



Lecture Two

The Sounds of Language



Introduction

Something general about phonetics and phonology

- Phonetics is concerned with the description of speech sounds in all languages.
- Phonology is concerned with the functioning of speech sounds in different languages.
- Phonetics and phonology have made the greatest contribution to “teaching” machines to “talk”, by telling them precisely how to produce each sound in a given language.

Part One Phonetics

- Human beings are capable of producing a wide range of sounds, but only a small set is used for speech.
- ***The study of the speech sounds that occur in all human languages is called phonetics.***
- Phonetics is the branch of linguistics which studies the characteristics of speech sounds and provides methods for their description, classification and transcription.

Branches of phonetics

Articulatory phonetics (发音语音学)

- Articulatory phonetics studies the human speech organs and the way in which the speech sounds are produced.

Acoustic phonetics(声学语音学)

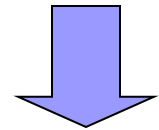
- Acoustic phonetics deals with the physical properties of the speech sounds; it studies the sound waves through the use of such machines as a spectrograph.

Auditory phonetics (听觉语音学)

- Auditory phonetics is the study of the perception of sounds by the human ear.
- Of the three, articulatory phonetics is the most highly developed.

Articulators and their functions

- To understand the nature of a language it is necessary to understand the nature of its speech sounds and how they are produced. Articulatory phonetics is the subject that attempts to provide a framework to do so.



The process of articulating

- All the sounds we make during speaking are the result of muscles contracting.
- The muscles in the chest that we use for breathing produce the flow of air that is needed for almost all speech sounds.
- The airstream pushed out by the lungs moves up through the windpipe to the larynx.
- Muscles in the larynx produce many different modifications in the flow of air from the chest to the mouth.
- After passing through the larynx, the air goes through the *vocal tract*, the air passage which is above the *vocal cords*, and ends at the mouth and nostrils. Here the air from the lungs escapes into the atmosphere.

