

# CHAPTER 1

## SPEECH SOUNDS IN ENGLISH

Regularly, we are in communication with sound. Without sound, communication can still go on by means of nodding a head, waving a hand, or drawing a picture, called *non-verbal communication*. Such communication can even be language without sound, that is, those who cannot hear use the language based on manual signals instead. Every language in communication, on the other hand, can still take place with sound, called *verbal communication*.--most of our messages we get from one to another were encoded in sounds and then decoded in meaning. Therefore, we can say that all languages in the world have spoken forms. Few languages have no written forms. In this chapter, we are going to focus on how speech sounds are described and how they are produced.

### **The speech sounds**

Language is a mainly used instrument of human communication. “Every language (Praromrat Jotikasthira, 1999: 1) has three important components: its grammar, its semantics (concerned with meaning), and its transmission systems (pronunciation for speech and orthography for writing).” It is clear that the language has an internal structure consisting of two sub-structures—sound and meaning. When speaking, we combine sounds together to make words meaningful. It is noted that because of a spoken language formed by sounds, the English language is examined with the sound system. To examine speech sounds, we can study how they are pronounced by the speech organs. Thus, it is very important to study English pronunciation through the functions of the various parts of these organs of speech.

## The production of speech sounds

How can we produce speech sounds? According to linguistics, we can find the way speech sounds are produced, which can be mainly divided into two sub-fields: **phonetics** and **phonology**.

### 1. Phonetics

“Phonetics (Zsiga, 2006: 13) studies how speech sounds are made, transmitted and perceived.” Phonetics is the study of the production, the transmission, and the perception of speech sounds, dealing with the characteristics of the specific sounds in a given language. In terms of phonetics, the study of human speech sound can be divided into three different ways: 1) **Articulatory Phonetics** is the study of how speech sounds are produced by the organs of speech; 2) **Acoustic Phonetics** is the study of how speech sounds are transmitted; and 3) **Auditory Phonetics** is the study of how speech sounds are heard. (See the figure 1.1)

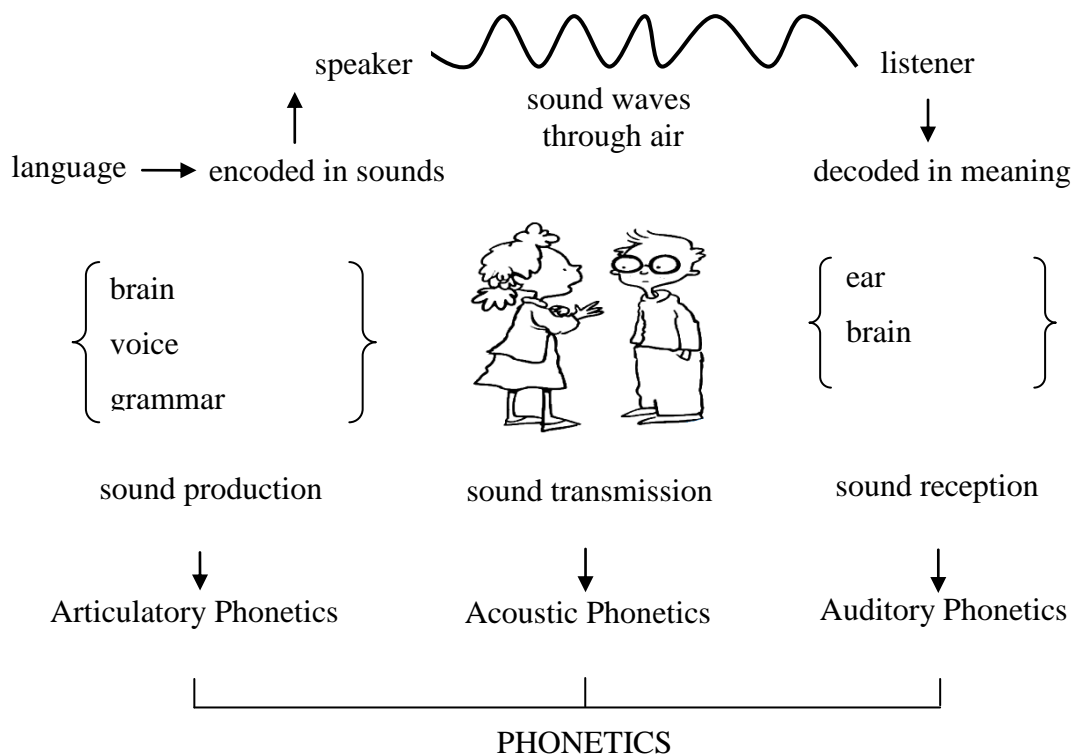


Figure 1.1 The production of speech sounds

Source: Pailin Yantrising (1999)

## 2. Phonology

“Phonology (Zsiga, 2006: 13) studies how languages organize sounds into different patterns.” Phonology is the study of different patterns of sounds in different languages, dealing with how sounds are combined together to form the different words. Thus, we can assume that “phonology is a grammar of phonetic patterns.” (<http://www.phon.ox.ac.uk/jcoleman/PHONOLOGY1.htm>).

