'nonno' (grandfather) /non:o/ 
 - 'ano' (anus) /a**n**o/ vs 'anno' (year) /an:o/



Non-English Consonants:
VOICING

Voicing

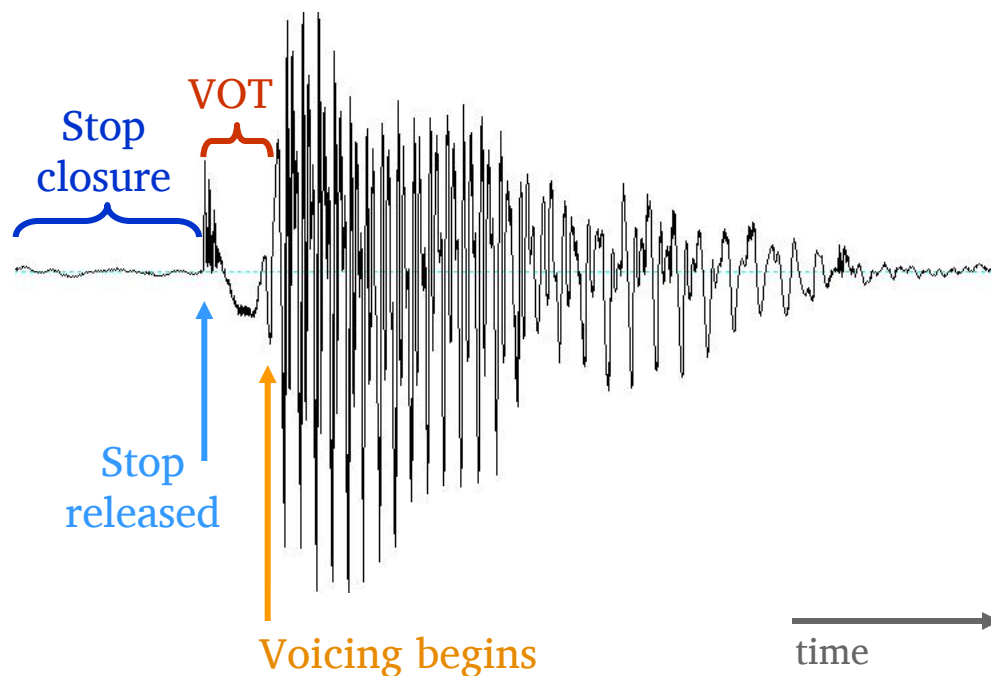
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant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

- English has many voiced/voiceless pairs
- Many languages don't
 - e.g. /p, t, k/ but no /b, d, g/

Voice Onset Time (VOT) Defined

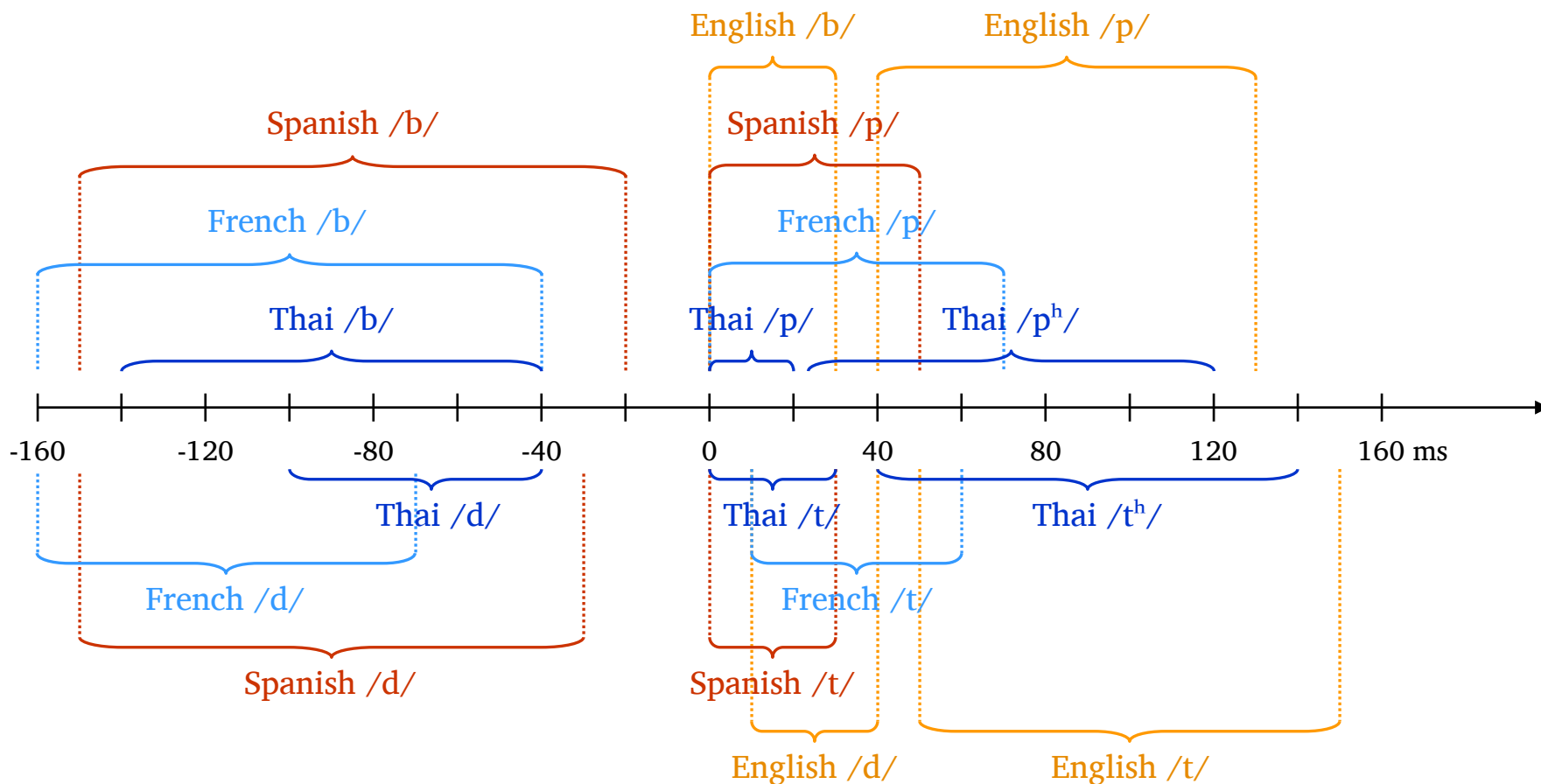
- *Voice onset time (VOT)* is the time between the release of a stop closure and the beginning of vocal fold vibration.
- VOT is the basis for our perception of whether or not a stop is voiced, voiceless, or aspirated.



