Introduction

In this chapter, you will learn how to make a consonant. Of course, you already know how to make many consonants, or you would not be able to speak English or any other language! What we are going to do, though, is focus on what making a consonant involves. This, we hope, will give you tools to learn new speech sounds, as well as to undo aspects of English pronunciation that can give you a foreign accent when speaking another language. Let’s start with a short exercise to show you just how skillful you already are.

Learning to speak a language is in some ways like learning to juggle: you have to coordinate many different movements in order to produce an intended effect. To see what we mean by this, say the word punctuate out loud very slowly. It may be helpful to watch your mouth in a mirror as you pronounce the word. Pay attention to what you are doing with your lips and tongue as you say the word. You may need to say it a few times in order to get a feel for what you are doing. Notice that you start out with your lips brought closely together. Feel where your tongue is positioned while your lips are closed. Is it toward the front of your mouth or closer to the back?

Now open your lips and continue saying the word. Notice that by the time you say the ‘unc’ part of the word, your tongue is bunched up toward the back part of the roof of your mouth. What happens when you continue to pronounce the word? Your tongue is on the move again. This time the front of your tongue should be touching the center of the roof of your mouth. Your lips are probably also protruded.

To complete the word, your lips will spread apart, showing your teeth, and your tongue will end up close to the front of the roof of your mouth. And these are only the
gestures involving your tongue and lips! Another gesture was needed to allow air to pass through your nose during part of the word, and another gesture was involved to make the air vibrate when you made the vowels and a consonant. How did you get so good at moving the various parts of your mouth around to make these sounds? Much of it has to do with practice, and since you have probably been speaking English for many years, you have had years of practice!

In any activity that requires precise, coordinated gestures—whether it be juggling, playing the violin, driving a manual transmission car, or playing soccer—the more you practice, the better you get. Learning how to speak a new language is no different. You have to learn how to coordinate gestures in ways that may at first be unfamiliar to you. Learning to speak another language may seem very complicated at first. However, if you break words and sounds down into their basic components, the task will likely be more manageable. In fact, it may even be easier than you think since you are already familiar with many of the movements required to make speech sounds in other languages. You just may not have had the experience of putting the movements together in the necessary way. But you can make new sounds based on what you already know.

To illustrate, let’s try pronouncing some sounds that may be new to you. We will start by making a vowel that does not occur in the English sound inventory but is found in many other languages, including Chinese, German, French, Turkish, Hungarian, and Swedish. (You saw this vowel in the previous chapter in the German word *Tuer* ‘door.’) The symbol that linguists use to describe this vowel is [y], which is part of the International Phonetic Alphabet (IPA), displayed on the back inside cover of this book. (A common alternative symbol for this sound is ‘ü’; in fact this is the symbol used in German to spell words with this sound.) Technically speaking, [y] is referred to as a front rounded vowel. The rounded part of the vowel means that the person’s lips are protruded when making the vowel, as in the English vowel [u] (*boot, coupe*). By referring to a vowel as front, we are making reference to the position of the tongue in the mouth; that is, the tongue is bunched toward the front of the mouth. You can feel this for yourself by pronouncing the front vowel [i] in words like *beet* and *sea*. We will have more to say about producing vowels in the next chapter.

For the moment, however, let’s combine frontness and roundness to make a front rounded vowel sound. Start by making the vowel [i], as noted just above. Pay attention to what you are doing with your lips and your tongue when you make this sound. Your lips are probably spread as if you are about to smile, and your tongue is bunched toward the front of your mouth. In order to make the new sound [y], all you need to do is protrude your lips when you say the vowel, as you would if you were making an [u] sound, as in *boot*. However, do not change the position of your tongue; just move your lips from a spread to a protruding (or rounded) position. Congratulations: you have just made the front rounded vowel [y], as in the French word *su* ['sy'] ‘knew’!

Let’s try another one. You may have heard of sounds called “clicks” that occur in African languages like Zulu. The term “click” is used to describe a group of sounds that are made with a noise that sounds like clicking (hence the name). You should be able to make some click sounds quite easily since you already know how to make the various
3: How to Make a Consonant

Sounds, Not Letters!