According to the grammar of phonetic patterns, if the sounds are combined together with a grammatical sound order like this: /kɪp/, we will get a meaningful word: *kip* (sleep), but if they are combined together like this: /ɪkp/, we will get a meaningless word because of an ungrammatical sound order. However, if the sounds are rearranged like this: /pɪk/, we will get a meaningful word: *pick*, which means “to to choose somebody/something from a group of people or things” (Hornby, 2000: 990). Thus, we can assume that if some phonemes (vowel and consonant sounds), which mean “the smallest distinct sound units” (Matthews, 1997: 276), are organized with the differently grammatical patterns of sounds, we will get the differently meaningful words.

## Articulatory Phonetics

Primarily, our primary concern in this chapter is *Articulatory Phonetics*, in which the speech sounds can be easily examined and studied. The Articulatory Phonetics is one of three subfields in phonetics, dealing with how speech sounds are made by **the organs of speech**. All sounds we articulate when we speak (Roach, 2010) are the result of the flow of air coming up from the lungs and interfering with other speech organs. To study the production of speech sounds it needs to be familiar with the different parts of the vocal tract. These different parts are called **articulators**, which are now described.

### 1. The vocal tract

“The passage above the larynx through which air passes in the production of speech (Mathews, 1997: 397) is called **the vocal tract**.” “After passing through the larynx, the air (Roach, 2009: 8) goes through what we called the **vocal tract**, which ends at the mouth and nostrils; we call the part comprising the mouth the **oral cavity**

and the part that leads to the nostrils the **nasal cavity**.” Thus, it can be assumed that within the vocal tract there are mainly three connected cavities consisting of the **oral cavity**, the **nasal cavity**, and the **pharyngeal cavity**.

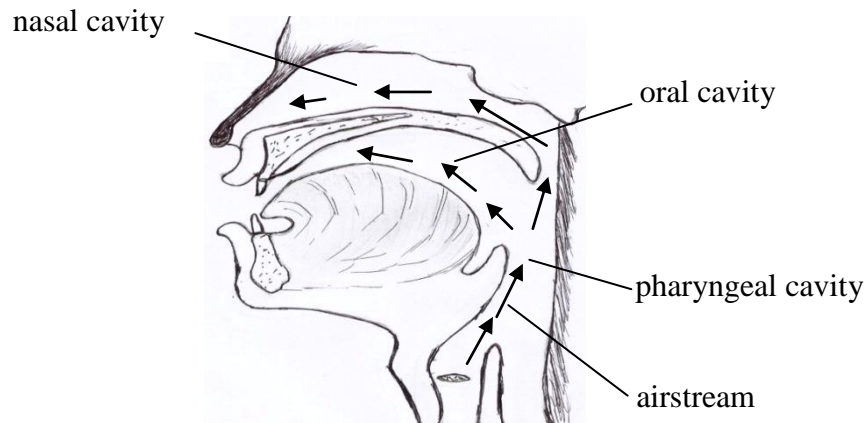


Figure 1.2 The main parts of the vocal tract

## 2. The articulators

“Any vocal organs used to form specific speech sounds: e.g., the upper and lower lips, as in the production of /p/ in *pit*, (Mathews, 1997: 26) are called the articulators.” Within the oral cavity, the articulators consist of the lower parts that are moveable and the upper parts that are immovable, which are mainly used to form speech sounds in English. Thus, the articulators can be assumed that there are two types, which are now described.

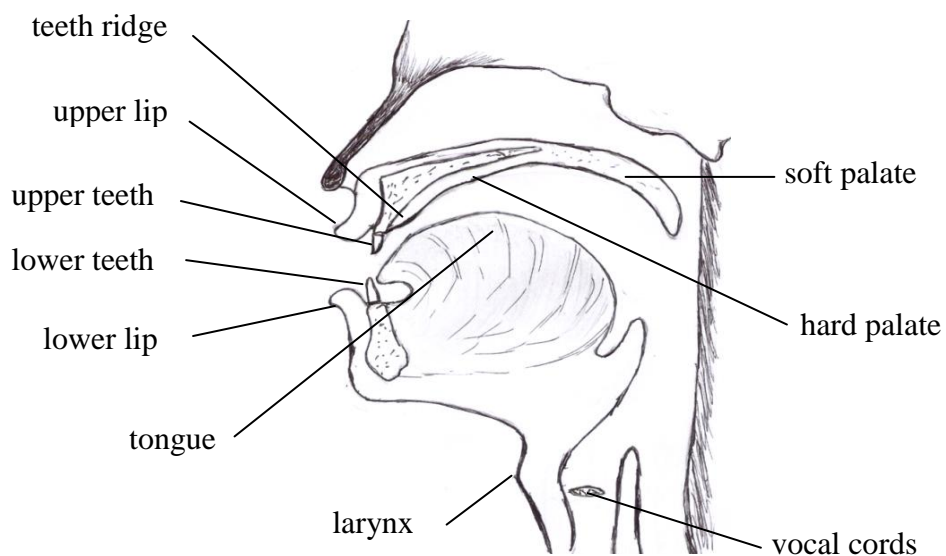


Figure 1.3 The articulators

### 2.1 The active articulators

The active articulators are the lower parts of the vocal cavity that are movable—comprising the lower lip and the tongue (tip, blade, front, center, back and root); these articulators can move to make contact with other articulators (passive articulators).