Variation in Voice Onset Time

- **Negative VOT**
 - voicing begins before the stop is released (e.g., voiced stops in French and Thai).
- **Short VOT**
 - voicing begins almost immediately after the stop is released (e.g., voiced stops in English).
- **Intermediate VOT**
 - voicing begins shortly after the stop is released (e.g., voiceless unaspirated stops in French, Thai, and English).
- **Long VOT**
 - voicing begins long after the stop is released (e.g., voiceless aspirated stops in Thai, and the English aspirated allophone).

Cross-Linguistic Comparisons of VOT

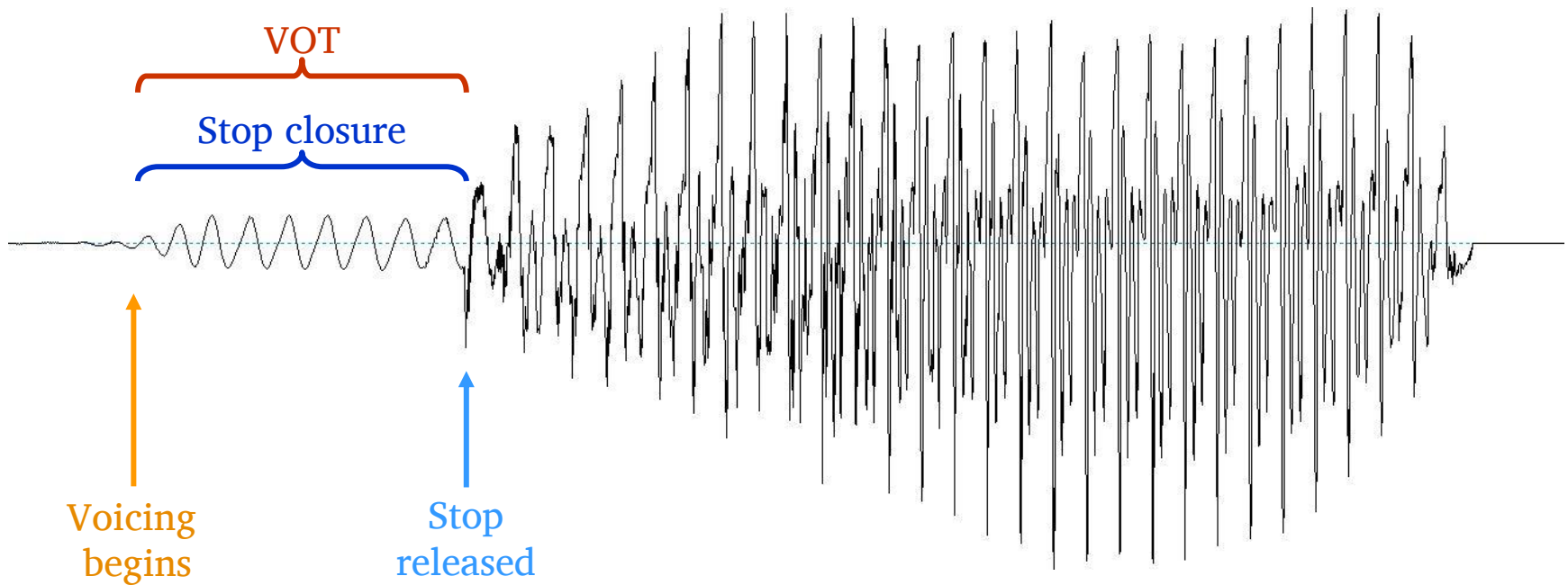


Sources:

Rosner, B.S. et al. "Voice-onset times for Castilian Spanish initial stops." *Journal of Phonetics* (2000) 28, 217–224.

Kessinger, R.H. and Blumstein, S.E. "Effects of speaking rate on voice-onset time in Thai, French, and English." *Journal of Phonetics* (1997) 25, 143–168.

