

# Phonetics

## LING 200: Introduction to the Study of Language

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# Outline

- 1 Introduction to speech
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  - Voicing
  - Place of articulation
  - Manner of articulation

Slides credit: David Pesetsky, Rebecca Starr

# Introduction to speech

## Let's listen to some speech...

- Discuss with your neighbor:
  - Any guesses about what languages these are?
  - Can you tell where the boundaries between words are?
  - Can you tell where the boundaries between sentences are?

## Listening to unfamiliar languages

- Language A was Hmong, B was Scots Gaelic.
- Even for languages we do not know, we can perceive some cues for sentence boundaries.
- But we cannot identify the boundaries of words. Within a sentence, speech comes out in a pretty continuous stream.
- Speech is often referred to as the **speech stream**.

# Introduction to speech

## Common thoughts when hearing an unfamiliar language:

- “Why are they speaking so quickly? How can anyone understand this?”
- “How do people make these sounds? Why is this language so hard to pronounce?”

## The language experts

- Humans are, in many ways, experts in our native languages.
- When we speak, we automatically coordinate our muscles to form the appropriate sound sequence.
- When we hear a language we know, our brain automatically breaks it up and analyzes it.
- These processes are invisible to us and seem easy.
- But in fact, they are so complex that we have yet to train a computer to reliably do any of them.

# Articulatory Phonetics: how is speech produced?

## How do we produce speech?

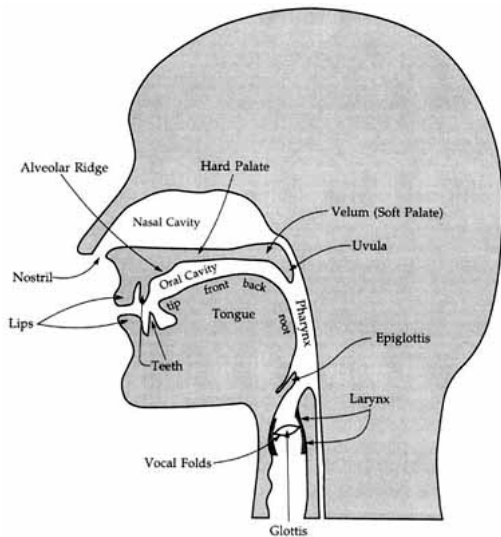
- Let's watch a slightly creepy X-ray video. Notice how many different parts are moving to produce these sounds:

<https://www.youtube.com/watch?v=DcNMCB-Gsn8>

## The process of speech production

- The voice is powered by air coming up from the lungs.
- The human voice, including speech, is created by the way that air is molded by different parts of the vocal tract as it travels up to escape through our mouth and nose.

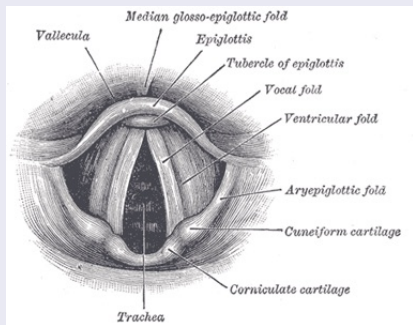
# The vocal tract



# The vocal tract

## The Larynx

- Commonly called voice box / Adam's apple.
- The vocal folds can be manipulated into various configurations.
- In certain configurations, air passing through causes the folds to vibrate, producing sound.

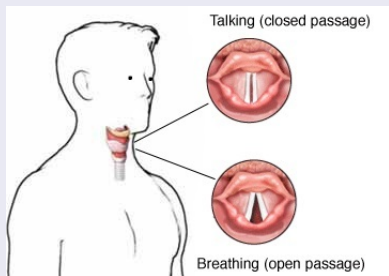


# The vocal tract

## The Larynx

- The vocal folds (or: vocal cords) in action (warning: slightly creepy):

<https://www.youtube.com/watch?v=-XGds2GAvGQ>





# Voicing

- What is the difference between a “z” sound and an “s” sound?
- Put your hand over your larynx and see if you can feel any difference between “zzzz” and “ssss.”