The vocal tract

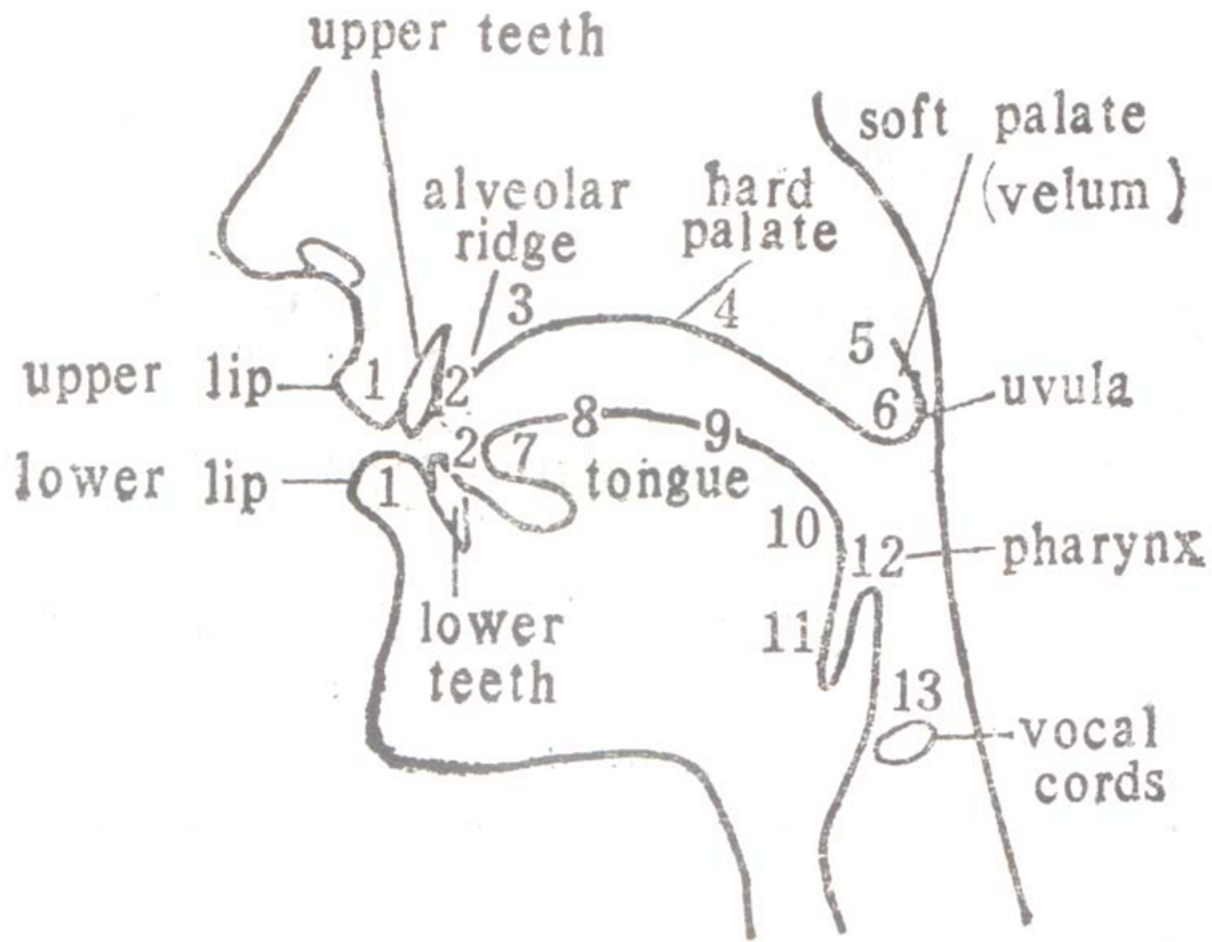
The vocal tract can be divided into

- the *oral cavity*, which is the air passage within the mouth and the throat,
- the *nasal cavity*, which is the air passage within and behind the nose,
- and the *pharynx*, which is the cavity at the back of the mouth and nose, where the passages to the nose and to the mouth connect with the throat.
- The shape of the vocal tract can be changed, e.g. by changing the position of the tongue or the lips. Changes in the shape of the vocal tract cause differences in speech sounds.