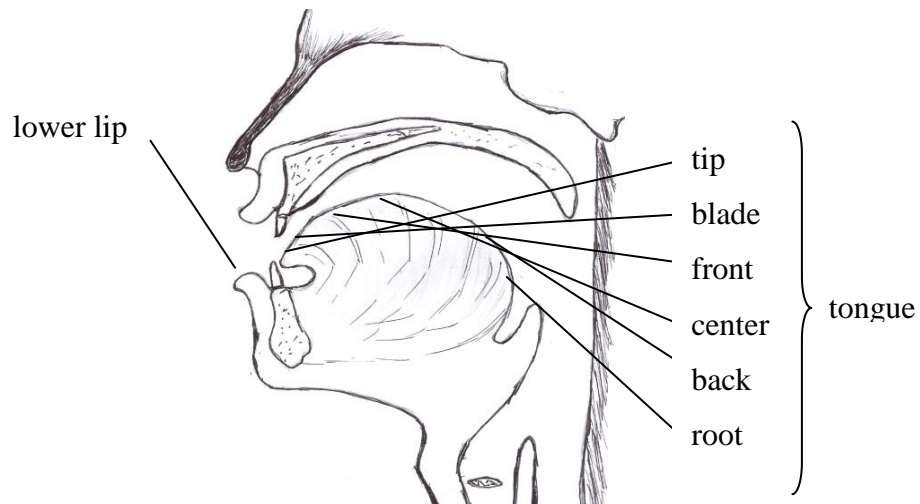


Figure 1.4 The active articulators

### 2.2 The passive articulators

The passive articulators are the upper parts of the vocal cavity that are immovable—comprising the upper lip, the upper teeth, the roof of the mouth (the teeth ridge, the hard palate and the soft palate), and the pharyngeal wall; these articulators cannot move to touch other articulators (active articulators).

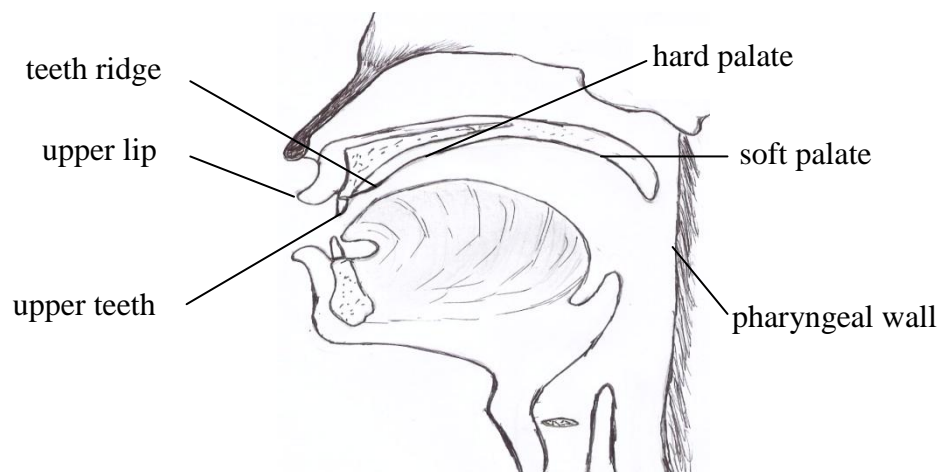


Figure 1.5 The passive articulators

### 3. The organs of speech

According to the articulatory phonetics, the articulators within the vocal tract consisting of active articulators and passive articulators, which are mainly used in the production of speech sounds, are called **the organs of speech**, which can be divided into three processes: *the airstream process*, *the phonatory process*, and *the articulatory process*.

#### 3.1 The airstream process

This process is the source of air used in making the sound—comprising **the lungs, the muscles of chest, and the trachea** (the windpipe). The function of the lungs (Sethi and Dhamija, 1999) is breathing under the action of the muscles the chest. When compressed by the muscle of chest, the lungs throw the air out, called *breathing out*; and when expanding, they draw the outside air in, called *breathing in*. In both cases, the airstream passes through the trachea.

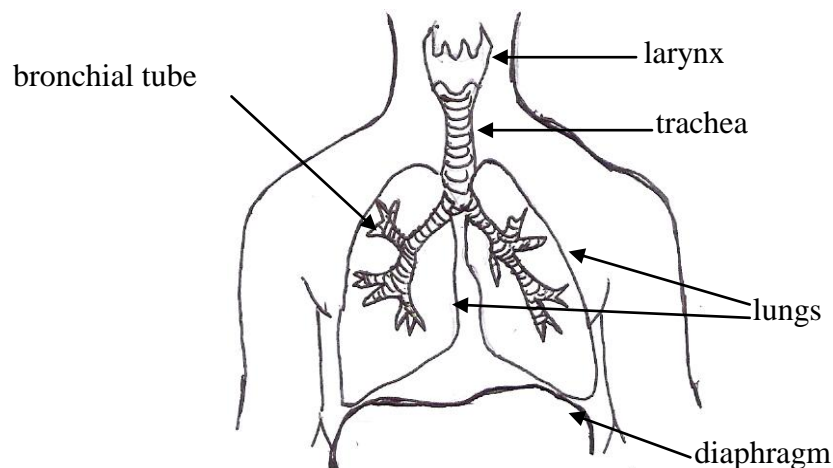


Figure 1.6 The source of air used in making sounds

From the airstream process, one thing to help produce speech sounds is airstream mechanism because we cannot produce the speech sounds without the movement of the airstream. Thus, it is necessary to study the airstream mechanism for the production of speech sounds. “This airstream mechanism initiated by the air from the lungs (Sethi and Dhamija, 1999: 2) is called **pulmonic egressive airstream mechanism** (pulmonic is the adjective form lungs, and egressive airstream means the stream of air going out of the lungs). English language and all other languages (also Thai language) use only the *pulmonic egressive airstream mechanism*.

