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语音学教程

周睿丰 编著

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1. Articulatory phonetics

Articulatory phonetics mainly studies how a sound is produced by the human speech mechanism. In all languages, the coordination of speech organs makes the articulation of a sound become possible. For example, the production of /æ/ is thought to consist of the following steps: Step one: the air goes into the larynx (喉) at the pressure of various muscles; step two: the vocal cords (声带) in the larynx are made to vibrate as the air goes across them, producing the typical sound wave that "voice" requires; step three: the air passes from the mouth to the nose is blocked by raising the soft palate or velum (软腭).

Introduction

What is phonetics?

Phonetics (语音学) is the study of the actual sounds of language. Though there exist various kinds of sound in the human world, in this course we are required to use "sound" in its restricted sense. In other words, we are considering the sounds of language. Therefore we will not include sounds made by animals or vehicles in phonetics. Nor shall we take into account a person's cough or a baby's hungry cry because they are not sounds of formalized language. In our course of English phonetics we will cover the sounds that are meant to be important in communication.

What are its sub-branches?

Phonetics is a broad branch of linguistics that can be further divided into articulatory phonetics (发音语音学), acoustic phonetics (声学语音学) and auditory phonetics (听觉语音学).

1. Articulatory phonetics

Articulatory phonetics mainly studies how a sound is produced by the human speech mechanism. In all languages, the coordination of the speech organs makes the articulation of a sound become possible. For example, the production of /e/ is thought to consist of the following steps. Step one: the air goes out of the lung into the larynx (喉) at the pressure of various muscles; step two: the vocal cords (声带) in the larynx are made to vibrate as the air goes across them, producing the typical sound wave that “voice” requires; step three: the air passage from the mouth to the nose is blocked by raising the soft palate or velum (软腭); step four: the sound wave is typically modified in the oral tract (口腔) so that no other sound but /e/ is produced.

2. Acoustic phonetics

Acoustic phonetics deals with the acoustic properties of sound waves in their transmission from speaker to hearer. In other words, it chiefly regards sounds as characterized by different sound waves.

1) The process of sound formation

Now let us think about the process of sound formation. As is well known, vibrations make sound waves, which are termed “sounds” once they are transmitted to the human ear and mind (声波由振动产生, 传到耳朵和人脑即为声音). It can therefore be concluded that there is no sound without vibration. We will take the production of /ɑ:/ and /i:/ as an example, and see how these two sounds are different in their formation. First, the air comes out of the lungs and into the larynx.

Second, the closed vocal cords are forced open as the air goes across. Third, the vocal cords begin to vibrate, making the air vibrate also. The vibration of air produces the first sound waves. Fourth, as sound waves are often affected by the shape of the oral tract, the original sound waves undergo different modifications in the oral tract. For /ɑ:/, the tongue is put down and back to make the sound. With reference to /i:/, the mouth is opened very little to pronounce it. Fifth, the two sound waves, once transmitted to the ear and the mind, are interpreted as /ɑ:/ and /i:/ respectively.

(2) Types of vibration in the sound formation

There are three kinds of possible vibrations in sound formation. The first type of vibration, which you have already read about, is the vibration of the vocal cords. It is the typical vibration that generates voiced sounds including both vowels and voiced consonants. In other words, it is the source from which vowels and voiced consonants obtain their "voice". For example, both /ɑ:/ and /b/ are said to be voiced because the vocal cords vibrate when these two sounds are made. Depending on whether the vibration takes place or not, we distinguish voiced sounds from voiceless ones. For instance, we call /g/ a voiced consonant and /p/ a voiceless one because vibration occurs to /g/ but not to /p/. The last two kinds of vibration often take place in the oral tract and unlike the first one, do not result in "voice". One of the two is characterized by the sudden release of air. This vibration helps to generate plosives. Take the formation of /p/ as an example, as a lot of air is released quickly and suddenly, the lips begin to vibrate, making the air vibrate also. The sound wave then is interpreted as /p/ once it

reaches the ears of the listener. /p/, therefore, does not originate from the vibration of the vocal cords (it is a voiceless sound) but from that of the lips. In the case of /t/, however, it is the tongue tip and the palate that begin to vibrate as air forces its way out. Soon the air begins to vibrate and the vibration produces /t/. The other kind of vibration is associated with the slow and continuous release of air. It helps to generate fricatives. Think of the articulation of /s/: the air goes through slowly as the tongue and palate start to vibrate. The air, then, vibrates too. /f/ is produced when the air is slowly released between the upper teeth and lower lip (in this case the upper teeth and lower lip vibrate).

