



University of Al-Mustaqbal
College of Science
Department of Medical
Physics



Phonetics

Second stage

Sound characteristics

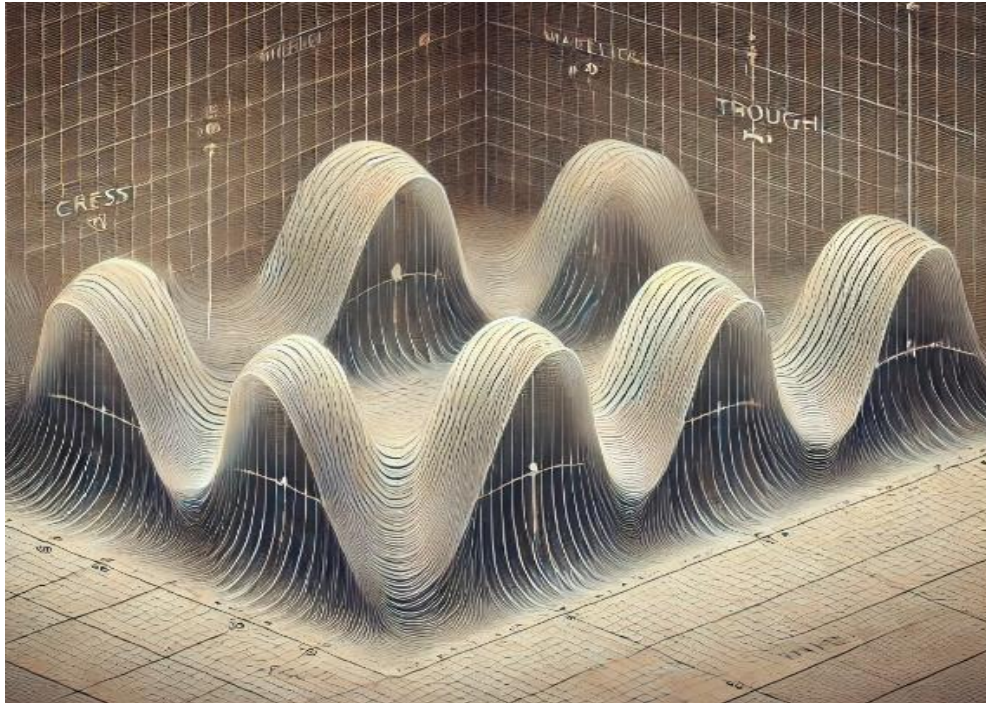
Second lecture

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Sound characteristics:

All waves have certain properties, but the most important properties of sound waves are as follows:



A - Wavelength: It is the distance between any point on one phase of the wave and an equivalent point on the next phase. In other words, it is the length of the wave itself.

B - Wave height: It represents the strength of the wave signal, and it is also the same as the height at which the wave appears when it is drawn in the form of a graph. When the wave is of high height, this is an indication that it is of high value. For your information, there is a device called a loudspeaker. An amplifier whose task is to increase the height of the wave.

C - Wave frequency: It represents the number of times a wave is repeated within one second, and the unit of measurement for frequency is kilohertz (Khz). The faster the sound source vibrates, the greater its wave frequency is, and high frequencies are observed through the crests of high waves. Definition Sound wave A sound wave is a wave resulting from vibrations and disturbances that occur in the air. When an object emits a sound, it creates a disturbance in the air molecules, which in turn

sends a series of reactions through the air until it reaches the listener's eardrum. When the ear picks up that sound, The process of sending signals to the brain so that it can interpret them and understand what is heard. In addition to all of this, it can be said that the wave is a process of pressure and disturbance in the air, so that the sound spreads through a fluid medium such as air.

D - Speed of sound: The speed of sound depends on the following: The type of medium through which sound is transmitted: it is higher in solids, lower in liquids, and much lower in gases. Properties of the medium: density and compressibility: velocity decreases as they increase.

E - Sound intensity: The sound intensity at a specific point depends on the following factors: The distance of the point from the source: The sound intensity is inversely proportional to the square of the distance of the point from the sound source. The amplitude and frequency of the source's vibration: The intensity is directly proportional to the frequency of the source, and also to the square of the amplitude of the sound source's vibration. Surface area of the vibrating body: The intensity increases as the vibrating surface area increases, due to the increase in the vibrating mass of air. Density of the propagation medium: increases with the density of the source, because the amount of energy that is transferred from the source to the medium increases with each oscillation.

F - Loudness: The loudness of the sound depends on the following: the intensity of the sound heard. Frequency of sound waves: The sensitivity of the ear decreases to sound waves with a frequency less than 1000 Hz, and to waves with a frequency higher than 10,000 Hz. As for sounds with frequencies less than 20 Hz, or greater than 20,000 Hz, the ear cannot hear them.

