

The Articulatory System

Marla Yoshida

How do we produce sounds?

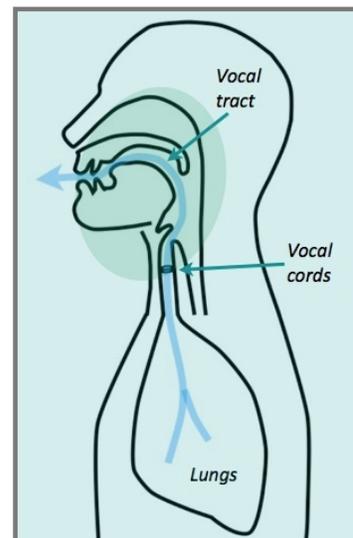
Think for a minute about how people produce sounds. Say a few words and concentrate on what's happening inside your mouth. The movements of your tongue, lips, and jaw are incredibly quick, delicate, and complex—just as complex as the movements of an Olympic gymnast or a surgeon's hands. When you think about it, it's a miracle that anybody can talk at all. So how do we produce speech sounds?

When we speak, we push air out of our lungs, up through our throat, and out our mouth or nose. The vibration of our **vocal cords**, along with movements of our tongue and lips, changes the airflow and produces different sounds. Even a slight change in the position and movements of these parts can make a perceptible change in the sound that is produced.

The articulatory system

All of the body parts that we use to produce speech sounds are called the **articulatory system**. Teachers need to understand how the articulatory system works so they can help students learn how to produce sounds accurately. These are the most important parts of the articulatory system:

The lungs are where sound production begins. When we breathe, air moves in and out of these two bag-like organs in our chest. When we speak, our lungs push air up past the **vocal cords** and through the rest of the **vocal tract**, the space in the throat, mouth, and nose where sound is produced.



The vocal cords or **vocal folds** are two small membranes in the throat that produce the sound of the voice. When the vocal cords are stretched tight and close together, they vibrate rapidly—more than 100 times per second—and the sound that comes out is louder.

When the vocal cords are more relaxed, the sound that comes out is quieter, like a whisper. The vocal cords also affect the **pitch** of the sounds we produce. Pitch is a measure of how high or low the voice is at a particular point in time; that is, high or low in the sense that a musical note is high or low; it doesn't mean a high or low volume or loudness. When the vocal cords are stretched out longer, the sound has a lower pitch; when they are shorter, the sound has a higher pitch. The space between the vocal cords is called the **glottis**.

Above the vocal cords, in the vocal tract itself, are several parts that move in various ways to change the size and shape of the open part of the vocal tract and produce all the sounds of English, or any other language. These are called the **articulators**.

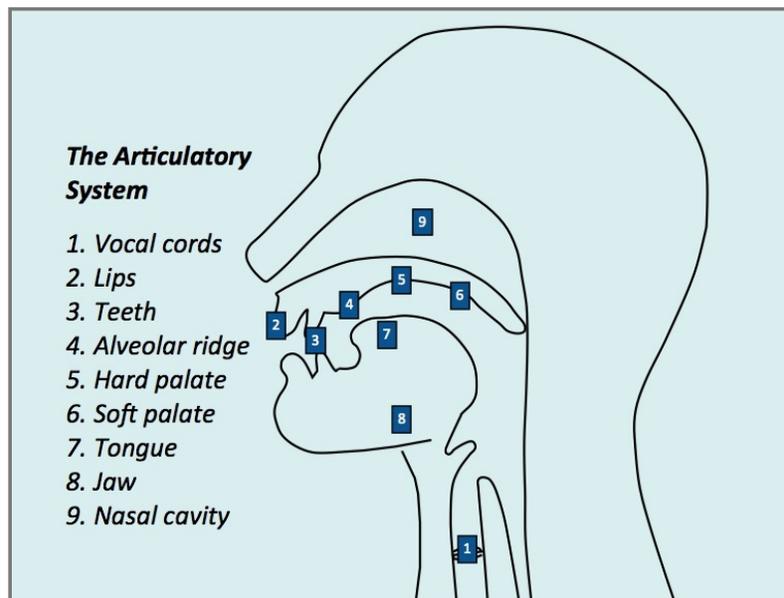
The **lips** are used in the production of several consonant sounds: /p/, /b/, /m/, /w/, /f/, and /v/. The way we move our lips—making them rounded, unrounded, or stretched a bit wide—also affects the sounds of vowels.

The **teeth** are used when we say the consonant sounds /f/ and /v/, with the upper teeth touching the lower lip, and also /θ/ and /ð/, with the tip of the tongue touching the upper teeth.

The **alveolar ridge** is the slightly rough area just behind the top teeth. It can also be called the tooth ridge or the gum ridge. The tongue touches or almost touches the alveolar ridge when we say the sounds /t/, /d/, /s/, /z/, /l/, and /n/.