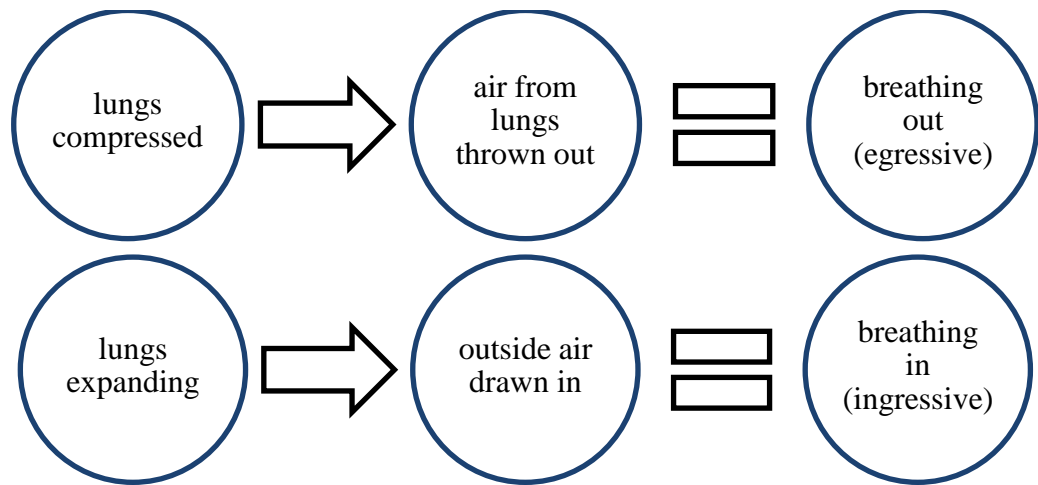


Figure 1.7 The airstream mechanisms: *egressive* and *ingressive*

### 3.2 The phonatory process

This process is the manner of vocal cords in the glottis used in making sound—comprising the **larynx** (voice box) and the **vocal cords**. “At the top of the trachea (Fasold and Connor-Linton, 2006: 14) is little box of cartilage, called the **larynx**,” whose front part is prominent in the neck, commonly known as **Adam’s apple**. Inside the larynx, there are two lip-like cartilages, which are horizontally situated from front to back, called the **vocal cords**. “At the back the vocal cords (Roach, 2010: 22) are attached to a pair of small cartilages called the arytenoids cartilages. If the arytenoids cartilages move, the vocal cords move too”, and they can be divided into three various positions, which are now described.

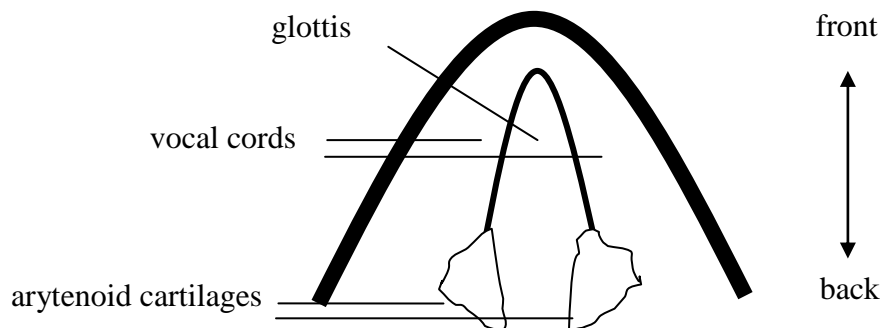


Figure 1.8 The inside parts of the larynx from *front* to *back*

3.2.1 The position of vocal cords in making the voiceless sounds: When we breathe normally, there is a wide opening between the vocal cords, called the **glottis**. When the vocal cords are widely open, they form a V-shaped opening across the larynx. Under such action, the air from the lungs can pass freely through the opened glottis without vibration. This is the position in making the **voiceless** sounds such as the initial sounds in the English words: *pot, ten, cat, chair, fan, thin, sun, sheet, hot*.