Estimating VOT from Waveforms

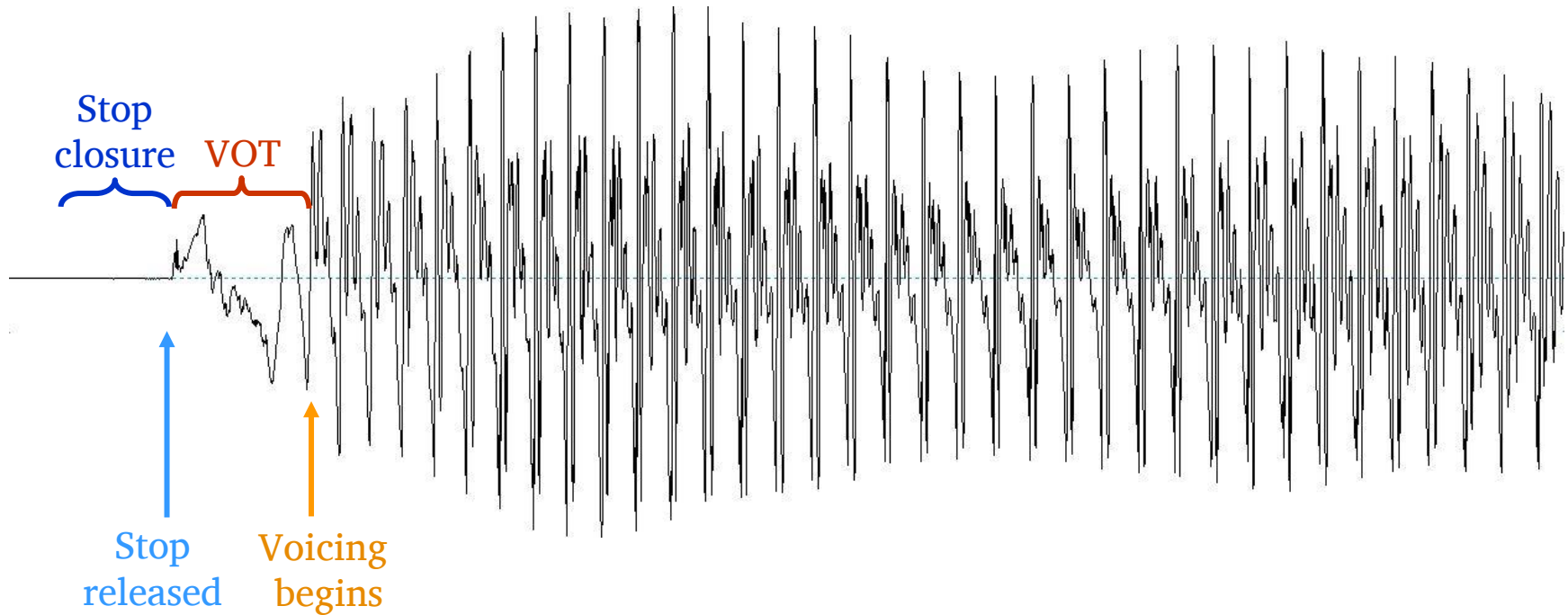


VOT = -50ms

Scale: 50 ms

Voicing: Negative VOT = Voiced

Estimating VOT from Waveforms

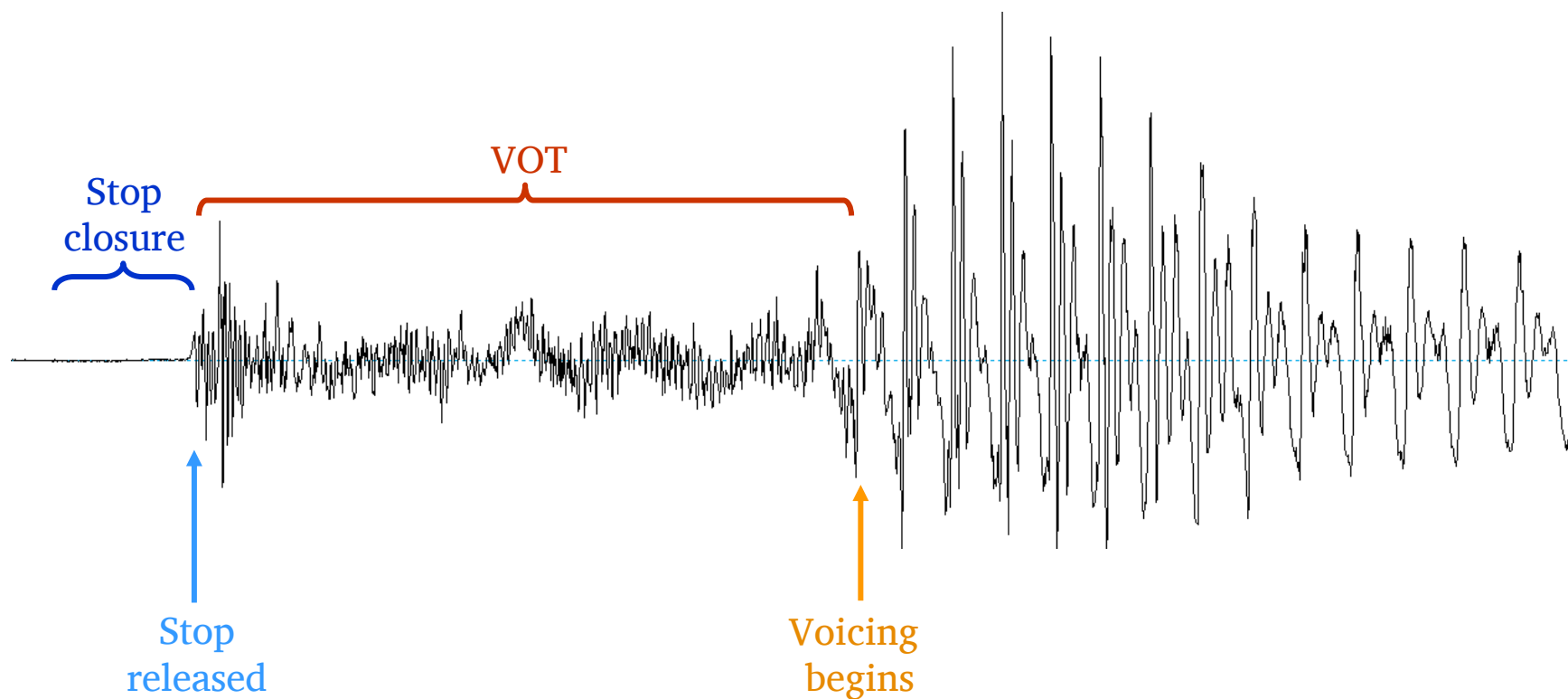


VOT = 20ms

Scale: 50 ms

Voicing: Short positive VOT = Voiceless unaspirated

Estimating VOT from Waveforms



VOT = 95ms

Scale: 50 ms

Voicing: Long positive VOT = Voiceless aspirated

Devoicing

- **Devoiced:** Sounds that are normally voiced are made with weak or no voicing
 - Mark devoicing/voicelessness with circle under/over primary symbol [w̥ ɹ̥ ʀ̥]
- **Voiceless nasals (and laterals)**
 - A few languages have these as phonemes
 - Burmese: / m̥ n̥ ŋ̊ ŋ̊ / (bilabial, alveolar, palatal, velar)
 - <http://www.phonetics.ucla.edu/course/chapter11/cburmese/burmese.html>
 - English allophones after voiceless /s/ onset
 - *Smile, snow, sleep...*