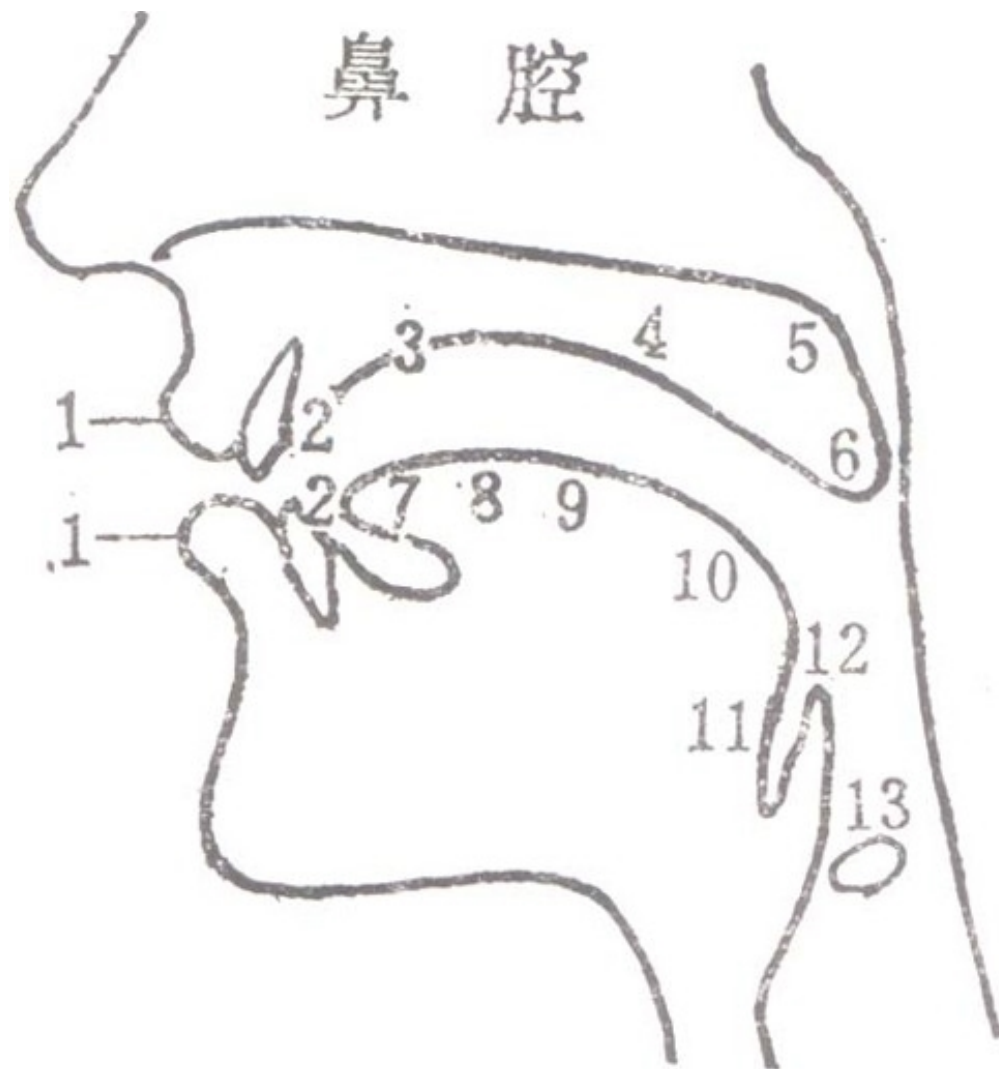
Articulators and their functions

- Figure 1 is usually used in the study of phonetics. It represents the human head, seen from the side, displayed as if it had been cut in half.