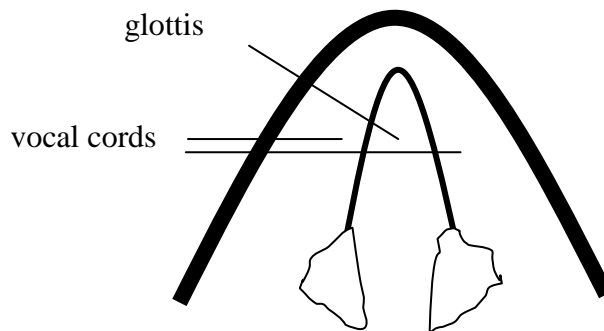


Figure 1.9 Open vocal cords (Voiceless sounds)

3.2.2 The position of vocal cords in making the voiced sounds: In making the voiced sounds, if the vocal cords are held loosely together, the air from the lungs passing through the narrow opening make the vocal cords vibrate. Such vibration causing 'hum' to the sounds produced is the position in making the **voiced** sounds such as the initial sounds in English words consonants: *bed, day, get, jail, man, no, red, late, van, this, zip, well*.

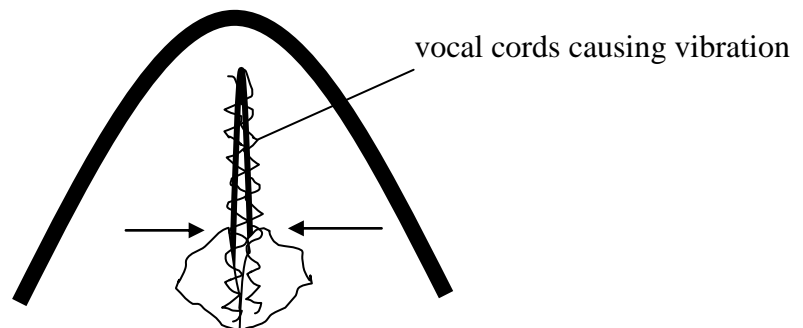


Figure 1.10 Loosely-closed vocal cords (Voiced sounds)



3.2.3 The position of vocal cords in making the glottal stops: When we eat food or drink water, the vocal cords are held tightly together to protect food or water from entering the windpipe. In the position of the closed glottis, the air from the lungs cannot pass through it. When the vocal cords are open suddenly, an explosive sound called **glottal stop** (also called **glottal plosive**) is produced. Such a glottal stop, resembling the sound of a mild cough, (Sethi and Dhamija, 1999: 4) may be found in a forceful articulation of words at beginning of a vowel sound as in some English words: *act*, *empty*, *uncle*. In some Englishmen's speech, a forceful articulation of the words can also occur at the end of sound **p**, **t**, or **k** as in the English words: *tip*, *let*, *back*.

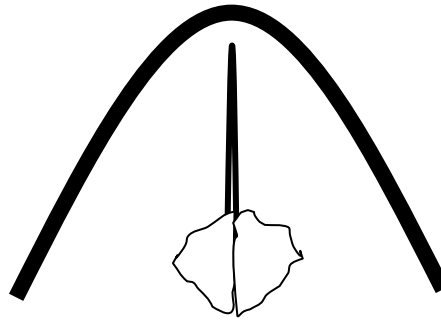


Figure 1.11 Tightly-closed vocal cords (glottal stops)

### 3.3 The articulatory process

Apart from both processes above, one important process that will help us produce speech sounds in English is the articulatory process. After the airstream from the lungs escapes through the windpipe in the neck, it comes up to the mouth. Within the mouth, it is further modified by various speech organs whose shapes in the vocal tract are very important factors in the production of speech sounds.

1.3.1 “The pharynx (Roach, 2009: 8) is a tube which begins just above the larynx. It is divided into two parts: one part being the back of the **oral cavity** and the other being the beginning of the way through the **nasal cavity**.” The shape and size of the pharyngeal cavity (Sathi and Dhamija, 1999) can be greatly contracted or expanded by the movement of the back of tongue, by the position of the soft palate, and by the raising or lowering of the larynx, each one affecting the quality of the sound produced.



Figure 1.12 The parts of pharyngeal cavity

1.3.2 The lips play an important role in producing certain sounds in English. The positions the lips are used in producing the sounds may be held together, kept in contact, or held apart in various ways, which are now described below:

1) If the lips are tightly held together, their position can be assumed in the following manners: (1) The lips are completely held together, called *bilabial stops*, as in producing the sounds /**p**/ and /**b**/ at the beginning of the words: ***p**ick*, and ***b**ig*; and (2) The lips are tightly pressed together by allowing the air to pass through the nose, called *bilabial nasal*, as in producing the sound /**m**/ at the beginning of the word: ***m**an*.

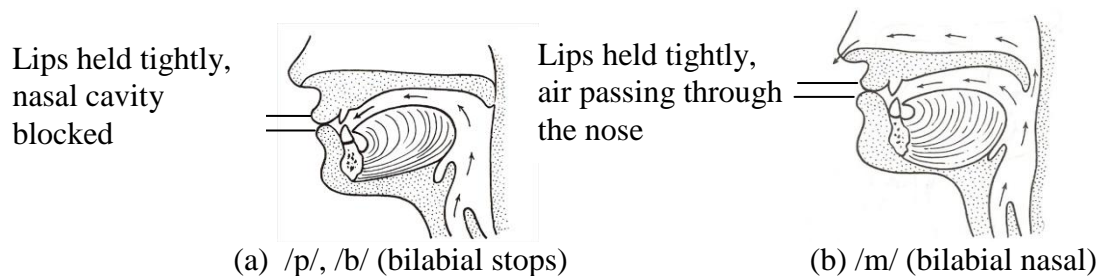


Figure 1.13 The position of lips tightly held

(Sethi & Dhamija, 1999: 93 & 103)

2) If the lips are held apart, their positions (Varshney, 1995) may be described in the following manners:

2.1) The lips are held apart in a spread position as in the vowel sound /i:/ in the word *free*.