Remember that we are talking about sounds, not the letters of the alphabet. Languages can use many different letters and symbols to characterize what is essentially the same sound. Even in a single language there can be more than one way to write a single sound. For example, in English, the letters and letter combinations ‘f,’ ‘ph,’ and ‘gh’ are all used to represent the same sound, as in food, photo, and enough. To simplify matters, we will use only one symbol to refer to a specific sound, regardless of what language it occurs in. For example, [f] refers to the sound at the beginning of the English words food and photo and at the end of enough. A chart of these IPA symbols is available for your reference at the back of the book.

movements, or gestures, involved. Although there are many types of click sounds (just as there are many kinds of vowels, for example), we will experiment with what is called an “alveolar click,” characterized by the IPA symbol [ǃ]. Begin by making the English sound [k] as in the word back. As you say back, hold your tongue in place when you make the [k] sound. Feel how your tongue is bunched up toward the upper back of your mouth. In fact, the top back portion of your tongue will be touching the roof of your mouth.

Now make the English sound [t], like in the words table, two. Feel where the front part of your tongue is. It will probably be touching the hard ridge located a short distance behind your teeth. To make the alveolar click, you need to put your tongue in both of these locations at the same time; that is, place the back of your tongue at the upper back part of your mouth (as in [k]), and put the front of your tongue up against the front top of your mouth (as in [t]). There should be a small space left between the back and front of your mouth above your tongue. Now create suction in this space and release your tongue abruptly from the roof of your mouth. If you hear a clicking sound, congratulations: you have just made an alveolar click found in the Zulu language!

The goal of these brief demonstrations is to show that learning to pronounce new sounds is doable if you start with some investigative work regarding the sounds. You can begin by getting information about what the various gestures of the new sounds are. You should be able to get this from, for example, a language instructor, language textbooks, websites, or even by having a native speaker describe how she makes the sounds.

The next step is to compare the new sound with similar sounds in English. What components of the new sound are different from sounds that you are already familiar with? Make use of the knowledge that you already have and apply it to sounds of the language that you are trying to learn. The gestures that combine to make sounds are independent from one another to a great extent and so can be combined in different ways to produce different sounds.

We believe that by understanding how you make the sounds in your own language, you will have tools to produce all kinds of new, exotic sounds. We include some exercises below to help you analyze the sounds of the language(s) that you are learning. Yet, before
proceeding, we need to point out that not all information about making speech sounds is presented in the following pages. Instead, we have chosen to focus on those aspects that we feel are most relevant to the language learner. Many colleges and universities offer courses in phonetics and phonology, the fields concerned with this subject matter, and we encourage you to consider taking such courses should you be interested in expanding your knowledge about these topics.

Creating Speech Sounds

Most speech sounds are created when air is pushed out of the lungs and up through the vocal tract. The term “vocal tract” refers to the passage that air follows from the vocal folds (or cords) to the front of the mouth, as shown in Figure 3.1. It also includes the nasal cavity since air can also flow out of the nose to make sounds. If you think of the vocal tract as a long tube, it is easy to see how different qualities of sound can be created. When there is nothing to obstruct the air as it moves up through the mouth, you will make the sound [h] as in hi, ha, ho, or something similar to it. However, if you narrow the tube at various locations along the tube, these modifications will result in differing acoustic effects and, as a result, different sounds.

You can get a feel for how this works by shaping your hand into a tube. To do this, put your hand in a loose fist so that you are making an “O” with all fingers touching the tip of your thumb. Bring the “O” up against your mouth, with the end of the tube and your thumb touching your face. Blow air through the hole (you may need to blow pretty hard). Listen to the kind of noise that is produced. Now close your fist just a bit and blow again. Did you hear a difference in the quality of noise? Try it again, closing your fist even more. You should have noticed that by narrowing the diameter of the tube created by your fist, you were able to create different sounds.

In a similar fashion, we can make different speech sounds by varying the width of the air passage from the vocal folds to the lips. Narrowing the passage in one part of the mouth will filter the air to create a particular sound, while narrowing it in a different location will produce a different sound. In the case of clicks, as we saw above, the passage is narrowed in two locations, giving rise to a clicking sound.

Making a Consonant Sound

• What parts of the vocal tract are involved in making the sound?
• Where in the vocal tract is the air passage narrowed?
• How narrow is the air passage?
• Does air flow through the nose and/or the mouth?
• What is the position of the vocal folds?
• How long is the consonant?
In order to make a consonant, you should keep several general points in mind, as shown in the box on page 34. Each of these questions will be addressed below.

**Parts of the Vocal Tract Involved in Making Sounds**

Let's begin by familiarizing ourselves with the parts of the mouth that are important for making speech sounds, beginning with the **vocal tract** where sounds are produced. Starting at the front of the mouth, as shown in Figure 3.1, sounds can be made using the **lips** and the **teeth**. Just behind the upper teeth you can see a change in the angle of the roof of the mouth; this is called the **alveolar ridge** and is also an important location for consonants in English and other languages. The roof of the mouth is divided into the **hard palate** and the **soft palate**, or **velum**. You should be able to feel the difference between these two parts of the palate with your tongue—as you run your tongue from front to back along the roof of your mouth, you should feel that the surface is harder in the front than it is in the back. At the back of the throat is the **uvula**, the soft, dangling tissue that hangs down at the back of the soft palate. As noted above, above the roof of the mouth is the **nasal cavity**.