## Voiced and voiceless sounds

- The vocal folds provide one of the key distinctions in speech sounds:
  - **Voiced:** vocal cords vibrating
  - **Voiceless:** vocal cords not vibrating
- Which of the following words start with a voiced consonant?
  - (1) a. pair      voiceless
  - b. shine      voiceless
  - c. judge      voiced
  - d. bear      voiced

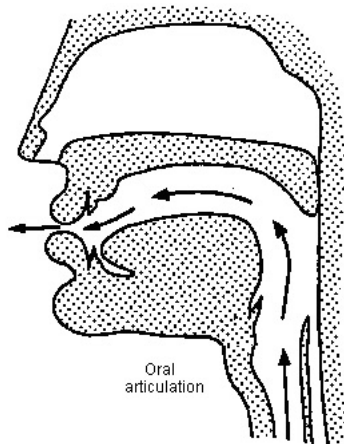
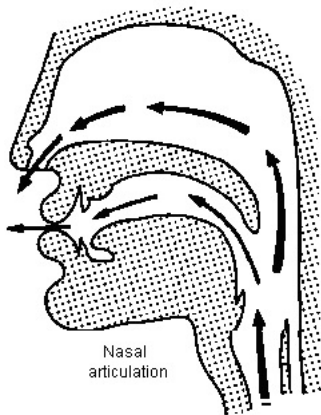
# Voicing

## Voicing and vowels

- What about vowels? Are they voiced or voiceless?
- In English (and most languages), all vowels are voiced.

## Oral and nasal

- Hold your nose and say “ahhhh”
- Now hold your nose and say “mmmm”



# Consonants vs. Vowels

- **Consonants:** airflow through the oral cavity is obstructed in some way.
- **Vowels:** airflow through the oral cavity is not obstructed.
- ▶▶ In this course, we will focus on (English) consonants.

# Consonants

## Three key features capture consonants

- **Voicing** (voiced vs. voiceless)
- **Place of articulation**  
Where is the air flow obstructed?
- **Manner of articulation**  
How is the air flow obstructed?  
Includes nasality (oral vs. nasal)

# Place of articulation

## Time for some Latin

<b>Location</b>	<b>Place of articulation</b>
lips	bilabial
teeth	dental
alveolar ridge	alveolar
hard palate	palatal
soft palate (velum)	velar
glottis	glottal

# Place of articulation

## Bilabial

- Oral
  - pet
  - bet
  - wet
- Nasal
  - met
- Which of these sounds is voiced vs. voiceless?
- 
-

# Place of articulation

## Labiodental

- **f**ine (voiceless)
- **v**ine (voiced)
- Why are they called labiodental?



# Place of articulation

## Interdental

- **thin** (voiceless)
- **this** (voiced)
  
- Wait, there are two “th” sounds?  
How are we supposed to write each one?

## The International Phonetic Alphabet

- Lets learn our first two International Phonetic Alphabet (IPA) symbols:
  - **thin**: [θ] (a Greek theta)
  - **this**: [ð] (called “eth”)
- More about the IPA on Friday!

# Place of articulation

## interdental

- Different people have different ways of making these sounds!
  - Some put their tongue between their teeth (Interdental)
  - Others put their tongue behind their teeth (dental)
- For this course, we'll just call them “interdental”.

# Place of articulation

## Alveolar

- Oral
  - tune
  - dune
  - soon
  - zoo
  - loon
  - rune
- Nasal
  - noon
- (linguists usually pronounce this alVEElar)

# Place of articulation

## Post-alveolar

- ship : [ʃ]
- genre / measure : [ʒ]
- chip : [tʃ]
- gym : [dʒ]

# Place of articulation

## Palatal

- yes : [j]

# Place of articulation

## Velar

- Oral
  - kit
  - gift
- Nasal
  - king, think : [ŋ] (“engma”)
- In English, engmas never appear at the beginning of a word. But they do in other languages like Cantonese.