2.2) The lips are held in a neutral position, lowering the lower

jaw as in the vowel sound /e/ in the word *met*.

2.3) The lips are held in an open position, in which they are held wide apart without rounding, as in the vowel sound /ɑ:/ in the word *far*.

2.4) The lips are held in a high rounded position as in the vowel sound /u:/ in the word *food*;

2.5) The lips are held in a low rounded position as in the vowel sound /ɒ/ in the words *pot*, and

2.6) The lips held in a rounded position produce the initial consonant sound /w/ in the word *win*, called *labio-velar*.

1.3.3 The teeth consisting of *upper teeth* and *lower teeth* are shown at the front of the mouth, just behind the lips, described as follows:

1) If the *upper teeth* are in contact with the lower lip, the sounds /f/ and /v/ at the beginning of the words *fan*, and *van* are produced, called *labio-dental*.

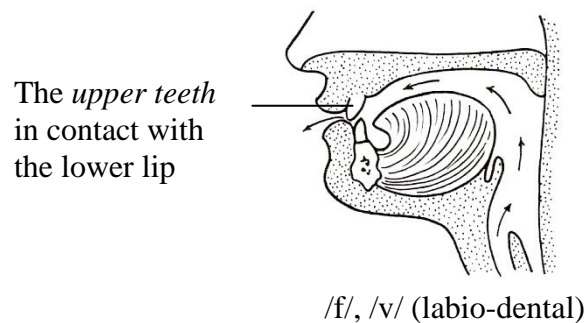


Figure 1.14 The position of the *upper teeth* in contact with the lower lip (Sethi & Dhamija, 1999: 109)

2) If the upper (front) teeth are in a light contact with the tip of tongue, the sounds /θ/ and /ð/ at the beginning of the words *think*, and *that* are produced, called *dental*.

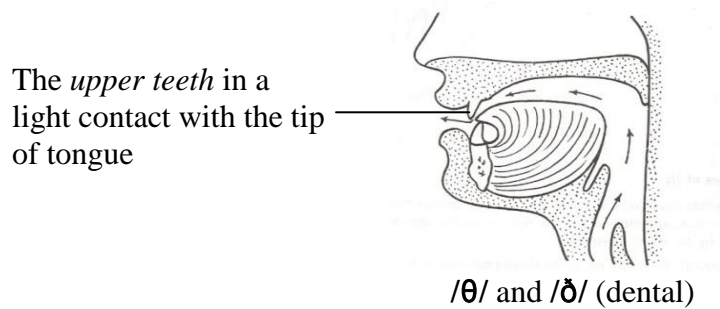


Figure 1.15 The position of the *upper teeth* in a light contact with the tip of tongue (Sethi & Dhamija, 1999: 110)

1.3.4 The teeth ridge (also called the **alveolar ridge**) is just behind the upper teeth. We can feel its surface with the tip of tongue. The sounds made with the tip (blade) of tongue touching the teeth ridge as in the sounds /t/, /d/, /n/, /l/, /s/, /z/ at the beginning of the words *ten*, *day*, *no*, *let*, *sip*, and *zip* are called **alveolar**.

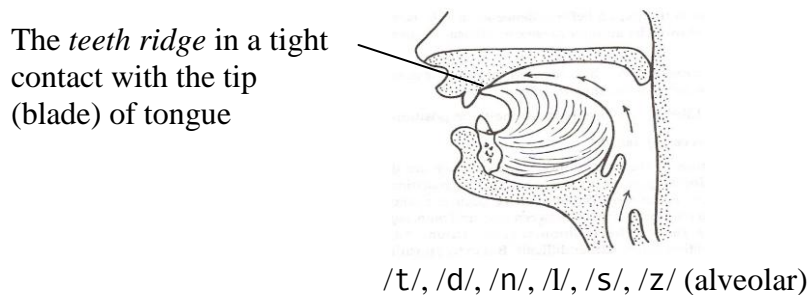
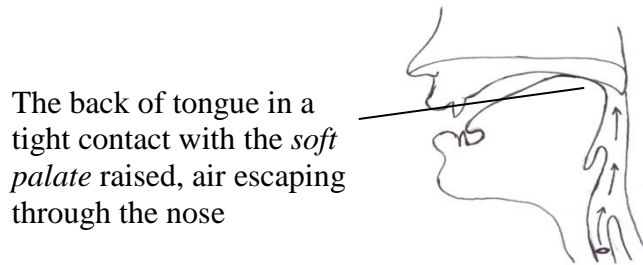


Figure 1.16 The position of the *upper teeth* in a light contact with the tip of tongue (Sethi & Dhamija, 1999: 96)

1.3.5 The hard palate (also called *the roof of the mouth*) is formed by a hard bony structure, lying immediately behind the teeth ridge. We can feel its smooth curved surface with the front of tongue. The sound made with the front of tongue touching the hard palate as is the sound /j/ at the beginning of the word *yes* is called **palatal**.