Shifting our focus to the **tongue**, as you no doubt know, the tongue is one of the most flexible complex of muscles of the human body. Different sounds are made by

![Figure 3.1 The human vocal tract.](image-url)
using the tongue to filter the air as it moves through the vocal tract. Some of the tongue positions that we will discover to be particularly important for making speech sounds are listed below in (1). Can you figure out which consonants are made at each of these locations?

(1) **Tongue positions**
- raised toward the top of the mouth
- pulled back toward the back of the throat
- tongue tip curled back so it touches the roof of the mouth
- tongue front pushed up against the upper set of teeth
- tongue tip pushed between the upper and lower sets of teeth

For our purposes, it is helpful to divide the tongue into four parts; moving from front to back, we have the **tip**, the **front**, the **back**, and the **root**. As we show below, each of these parts plays a key role in making consonants. Below the root of the tongue, you will see the **epiglottis**, a fold of tissue that helps cover the larynx (Adam’s apple) during swallowing to help make sure that food goes into the stomach and not the lungs. The **larynx** houses the **vocal folds** (or vocal cords), and the space between the folds is known as the **glottis**.

**Places Where the Air Passage Is Narrowed for Consonants**

In this section, we go over where in the vocal tract the air passage is narrowed and identify some of the consonants that correspond to these locations. In the IPA charts of consonants at the back of this book, this aspect of a consonant is referred to as its **place of articulation**.

We begin with the lips. Sounds that make crucial use of the lips in their production are called **labial** sounds. If both lips are used, the sounds are called **bilabials**. English has the bilabials \[p, b, m, w\] which occur in words such as \[p\] *peat*, \[b\] *beat*, \[m\] *meat*, \[w\] *wheat*.

(2) **English bilabials**
\[
\begin{array}{ll}
[p] & \text{peat, cap} \\
[b] & \text{beat, cab} \\
[m] & \text{meat, camera} \\
[w] & \text{wheat, tower}
\end{array}
\]

The sounds \[f\] (*fan*) and \[v\] (*van*) are also made with the lips; in this case, the bottom lip rests on the upper teeth. These sounds are called **labiodentals**. In addition to raising the lip to the teeth as in making labiodentals, you can also put your tongue between your teeth. Sounds made with this gesture are called **interdentals** and correspond to the sounds \[\theta, \delta\] in the English words *bath* and *bathe*, respectively.
You can also push the tip of your tongue against the back of your teeth to make a consonant. Sounds made in this manner are called **dentals** and occur in many languages, including French, Spanish, and Italian. The Italian word for ‘table,’ for example, begins with the dental consonant \([t]\) *tavola*.

The Italian sound differs from the ‘t’ in English partly because the English ‘t’ is made further back in the mouth, against the alveolar ridge. Sounds made in this area are called **alveolars**. English has the alveolar consonants listed in (4). A common pronunciation error made by English speakers is to pronounce dental consonants as alveolars. Although the consonants sound quite similar to English ears, they are a sure mark of a foreign accent to native speakers of a language with dentals. In Chapter 6 we discuss some strategies for overcoming this pronunciation error.

(4) **English alveolars**

- **t**  [t] two, boat, retire
- **d**  [d] do, ride, reduce
- **r**  [r] letter, madder
- **s**  [s] sue, face, bats
- **z**  [z] zoo, rise, dogs
- **n**  [n] new, bone, banner

Moving further back in the mouth, the tongue can be raised so that it touches or comes near to the **hard palate**, the hard part of the roof of the mouth. Sounds made in this area are called **palatals**. They are sometimes also referred to as **palato-alveolars** or **alveopalatals**, but to keep things simple, we will just use the term **palatal**. English has the following palatal consonants:

(5) **English palatals**

- **tʃ**  [tʃ] check, batch
- **dʒ**  [dʒ] jack, badge
- **ʃ**  [ʃ] shack, bash
- **ʒ**  [ʒ] Jacques, garage
- **ʃ**  [ʃ] yak, view

Another type of sound made with the tongue close to or in contact with the hard palate is a **retroflex** consonant. A retroflex sound is made by curling the tip of the tongue back toward the hard palate. For some speakers, the English \([r]\) sound is made in this way.
Figure 3.2 shows X-ray tracings of the retroflex consonant [ɻ] produced by speakers of Hindi and Tamil. A comparison of the two tracings indicates that the way that this sound is made can vary from language to language. The different articulations of this sound, though, do share one thing in common: both involve the tongue reaching up so that it approaches the hard palate.