Each sound consists of a different number of vibrations in the process of its formation. All the vowels, for example, originate from the vibration of the vocal cords, but not from the other vibrations. Voiceless plosives, on the other hand, originate from the vibration in the oral tract when the air is suddenly released. Very often, however, there will be two or three kinds of vibration that are at work in the process of the production of a sound. Voiced plosives result from two kinds of vibration: the vibration of the vocal cords and the vibration in the oral tract when the air escapes suddenly. For a voiced affricate, all the three kinds of vibration are involved. Because of this, the voiced sound /dʒ/ has not only the characteristic of a plosive but also that of a fricative.

3) A vibration, the shape of a sound wave, and the quality of a sound

A vibration may largely affect the shape of a sound wave, which in turn can determine the quality of a sound. For example, because of different vibrations, the shapes of the sound waves for /p/ and /b/ also

differ, which results in the different qualities of the two sounds. In other words, /p/ and /b/ will be felt to be different by the listener. In the case of /p/ and /t/, the corresponding kind of vibration is the same, though as the speech organs that are involved are different, so are the shapes of the sound waves. Thus /p/ and /t/ differ in their qualities.

4) Connected phonetic terms

The important information about a sound wave mainly includes its amplitude (振幅), frequency (频率), and period (周期). From them, we derive typical phonetic terms such as sound length or duration (closely connected with period), loudness (roughly equal to amplitude), pitch (associated with frequency), and quality (determined by the shape of sound waves). In their practical usages, vowels (元音) and consonants (辅音) are differentiated by length (音长) and quality (音质); stress (重音) is determined by loudness (音强), length and frequency; intonation (语调) is mainly decided by loudness and frequency. For example, the English vowel /i:/ is different from /ɪ/ not only because of its longer duration (length) but also because of its higher tongue position (quality). A stressed syllable in English is the loudest of all the syllables in a word. It is not only thought to be longer than the same one in an unstressed position, but often possesses the highest pitch (音高) in a word. For instance, "interesting" consists of three syllables, among which the first stressed syllable is the longest and often has the highest pitch (unless the rising tone is applied). As for intonation, it is always the last stressed syllable that takes on the nuclear tone (major variation in pitch), and the tone can be either falling, rising or the fall-rise, depending on different contexts.

3. Auditory phonetics

Auditory phonetics, however, is mainly concerned with the physical effects of speech on the human ear and its associated mechanisms. Compared with the first two branches of phonetics, this one is relatively new, but it has been receiving more and more attention. In this course, however, we will mainly be concerned with the first two branches of phonetics, articulatory and acoustic.

Why do we study phonetics?

As an English major, everyone wishes to have good pronunciation and beautiful intonation. Yet neither can be achieved without some knowledge of phonetics. This is because most Chinese sounds, though very similar to their English counterparts, are in fact rather different. Many Chinese students, unaware of the differences, are in the habit of replacing the English sounds with the Chinese ones. This results in the so-called "foreign accent". Instances of this are not rare. Most Chinese students tend to regard the first consonant of "爸" as the same as the one in "bare". A mention of their distinctions always takes the students by surprise. The Chinese consonant, noted down as /p/, is voiceless and unaspirated (不吐气) while the corresponding English sound is a voiced one (transcribed as /b/). The difference in question is an overwhelming one because it pervades the consonant systems of both languages. For example, it is exemplified through affricates (塞擦音) as well. The first consonants of "几" and "字" are all voiceless ones, compared with the

voiced counterparts in “jeep” and “words”. All these differences will not be grasped without a systematic study of phonetics. Therefore, knowledge of phonetics can help improve your English a lot.

Second, knowledge of phonetics can provide you with rich material for the study of language. It is known, that if in agreement with grammatical rules, individual sounds may form syllables (音节), syllables may form words, and words may form sentences. But have you noticed that many words in English are composed of three or more syllables while most Chinese words are made of one or two syllables? Have you also found that while Chinese syllables permit no consonant clusters, English syllables allow initial consonant clusters (辅音群) as “pl” and “spl” in “plane” and “splash”, and final clusters as “lp” in “help”? Apart from these, English sounds are more flexible than Chinese sounds in building various kinds of syllables. In Chinese, the permissible sound sequences are CV^①, V, and CVC, which can be induced from such syllables as “好”, “啊”, “行”. The last type of syllable (CVC), however, is rather limited with regard to the sounds it may end with, that is, it permits no other sound than /n/ and /ŋ/. English, in comparison, allows more types of syllables including CV, CVC, V, VC, CCV, CVCC, etc. Therefore, the study of phonetics can help you know more about languages themselves.

① Here C stands for a consonant and V represents a vowel.

Why do people wish to “use the same voice” in social communications and what is the “standard language” used in international communications?