1.3.6 The soft palate (or velum) is the muscular flap that can be raised to touch the pharyngeal wall, blocking the nasal cavity so that air cannot pass through the nose. We can use the back of tongue to feel its surface at the back of the mouth.

When the soft palate is raised, air cannot escape through the nose; it can escape only through the mouth, and therefore, the sounds produced in this state of the soft palate are called *oral* sounds. The sounds made with the back of tongue touching the soft palate as in the sounds /k/, /g/ at the beginning of the words *key* and *get* are called *velar stops*.



/k/, /g/ (**velar stops**).

Figure 1.17 Nasal tract blocked; oral sounds produced

When it is lowered, the air can pass through the nose, and therefore, the sounds produced in this state of the soft palate are called *nasal* sounds. The sound made with the back of tongue touching the soft palate, allowing air to escape through the nose such as /ŋ/ at the end of the word *sing* is called *velar nasal*, and the sound made with the lips tightly held together, allowing the air to escape through the nose as in the sound /m/ at the beginning of the word: *my* is called *bilabial nasal*.

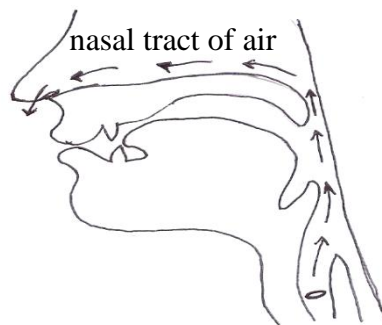


Figure 1.18 Nasal tract open; oral tract blocked; *nasal sounds* produced

Herein if there is no closure at any point in the oral tract and in the nasal tract, air can pass through the mouth as well as the nose. The sounds at the same time made, allowing air to escape through both the mouth and the nose are called *nasalized sounds*, as in the English words *hand* and *man*.

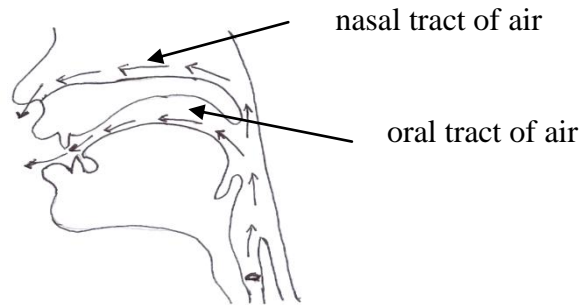


Figure 1.19 Nasal tract open; oral tract also open; *nasalized sounds* produced

We can summarize the state of the soft palate, which is (Sethi & Dhamija, 1999) represented below:

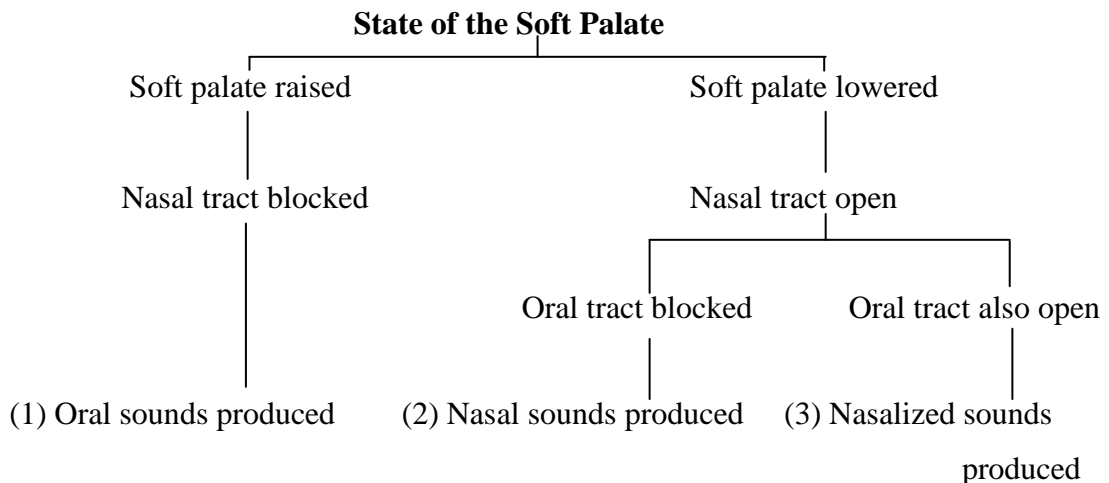


Figure 1.20 State of the soft palate

Source: Sethi & Dhamija (1999)

1.3.7 At the lower end of the soft palate there is a small appendage hanging down that is known as the **uvula**.

1.3.8 The most flexible organ of speech is known as the **tongue** (see the figure 1.4) which has the specific names for different shapes and positions forming the lower surface of the vocal tract. The **tip** and **blade** of the tongue are the most mobile parts. Behind the blade is what is technically called the **front** of the tongue. The remainder of the body of the tongue may be divided into the **center**, which partly

beneath the hard palate and partly beneath the soft palate, the **back**, which is beneath the soft palate, and the **root**, which is opposite the back wall of the pharynx.