The tongue can also approach or make contact with the velum (soft palate) to produce what is referred to as a velar consonant. You should be able to feel this for yourself when you say the first consonant in the English word gold. There are three velar consonants in English:

(6) **English retroflex consonant** (for some speakers)

[ɻ] run, car

(7) **English velars**

[k] cold, jock
[g] gold, jog
[n] song, mingle

Figure 3.2 The position of the tongue for the retroflex consonant [ɻ] in Hindi (left) and Tamil (right). Based on an article published in *Journal of Phonetics* 11, Peter Ladefoged and Peri Bhaskararao, "Non-Quantal Aspects of Consonant Production: A Study of Retroflex Consonants," 291–302. Copyright Elsevier (1983), with permission from the publisher.
of the tongue is moved up toward the uvula to make sounds. These sounds are called, not surprisingly, **uvulars**, and the sound that you were just attempting to make, \([q]\), is a common sound in Hebrew and many Arabic languages, e.g. Hebrew *qeber* ‘grave.’

The leftmost image in Figure 3.3 shows a drawing of an Arabic speaker producing the uvular consonant \([q]\). Notice that the back of the tongue is located right up against the uvula. You can compare this with how you would say the velar consonant at the beginning of *cat*, where your tongue would be touching the soft palate and therefore would be slightly further to the front of your mouth.

Another uvular consonant, shown on the right in Figure 3.3, occurs in some Arabic languages, as well as in many varieties of French, including Parisian French, where it is spelled with the letter ‘r,’ e.g. *rouge* ‘red.’ This sound, characterized by the IPA symbol \([ʁ]\), has the same place of articulation as the \([q]\) sound, but it is made by letting a bit of air pass between the tongue and the uvula. This creates the turbulent noise that you can often hear associated with the sound. We will return to this topic in the next section.

We will go back one more step in the mouth, to the pharynx. If you move the root of the tongue back toward the pharyngeal wall, that is, the back of your throat, you can make what is called a **pharyngeal** consonant. While English does not have consonants made at this location, many Arabic languages include pharyngeals in their inventory of sounds. The Maltese language, spoken on the island of Malta just south of Italy, has the pharyngeal sound \([ħ]\), e.g. *heles* ‘he set free.’ The consonant sounds a bit like the English \([h]\) in *hat*, but the tongue is pulled further back which then affects the acoustics of the sound. Figure 3.4 shows the tongue position for \([ħ]\) as pronounced by a speaker of Arabic.

There are two additional places in the vocal tract that are used to make consonants: the epiglottis and the glottis. Since epiglottal sounds are extremely rare, we will focus only on consonants made at the glottis. You will recall that the vocal folds are located at the glottis. By manipulating the position of the vocal folds, you can produce different **glottal** sounds. One such sound is English \([h]\) (\(hi\)) that we discussed above. In the case of \([h]\), the vocal folds remain open and the air passes freely through the vocal tract. The other most common glottal sound is made by closing and then quickly opening the vocal folds. This produces a sound called the **glottal stop** \([ʔ]\) which occurs in the English
expression, \textit{uh\_oh}, for example. While it is not used to differentiate words in English as the consonants [b] and [p] do (e.g. \textit{bat} vs. \textit{pat}), it is distinctive in other languages, including Arabic and Maltese. Notice that the only difference between the Maltese words for ‘to taste’ and ‘this’ in (8) is the quality of the last consonant; that is, whether it is [?] or [n].

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{figure3.4}
\caption{The pharyngeal consonant [h], as pronounced by a speaker of Arabic. \textit{Source: Based on Zeroual 2000.}}
\end{figure}

\begin{equation}
\text{da\_? vs. dan}
\end{equation}

‘to taste’ ‘this’

Thus far, we have been focusing largely on consonants made where the air passage is narrowed in one location in the vocal tract. Interestingly, in some languages the air passage is narrowed in two places, creating what are called \textbf{doubly-articulated consonants} (recall that the click consonant described above has two articulations). With the possible exception of ‘r’ mentioned above, the closest that English comes to this type of consonant is the sound [w], e.g. \textit{will} and \textit{tower}. Most English speakers pronounce [w] with the lips protruded (1st location) and the back of the tongue raised toward the velum (2nd location). Hold your mouth in the position to make the [w] sound and see if you are making a sound with two places of articulation.

