

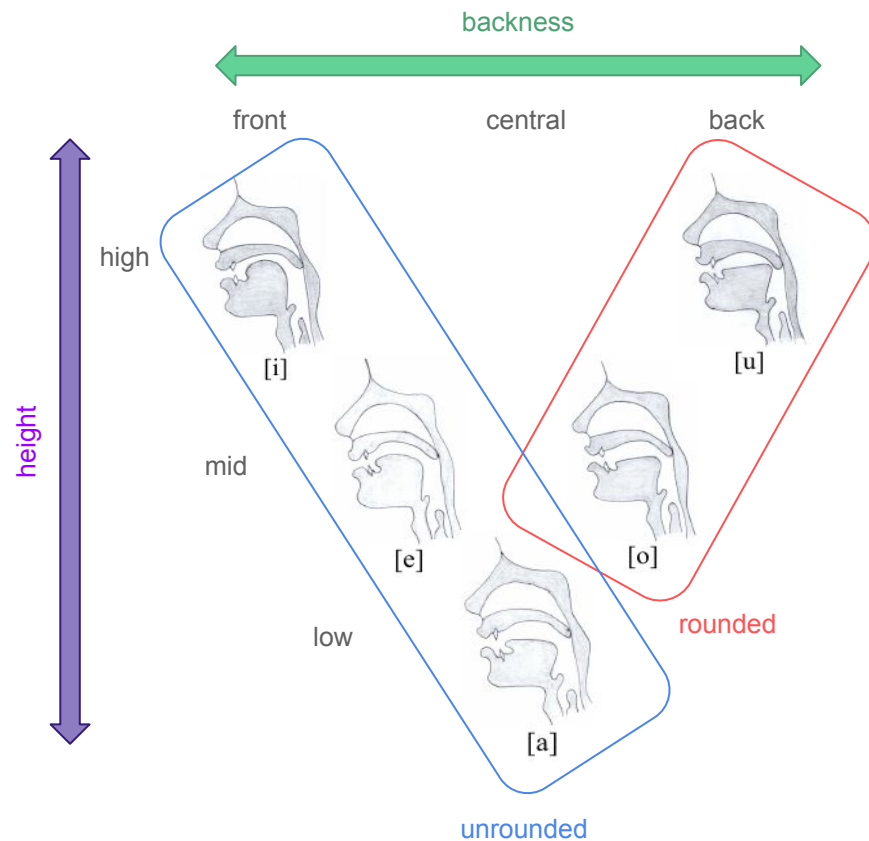
# Week 11 Lecture: Phonetics

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Ling 201 - Fall 2025

# Vowels and consonants

- Last week we discussed **vowels**.
- We saw that vowels can be described in terms of **three features**:
  - **tongue height**
  - **tongue backness**
  - **lip roundedness**



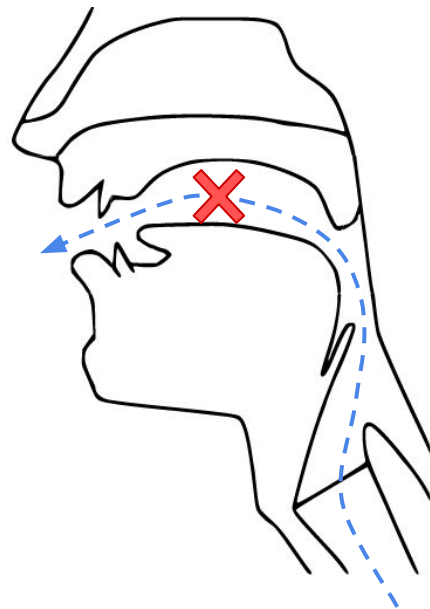
# Vowels and consonants

- We also learned about how vowels and consonants differ in articulation:
  - **Airflow** – when we speak, we exhale, forcing air to flow outward through our **vocal tract**
    - With consonants, we block this airflow completely or partially. With vowels, we don't
  - **Voicing** – when we cause our vocal cords to vibrate during speech.
    - Vowels are usually voiced. Consonants may be voiced or voiceless.