Figure 1: The articulators



- 1.唇 2.齿 3.齿龈 4.硬腭 5.软腭 6.小舌 7.舌尖
8.舌叶 9.舌前部 10.舌背 11.舌根 12.咽腔 13.声带



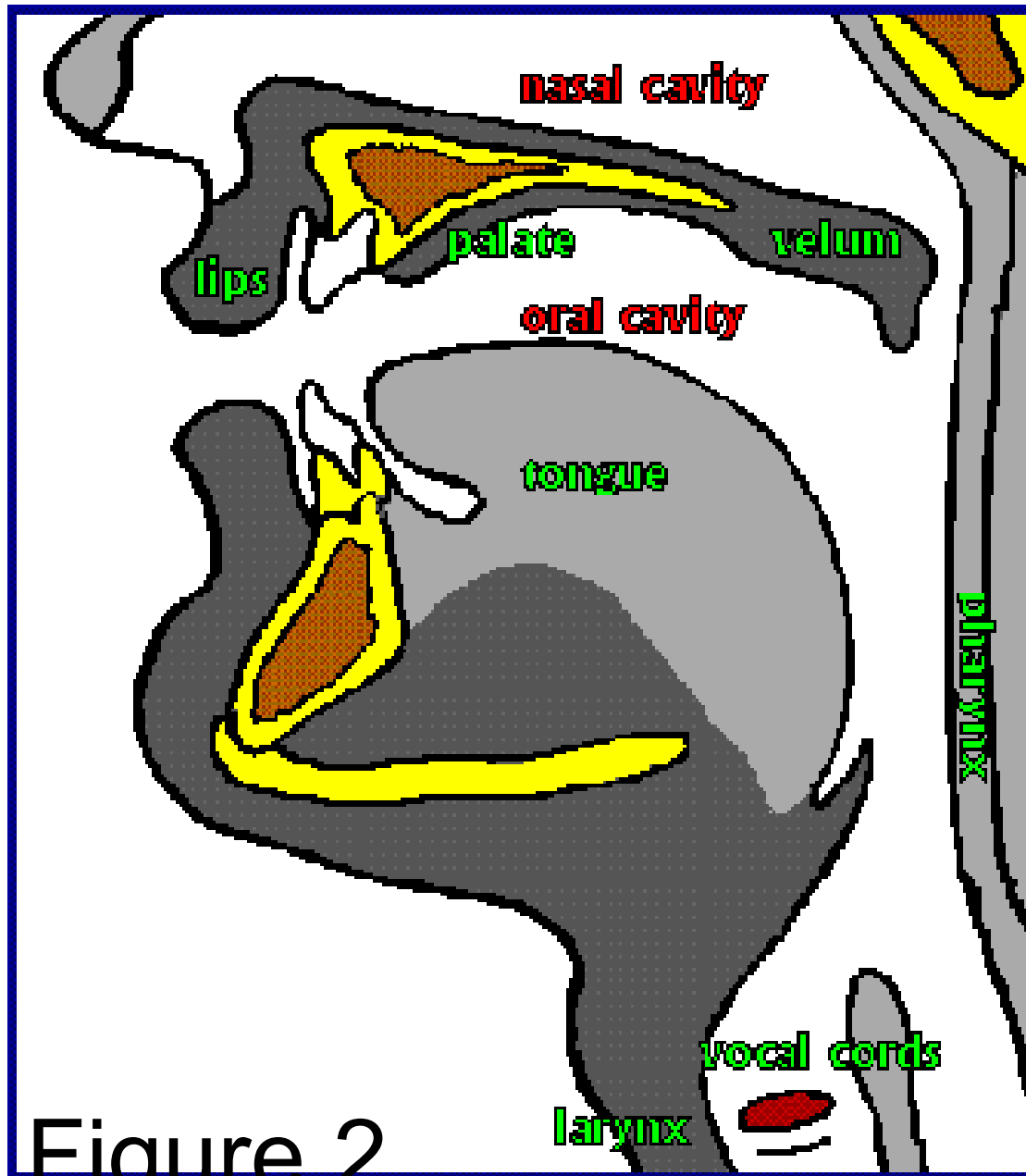


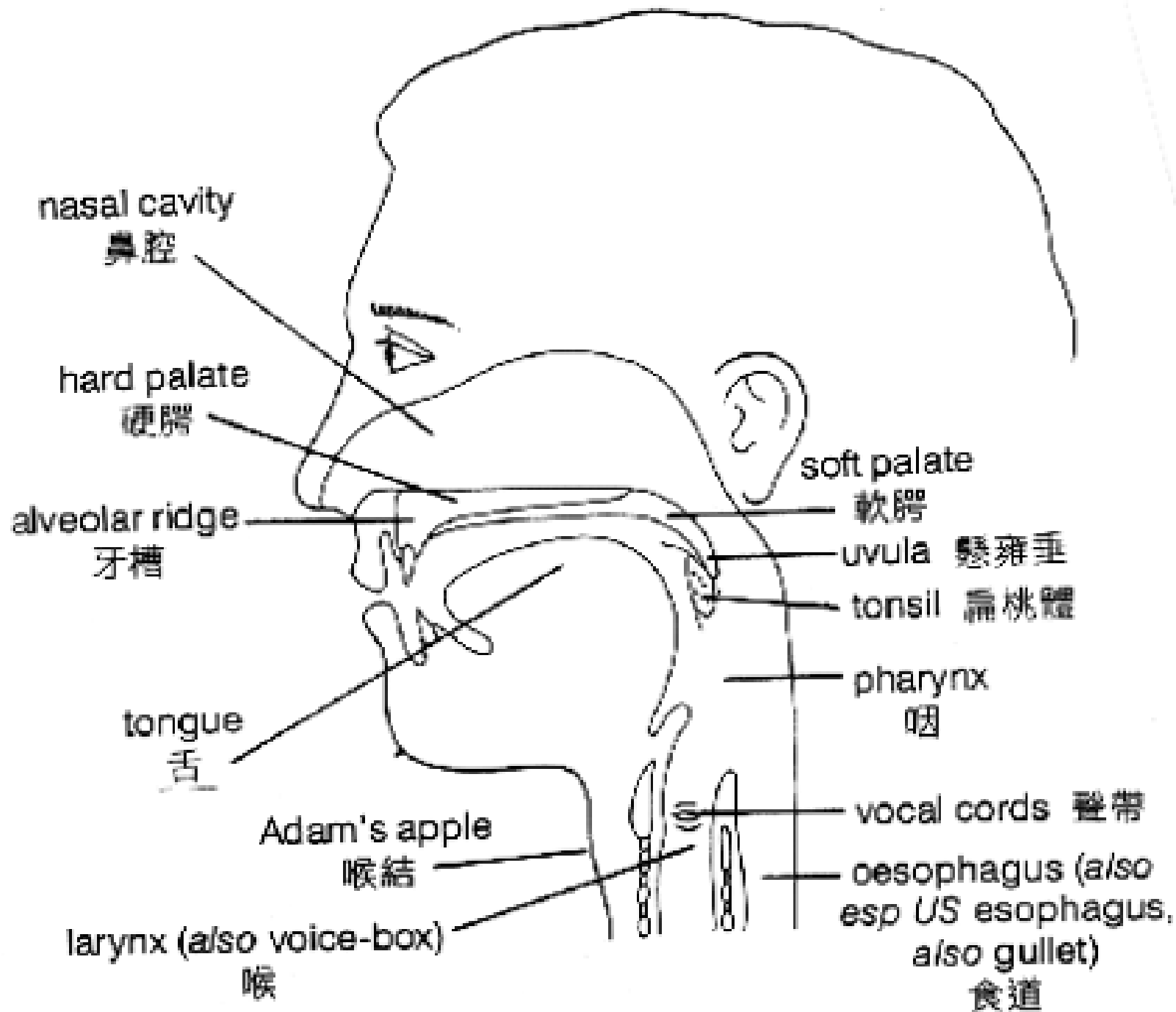
Figure 2

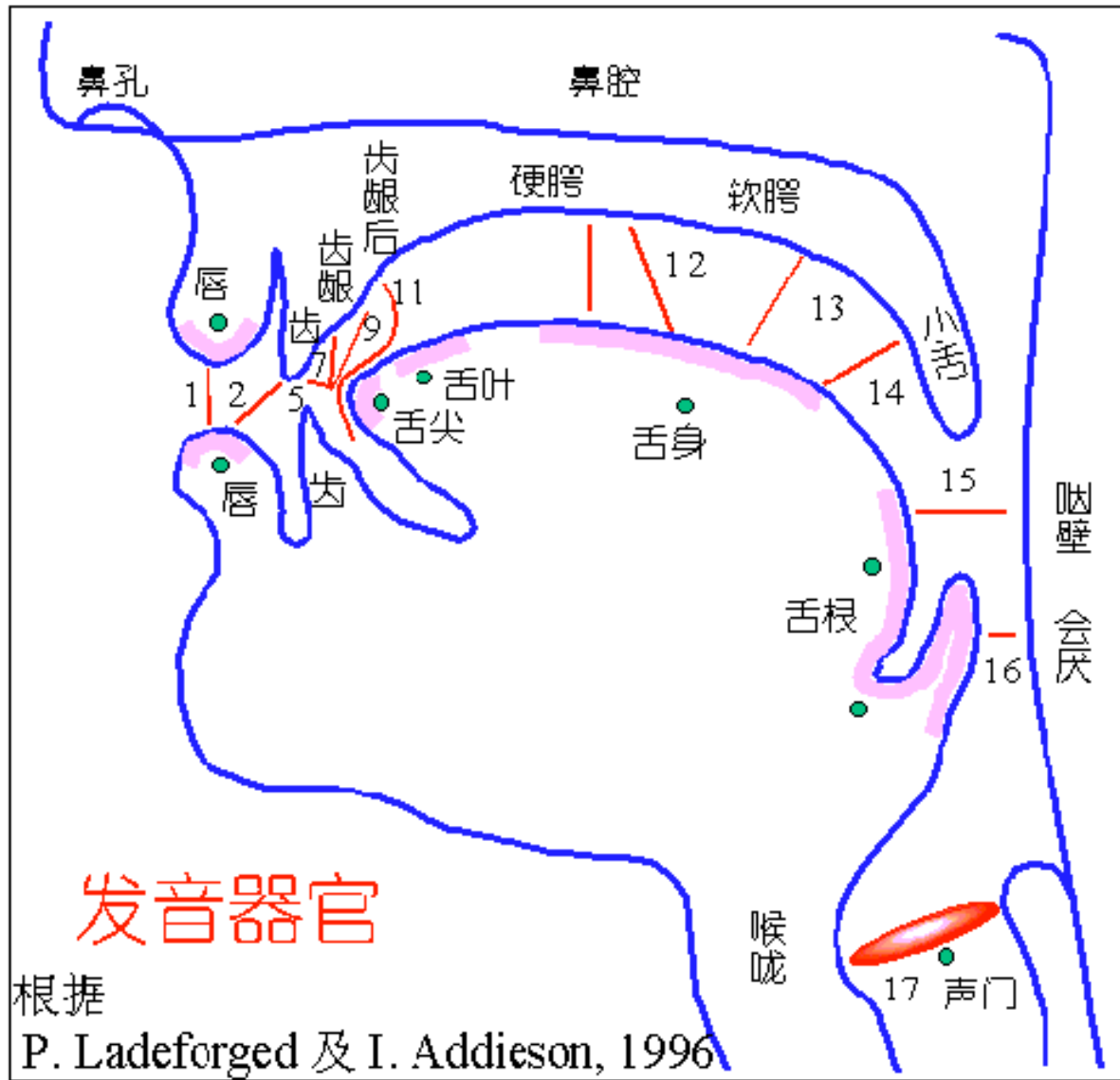
**The
speech
organs**

**The
vocal
tract**

cavity at the back of the mouth and nose, where the passages to the nose and to the mouth connect with the throat

Esophagus/gullet





- | | | |
|----|-------|---|
| 1 | 双唇音 | m |
| 2 | 唇齿音 | ɱ |
| 5 | 舌尖齿音 | ɲ |
| 7 | 舌尖齿龈音 | n |
| 9 | 舌尖卷舌音 | ɳ |
| 11 | 舌尖底卷舌 | ʂ |
| 12 | 硬腭音 | c |
| 13 | 软腭音 | k |
| 14 | 小舌音 | q |
| 15 | 咽音 | ħ |
| 16 | 会厌音 | h |
| 17 | 声门音 | h |

• 主动发音器官

Figure 4

Summary about the vocal tract

The pharyngeal cavity/pharynx (咽腔): between the top of the larynx (喉) and the soft palate)


The throat (larynx) contains vocal cords/folds, ventricular folds (膨胀带) and glottis (the opening between the vocal cords), the movement of which determines the quality of voicing (voiced & voiceless(浊/清音)) and pitch(音高).