While not common in English, other languages can have many doubly-articulated sounds, and these can pose a challenge to the language learner. Russian’s sound inventory, for example, is rich in doubly-articulated consonants. The language combines a palatal sound similar to [j] in \textit{yellow} with what would otherwise be a basic labial, dental, or velar articulation to create what are called \textbf{palatalized} consonants. Recall that a palatal is made with the tongue raised up toward the hard palate. A palatalized consonant is similar to sequences of consonant + [j] at the beginning of English words like \textit{view, cue, hue, pew}.

An important difference between English and Russian is that, psychologically, a native English speaker will generally consider the consonant and palatal [j] to be a sequence of two consonants, while a Russian will hear the consonant and palatal as a single sound.

A [w]-like sound can also be added to a basic consonant sound to create what are called \textbf{labialized} consonants, e.g. [p\textsuperscript{w}], [t\textsuperscript{w}], [k\textsuperscript{w}]. English does not make use of this fea-
Exercise 1: English Consonant + Palatal
Say the pairs of English words below out loud, focusing on the beginning of each word. Notice the [j]-like sound after the beginning consonant, i.e. [vj] in view, [kj] in cue, [hj] in hue, and [pj] in pew. (Try not to be distracted by the spelling of the word, which does not consistently represent the palatal.) Compare the pronunciation of each word on the left with the similar word to its right. The words in the column on the right do not have a [j] sound after the first consonant, while those on the left do.

<table>
<thead>
<tr>
<th>1st Consonant Sound + [j]</th>
<th>1st Consonant Sound, No [j]</th>
</tr>
</thead>
<tbody>
<tr>
<td>pew</td>
<td>Pooh</td>
</tr>
<tr>
<td>hue</td>
<td>who</td>
</tr>
<tr>
<td>cue</td>
<td>coupe</td>
</tr>
<tr>
<td>view</td>
<td>voodoo</td>
</tr>
</tbody>
</table>

Exercise 2: Russian Palatalization
Practice saying the following Russian words first with a plain consonant and then with a slight [j]-like pronunciation added. Notice that when the palatal articulation is added, the meaning of the word changes.

<table>
<thead>
<tr>
<th>Russian Plain and Palatalized Consonants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plain</strong></td>
</tr>
<tr>
<td>mal ‘little’</td>
</tr>
<tr>
<td>nos ‘nose’</td>
</tr>
<tr>
<td>sok ‘juice’</td>
</tr>
<tr>
<td>zof ‘call’</td>
</tr>
</tbody>
</table>

...ture systematically, although, as we mentioned above, lip protrusion is found with some English consonants including [ʃ], e.g. shoe, and [tʃ] gun. On the other hand, labialized consonants do occur widely in some languages of Africa (e.g. Hausa, Berber, Igbo) and in some Native American languages (e.g. Navaho, Chipewyan, Bella Coola), as well as in Ancient Greek and Siberian Eskimo, among others.

Narrowsness of the Air Passage
In addition to thinking about where in the mouth a particular consonant is made, it is also important to take into account how narrow the passage is for the air to move through. This property is typically referred to as a consonant’s manner of articulation.
For example, if you jam your tongue up against the roof of your mouth, you will produce a different sound than if you leave a small space between the tongue and the roof. Try this by saying the following pairs of sounds:

(9) [t] vs. [s] e.g. two vs. sue  
[d] vs. [z] e.g. do vs. zoo

The consonants in each pair are alveolars because the tongue front is at or near the alveolar ridge. The place of articulation is then the same. What distinguishes [t] from [s] and [d] from [z] is the narrowness of the passage between the tongue and the alveolar ridge. When you pronounce [t] or [d], you will notice that your tongue actually touches the ridge, which has the effect of blocking the passage of air momentarily. Sounds made in this way are called **stops**. Now pronounce [s] or [z]. Unlike with [t] and [d], notice that the air is not blocked at all. Instead, your tongue rests very close to the alveolar ridge without touching it. This is what gives [s] and [z] their noisy quality. Consonants that have this turbulent noise quality are called **fricatives**.

There are basically three degrees of narrowness that we need to take into account when describing how narrow the air passage is at a consonant’s place of articulation. Below each category, we list the corresponding consonants from English.

**DEGREE 1: COMPLETE CLOSURE**

There is no space for air to pass through. Sounds produced in this way are called **stops** (or **plosives**).