	Vowels	Consonants
<b>Obstruction of airflow</b>	No obstruction in vocal tract; air flows freely	Total or partial obstruction in vocal tract, blocking or restricting airflow
<b>Voicing</b>	Usually voiced	May or may not be voiced

# Consonants and vowels

- All consonants are produced by restricting or obstructing the airflow in some way – whether partially or totally.
- But the nature of the obstruction varies from consonant to consonant.
- We describe consonants in terms of three **features** – which all serve to describe that obstruction:
  - **Manner of articulation** – what is the nature of the obstruction? is it partial or complete?
  - **Place of articulation** – where in the vocal tract is the obstruction made.
  - **Voicing** – are the vocal folds vibrating throughout this period of obstruction?



# Consonants

- The IPA consonant chart is arranged by these three features:  
**voicing, place, manner**
- And we use these features to **describe** consonants:  
[f] is a *voiceless labiodental fricative*
- Once you understand this terminology, you can use it to understand how to pronounce any consonant on this chart.

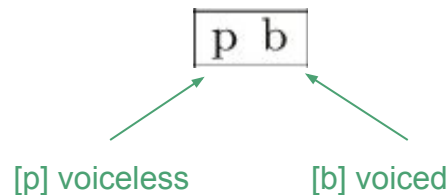
manner of  
articulation

place of articulation

CONSONANTS (PULMONIC) © 2020 IPA

	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		ɸ		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.



# Consonants

- You may notice that some cells are empty and some are grayed out.
- Cells that are grayed out are judged **impossible** to pronounce based on the anatomy of the vocal tract.
- Cells that are empty but not gray are **possible but unattested**:
  - We have not found a language that uses them as part of words.
  - If we did, we would add a new symbol to the chart.

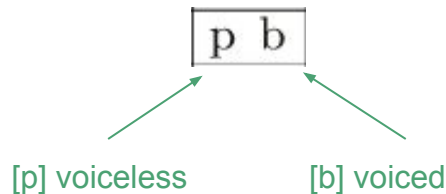
manner of  
articulation

place of articulation

CONSONANTS (PULMONIC) © 2020 IPA

	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		ɸ		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.



# Voicing

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# Voicing

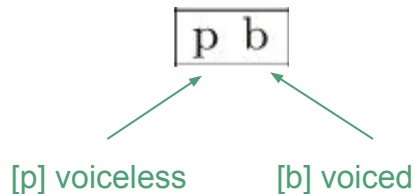
- Difference between [s] and [z] is voicing:
  - [s] is **voiceless**
  - [z] is **voiced**
- Many other consonants differ in voicing:
  - [p, b], [t, d], [k, g], [f, v], [θ, ð], [ʃ, ʒ]
- On the consonant chart, this is indicated by the alignment of the symbol in the cell:
  - left = voiceless
  - right = voiced

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.





# Manner of articulation

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# Manner of articulation

- As we've seen, all consonants are produced with some obstruction.
- Manner of articulation** indicates the type of obstruction:
  - Is there a complete blockage of airflow?
  - Is there a partial blockage?
  - Is the airflow blocked in one part of the vocal tract but allowed to flow through a different part?

manner of articulation

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.

# Manner of articulation: Plosives/Stops

	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

- Say the sounds ***papapapa*** and ***tatatata***. What is your mouth doing to restrict the flow of air?
- **Plosives** (aka **stops** or **oral stops**) are articulated with a **complete closure** somewhere in the vocal tract.
- After you make the closure, you continue exhaling, so air pressure builds up behind the closure.
- Then you release the closure, causing a small burst or explosion of pressurized air – hence "plosive"



# Manner of articulation: Plosives/Stops

	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

- English stops include:
  - Voiceless stops** [p, t, k]:  
*spin* [spɪn], *stop* [stɒp], *scar* [skaɹ]
  - Voiced stops** [b, d, g]:  
*about* [əˈbaʊt], *adore* [ədɔː], *ago* [əˈɡoʊ]
  - English voiceless stops are often **aspirated** – pronounced with a short [h] sound after the release:  
*tip* [tʰɪp], *pen* [pʰɛn], *cat* [kʰæt]



# Manner of articulation: Fricatives

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Fricative	$\phi$ $\beta$	$f$ $v$	$\theta$ $\delta$	$s$ $z$	$\ʃ$ $\ʒ$	$\ʂ$ $\ʐ$	$\ç$ $\j$	$x$ $\gamma$	$\chi$ $\ʁ$	$ħ$ $ʕ$	$h$ $ɦ$

- Say the words **see** and **tea**. Your tongue will move to a similar but not identical position for both consonants. With which word does your tongue touch the upper part of your mouth?
- **Fricatives** are produced with an **incomplete obstruction**:
  - You bring two articulators close together but don't quite let them touch, creating a narrow opening for air to flow through.
  - Forcing air through a narrow opening produces a turbulent airstream that makes a hissing sound, like air escaping a tire.