Voice Quality

- Some languages have quality distinctions on voiced consonants (and/or vowels)
 - Modal (normal voicing)
 - Breathy
 - Mark with two dots under symbol: [b̥ ḁ]
 - Or if aspiration is breathy, raised h after: [bʰ]
 - [consonant_practice.pptx](#): Hindi
 - Creaky / glottalized / laryngealized
 - Mark with tilde under symbol: [b̰ a̰]

Breathy: Hindi

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Retroflex	Palatal	Velar	Glottal
Plosive	p b p ^h b ^ɦ		t̪ d̪ t̪ ^h d̪ ^ɦ			t̠ d̠ t̠ ^h d̠ ^ɦ		k g k ^h g ^ɦ	
Affricate					tʃ dʒ tʃ ^h dʒ ^ɦ				

■ /p^hal/ ‘knife blade’



■ /pal/ ‘nurture’



■ /bal/ ‘hair’



■ /b^hal/ ‘brow’





Non-English Consonants:

PLACE

Place: Anterior

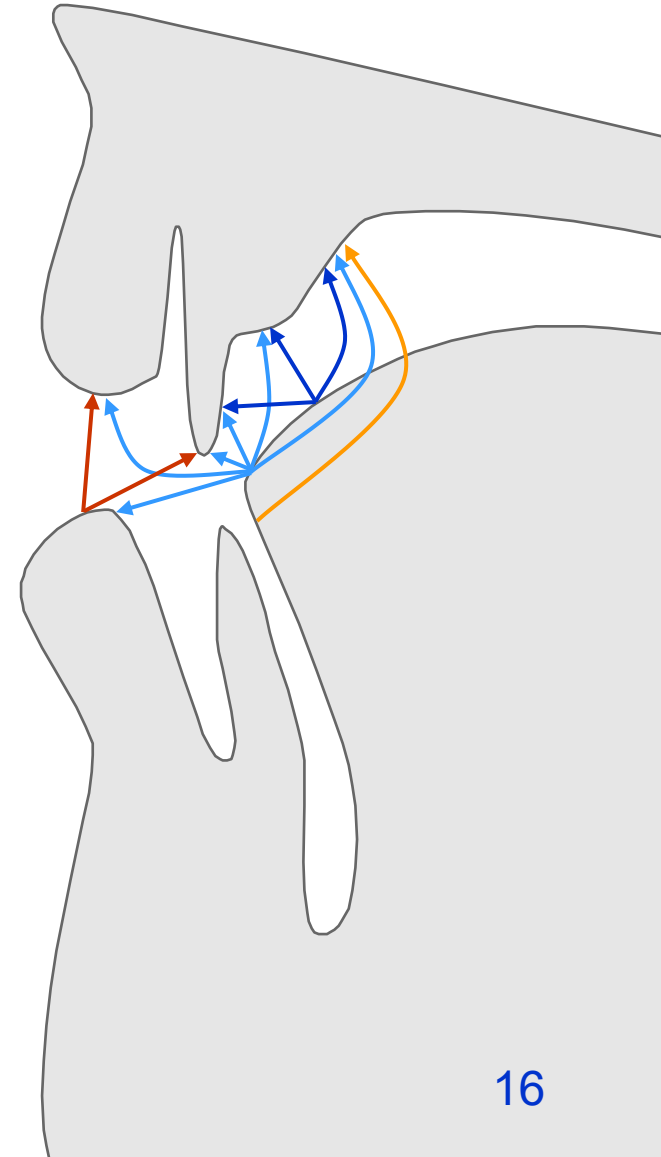
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant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

- Places not used (much) in English
 - Anterior: Dental, retroflex
 - Posterior: Palatal, uvular, pharyngeal

Anterior Places of Articulation

- Active articulators:
 - lower lip (*labial*)
 - tongue tip (*apical*)
 - tongue blade (*laminal*)
 - underside of tongue tip (*retroflex*)
- Targets:
 - upper lip
 - upper teeth
 - alveolar ridge
 - post-alveolar region



Reference Chart: Anterior Places of Articulation

	Passive Articulator	Active Articulator	IPA Examples
Bilabial	upper lip	lower lip	[p b m ɸ β]
Linguolabial		tongue tip	[ɬ ɽ ɳ]
Labiodental	lower edge of upper incisors	lower lip	[ɱ f v]
Interdental		tongue tip/blade	[ɸ ɸ̥ ɸ̣ θ ð]
Apical Dental	back side of upper incisors	tongue tip	[ɸ̣ ɸ̣̥ ɸ̣̣]
Laminal Dental		tongue blade	[ɸ̣̥ ɸ̣̥̥ ɸ̣̥̣]
Apical Alveolar	alveolar ridge	tongue tip	[t d n s z]
Laminal Alveolar		tongue blade	[ṭ ḍ ṇ ṣ ẓ]
Apical Retroflex	post-alveolar	tongue tip	[ɻ ɻ̥ ɻ̣]

- Don't need apical/laminal if language doesn't have that distinction

Chart based on Ladefoged and Maddieson (1996) p15.

Example Sounds: [ṭ ḍ ṇ ṣ ẓ]

<http://www.phonetics.ucla.edu/course/chapter7/chapter7.html>

New Anterior Sounds

□ Bilabial fricatives

<http://www.phonetics.ucla.edu/course/chapter7/ewe/ewe.html>

■ Ewe: [éϕá] (vs. [éfá])



[èβè] (vs. [èνè])



□ Dentals

■ Many languages use (apico-)dental articulations instead of alveolar (tongue tip to back of upper teeth)

□ Spanish / t̪ d̪ ɲ̪ s̪ z̪ ʎ̪ /

□ Rare to contrast these with alveolar or laminal

Retroflex

- Curl tongue tip/blade so underside is closest to alveolar/post-alveolar region
 - Mandarin: / ɹ ʂ tʂ tʂʰ / (rhotic, fricative, affricates)
 - [vowel_practice.ppts](#): Tamil
 - [consonant_practice.pptx](#): Hindi

- [t̪ɑl] ‘beat’
- [tɑl] ‘postpone’
- [d̪ɑl] ‘lentil’
- [dɑl] ‘branch’



