Articulation and Acoustics

Phonetics is concerned with describing speech. There are many different reasons for wanting to do this, which means that there are many different kinds of phoneticians. Some are interested in the different sounds that occur in languages. Some are more concerned with pathological speech. Others are trying to help people speak a particular form of English. Still others are looking for ways to make computers talk more intelligibly, or to get computers to recognize speech. For all these purposes phoneticians need to find out what people are doing when they are talking and how the sounds of speech can be described.

SPEECH PRODUCTION

We will begin by describing how speech sounds are made. Most of them are the result of movements of the tongue and the lips. We can think of these movements as gestures forming particular sounds. We can convey information by gestures of our hands that people can see, but in making speech that people can hear humans have found a more efficient way to impart information. The gestures of the tongue and lips are made audible so that they can be heard and recognized.

Making speech gestures audible involves pushing air out of the lungs while producing a noise in the throat. This basic noise is changed by the actions of the tongue and lips. Later we will study how the tongue and lips make about twenty-five different gestures to form the sounds of English. We can see some of these gestures by looking at an x-ray movie. Figure 1.1 shows a series of frames from an x-ray movie of the phrase on top of his deck. (See Sources at the end of the book for an account of this movie.) In this sequence of twelve frames (one in every four frames of the movie) the tongue has been outlined to make it clearer. The lettering at the left of the frames shows, very roughly, the sounds being produced. The individual frames in the figure show that the tongue and lips move rapidly from one position to another. To appreciate how rapidly the
The mouth is lowered (or you now do you are pharyngeal) as it passes over the back of the tongue. The tongue root becomes raised and phonates and the nasal tract, within the nose. When the back of the tongue touches the soft palate, a structure that separates the mouth and nasal passages, the nasal passages are occluded through the hard palate.

In figure 1.2, the speaker's mouth is seen at various stages throughout the production of speech. The arrows indicate the shift in the position of the speech sounds as they are produced.
we hear a sound depends on its acoustic structure. We want to be able to describe it. It is also possible to describe it in terms of what we can hear. The way in which we hear it depends on the sounds we make, but...

**SOUND WAVES**

SOUND WAVES

We hear sound waves as the pressures on the eardrum, which are part of the auditory process. The movements of the eardrum and its interaction with the cochlea of the inner ear that send neural impulses to the brain, result in the perception of sound. The pressure waves that are generated by the sound source move through the air in the form of mechanical waves. These waves are then detected by the eardrum and converted into neural signals by the auditory nerve, which are then transmitted to the brain.

**Figure 1.3 The Four Main Components of the Speech Mechanism**

**Figure 1.2 The Vocal Tract**

**Chapter 1 | Articulation and Acoustics**

For the moment we have considered just the respiratory system, the lungs and the nasal tract. The human process, the speech process, involves all the ways of putting sounds into words. The way we produce speech sounds as a whole is shown in Figure 1.2. The vocal tract is a system of cavities that act like a resonator for the production of speech sounds. The vocal tract is a system of cavities that act like a resonator for the production of speech sounds.
The parts of the vocal tract that can be used to form sounds are called articulation gestures. Place of articulation refers to the location of the barrier to airflow, and manner of articulation refers to the shape of the barrier.

Figure 1A shows the variations in air pressure that occur during the production of the vowel /ə/.

FIGURE 1A
The variations in air pressure that occur during the production of the vowel /ə/.
The principle parts of the lower surface of the vocal tract

FIGURE 1.6 The principle parts of the lower surface of the vocal tract

FIGURE 1.7 The principle parts of the upper surface of the vocal tract
In English, the consonant region is shown in more detail at the right.

**Articulatory gestures** occur in English as shown in a section of the vocal tract showing the places of articulation that:

- **Consonants**: Point to the front of the tongue.
- **Vowels**: Point to the back of the tongue.
- **Phonemes**: Point to the middle of the tongue.

**Place of Articulation**

- **Front (oral)**: Place of articulation is closer to the palate.
- **Back (oral)**: Place of articulation is further back in the mouth.
- **Central (oral)**: Place of articulation is in the middle of the mouth.
- **Front (nasal)**: Place of articulation is closer to the nose.
- **Back (nasal)**: Place of articulation is further back in the nose.
- **Central (nasal)**: Place of articulation is in the middle of the mouth.

**Articulatory phonetics**: The study of the movements of the articulators during speech production.

**Articulatory gestures**: The movements of the vocal tract that produce speech.

**Articulatory phonology**: The study of the relationships between the sounds of a language and the articulatory gestures that produce them.