# Manner of articulation: Fricatives

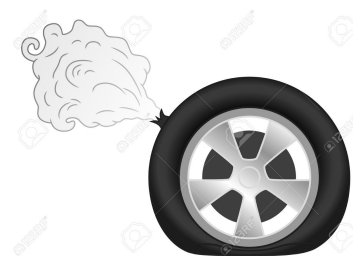
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ

- English fricatives include (which of these are voiced/voiceless?):
  - [f] and [v]: *fit* ['fɪt], *vet* ['vet]
  - [θ] and [ð]: *think* ['θɪŋk], *that* ['ðæt]
  - [s] and [z]: *see* ['si], *zoo* ['zu]
  - [ʃ] and [ʒ]: *ship* ['ʃɪp], *measure* ['meɪʒə]
  - [h]: *heat* ['hit]
- [s, z, ʃ, ʒ] are a special class of fricatives known as **sibilants** because they produce a louder, more strident sound than the other fricatives



# Manner of articulation: Affricates

- Say the words ***tie, shy, chai***.  
With which words does your tongue touch the upper part of your mouth?  
Which words produce a hissing sound?
- **Affricates** are a sort of combination between stops and fricatives:
  - A complete closure is made, building up pressure.
  - When it is released, the articulators are kept close together enough to produce the hissing sound characteristic of fricatives.
- We consider affricates one sound, but with two phases, and we write them with two IPA symbols joined with a tie bar: *check* [tʃɛk]



# Manner of articulation: Affricates

- English affricates include:
  - [tʃ]: *choose* [tʃuːz]
  - [dʒ]: *judge* [dʒʌdʒ]
- Other languages may have other affricates:
  - Japanese *tsuru* [ʈ͡sɯɾɯ] 'crane (bird)'
  - German *Salz und Pfeffer* [zalt͡s ʊnt p͡fɛfɐ] 'salt and pepper'
  - Italian *zero* [d͡zɛ:ro] 'zero'

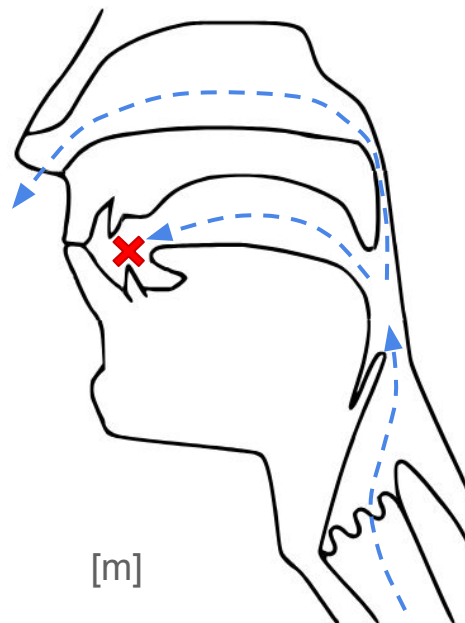




# Manner of articulation: Nasals

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Nasal	<b>m</b>	<b>ɱ</b>	<b>n</b>			<b>ɳ</b>	<b>ɲ</b>	<b>ŋ</b>	<b>ɴ</b>		

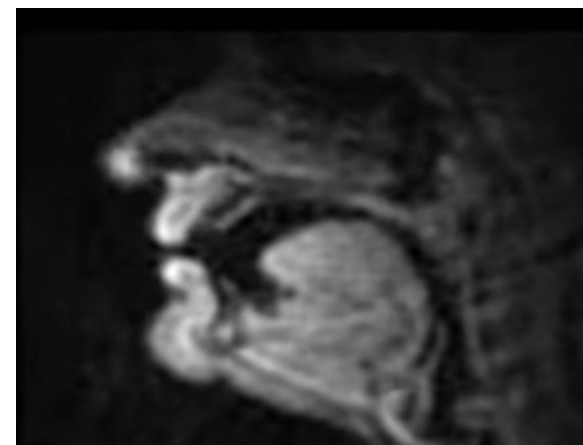
- Try saying [m] while pinching your nose. Can you do it?
- We produce most consonants by breathing out our mouth. But with **nasal** consonants, we're actually breathing out our nose.
- We do this by making a complete obstruction in the mouth, and lowering our **velum** or **soft palate**, allowing air to pass through the **velar port** into the **nasal cavity**.
- English nasals: [m, n, ŋ]:  
*mat* [mæt], *nine* [naɪn], *sing* [sɪŋ]