# Place of articulation

## Uvular

- There are no uvular sounds in English.
- The French [R] is uvular!
  - purée “purée”
  - arrêt “stop”

# Place of articulation

## Glottal

- Produced by narrowing or closing vocal folds.
  - hat
  - uh-oh : [ʔ]



# Place of articulation

## Summary: places of articulation

- Bilabial: [b] [p] [m] [w]
- Labiodental: [f] [v]
- Interdental: [θ] [ð]
- Alveolar: [t] [d] [n] [l] [s] [z] [r]
- Post-alveolar: [ʃ] [ʒ] [tʃ] [dʒ]
- Palatal: [j]
- Velar: [k] [g] [ŋ]
- Glottal: [h, ʔ]

One more video:

<https://www.youtube.com/watch?v=4zc-ZQ7f2g8>

# Manner of articulation

## Manner of articulation

- Is place of articulation enough information for us to distinguish between sounds?

[t] [s]

- Both of those sounds are voiceless alveolar consonants.
- But they are obviously very different!

# Manner of articulation

## Stops

- In a **stop** (aka **plosives**), the oral cavity is completely blocked.  
[p], [b], [t], [d], [k], [g], [ʔ]
- Good test for a stop: can you hold out the sound?

# Manner of articulation

## Nasals

- We create **nasals** by blocking the flow of air in the oral cavity (like we do for stops), but allowing it to flow in the nasal cavity.
- We will call these sounds nasals (aka **nasal stops**):  
[m], [n], [ɱ]
- The sounds [b] and [m] differ only in their nasality.

# Manner of articulation

## Fricatives and affricates

- **Fricative:** partial obstruction of the airflow, causing turbulence (a buzzy noise).  
[f], [v], [θ], [ð], [s], [z], [ʃ], [ʒ], [h]
- **Affricate:** a stop plus a fricative.  
[tʃ], [dʒ]

# Manner of articulation

## Quiz your neighbor

which of these words start with a fricative, and which with an affricate?

- (1) staple
- (2) juice
- (3) phase
- (4) Cheryl
- (5) Charley
- (6) (Novak) Djokovic



- |             |                |
|-------------|----------------|
| (7) staple  | [s] fricative  |
| (8) juice   | [dʒ] affricate |
| (9) phase   | [f] fricative  |
| (10) Cheryl | [ʃ] fricative  |

# Manner of articulation

## Approximants: Liquids and Glides

- **Liquids:**

- Constriction but no turbulence
- [l] : lateral liquid
- [r] : central liquid

- **Glides:**

- Also called “semi-vowels.” Very vowel-y.
- [j], [w]

# Manner of articulation

## Summary: manners of articulation

- **Stops:** [p], [b], [t], [d], [k], [g], [ʔ]
- **Fricatives:** [f], [v], [θ], [ð], [s], [z], [ʃ], [ʒ], [h]
- **Affricates:** [tʃ], [dʒ]

### ▶ Obstruents

- **Nasals:** [m], [n], [ŋ]
- **Liquids:** [l], [r]
- **Glides:** [j], [w]

### ▶ Sonorants



## Manner of articulation

### Remember the *red* rule?

- (13) a. whiten, blacken, *red*den, quicken, deepen, shorten, lighten...  
b. \*greenen, \*yellowen, \*purplen, \*slowen, \*highen, \*tallen...

➡ What is the rule for when *-en* can be attached to an adjective?  
*-en* can attach to **obstruents** but not to **sonorants**.

# Manner of articulation

Practice: identify the place of articulation!

- [θ] interdental
- [ŋ] velar
- [j] palatal

Practice: identify the manner of articulation!

- [l] liquid (approximant)
- [ʔ] stop
- [m] nasal

## For next time...

- Don't forget: **we have class this Friday!**
- The slides from Monday have been posted, the slides from today will be up soon.
- **Assignment 1 has been posted, due Monday, January 18.**
- Starting today, you should be able to sign up for conferences on Minerva.