(10) **Stops (or plosives)**  
[p, b] pat, bat bilabial stops  
[t, d] tall, doll alveolar stops  
[k, g] cage, gauge velar stops  
[?], uh_oh glottal stop

English has another stop-like sound, [r], that occurs in words such as letter, matter, and madder. Like a stop, the air flow is briefly interrupted while passing through the mouth. The term **flap** is used to describe sounds made in this way. It may be difficult for you to hear the difference between [t] and [r], or [d] and [r] if you are a native speaker of English. This is because the presence of [r] in a word is completely predictable and so we tend not to pay attention to it. Since the flap is used in languages like Spanish to distinguish the meaning of words, it will come up again in Chapter 6 when we discuss common pronunciation errors.

(11) **Alveolar flap**  
[r] ladder, letter
DEGREE 2: NEAR CLOSURE

There is just enough space so that noise is produced when the air passes through the mouth. These sounds are called fricatives.

(12) Fricatives

| /f, v/ | fat, yat | labiodental fricatives |
| /θ, ð/ | bath, bathé | interdental fricatives |
| /s, z/ | sip, zip | alveolar fricatives |
| /ʃ, ʒ/ | shack, Jacques | palatal fricatives |
| /h/ | hello | glottal fricative |

You can actually combine degrees 1 and 2 and make another type of sound. We call this Degree 2½. These sounds have a complete closure, like a stop, followed by a near closure, like a fricative. These sounds are called affricates.

(13) Palatal affricates

| /tʃ, dʒ/ | Cho, Joe |
DEGREE 3: RELATIVELY OPEN

The air passage is narrowed, but the air can still pass through the mouth without making a lot of noise. These sounds are called **approximants** and include all **vowels**, **glides**, and **liquids**.

(14) **Approximants**

<table>
<thead>
<tr>
<th>Sound</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[w]</td>
<td>whack, win</td>
<td></td>
<td>bilabial glide</td>
</tr>
<tr>
<td>[l, j]</td>
<td>lack, rack</td>
<td></td>
<td>alveolar liquids</td>
</tr>
<tr>
<td>[j]</td>
<td>yak</td>
<td></td>
<td>palatal glide</td>
</tr>
</tbody>
</table>

**Air Flow through the Nose and Mouth**

Whether the air passage is open or closed is also important for distinguishing between sounds that are made with the air flowing through the mouth and those where it also passes through the nose. Say the following pairs of words out loud and see if you can determine whether the air is coming out of your mouth or your nose. It may help to put your hand in front of your face to try to feel the air:

(15) 

<table>
<thead>
<tr>
<th>Sound</th>
<th>Example 1</th>
<th>Example 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>[b]</td>
<td>ba</td>
<td>[m] ma</td>
</tr>
<tr>
<td>[d]</td>
<td>da</td>
<td>[n] na</td>
</tr>
<tr>
<td>[g]</td>
<td>ag</td>
<td>[ŋ] ang</td>
</tr>
</tbody>
</table>

If you determined that the air is exiting the mouth for [b, d, g] and going through the nose (and perhaps also the mouth) for [m, n, ŋ], you are absolutely right. In distinguishing these pairs of sounds, what matters is whether the air passage going into the nasal cavity is open or closed. When it is open, the air is able to go through the nasal cavity, and a nasal sound such as [m, n, ŋ] is made; when the air passage is closed, the air can only go through the mouth, and the sound is oral, e.g. [b, d, g]. The **velum** (soft palate) is responsible for controlling the flow of air through the nasal or oral cavities. If the velum is lowered as is the case in Figure 3.1, there is an opening that allows air to flow out through the nose. If the velum is raised, the opening is blocked, and no air can flow through the nose. As stated above, sounds made with air coming out of the nose are called **nasals**. The English sound inventory includes the following three nasal consonants:

(16) **English nasal consonants**

<table>
<thead>
<tr>
<th>Sound</th>
<th>Example 1</th>
<th>Example 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>[n]</td>
<td>nose, can</td>
<td></td>
</tr>
<tr>
<td>[m]</td>
<td>mouse, same</td>
<td></td>
</tr>
<tr>
<td>ŋ]</td>
<td>sing, mingle</td>
<td></td>
</tr>
</tbody>
</table>

Most, if not all, languages have at least one nasal consonant. The Dravidian language
Exercise 4: Nasals

Practice trying to move your velum to contrast nasal and oral sounds. Start by saying the vowel [a], as in father, several times; the velum is raised in this case. Now say [aŋ] as in song, several times. In this case, the velum is lowered to let the air pass through the nose as well as the mouth. Now alternate: [a], [aŋ], [a], [aŋ], [a], [aŋ], [a], [aŋ]. Focus on your velum and try to sense it moving up and down. With enough practice, you should be able to feel the movement of the velum as it lowers and rises to create nasal and oral sounds. If you are able to do this, you should be able to pronounce unfamiliar nasals by turning a familiar oral sound into its corresponding nasal sound.

