HOW SPEECH SOUNDS ARE PRODUCED

- The vocal tract
- The respiratory system
- Airstream
- Articulators of Speech Sounds
LEARNING OUTCOMES

At the end of the lecture, students are able:

- to describe the airstream & basic mechanisms of English speech sound production
- to explain major vocal organs and their functions
THE RESPIRATORY SYSTEM

Where is air initiated?

- the ‘initiator’ of air is the lungs.

- **Lungs**: a pair of organs (elastic & spongy in nature) used to initiate/generate an airstream for speech (acts like a bellows/piston)

- **Larynx**: a piston-like structure that can also act in a valve-like manner
  - generates an airstream
  - source of sound
  - serves as an articulator
AIRSTREAM

What is an airstream?

- **Airstream**: a body of moving air required for producing speech sounds

- Airstream in human speech sound production can be described in terms of 2 parameters:
  1. the direction of the air flow:
     - outward (**egressive**) or inward (**ingressive**)
  2. the internal bound of the passage through which the air moves
WHAT TYPE OF AIRSTREAM IS USED FOR ENGLISH SPEECH SOUND PRODUCTION?

- **Pulmonic Egressive** airstream: the only airstream responsible for the production of English speech sounds.

- Air is initiated at the lungs (*pulmonic*) and pushed outward (*egressive*) through the trachea, larynx, oral and/or nasal cavity.

- Pulmonic egressive airstream is typical in all human languages.
# Airstream Types

<table>
<thead>
<tr>
<th>Mechanism location</th>
<th>Pressure (direction of airflow)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Lungs</td>
<td>Pulmonic (ingressive)</td>
</tr>
<tr>
<td>Larynx</td>
<td>Glottalic (ingressive)</td>
</tr>
<tr>
<td>Larynx</td>
<td>Glottalic (ingressive)</td>
</tr>
<tr>
<td>+ lungs (mixed)</td>
<td>Velaric (ingressive)</td>
</tr>
<tr>
<td>Mouth</td>
<td>Velaric (ingressive)</td>
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</tbody>
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(Ball & Rahilly, 1999: 20)
THE VOCAL TRACT

What is the vocal tract?

- Air passage above the larynx: *vocal tract*

- Main functions: setting a column of air into motion & modifying this moving airstream in several ways to produce speech sounds

- A series of cavities above the larynx: the pharyngeal, oral & nasal cavities (supraglottal cavity) act as resonating chambers
THE VOCAL TRACT (cont’d)

(www.indiana.edu/.../vocalTractLabels.gif)
THE VOCAL TRACT (cont’d)

- Most articulations take place in the oral cavities.

- The human nasal cavity cannot be modified internally, but can be opened/sealed off at its intersection with the oral & pharyngeal cavities.

- The pharyngeal cavity can be constricted slightly.
ARTICULATORS

What are articulators?

- Different parts of the vocal tract (speech organs) used to produce sounds

- They can be categorised as **active** (movable) & **passive** (non-movable) articulators

- Active articulators:
The mobile lower articulators—tongue, lower lip

- Passive articulators:
The target of articulation: upper front teeth, upper lip, (hard) palate, alveolar ridge, pharynx, velum (soft palate)
THE ORGANS OF SPEECH (ARTICULATORS)

1- nasal cavity
2- lips
3- teeth
4- alveolar ridge
5- hard palate
6- velum (soft palate)
7- uvula
8- apex (tip) of tongue
9- blade (front) of tongue
10- dorsum (back) of tongue
11- oral cavity
12- pharynx
13- epiglottis
14- larynx
15- vocal cords
16- trachea
17- esophagus
7 major articulators:

- **Pharynx:** a tube that begins just above the larynx; In women: 7 cm, In men: 8 cm

- **Velum/Soft Palate:** In speech, it is often raised so as not to allow air to escape through the nose

- **Hard palate** ("roof of the mouth"): It has smooth surface

- **Alveolar ridge:** located between top front teeth and hard palate; surface covered with little ridges
- **Teeth**: the tongue in contact with the upper front teeth for many speech sounds such as [f, v, θ, ð]

- **Tongue**: a very important articulator; can be moved into many different places and shapes; divided into various sections, e.g. tip, blade, front, back, root

- **Lips**: important in speech; can be pressed together (sounds: [p], [b] - **bilabial**); brought into contact with the teeth ([f], [v] – **labio-dental**), rounded to produce the lip shape for vowels like [u:]
Shapes of lips for articulating vowels

Adapted from Clark & Yallop, 2007: 27
READ, YOU MUST!
See you soon.