As all mentioned above, we can summarize the outline of organs speech used in the production of speech sounds as follows:

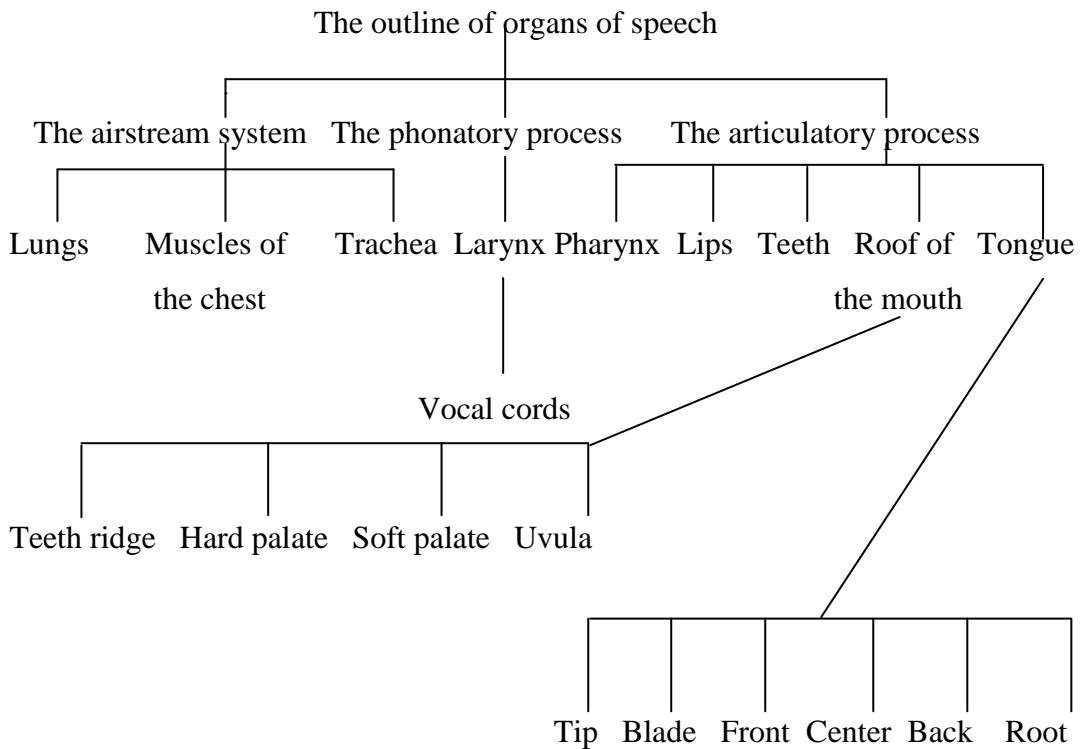


Figure 1.21 The outline of organs of speech

Source: Sethi & Dhamija (1999)

## Summary

In the production of speech sounds, as all mentioned above, we can summarize that the study of how speech sounds are produced can be mainly divided into two different ways: **Phonetics** is the study of how speech sounds are made, transmitted and perceived; and **Phonology** is the study of how languages organize sounds into different patterns.

According to Phonetics, we can say that the speech sounds can be studied and examined through three different ways: 1) **Articulatory phonetics** is the study of how speech sounds are produced by the organs of speech; 2) **Acoustic phonetics** is the

study of how speech sounds are transmitted, and **Auditory phonetics** is the study of how speech sounds are heard as well as mediated by ear, auditory nerve and brain.

In terms of the articulatory phonetics, we can conclude that it is the study of how speech sounds are produced by **the organs of speech**, mainly divided into three processes: 1) **The airstream process** is the study of how air are produced in making the sound; 2) **The phonatory process** is the study of how vocal cords in the glottis function in making sound; and 3) **The articulatory process** is the study of how speech sounds are produced within the mouth, modified by various speech organs whose shapes in the vocal tract are very important factors in the production of speech sounds. Inside the vocal tract, there are two articulators that can be used to form sounds: 1) **The active articulators**: *lower lip, lower teeth and tongue*; and 2) **the passive articulators**: *upper lip, upper teeth, teeth ridge, hard palate, soft palate, and uvula*.

### Question reviews

Answer the following questions.

1. What is Phonetics and what are its main subfields?
2. What are the differences between phonetics and phonology?
3. What are organs of speech? Explain their processes briefly as follows:
  - 3.1 The airstream process
  - 3.2 The phonatory process
  - 3.3 The articulatory process
4. What is the organ of speech that is the most flexible?
5. What is the airstream mechanism initiated by the air moving out from the lungs, mainly used for the production of speech sounds, called?
6. What is the front part of the larynx that is prominent in the neck commonly called?
7. Describe the characteristics of the vocal cords according to their position briefly as follows:
  - 7.1 Voiceless sounds
  - 7.2 Voiced sounds
  - 7.3 Glottal positive sounds



8. What is the difference between voiceless sounds and voiced sounds?
9. Explain the state of soft plate with the following topics briefly:
  - 9.1 oral sounds produced
  - 9.2 nasal sounds produced
  - 9.3 nasalized sounds produced
10. Summarize the parts of oral tracts in the following:
  - 10.1 Draw the facial diagram of the part of vocal tracts.
  - 10.2 Identify the names of active articulators and passive articulators.