Dental		Retroflex	
t̪	d̪	t	d
t̪ʰ	d̪ʰ	tʰ	dʰ

Hindi contrasts dental and retroflex stops

Place: Posterior

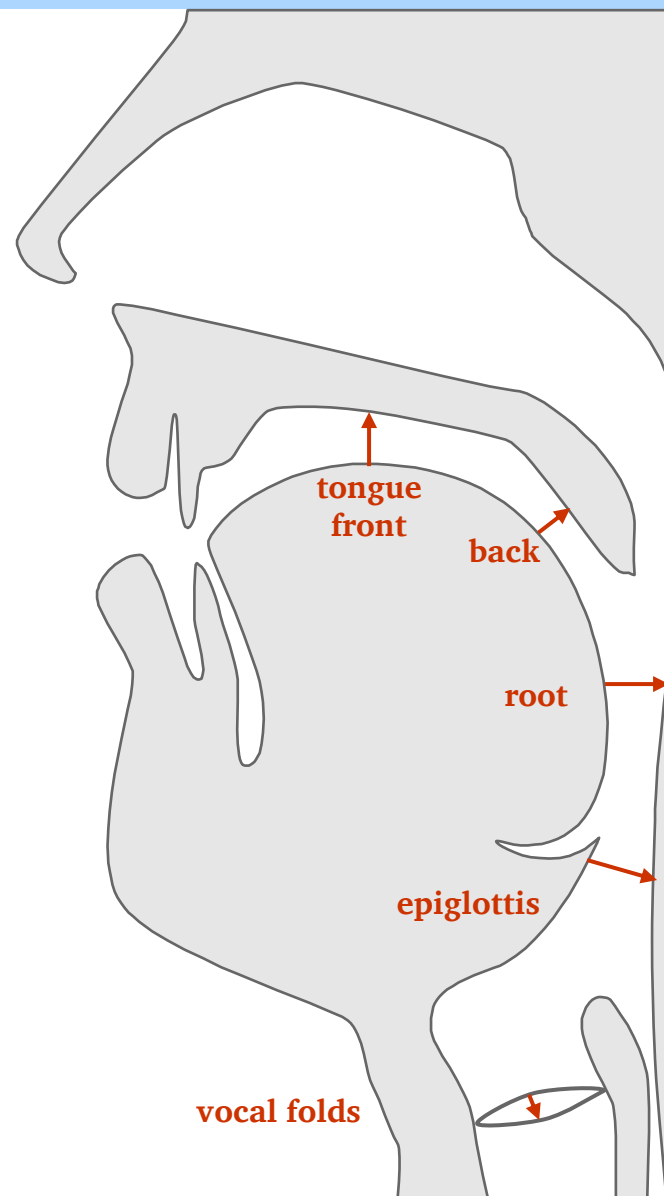
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant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

- Places not used (much) in English
 - Anterior: Dental, retroflex
 - Posterior: Palatal, uvular, pharyngeal

Posterior Places of Articulation

- Active articulators:
 - tongue front
 - tongue back
 - tongue root
 - epiglottis
 - vocal folds (glottis)
- Targets
 - palate
 - velum
 - uvula
 - pharyngeal wall



Reference Chart: Posterior Places of Articulation

	Passive Articulator	Active Articulator	IPA Examples
Palatal	hard palate	tongue front	[c ʃ ɲ ç ʝ]
Velar	velum	tongue back	[k g ŋ x ɣ]
Uvular	uvula	tongue back	[q ɢ ɴ χ ʁ]
Pharyngeal	(upper) pharynx	tongue root	[ħ ʕ]
<input type="checkbox"/> Example Sound Epiglottal	(lower) pharynx	epiglottis	[ʔ ʕ ɦ]
<input type="checkbox"/> French uvulars <input type="checkbox"/> Agul pharyngeal fricatives; epiglottal fricative, stop Glottal		vocal folds	[ʔ h ɦ]

Chart based on Ladefoged and Maddieson (1996) p15.

<http://www.phonetics.ucla.edu/course/chapter7/chapter7.html>

Palatals

- Some palatals occur in certain configurations in English:
 - [k] + [j] → [c] “cue”
 - [h] + [j] → [ç] “hue”
 - [n] + [j] → [ɲ] “onion”
 - “ñ” in Spanish, “gn” in Italian
 - [l] + [j] → [ʎ] “million”
 - “ll” in Spanish, “gl” in Italian

	Palatal
Plosive	c ɟ
Nasal	ɲ
Trill	
Tap or Flap	
Fricative	ç ʝ
Lateral fricative	
Approximant	j
Lateral approximant	ʎ

Palatals

- Stops

- Hungarian: [ɔcɔ] ‘gather’



- [ɔɟɔ] ‘his brain’



- Fricatives

- Greek: [çɛri] ‘hand’



- [jɛri] ‘old men’



- consonant_practice.pptx: Polish

New Posterior Sounds

□ Velar fricatives



■ Greek: [xɔma] ‘soil’



[ɣɔma] ‘eraser’

□ Uvular

■ Quechua: [qaɮu] ‘tongue’



■ Hebrew: [maɣar] ‘he sold’



■ French: [ʁuʒ] ‘red’



	Uvular	Pharyngeal
Plosive	q G	
Nasal	N	
Trill	R	
Tap or Flap		
Fricative	χ ʁ	ħ ʕ

□ Pharyngeal

■ [ħu:] ‘over there’



[ʕaʔuk] ‘meadow’



■ [consonant_practice.pptx](#): Nuuchahnulth



Non-English Consonants:
MANNER

Manner

	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			ʀ					ʀ		
Tap or Flap				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				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.