# Manner of articulation: Approximants

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Approximant		ʋ	ɹ			ɻ	j	ɰ			

- **Approximants** – like fricatives – feature a partial closure.
- But the articulators are held slightly further apart so the airstream isn't turbulent and there's no hissing.
- Glides like [j] yes and [w] we are technically approximants.
- As is American English *r* [ɹ], which can be pronounced as:
  - “bunched *r*”: tongue back is arched in back of mouth
  - “retroflex *r*”: tongue tip is curled backward

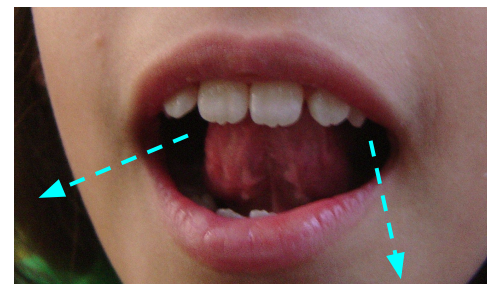


English “bunched *r*”

# Manner of articulation: Laterals

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Lateral fricative				ɬ ɮ							
Lateral approximant				l		ɭ	ʎ	ʟ			

- Say the following word: **light**. What is your mouth doing when you say the [l]? Is there a complete obstruction of airflow?
- **Laterals** are produced with an obstruction in the center of the vocal tract, but air flows past the tongue on one or both sides.
  - **Lateral fricative**: the airstream is restricted enough to make a hissing sound: Welsh *Llwyd* [ɬɯid] 'Lloyd'
  - **Lateral approximant**: the airstream is not as restricted, no hissing sound: English *lose* [luːz]



# Manner of articulation: Trills, taps, and flaps

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Trill	<b>B</b>		<b>ɾ</b>						<b>R</b>		
Tap or Flap		<b>ɸ</b>	<b>ɾ</b>			<b>ɽ</b>					

- Say the words ***ladder*** and ***adore***. Are you pronouncing the *d* the same in both words?
- In English, the sounds spelled <t> and <d> are often pronounced as a **flap** [ɾ] before unstressed vowels: *ladder*, *water*, *meadow*, *little*, *battle*, *city*, *ready*
- Flaps and the similar **taps** (Spanish *para* [pa.ra] 'for') block air completely like stops but don't hold the closure long enough to build up pressure, so there's no burst.
- **Trills** are like flaps and taps, but feature repeated closures: Spanish *rojo* [ro.xo] 'red'

# Manner of articulation

- This gives us our **manners of articulation** – classes of consonants based on *type of obstruction*:
  - **Plosive** (stop) – complete obstruction, release with burst [p, t, k, b, d, g]
  - **Fricative** – narrow obstruction, hissing sound [f, v, θ, ð, s, z, ʃ, ʒ, h]
  - **Affricate** – complete obstruction, release to narrow obstruction [tʃ, dʒ]
  - **Nasal** – complete obstruction in mouth, air flows through nose [m, n, ŋ]
  - **Lateral** – obstruction on centerline of mouth, air flows on side(s) [l]
  - **Approximant** – narrow obstruction, not narrow enough for hissing [j, w, ɹ]
  - **Tap/flap/trill** – very brief obstruction, repeated for trills [r]

# Natural classes

- We can also group manners of articulation into several larger **natural classes**:
  - **Obstruent** = plosives, affricates, fricatives (consonants with greater constriction of airflow)
  - **Sonorant** = nasals, laterals, approximants (consonants with lesser constriction of airflow)
  - **Rhotics** = *r*-sounds, which can differ from language to language
  - **Liquids** = laterals + rhotics (*l*-sounds + *r*-sounds)

# Place of articulation

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# Place of articulation

- We've seen **manner of articulation**:
  - *Type* of obstruction
  - Rows on the consonant chart
- Let's move on to **place of articulation**:
  - *Location* of obstruction in vocal tract
  - Columns on the consonant chart