Malayalam is particularly impressive in this regard because it has five nasals: labial, dental, alveolar, retroflex, and velar, as shown in (17) (the symbol [A] characterizes the vowel sound in the English word butter).

(17) Malayalam nasals

Labial: kamma ‘shortage’
Dental: panni ‘pig’
Alveolar: kanni ‘virgin’
Retroflex: kanni ‘link in chain’
Velar: kunja ‘crushed’

Position of the Vocal Folds

The narrowness of the air passage through the vocal folds can also affect the quality of sound that is being produced. The vocal folds are tissue that stretches across the airway to the lungs; they can vibrate against each other, providing much of the sound that we hear when someone is talking. Just like the tongue, the vocal folds are used to filter air as it comes out of the lungs. Depending on their position, the quality of the air differs, and, as a result, so does the sound produced. Let’s consider a number of different vocal fold positions that are used in languages to make consonants.

The vocal folds can be closed tightly and then released. This produces a sound called the glottal stop [ʔ] which, you will recall, is used marginally as in the English expression uh_oh. The vocal folds can also be held very close together though not closed, which allows them to vibrate. Sounds made in this way are called voiced sounds. Vowels are voiced, as are some consonants, including [z] (vs. [s]), zoo vs. sue and [d] (vs. [t]), do vs. two. Nasal consonants, e.g. [m, n, ŋ], are also voiced. Sounds that are made without vibration of the vocal folds are called voiceless sounds.
(18) **English voiceless sounds**

[p] cap voiceless bilabial stop  
[f] calf voiceless labiodental fricative  
[θ] path voiceless interdental fricative  
[t] cat voiceless alveolar stop  
[s] Cass voiceless alveolar fricative  
[ʃ] cash voiceless palatal fricative  
[tʃ] catch voiceless palatal affricate  
[k] pack voiceless velar stop  
[h] hi voiceless glottal fricative  
[ʔ] uh_oh voiceless glottal stop

(19) **English voiced sounds: all vowels, nasals, liquids, and glides, plus the following:**

[b] slab voiced bilabial stop  
[v] sleeve voiced labiodental fricative  
[ð] seethe voiced interdental fricative  
[d] seed voiced alveolar stop  
[z] seize voiced alveolar fricative  
[ʒ] seizure voiced palatal fricative  
[dʒ] siege voiced palatal affricate  
[g] slug voiced velar stop

Many languages differentiate words solely on the basis of the voiced and voiceless distinction in consonants. This means that the only difference in the pronunciation of two words will be that the vocal folds are vibrating for some sound in one of the words, while they are not vibrating in the other. This is the case with English words like *cab* (voiced) and *cap* (voiceless), ignoring possible differences in the length of the vowel.

The vocal folds can also be kept wide apart. When there is a considerable amount of air passing through them in this state, a small puff of air will be released at the end of a consonant made in this way. Say the pairs of words below with your hand in front of your mouth. Notice the difference between the underlined sounds of each pair.

(20) **pot** spot  
**top** stop  
**core** score

You should be able to feel a small puff of air after [p, t, k] at the beginning of the words in the left column. These sounds are called **aspirated** sounds. The corresponding stops in the right hand column are **unaspirated**, since no puff of air accompanies the consonant.

While English has both aspirated and unaspirated consonants, the presence or absence of aspiration is never the only property distinguishing two words. As a result, there are no two words that both begin with a voiceless stop and that are identical in all respects but where one is aspirated while the other is unaspirated; English has only voiceless aspirated stops in this position, e.g. *pam*. Nor are there two words beginning with
Exercise 5: Voiced and Voiceless Consonants

Try to get a feel for what the difference is between a voiced and a voiceless consonant. To do this, touch your palm to your throat by your larynx. Now say the following pairs of words, paying special attention to the underlined sounds:

zoo       sue
yat       fat
do       to

Can you feel your vocal folds vibrating when you say the first consonant of the words on the left? For the words on the right, there will be vibration associated with the vowel, but you should still be able to notice that there is no vocal fold vibration associated with the first consonant.

[s] followed by two identical voiceless stops except that one is aspirated and the other is unaspirated: only unaspirated voiceless stops occur in this position, e.g. sgam.