- Manners not used (much) in English
 - Trills & taps/flaps
 - Laterals

Trills, Taps, and Flaps

- **Trills**: airstream causes articulator to vibrate, creating rapid closures
 - [B r R] (bilabial, alveolar, uvular)

- **Taps** and **flaps** are ballistic: articulator is thrown towards and bounces off the target, resulting in brief stop-like closure
 - Taps move (more or less) straight toward target;
 - Flaps move back-to-front (usually retroflex)
 - [v r ɾ ɽ]
labiodental, alveolar, retroflex, lateral

Fun Taps

- Nasal alveolar tap [ɾ̃]: allophone of /n, nt/ in same places /t, d/ are tapped (Amer. Engl.)
 - Between stressed & reduced syllable
 - *winter, winner, enter, inter-, inner, dinner, any, sunny, pony, lentil, funnel, penny, Jenny, etc.*
- Labiodental flap [ɸ]: Tuck bottom lip behind upper teeth, flap against them
 - Occurs in Central African languages, e.g. Kera:
 -  [ɸīw] 'see something pass quickly'
 -  [ɸìw] 'hearing something pass by'
 -  [wīw] 'something attached'

Manner



	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			ʀ					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.

- Manners not used (much) in English
 - Trills & taps/flaps
 - Laterals

Laterals

Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar
	l		ɭ	ʎ	ʟ

- **Central**: constriction along center of vocal tract
 - All sounds so far
- **Lateral**: obstruction along center of tract, incomplete closure along side(s) of tongue
 - Approximants: [l ɭ ʎ ʟ]
 - Italian: 'there' /li/  'to him' /li/ 
 - Alveolar fricatives: [ɸ ɮ]
 - Alveolar affricates: [tɸ dɮ]
 - Flap: [ɺ]
 - Click: [kll]

More: Zulu, Mid-Waghi
<http://www.phonetics.ucla.edu/course/chapter7/chapter7.html>

Rhotics

- Some notes on **rhotics** (r-like liquids)
 - English alveolar /ɹ/ is unusual in the world's languages, not usually retroflex, often labialized (with lip rounding)
 - Important to distinguish liquid and trill [ɹ r]
 - Retroflex /ɻ/ occurs in a few languages as a phoneme, more as an allophone
 - [vowel_practice.ppts](#): Tamil

Affricates

- Stop released to **homorganic** fricative (same/similar place of articulation)
 - Post-alveolar [tʃ, dʒ]
 - Alveolar [ts, dz]
 - “z, zz” in Italian [ts]: “pizza” = [pi.ts:a], not [pit.sa]
 - Labial [pf]
 - Alveolar lateral [tɬ]
 - Velar [kx]

Doubly Articulated

- Simultaneous constriction at more than one place

M	Voiceless labial-velar fricative	ç ʒ	Alveolo-palatal fricatives
W	Voiced labial-velar approximant	ɺ	Alveolar lateral flap
ɥ	Voiced labial-palatal approximant	ɧ	Simultaneous ʃ and X
H	Voiceless epiglottal fricative	Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary.	
ħ	Voiced epiglottal fricative	kp̄	ts̄
ʕ	Epiglottal plosive	oō	oō

- Yoruba: labial-velar [g**ɓ̄**, k**ɓ̄**]

Secondary Articulations

□ Articulation added to another

■ **Labialized**: add lip rounding

- English [ɹ̥ ʒ̥]
- Mark with raised [w] after primary symbol (usually)
- [consonant_practice.pptx](#): Amharic & Nuuchahnulth

Velar	Uvular
k k ^w	q q ^w
x x ^w	χ χ ^w

■ **Nasalized**: open velum

- Mark with ~ over primary symbol
- [ĩ ž̃]

	Labial	Alveolar	Velar	Glottal
stop	b ^w (p ^{w'})	t ^{w'}	k ^w g ^w k ^{w'}	ʔ ^w
fricative	f ^w			h ^w
nasal	m ^w			

Secondary Articulations

- **Palatalized**: constrict tongue like [j]
 - Mark with raised [j] after primary symbol
 - Russian “soft” / pʲ bʲ tʲ dʲ mʲ nʲ fʲ vʲ sʲ zʲ lʲ rʲ /
 - “Hard” counterparts are often velarized

- **Velarized**: pull tongue toward velum
 - Mark with ~ through the middle of the symbol or with raised ɣ after symbol
 - Kurdish [ɫ sɣ zɣ]
 - [ɫ] = “dark L” at the ends of English syllables

Secondary Articulations

- **Pharyngealized**: pull root toward pharynx
 - Mark with raised ʕ (ain) after symbol
 - Arabic “emphatics” / t^ʕ d^ʕ s^ʕ ð^ʕ /
 - Sometimes an allophone of velarized consonants



Non-English Consonants:

AIRSTREAM



Airstream

- Ways to move air through vocal tract:
 - ***Pulmonic***: in/out lungs (all sounds so far)
 - ***Glottalic***: trap air between glottis and oral closure; move glottis up/down before release
 - ***Velaric***: trap air between velic and anterior closures before release

- Direction of flow:
 - ***Egressive***: out through vocal tract
 - ***Ingressive***: into vocal tract

Pulmonic

- All sounds so far have been **pulmonic egressive**: air flows out from the lungs

- **Pulmonic ingressive**: air flows in
 - Not used phonemically in any language
 - Used para-linguistically (<http://ingressivespeech.info/>)
 - English: gasp (surprise, shock, pain)
 - N Swedish: ingressive bilabial /ɱ/ (“mhm”)

Glottalic Egressive (Ejectives)

- Air trapped between the glottis and an oral closure is *compressed* by *raising* the *larynx*
- When the oral closure is released, a burst of compressed air exits the oral cavity