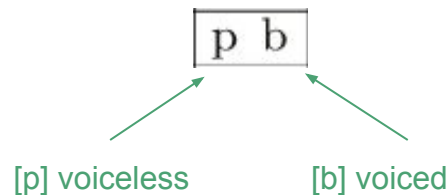
manner of articulation

place of articulation

CONSONANTS (PULMONIC) © 2020 IPA

	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		ɸ ɶ		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			

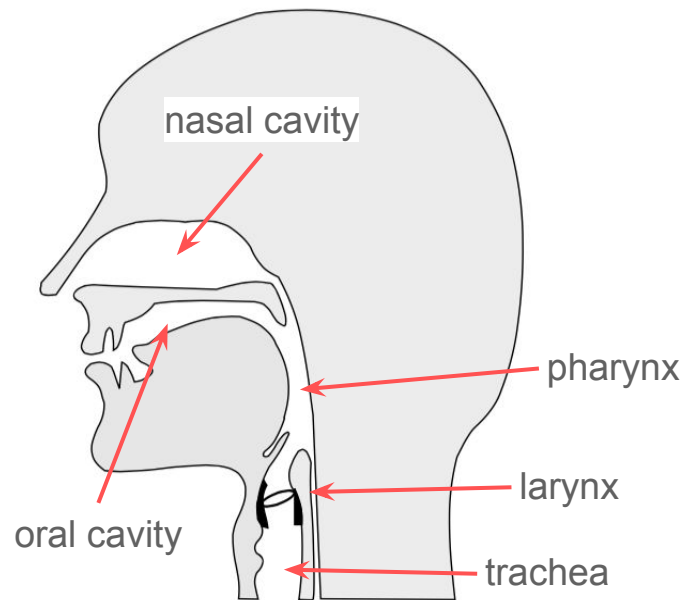
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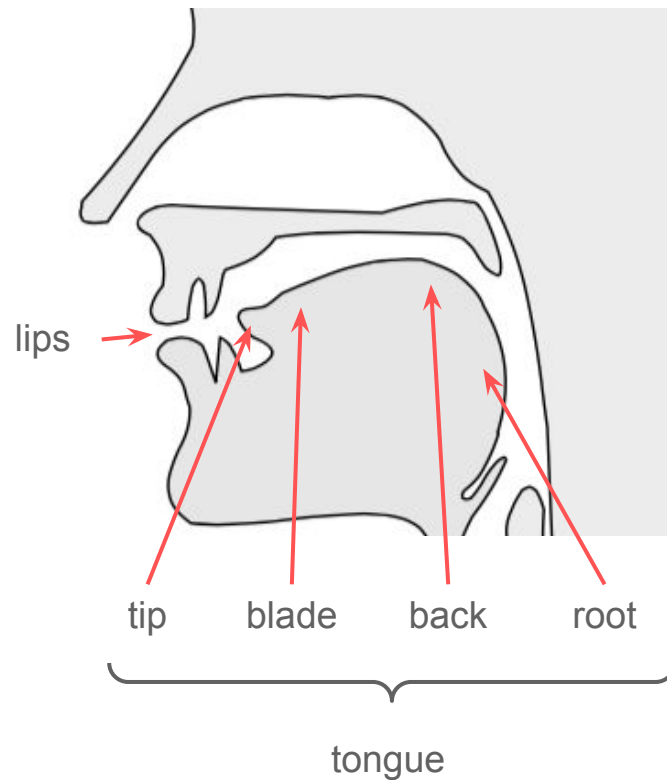
# Anatomy of the vocal tract

- Before we talk about place of articulation, we have to discuss a bit of **anatomy**.
- As we exhale:
  - Air flows up from our lungs via the **trachea**.
  - Through the **larynx** (source of voicing).
  - Through the **pharynx** (open space behind tongue).
  - Through the **oral cavity** (mouth) and/or **nasal cavity** (nasal sinuses).
  - And out of the body.