**Articulatory anatomy**: The study of the structures involved in speech production.

**Articulatory physiology**: The study of the physical processes involved in speech production.

**Articulatory acoustics**: The study of the sound waves produced by speech articulations.

**Articulatory perception**: The study of how the brain perceives speech sounds.

**Articulatory gestures** are also known as so-called motor-gestural, voice-on-motor, or motor-driven gestures. They are important for understanding the production and perception of speech sounds.
The ORO-NASAL PROCESS

MANEARS OF ARTICULATION

DISTINGUISHING LETTERS BETWEEN或用鼻音的音位，the

Maneans of Articulation controls the oronasal process.

If the nasal is not produced, there is an obstruction in the mouth, and the

maneans of Articulation are reduced. When the sound is nasal

more because of the soft palate, the vowel is lowered.

In most speech, the soft palate is raised so that there is a velar closure.

Consider the consonants at the ends of nasals, and in the

Maneans of Articulation and Acoustics.
LATERAL (APPROXIMANT)

Motion in the alveolar region are also examples of approximants. Sometimes called shibamts, these approximants are produced with a more obvious hiss, such as those in shh, shh, and shh. The manner of the production of these shibamts involves a narrowing of the vocal tract, which causes a decrease in friction. The sound is produced when the tongue is lifted to block the passage of air, creating a hissing sound.

APPROXIMANT

Although the term stop may be derived, it applies only to the production of the approximant.

FIGURE 1.9. The positions of the vocal organs in the pharyngeal area (stop) in jh.

FIGURE 1.10. The positions of the vocal organs in the palato-pharyngeal (post-velar) area.

MANIERS OF ARTICULATION
The waveforms of consonants

The waveform of the phrase My two boys know how to fish:

Additional Consonant Variations

This preliminary chapter will not be necessary to discuss all of the features of articulation.

Additional Consonantal Features

The production of some sounds involves more of these nuances of

The waveform of the phrase My two boys know how to fish.
The Articulation of Vowel Sounds

The end of this word

The vowels in this word indicate the presence of these words, which are

The position of these sounds are

between these sounds, for the vowels in the words /read/ and

The position of the vowel sounds for the words /read/ and /read/ is

Figure 1.2 The position of the vowel sounds for the words /read/ and /read/
The Sounds of Vowels

Chapter 4 and 9

The Sounds of Vowels. We will discuss better ways of describing vowels in

When vowels are classified and are grouped according to the height of the

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When vowels are classified and are grouped according to the height of the
produce a question spoken with an articulation pattern that matches your own. Then, if you are listening to a question spoken with an articulation pattern that matches your own, you will hear the question and immediately recognize the question's speaker. This means that the speaker's voice is immediately recognized as the speaker's voice. Therefore, if you are listening to a question spoken with an articulation pattern that matches your own, you will immediately recognize the question's speaker.

In this book, we will discuss the different types of articulation patterns and how they are recognized by the listener. We will also discuss the role of the speaker's voice in determining the listener's perception of the speaker's voice. Finally, we will discuss the implications of these findings for speech therapy and communication disorders.

Suprasegmentals

Words are groups of sounds that can be distinguished from one another by their phonetic structure. In this book, we will be discussing the different types of words that can be distinguished from one another by their phonetic structure.

In the English language, there are two basic types of words: simple words and compound words. Simple words are made up of a single word, while compound words are made up of two or more words. For example, the word "book" is a simple word, while the word "book case" is a compound word.

In this book, we will be discussing the different types of words that can be distinguished from one another by their phonetic structure. We will also discuss the role of the speaker's voice in determining the listener's perception of the speaker's voice. Finally, we will discuss the implications of these findings for speech therapy and communication disorders.

In summary, you can train yourself to recognize the different types of words that can be distinguished from one another by their phonetic structure. This will help you to improve your ability to understand speech and to communicate more effectively.
EXERCISES

A. Fill in the name of the vocal organs numbered in Figure 1.14.

B. Describe the consonants in the word shiring using the chart below. Fill in the appropriate columns and put parentheses around the letters that may be felt.

C. Figure 1.15-18 illustrates all the places for articulatory gestures that we have discussed so far, except for the voice sounds which will be described in Chapter 2. In the spaces provided below, state (1) the place of articulation (e.g. velar, alveolar, palatal) (2) the manner of articulation (e.g. frication, voiced, glottal stop), and (3) an example of each sound as given in English or a word beginning with the sound illustrated.

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EXERCISES

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2. Describe the consonants in the word shiring using the chart below. Fill in the appropriate columns and put parentheses around the letters that may be felt.

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EXERCISES

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