In Hindi, on the other hand, pronouncing an aspirated consonant without aspiration, or an unaspirated consonant with aspiration, can change the meaning of a word. Compare the pairs of words given in (21). The only difference between the members of each pair is aspiration: the word on the left is aspirated, while the one on the right is unaspirated.¹

(21) Hindi aspirated and unaspirated voiceless stops

[pʰal] ‘knife-edge’     [pal] ‘take care of’
[ tʰan ] ‘roll of cloth’ [ tʰan ] ‘mode of singing’
[kʰal] ‘skin’           [kal] ‘era’
[tʰal] ‘place for buying’ [tal] ‘postpone’

Because aspiration is not distinctive in English, it is easy for an English speaker to mispronounce aspirated and unaspirated words in languages that have different rules from those of English. In Chapter 6, we review some of these errors and ways to avoid them.

Length of the Consonant

An interesting property used to distinguish words in some languages concerns consonant length, that is, how long the articulation of the consonant is held. Saying a sound in an English word for a longer or shorter amount of time does not change the meaning of the word. Take the word sun, for example. If you hold the ‘s’ twice as long as you normally would, the word may sound rather strange, but it does not make it a new word.

¹. We thank Ila Nagar for supplying us with these Hindi examples.
Yet, this is exactly what happens in many languages. In Italian, for instance, the words for ‘fate’ and ‘made’ are distinguished solely by the length of the consonant ‘t’. In ‘made’ the consonant is about twice as long as its counterpart in ‘fate’, a quality indicated in the Italian spelling system by doubling the letter.

(22) **Italian consonant length**

fato ‘fate’ vs. fatto ‘made’

While English words can also be spelled with double letters, e.g. *matte, assure, babble*, this doubling is not telling the reader that the consonant is to be made twice as long as a word with only a single letter, e.g. *mate*. As noted above, consonant length is not used to distinguish word meaning in English. Double letters in English can nonetheless give us clues about how words are pronounced. In *matte* (vs. *mate*), for instance, the double letters provide information about the quality of the preceding vowel.

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**Summary**

To summarize what we have covered in this chapter, we have identified the following points concerning the production of consonants:

1. The parts of the vocal tract that are involved:
   - lips, teeth, alveolar ridge, hard palate, velum, uvula, pharynx, vocal folds
   - tongue tip, tongue front, tongue back, tongue root

2. Places where the air passage is narrowed for consonants:
   - lips, teeth, alveolar ridge, hard palate, velum, uvula, pharynx, vocal folds

3. The narrowness of the air passage:
   - Degree 1: closure (no sound; air flow is interrupted)
   - Degree 2: near closure (turbulent noise is produced)
   - Degree 2½: a combination of 1 and 2 (no sound followed by turbulent noise)
   - Degree 3: relatively open (no turbulent noise)

4. Does air flow through the nose and/or the mouth?
   - through the mouth: oral consonants (and vowels)
   - through the nose (and mouth): nasal consonants (and vowels)

(continued on next page)
Summary (continued from previous page)

5. What is the position of the vocal folds?
   • tightly closed and released: glottal stop
   • close together to produce vibration: vowels, voiced consonants
   • opened without vibration: unaspirated
   • opened with increased volume of air: aspirated

6. How long is the consonant?
   • longer
   • shorter

Keeping these points in mind, you should be able to tackle the pronunciation of new sounds. To do so, start by understanding how a new sound is made. This may involve asking your language teacher to say the sound slowly so that you can repeat it. Some language books actually describe the particular sounds using labels similar to the ones used above. Once you understand the components of the new sound, go slowly, putting the components together. Finally, practice, practice, practice! And practice slowly. Remember: you have had years to practice making the sounds of your native language!

Additional Exercise: Comparing Consonants

Here is an exercise to help you better understand how the consonants in a language that you are learning differ from those in English.

1. On the inside back cover of this book you will find consonant charts from the International Phonetic Association giving the symbols needed to describe the speech sounds in all the languages of the world (many more than you will ever need!). On the page opposite to the IPA chart, you will see a simplified chart containing the consonants of English.

   • Make a copy of the IPA consonant chart (or draw your own).
   • Circle all the consonants from English.
   • Then, taking information that you have gathered from your language book, your instructor, the web, or other sources, draw a triangle around the consonants of the language you are learning. You could also sit down with a native speaker of the language and have her say each sound individually. You can ask her to describe how she is making the sound, or you can imitate the sound, asking her to let you know how native-like you sound. You can then determine for yourself how the consonant is made and put a triangle around the appropriate symbol in the chart.
The next step is to compare the sounds in the circles and triangles you have drawn. Are there triangles without corresponding circles? If so, look for English consonants that share some of the same properties, for example, place of articulation, voicing quality, and so on, and use your knowledge of producing these familiar sounds to create new ones, as we did at the beginning of this chapter with clicks and front rounded vowels.

References