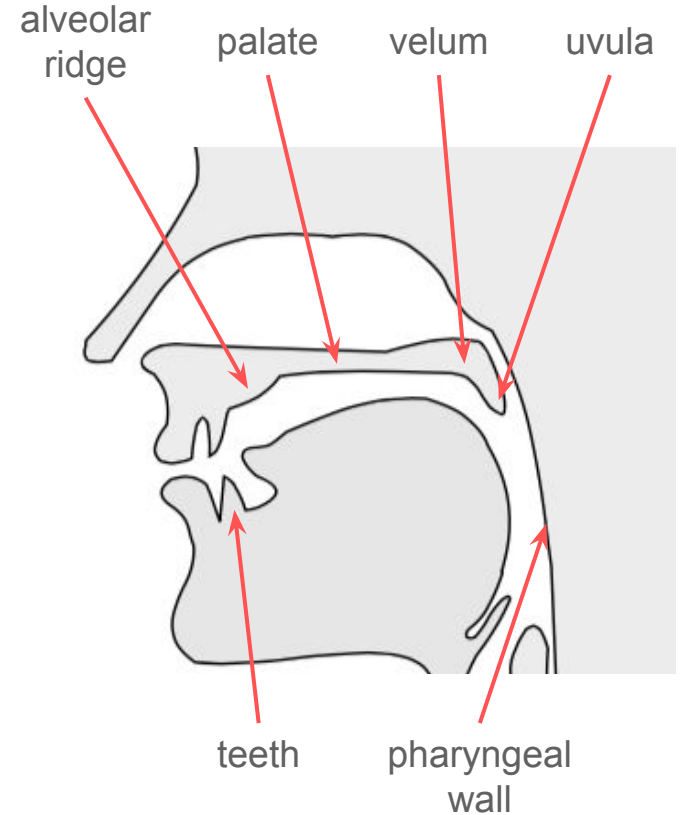
# Anatomy of the vocal tract

- To make a consonant, we obstruct the airflow.
- We do this by moving an **active articulator** toward a **passive articulator** to restrict airflow.
- Active articulators are:
  - **Lips**
  - **Tongue:** tongue tip, blade, back, root



# Anatomy of the vocal tract

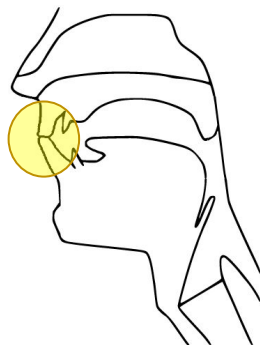
- Passive articulators are:
  - **teeth**
  - **alveolar ridge**
  - **(hard) palate**
  - **velum (soft palate)**
  - **uvula**
  - **pharyngeal wall**



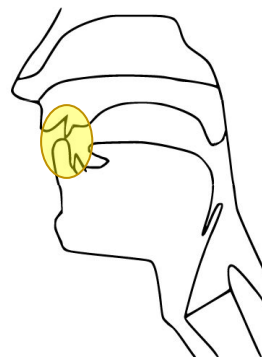
# Place of articulation: Labials

- Say the following words: **pa**, **fee**. What two articulators touch when you pronounce the first consonant in each word?
- **Labials** are articulated with your **lips**. These include:
  - **Bilabials** – both lips: *bee* ['bi], *ma* ['mɑ], Japanese *tōfu* [to:ɸu] 'tofu'
  - **Labiodentals** – lower lip and upper teeth: *fin* [fɪn], *vote* [vowt]

bilabial



labiodental



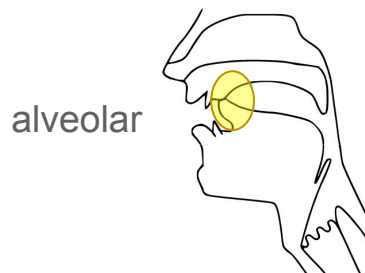
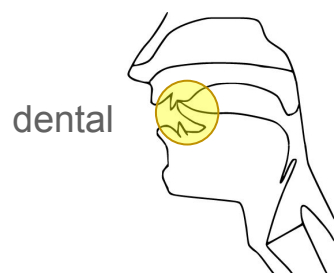
	Bilabial	Labiodental
Plosive	p b	
Nasal	m	ɱ
Trill	ʙ	
Tap or Flap		ɸ
Fricative	ɸ β	f v
Lateral fricative		
Approximant		ʋ
Lateral approximant		

# Place of articulation: Coronals

- Say the following words: **too**, **now**. Where does your tongue tip touch when you say the first consonant?