The nasal cavity (鼻腔): the nose


Nasal resonance(共鸣) can be produced due to the lowering the soft palate (velum), resulting the production of nasals.

The oral cavity(口腔): the mouth

It contains the lips, teeth, teeth (alveolar) ridge (齿龈/槽) tip of tongue, blade of tongue, hard palate, front of tongue, back of tongue, soft palate (velum), uvula, epiglottis (会厌软骨).

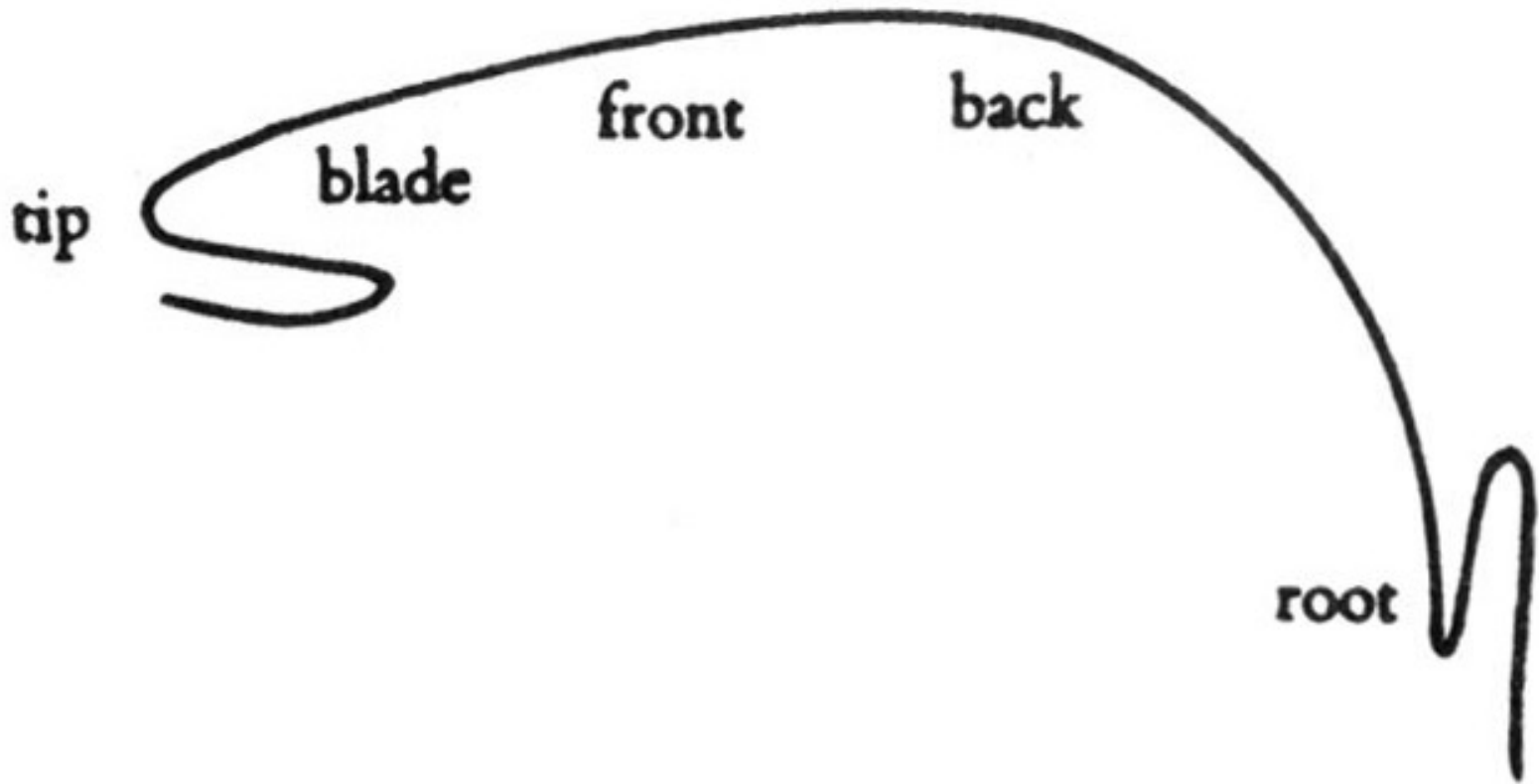



- The *velum* or *soft palate* is seen in the position that allows air to pass through the nose and the mouth. It is one of the articulators that can be touched by the tongue. When we make the sounds [k] and [g] the tongue is in contact with the lower side of the velum, and we call these *velar* consonants.


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- The *hard palate* is often called the “roof of the mouth”. You can feel its smooth curved surface with your tongue.
 - The *alveolar ridge* or *alveolum* is between the top front teeth and the hard palate. You can feel its shape with your tongue. Its surface is really much rougher than it feels, and is covered with little ridges. Sounds made with the tongue touching here such as [t] and [d] are called *alveolar*.


- *The Tongue* is a very important articulator. It can be moved into different places and form different shapes. Usually it is divided into different parts, though there are no clear dividing lines within its boundary. Figure 2 shows the tongue on a larger scale with these parts shown: tip, blade, front, back and root.


Figure 5: Sub-divisions of the tongue



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- The *teeth* (upper and lower) are usually shown only at the front of the mouth, immediately behind the lips. This is a simplified diagram showing only the front teeth, ignoring the teeth on either side of the mouth. The tongue is in contact with the upper teeth for many speech sounds. Sounds made with the tongue touching the front teeth are called *dental*.

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- The *lips* are important in speech production. They can be pressed together when we produce the sounds [p] and [b], brought into contact with the teeth as in [f] and [v], or rounded to produce the lip-shape for vowels as [uP]. Sounds in which the lips are in contact with each other are called *bilabial*, while those with lip-to-teeth contact are called *labiodental*.

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- The seven articulators described above are the major ones, but there are three other things to remember:
 - (i) The larynx is also an articulator, a very important and complex one;
 - (ii) The jaws are sometimes called articulators; surely we move the lower jaw a lot in speaking. But the jaws are not articulators in the same way as others, because they cannot themselves make contact with other articulators;




(iii) Although there is practically nothing that we can do with the nose and the nasal cavity, they are a very important part of our vocal apparatus for making sounds, particularly nasal consonants such as [m] and [n].


Again, we cannot really describe the nose and the nasal cavity as articulators in the same sense as what we have discussed above.

It should also be noted that what linguists call articulators or organs of speech have other functions even more crucial for the survival of human beings such as breathing and eating. Speech has developed as a secondary use of organs already in place for other functions.

Voiced and voiceless sounds


- The vocal cords are located in the larynx, in what we perceive as “Adam’s apple” (i.e. part of the larynx). The vocal cords are like curtains of muscular tissue that can be drawn across the windpipe.
- When the vocal cords are spread apart, the air-stream from the lungs is not obstructed at the space between vocal cords and passes freely. The sounds produced in this way are described as *voiceless* sounds. The sounds [p], [t], [k], and [s] are voiceless sounds.


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- When the vocal cords are drawn together, the air-stream forces its way through and causes them to vibrate. Sounds produced in this way are described as *voiced* sounds. The sounds represented by [b], [d], [g], and [z] are voiced sounds.
 - Vowels are usually voiced sounds.

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- The distinction between voiceless and voiced sounds can be felt physically. You may be able to tell the difference by resting your fingers on the top of your “Adam’s apple” as you make each sound. If you produce sounds like “z-z-z-z-z” you can feel some vibration because these are voiced sounds. If you produce sounds like “s-s-s-s-s” there should be no vibration because these are voiceless sounds.

Nasal and oral sounds

- If you say *rip* [rip], *rib* [rib], and *rim* [rim], you will notice that the final sounds ([p], [b], and [m]) are all produced by closing the lips. [p] is different from [b] because in producing the voiceless [p] the vocal cords are apart; the glottis is open. [b] is voiced because the vocal cords are together and vibrating.

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- If you put your hands over your ears and keep your lips together prolonging the pronunciation of the [b] in *rib* you will feel the hum of the vibrations while your lips are closed. You will not feel such vibrations if you keep your lips together before releasing them in producing the [p] in *rip* because [p] is voiceless. If you do the same in producing a prolonged “m-m-m-m-m” in *rim* you will see that [m] is also a voiced sounds. What, then, distinguishes [m] and [b]?