J - Pitch of sound: Through this characteristic it is possible to distinguish between thin (sharp) sounds and thick sounds, as it depends on the frequency of the sound waves that reach the ear. Thin sounds have a higher frequency than thick sounds, and the best example of this is the voice of women and men. The pitch of a woman's voice is higher than

that of a man, because the frequency of a woman's voice is higher than the frequency of a man's voice. Type of sound The type of sound depends on the type of material from which it comes from and the method of generating it, and through it it is possible to distinguish between two sounds of the same pitch and loudness. But they come from a different source. The pitch of sound is related to the speed of the oscillations. The faster the oscillations are, and the more there are in number per second, the higher the pitch, and vice versa. The smaller the number of oscillations, the thicker the resulting sound. The pitch of the sound is called the tone of sound or pitch. Sound or pitch.

The phonetic material of the language is divided into:

1- Musical sounds: These are those sounds that contain regular vibrations, such as the consonants Lām, Nūn, and Mīm.

2- Noisy sounds: These are those sounds that do not contain regular vibrations, such as the whispered consonants, ta, tha, ha, kha, shin, sīn, sād, ta, fa, qāf, kāf, and ha.

3-Sounds that contain regular vibrations and noise, which are the abandoned consonants: ba, ji, dal, dha, ra, za, dha, ayn, ghain, lam, meem, and nun.

2- The physiological study of the voice:

The speech system and the functions of its organs:

1- Diaphragm:

The chest opens to the abdomen at the bottom with a wide opening, and this opening is closed by a muscular and tendinous barrier, which is the diaphragm. Its function in speech: In the case of speech, the diaphragm presses the lungs with regular pressures to different degrees, and each pressure results in an air push, so the air pushes are successive in proportion to the number of compressions.

2- Lungs:

Two soft, spongy bodies. The right is larger than the left. It is divided by oblique and horizontal slits into three lobes: an upper lobe, a middle lobe, and a lower lobe. As for the left lung, it is divided by an oblique slit into an upper and lower lobes. The lungs are composed of what are called alveoli, capillary tubes, and bronchioles. They are all filled with breathing air. Their function is In speech: In the case of speaking, the exhalation time is prolonged, and this length is evident in cases of excessive prolongation, as well as in the case of stopping after a long linguistic structure. "Scientists have estimated the exhalation time in the case of speaking to be about 85% of the total time of the breathing cycle, and the inhalation time to be about 15%."

3-Tracheal:

The trachea is a movable tube with a length of 13 cm and a diameter of 2.5 cm. It ends at the bottom of the chest at the lower edge of the fourth thoracic vertebra by dividing it into two main bronchi, the right and the left. Its function is in speech: Recent studies have shown that the trachea is sometimes exploited as a resonant space with an effect between degrees. The voice, especially if the voice is deep.

4-The larynx:

The main voting organ, which is connected from the top to the laryngeal part of the pharynx, and from the bottom to the trachea. It consists of a group of cartilages connected to each other by membranes and ligaments, and is moved by muscles. The larynx is lined with a mucous membrane. The most important cartilages that make up the larynx are:

1-Thyroid cartilage: It consists of two sheets of hyaline cartilage that meet at the midline in the prominent corner of the Adam's apple.

2-Cricoid cartilage: It consists of a complete ring of hyaline cartilage, which resembles a ring with a lobe and is located at the bottom of the thyroid cartilage.

3-The arytenoid cartilages: They are two small cartilages, each in the shape of a pyramid. They are located on the back of the larynx on the upper edge of the cricoid cartilage plate, and are connected to these two cartilages by the vocal chords (each cartilage is connected to a vocal chord and the two chords meet together in the inner corner of the thyroid cartilage).

Sound outputs:

Linguistic sound occurs as a result of varying pressure at a certain point in the speech system. This point is called the outlet, and there is a meeting or convergence between two members of the speech system, which are usually an active, moving member and a fixed one. (Lips (upper and lower lip) - Tongue (where the tongue meets the front or back palate) - Larynx - Upper teeth (dental ridges)

Contextual audio phenomena:

They are the phenomena resulting from the use of language, where use leads to the interaction of adjacent sounds to different degrees according to the strength of the influencing and affected person and the factors controlling the use. The phenomena are divided into three sections:

Questions

1. What does the wave amplitude represent?

- A. The total length of the wave.
- B. The time between two wave peaks.
- C. The strength of the wave signal or its height on the graph.
- D. The difference between frequency and wavelength.

2. If the wave has a high amplitude, this indicates that:

- A. The wavelength is short.
- B. The wave has a low value.
- C. The wave has a high value.
- D. The wave moves slowly

3. How does sound reach the listener's ear?

4. What does the speed of sound depend on?

5. How does the distance from the sound source affect the intensity of the sound at a specific point?

6. Why can't the human ear hear sounds with frequencies below 20 Hz or above 20,000 Hz?

7. What determines the pitch or tone of a sound?

- A) Vibration speed
- B) Material type
- C) Sound source
- D) Loudness

8. What term is used to refer to the pitch of a sound?

- A-Sound density.
- B-Sound tone.
- C-Sound intensity.
- D-Sound type.

9. Which part of the body controls the regulation of breathing in humans?

- a- Heart
- b- Brain
- c- Liver
- d- Kidneys

What is the point where two speech organs come together or approach each other, and is called the "place of articulation?"

- a- Larynx
- b- Tongue
- c- Lips
- d- Upper teeth