Quechua

Plain

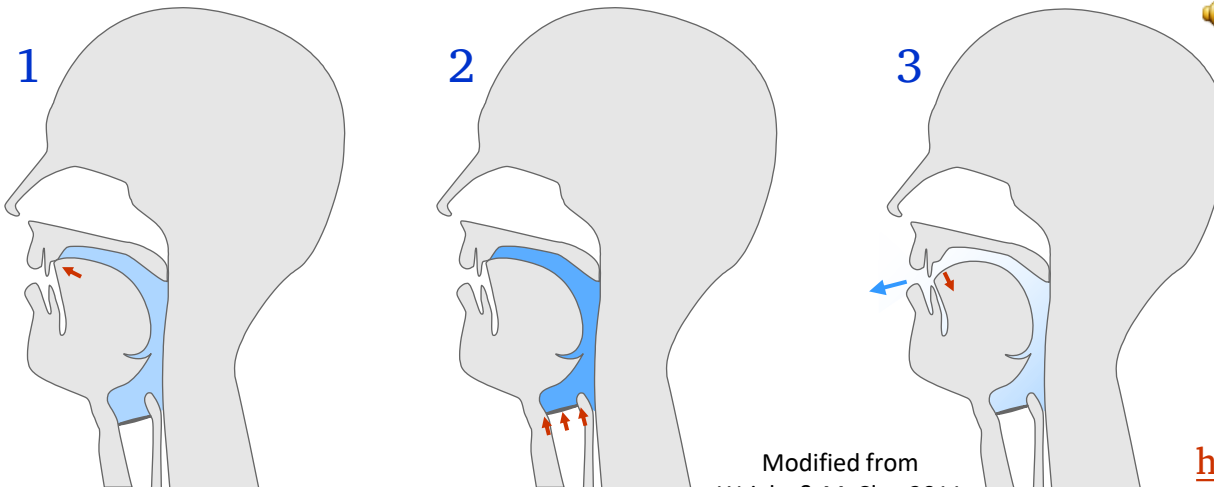
- 🔊 “tongue” [gaʎu]
- 🔊 “bridge” [tʃaka]

Aspirated

- 🔊 “shawl store” [q^haʎu]
- 🔊 “large ant” [tʃ^haka]

Ejective

- 🔊 “tomato sauce” [q'aʎu]
- 🔊 “hoarse” [tʃ'aka]



Modified from
Wright & McCloy 2011

<http://archive.phonetics.ucla.edu/>

Glottalic Ingressive (Implosives)

- Air trapped between the glottis and an oral closure is *rarefied* by *lowering* the *larynx*
- Vocal folds vibrate as larynx moves down (=voiced)

Sindhi

Aspirated

🔊 “snake hood” [p^haŋu]

Voiceless

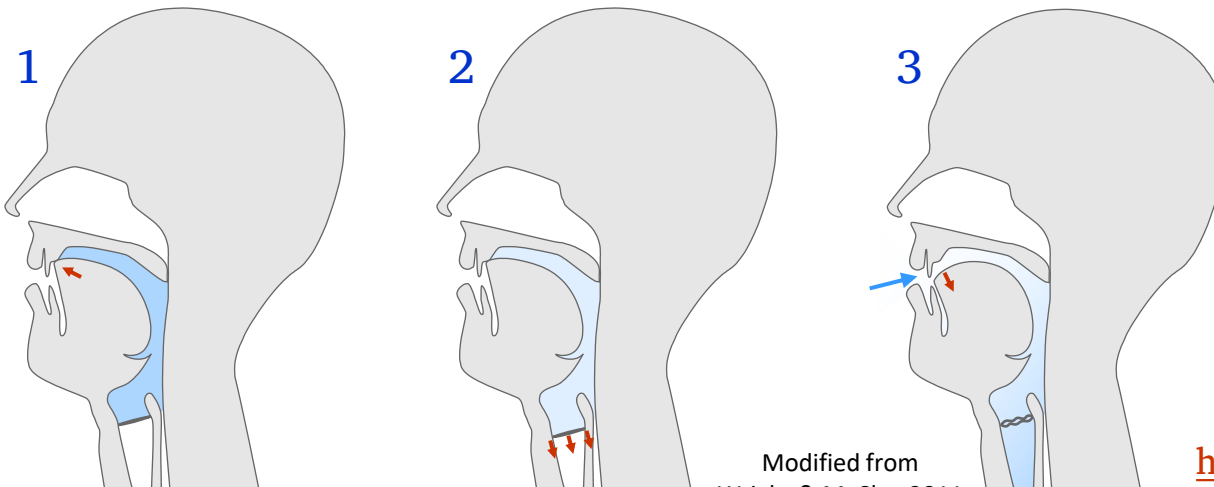
🔊 “leaf” [panu]

Voiced

🔊 “forest” [banu]

Implosive

🔊 “field” [ɓani]



Modified from
Wright & McCloy 2011

<http://archive.phonetics.ucla.edu/>

Glottic: Ejectives & Implosives

- **Ejectives:** Glottic egressive (voiceless)
 1. close glottis & make primary articulation
 2. raise larynx
 3. release primary articulation then glottis
- **Transcribe**
 - / p' t' k' / or / pʔ tʔ kʔ /
- **consonant_practice.pptx:** Nuuchahnulth & Amharic
- **Implosives:** Glottic ingressive (voiced)
 2. lower larynx
- **Transcribe w/ hook**
 - / b d g /

Velaric Ingressive (Clicks)

- Air trapped between velar and anterior closure is *rarefied* by *lowering* the *tongue* before releasing the oral closure
 - Clicks can be voiced, voiceless, aspirated, unaspirated, nasal, oral, and may be accompanied by a variety of secondary articulations (e.g., lip rounding).