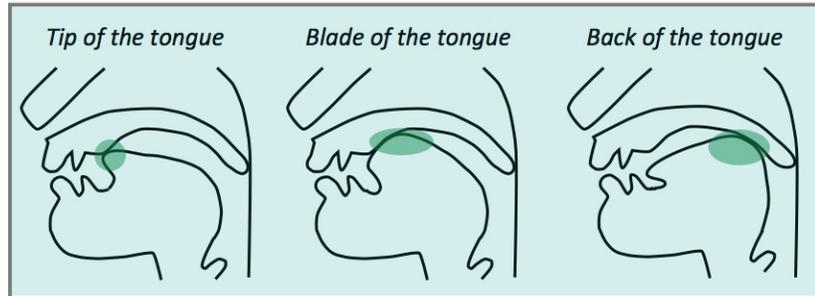
The **hard palate** is the hard part at the top of the mouth, beginning just behind the alveolar ridge. It can also be called the roof of the mouth. When you close your mouth, your tongue is probably flat against your hard palate. The tongue touches or almost touches the hard palate when we say the sounds /ʃ/, /ʒ/, /tʃ/, /dʒ/, and /y/.

The **soft palate** is the softer part of the roof of the mouth, farther back than the hard palate. It is also called the **velum**. If you touch the roof of your mouth with your tongue and then keep moving your tongue



farther back, you'll find that softer area. The back of the tongue touches the soft palate when we say the sounds /k/, /g/, and /ŋ/.

The **tongue** is involved in producing almost all the sounds of English, both consonants and vowels. We can also refer to different parts of the tongue: the tip of the tongue, the blade of the tongue, and the back of the tongue.



The lower **jaw** moves up and down to allow the mouth to open and close. Its movement also helps the tongue move to higher or lower positions, and to makes the space inside the mouth bigger or smaller. All of these movements have a great influence on the sounds we produce.

The **nasal cavity** is the space inside the nose where air passes in and out when we breathe through our nose. It can also be called the nasal passage. This area is important in producing the nasal sounds /m/, /n/, and /ŋ/. For these sounds, the air stream moves up and out through the nose instead of the mouth.

Teaching about the articulatory system

It's important for students of all ages to become aware of the parts of their mouths and how they move when they produce sounds. It's much less important for them to memorize the names of the parts of the articulatory system, either in English or in their native language.

We can use tools, models and illustrations to help students of all ages understand the articulatory system. For example:

- Have students look in a mirror to see how their mouths move, whether their lips are rounded or not, and how wide open their mouths are so they can compare these things with an illustration or the teacher's example.
- Have students touch their throats to feel the vibration of the vocal cords.
- Use a dental model (a set of giant teeth like dentists use to show children how to brush their teeth) to show students



what's happening inside their mouths. It's much easier to show students where the alveolar ridge is on a model, for example, than to try to get them to look inside the teacher's mouth. (It's dark in there!)

- Diagrams of the vocal tract, like the ones we've seen in this chapter, also give students a visual image of the position of the articulators during speech. This type of diagram is often called a "**Sammy**" **diagram** (I don't know why.) or a **sagittal section diagram**. However, these diagrams are sometimes hard for students to understand and connect to reality, especially for younger students.
- Many websites and software programs offer videos or interactive diagrams showing the articulation of sounds. One of the best-known is the Phonetics Flash Animation Project of the University of Iowa (<http://www.uiowa.edu/~acadtech/phonetics/>). For each of the phonemes of American English, it shows an animated sagittal section diagram, a video of a speaker pronouncing the sound, and recorded example words. The site also shows the phonemes of Spanish and German.

For young learners, *show* students what to do and keep explanations especially simple. Children are already aware of the more visible parts of the articulatory system—the tongue, teeth, and lips—and this is usually enough to help them understand what they need to do to say a sound.

Think of images or actions to help children understand how to pronounce new sounds, and keep them within the realm of children's experience. For example, when practicing the /θ/ sound, you might say, "Pretend you're licking a lollipop" to make it easier for them to stick their tongues out just a bit. To get them to round their lips for sounds like /w/ and /uw/, have them pretend they're blowing soap bubbles. (Or bring in actual lollipops and bubbles for them to practice with, if it's allowed by your school.) For the /s/ sounds, ask them to make a sound like a hissing snake.

Internet links

- An x-ray video of a person talking, from the companion website to Peter Ladefoged's book *A Course in Phonetics*:
<http://www.phonetics.ucla.edu/course/transcription%20exercises/moviepage.htm>
- The University of Iowa Phonetics Flash Animation Project:
<http://www.uiowa.edu/~acadtech/phonetics/>