People speak differently in different places. While some of them speak different languages, others of them speak the same language with different accents. Very often, differences in languages and accents can hinder ordinary communications. There is a famous joke which tells about the misunderstanding caused by different accents. A visitor from Beijing is enjoying the beautiful scenery on Wuhan Yangtze Bridge when a local woman exclaims: “我的孩子掉到水里了!” The visitor is worried about her, until at last he realizes that she is referring to her “鞋子” instead of “孩子”. He is told by the people standing by that in Wuhan accent, “鞋子” has the same pronunciation with “孩子”. You can hardly imagine that a Chinese businessman, knowing no English at all, can make a successful business deal with an Englishman who speaks no Chinese all by himself. But compared to the past, things have gotten much better now. Devoid of advanced transportation, people in ancient times were unable to go very far. Without TV, radio, etc., it was impossible for them to hear how other people spoke at home. It was quite likely, therefore, that most people encountered communicative failures because of differences in pronunciations, tones or intonations. Thus in order to communicate smoothly, people have long felt necessary to “use the same voice”, that is, to speak the same language or dialect in social exchanges. In ancient China, for example, emperors always demanded that all the officials speak in the same “voice” in order to avoid different

dialects in royal courts(在中国古代,为了避免宫廷里出现南腔北调,皇帝们通常都要求官员们说话时用同种语言)。In international communications, English is thought to be the “standard” language in a sense that it is used most widely. People from all over the world tend to communicate with this “common language”.

What accents are established as “standard” in English and what is “standard Chinese”?

English is a broad term that covers a wide range of accents, among which RP and GA are very famous. RP, also known as Received Pronunciation, ranks high in Britain and other English-speaking countries. Based on London dialect, the English is spoken by educated people in Southern England and used by the announcers of BBC in their broadcasting. Apart from RP, General American (GA), the English used by most Americans, has readily established itself in second language acquisition as well. For example, many Chinese students, fascinated by America’s great power, usually regard GA as their first choice of learning instead of RP. It can be said, therefore, that these two accents are “standard English”. In China, Putonghua is thought to be the standard Chinese, enjoying its privilege of being the official and educational language.

Why should sounds be transcribed?

As has been discussed, “the same voice” is always in great demand

for convenience of communication. Once a certain dialect establishes itself as standard, people are required to learn it at school, use it in formal occasions etc. The requirement makes it necessary for some phoneticians to propose sets of phonetic symbols. The symbols, known as phonetic alphabets, will note down the standard pronunciations of each letter, character or word. In other words, the phonetic symbols can promote teaching and learning of the standard language, thus enhance communication. The Chinese Pinyin is a kind of phonetic alphabet, because it tells you the pronunciations of each character or word. With reference to English, many phoneticians have agreed to use the International Phonetic Alphabet (IPA). The following will be a brief introduction to IPA.

What is IPA?

The International Phonetic Alphabet (IPA), as its name suggests, is a kind of phonetic alphabet. First put forward in 1888, it is still very popular in a number of countries. The word “international” suggests that this phonetic system aims to transcribe sounds in every country. In order to accomplish this, a set of phonetic symbols were devised, including letters and diacritics, each of which is given an accepted phonetic value. For example, /g/^① represents not the orthographic “g” of “gin” (notated as /dʒ/), but a voiced velar plosive as the first sound in “gate”. With a

① /g/ with slashes refers to a phoneme, which is an abstract sound. A phoneme is realized as different physical sounds, that is, phones in different environments. A phone is represented by “[]”. For example, /g/, when followed by a back vowel, is pronounced as [g], as in “goose”.

resemblance to “s”, /ʃ/ has an agreed value of being a voiceless retroflex palato-alveolar fricative. This is the typical Chinese sound that occurs in “是”. [p^h] as in “pie” shows that the voiceless bilabial plosive is produced with a strong puff of air; /p/ stands for a voiceless bilabial plosive and the diacritic [h] represents aspiration. Since its emergence, IPA has been used in many pronouncing dictionaries and proved extremely useful in the transcription of sounds. For instance, it is the phonetic alphabet that appears in the 4th edition of *Oxford Advanced Learner's English-Chinese Dictionary* (OALD). A brief introduction will be made in the following to the two different systems that have developed from IPA.

Jones and K. K.

In terms of English, two different systems have developed from IPA, namely “Jones” and “K. K.” Whereas “Jones” is authoritative in transcribing RP, K. K. is often used for American English. Because of the accentual differences, the phonetic symbols that the two systems use are somewhat different. For example, “go” is read as /gəʊ/ in British English but as /go/ in American English. While /əʊ/ stands for a diphthong gliding from /ə/ to /u/, /o/ indicates that this diphthong glides from /o/ to /u/. Sometimes the choice of a phonetic symbol may be affected by the phoneticians' different grounds. For instance, “bead” is notated as /bi:d/ according to Jones on the account that length may distinguish meaning (a long sound is marked by “:”), e. g. /bi:d/ vs /bid/. So /i:/ differs from /i/ in two perspectives: quality (marked by