!Xóõ

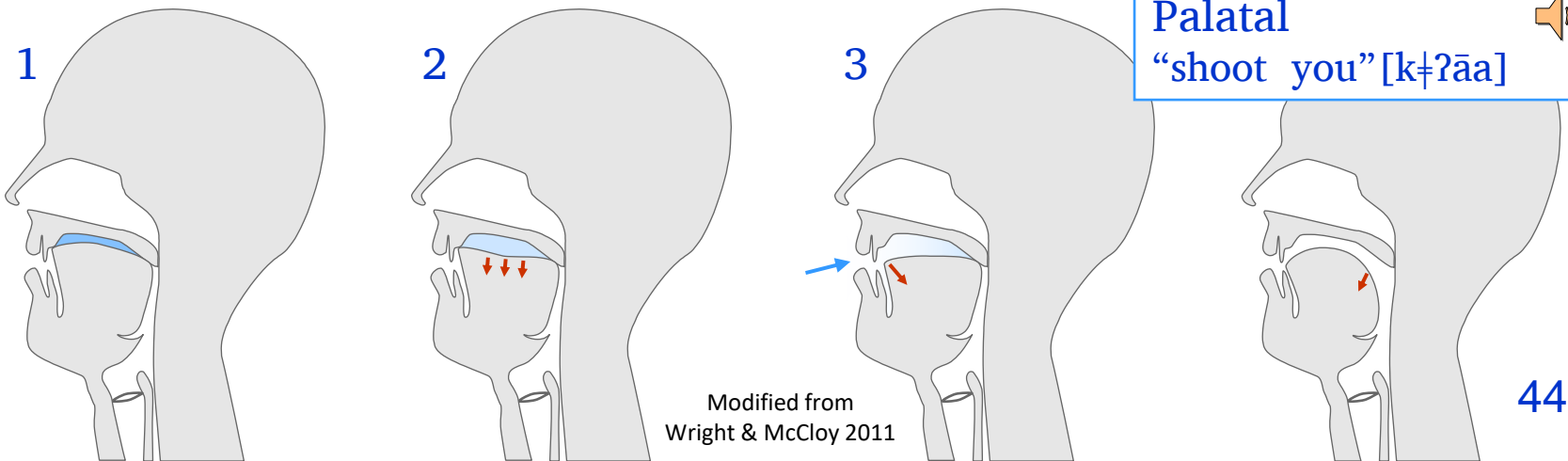
Bilabial 
“get stuck” [kʘʔôo]

Dental 
“die” [k|ʔâa]

Alveolar 
“be seated” [k!ʔáã]

Alveolar Lateral 
“not to be” [k||ʔàa]

Palatal 
“shoot you” [kʞʔāa]








Modified from
Wright & McCloy 2011

Velaric: Clicks

□ Clicks: Velaric ingressive

1. close velum & make primary articulation
2. lower tongue
3. release primary articulation then velum

Clicks	
	Bilabial
	Dental
	(Post)alveolar
	Palatoalveolar
	Alveolar lateral



Tsk, tsk



Transcribing Clicks

- Since clicks involve two places of articulation, transcribe with two symbols:
 - [k g ŋ] for velaric closure and place, manner, voicing
 - [⊙ | || ! ≠] for anterior closure place
 - k| = voiceless dental click
 - g|| = voiced lateral click
 - ŋ⊙ = nasal bilabial click
 - Note: The (post)alveolar click can be described as alveolar and the palatoalveolar as palatal.

Clicks	
⊙	Bilabial
	Dental
!	(Post)alveolar
≠	Palatoalveolar
	Alveolar lateral



Non-English Consonants:

**PRACTICE &
RESOURCES**

Practice making new sounds

	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			ʀ					ʀ		
Tap or Flap		ʋ		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.

Practice: Name That Click! (Zulu)

- “a conversation” íŋ'ŋllo:klló  nasal lateral;
voiceless lateral
- “to make clear” 'klà:klá  voiceless dental
- “to pound” 'glló:bá  voiced lateral
- “to undo” k!ák!á  voiceless alveolar
- “to be loose” 'kllè:gá  voiceless lateral



More Practice

- Practice listening to and transcribing in [consonant_practice.pptx](#)
 - Listen to transcribed examples to get familiar with the sounds
 - Transcribe new words
 - Check answer key

- Use [IPA_chart_2018.pdf](#) on Canvas as reference

Links – Charts (helpful for learning)

- Interactive IPA charts
 - Paul Meier Dialect Services (uses Flash, user-friendly):
www.paulmeier.com/ipa/charts.html
 - U. of Victoria (includes audio explanations, uses QuickTime):
web.uvic.ca/ling/resources/ipa/charts/IPALab/IPALab.htm
 - U. of Iowa Flash Animation (English, Spanish, German; uses Flash, includes visual aids): <https://soundsofspeech.uiowa.edu/>
 - Ladefoged & Johnson online materials (uses QuickTime, may have to download each aiff file to play):
<http://www.phonetics.ucla.edu/course/chapter1/chapter1.html>

Links – Fonts (needed for typing HW)

- IPA character-picker sites
 - Select, copy and paste IPA symbols from here to Canvas or other sites/programs that have trouble with IPA fonts
 - Weston Ruter's: <http://westonruter.github.com/ipa-chart/keyboard/>
 - Richard Ishida's: <https://r12a.github.io/pickers/ipa/>
 - TypeIt: <http://ipa.typeit.org/full/>
- Download IPA font Charis SIL: <https://software.sil.org/charis/>

Links – Keyboards (alternative for HW)

- Keyboard layouts configured for IPA Unicode fonts:
 - Google "IPA keyboard layout unicode" plus your operating system
 - Good layout for Windows:
<http://www.phon.ucl.ac.uk/resource/phonetics/>.
 - Quirk/Tip: uninstall Charis and Doulos fonts before installing the keyboard layout, then reinstall them afterward. If you forget to uninstall them, the keyboard installation process will pop up an error window for each font. Click Ignore. When it finishes installing, go back and reinstall [Charis](#) and [Doulos](#) (or the fonts will cause quirks like permanent Italics in Word).
 - How to set your keyboard once you've installed a layout (for Windows XP) – see next slide and modify for your OS

Installing

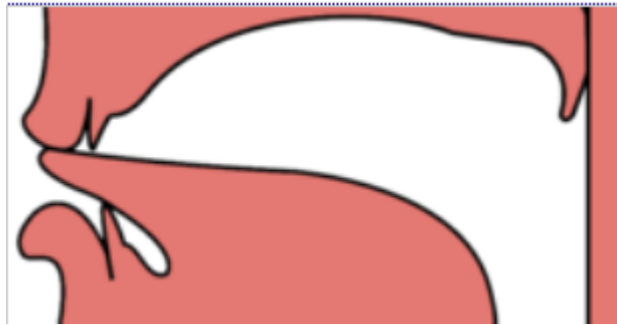
Please note, these instructions are for Windows XP.

After unzipping and running IPA-keys.msi, you need to go to Control Panel and open Regional Settings (or the equivalent item in Windows Vista). Then click on the Languages tab, click "Details...", then click "Add...". Find IPA in the list, and click OK on all three windows.

After this, you should get a language bar notifier on the task bar:



Linguolabials?



<http://youtu.be/oSnqeQ9fzmo>