	Dental	Alveolar	Postalveolar
Plosive	t d		
Nasal	n		
Trill	r		
Tap or Flap	ɾ		
Fricative	θ ð	s z	ʃ ʒ
Lateral fricative	ɬ ɮ		
Approximant	ɹ		
Lateral approximant	l		

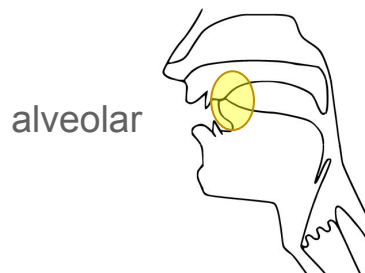
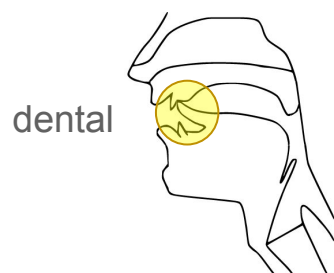
Many coronal symbols don't specify exact place of articulation. You can use diacritics like [t̪] (dental) if necessary.



# Place of articulation: Coronals

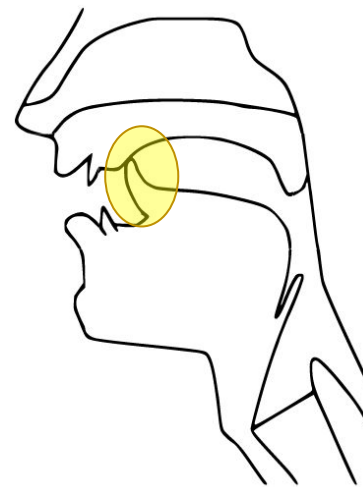
- **Coronals** have constriction in the front part of mouth:
  - **Dentals** – tongue tip and teeth  
[θ] *think*, [ð] *that*
  - **Alveolars** – tongue tip/blade and alveolar ridge  
[t] *tea*, [d] *day*, [n] *night*, [l] *late*
  - **Postalveolars** – tongue blade and area behind alveolar ridge  
[ʃ] *shake*, [ʒ] *vision*, [tʃ] *check*, [dʒ] *jay*

	Dental	Alveolar	Postalveolar
Plosive	t d		
Nasal	n		
Trill	r		
Tap or Flap	ɾ		
Fricative	θ ð	s z	ʃ ʒ
Lateral fricative	ɬ ɮ		
Approximant	ɹ		
Lateral approximant	l		



# Place of articulation: Retroflexes

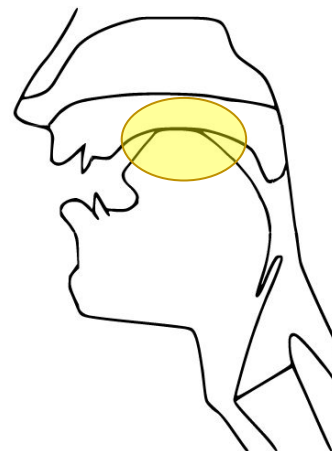
- **Retroflexes** are articulated with the tongue tip arched backward.
- American English *r* may be pronounced as retroflex, but it depends on the speaker.
- Other languages with retroflexes:
  - Hindi/Urdu [ʈa:l ʈʰa:l dʌ:l dʱa:l]  
'postpone, wood shop, branch, shield'
  - [ɖ] – Swedish *nord* [nu:ɖ] 'north'
  - [ɻ] – Portuguese (São Paulo state)  
*carta* ['kaɻtɐ] 'letter'



	Retroflex
Plosive	ʈ ɖ
Nasal	ɳ
Trill	
Tap or Flap	ɽ
Fricative	ʂ ʐ
Lateral fricative	
Approximant	ɻ
Lateral approximant	ɭ

# Place of articulation: Palatals

- **Palatals** are produced with the tongue body raised against the hard palate
- English [j] *yes* is considered a palatal approximant.
- Palatals in other languages:
  - Spanish *niño* [niɲo] 'child'
  - Portuguese *velho* [vɛλu] 'old'

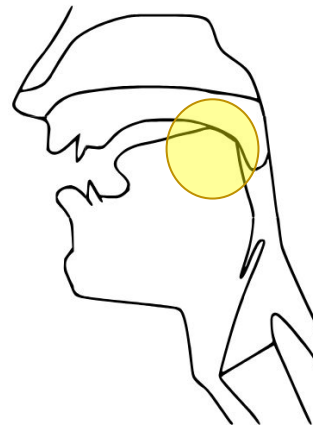


	Palatal
Plosive	c ɟ
Nasal	ɲ
Trill	
Tap or Flap	
Fricative	ç ʝ
Lateral fricative	
Approximant	j
Lateral approximant	ʎ