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- [m] is a *nasal* sound. When you produce [m], air escapes not only through the mouth (when you open your lips) but also through the nose. When the velum is raised all the way to touch the back of the throat, the passage through the nose is cut off. When the nasal passage is blocked in this way, the air can escape only through the mouth. Sounds produced this way are called *oral* sounds. [p] and [b] are oral sounds. When the velum is lowered, air escapes through the nose as well as the mouth; sounds produced this way are called *nasal* sounds. There are three nasal consonants [m], [n], and [ŋ] in English. These consonants are usually voiced.


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- These phonetic features permit the classification of all speech sounds into four classes: *voiced*, *voiceless*, *nasal*, and *oral*. One sound must choose two of these features, as shown by the examples in Table 1. As you can see, there are no voiceless nasals in English.

Table 1: Classes of speech sounds

	<i>Oral</i>	<i>Nasal</i>
<i>Voiced</i>	b d g	m n ☠
<i>Voiceless</i>	p t k	


Classification of English speech sounds

- [点击链接](#) 英语语音分类描述

Variations of sounds


■ 1) Liaison


- All English words would be separate units placed next to each other in sequence; in real connected speech, however, we sometimes link words together. The most familiar case is the use of [r]. When a word's spelling suggests a final [r], and a word beginning with a vowel follows, the usual pronunciation is to pronounce the second word with [r]. For example, the English phrase *here are* is often pronounced [hiLrL].

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- Such a phenomenon of the linking of words in speech, in particular when the second word begins with a vowel, is called *liaison*. Another example is the phrase *an egg* which is often pronounced [LQ_{neg}] with no noticeable break between the two words.

2) Elision and assimilation


- Under certain circumstances some sounds may disappear. For example, in rapid informal speech in English, the word *suppose* is often pronounced as [spLuz], *factory* as [Qfæktɹi] and *mostly* as [QmLusli]. The loss of a sound or sounds in speech like these is called *elision*. This loss may be a consonant or vowel. Elision is typical of rapid, casual speech. Producing elisions is something which students of foreign languages do not need to learn to do, but it is important for us to be aware that when native speakers of English talk to each other, quite a number of sounds that we expect to hear are not actually pronounced.

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- Another significant difference in natural connected speech is the way that sounds belonging to one word or one syllable can cause changes in sounds belonging to neighbouring words or syllables. This is called *assimilation*. For example, in English the negative prefix occurs as *im-* before words such as *possible*: *impossible*. As *possible* starts with a bilabial sound, the prefix *-im-* ends in a bilabial sound.

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- Before words like *tolerant*, however, the prefix is *in-*: *intolerant*. As *tolerant* starts with an alveolar sound, the prefix *in-* ends in an alveolar sound. As the following sounds bring about the change, this process is called *regressive assimilation*.
 - On the other hand, the difference between the [s] in the English word “cats” and the [z] in the English word *dogs* is an example of *progressive assimilation* because the preceding sounds bring about the change.

Part Two Phonology

- Both phonetics and phonology are concerned with the same aspect of language---- the speech sounds. But they differ from each other.
- Phonetics is the branch of linguistics which studies the characteristics of speech sounds and provides methods for their description, classification and transcription.
- PHONOLOGY is the branch of linguistics which studies the ways in which speech sounds form systems and patterns in particular human languages.

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- Phonetics is general, descriptive and classificatory. It provides the means for describing and classifying speech sounds and deals with how speech sounds are actually made, transmitted and received.
 - Phonology, on the other hand, deals specifically with the ways those sounds are organized in individual languages, with its primary aim being to discover the principles that govern the way sounds are organized in languages, and to explain the variations that occur.

Phone and phoneme

- Phones are the speech sounds we hear and produce in linguistic communication.
- Phoneme is the smallest unit of sound in a language which can distinguish two words.
- Phones do not necessarily distinguish meaning. But a phoneme is a unit that is of distinctive value. It is not any particular sound, but rather it is represented or realized by a certain phone in a certain phonetic context.

Phonemes: the phonological units of language

- Phonological knowledge enables us to produce all the phonetically different sounds of a language. A speaker of English can produce the sound [G] and knows that this sound occurs in English, in words like “thin” [Gɪn] and “bath” [bAPG]. He also knows that [B], the voiced counterpart of [G], is a sound of English, occurring in words like “then” [Ben], and “bathe” [beɪB].

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