# Place of articulation: Velars

- Say the following words: **car**, **go**. Where does your tongue touch when you pronounce the first consonant of each word?
- **Velars** are articulated with the back of the tongue against the **velum** (soft palate).
- English velars:
  - [k] *cat* [kʰæt], [g] *goat* [gowt], [ŋ] *song* [sɒŋ]
- Other velars:
  - [x] Mexican Spanish *jefe* [xefe] 'boss'
  - [ɣ] Spanish *hago* [aɣo] 'I do'

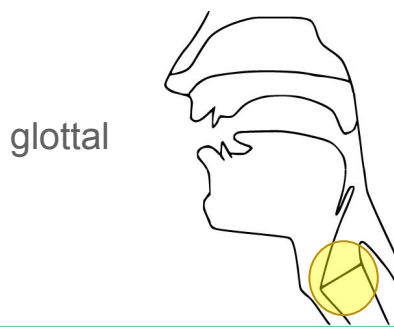
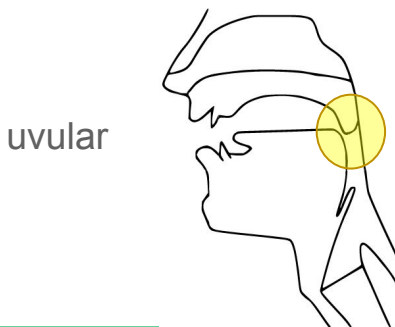


	Velar
Plosive	k g
Nasal	ŋ
Trill	
Tap or Flap	
Fricative	x ɣ
Lateral fricative	
Approximant	ɰ
Lateral approximant	l

# Place of articulation: Gutturals

- Guttural consonants are pronounced in the back of the mouth:
  - Uvulars:** back of tongue against the uvula:  
Madrid Spanish *jefe* [χefe], Quechua *qusa* [qosa] 'husband'
  - Pharyngeals:** root of tongue obstructing the pharynx:  
Arabic [ħar] 'heat', [ʕajn] 'eye'
  - Glottals:** vocal folds obstructing the glottis:  
[h] *hold* [howld], [ʔ] *uh-oh* [ʌʔow], Caribbean Spanish *jefe* [hefe]

	Uvular	Pharyngeal	Glottal
Plosive	q G		ʔ
Nasal	N		
Trill	R		
Tap or Flap			
Fricative	χ ʁ	ħ ʕ	h ɦ
Lateral fricative			
Approximant			
Lateral approximant			



[ħ]



voiceless  
pharyngeal  
fricative

[ʕ]



voiced  
pharyngeal  
fricative

# Place of articulation

- This gives us our **place of articulation** – *where* in the vocal tract obstruction is made:
  - **bilabials** – lips
  - **labiodentals** – lips and teeth
  - **dentals** – tongue tip and teeth
  - **alveolars** – tongue tip/blade and alveolar ridge
  - **postalveolars** – tongue blade and area behind alveolar ridge
  - **palatals** – tongue blade and palate
  - **velars** – tongue back and velum
  - **uvulars** – tongue back and uvula
  - **pharyngeals** – tongue root and pharyngeal wall
  - **glottals** – glottis

# Describing consonants

- Consonants are sounds that feature some **obstruction of airflow**.
- We describe this obstruction using three features:
  - voicing**  
*is there voicing?*
  - place of articulation**  
*where is the obstruction?*
  - manner of articulation**  
*what kind of obstruction is it?*

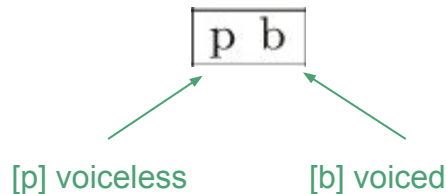
manner of articulation

place of articulation

CONSONANTS (PULMONIC) © 2020 IPA

	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.



# Describing consonants

- With these three features:
  - **voicing**
  - **place of articulation**
  - **manner of articulation**
- We can now fully describe consonants:
  - [p] voiceless bilabial plosive
  - [l] voiced alveolar lateral
  - [ŋ] voiced velar nasal
  - [h] voiceless glottal fricative

manner of articulation

place of articulation

CONSONANTS (PULMONIC) © 2020 IPA

	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.

