

U. Review the description of clicks. Try to say a voiceless version of each click between vowels [akla, ak'la, ak|la] then a voiced version [aqla, aq'la, aq|la], and finally a nasalized version [aŋla, aŋ'la, aŋ|la].

V. Incorporate all these sounds into simple series of nonsense words such as:

p'etag	'gopet'	'kloko
'dedak	'tip'uk	'k'oklo
'pe'ak	'baqod	'bekl a
'bedag	'dukap'	'kakko
'k'ebap	'r'edug	'r'iki

7

Consonantal Gestures

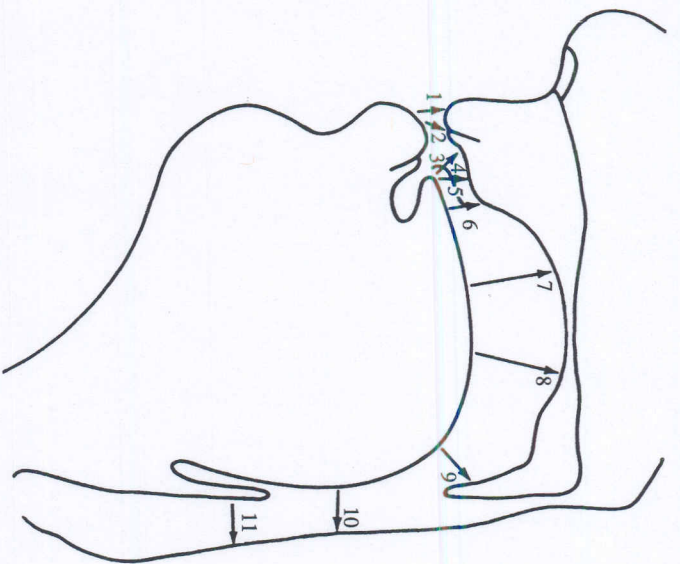
The movements of the lips and tongue in English are only a small subset of those that can be used for making consonants. Scores of other sounds can be made, as we will see by considering different languages. An appropriate way to describe consonantal gestures in the languages of the world is in terms of two of their aspects: the targets of the gestural movements, commonly called the places of articulation, and the way in which the target is approached, often thought of as the manner of articulation. We will use these traditional terms, but always remembering that speech sounds are gestural movements, not static positions of the vocal organs.

Consonants that occur in other languages are well worth studying even by those concerned mainly with the phonetics of English. Many of the sounds that occur in other languages also occur in deviant forms of English. As we noted at the beginning of the previous chapter, the best way to study unfamiliar sounds is by observing them in languages in which they are a regular, easily observable part of the sound system.

ARTICULATORY TARGETS

Many of the possible places of articulation that are used in the languages of the world were defined in Chapter 1. Figure 7.1, which is similar to Figure 1.4, shows three additional places that will be discussed below. The terms for all the places of articulation are not just names for particular locations on the roof of the mouth. They should be thought of as names for the numbered arrows. Each term specifies where the arrow starts, the articulator on the lower surface that makes this particular gesture, and where it ends, the part of the vocal tract that is the target of the gesture.

A large number of non-English sounds are to be found in other languages. Many of them involve using gestures in which the target, the place of articulation, is different from any found in English. For others it is the type of gesture, what is traditionally called the manner of articulation, that is different. We will



ate the different targets by considering how each place of articulation is in English and in other languages for making stops, nasals, and fricatives. The numbers in the following paragraphs refer to the numbered arrows in Figure 7.1.

The bilabial gesture is common in English, which has bilabial stops and fricatives [p, b, m]. But bilabial fricatives in English are simply allophones of the coronal sounds [f, v]. In some languages (for example, Ewe of West Africa), bilabial fricatives contrast with labiodental fricatives. The symbols for the voiced and voiceless bilabial fricatives are [ɸ, β]. These sounds are pronounced by bringing the two lips nearly together, so that there is only a slit between them. In Ewe the name of the language itself is [ɛ̀βɛ̀], whereas the word for two is [ɛ̀vɛ̀].

In Ewe, you should pronounce these contrasting words yourself. Ewe also contrasts voiceless bilabial and labiodental fricatives. Contrasts involving all these sounds are listed in Table 7.1.

You should also note here some other labial sounds not shown in Figure 7.1. A number of Austronesian languages spoken in Vanuatu have **linguo-labials**, in which the tongue touches the upper lip. V'enen Taut has nasals, stops, and fricatives pronounced in this way. The diacritic for indicating a linguo-labial articulation is [ˌ],

TABLE 7.1 Contrasting bilabial and labiodental fricatives in Ewe.

Voiceless bilabial fricative	ɛ̀ɸá 'the polished'	ɛ̀βlé 'he bought'
Voiceless labiodental fricative	ɛ̀ɸá 'he was cold'	ɛ̀βlé 'he split off'
Voiced bilabial fricative	ɛ̀βɛ̀ 'Ewe' (the language)	ɛ̀βlé 'mushroom'
Voiced labiodental fricative	ɛ̀vɛ̀ 'two'	ɛ̀vɛ̀ 'he is evil'

CD 7.1

a shape like a seagull, placed under the coronal symbol. The V'enen Taut for 'breadfruit' is [tatei], and for 'stone' is [naɔt]. These and other V'enen Taut sounds are on the CD.

CD 7.2

(2) Many languages are like English in having the labiodental fricatives [f, v]. But probably no language has labiodental stops or nasals except as allophones of the corresponding bilabial sounds. In English, a labiodental nasal, [ɱ], may occur when /m/ occurs before /f/, as in *emphasis* or *symphony*. Say these words in a normal conversational style and see if your lower lip ever contacts your upper lip during the nasal.

Some languages have affricates in which the bilabial stop is released into a labiodental fricative. Practice these sounds by learning to say the German words *Pfanne* ['pfane] 'bowl' and *Pflug* ['plʊk] 'plough'.

(3) Most speakers of both British and American English have dental fricatives [θ, ð] but no dental stops, nasals, or laterals except allophonically before [θ, ð], as in *eight*, *tenth*, *wealth* [eɪt̪, teɪn̪, weɪl̪θ]. Many speakers of French, Italian, and other languages typically have dental stops, nasals, and laterals. In these languages [t̪, d̪, n̪] are not just coarticulated allophones that occur only before [θ, ð] as in English. However, there is a great deal of individual variation in the pronunciation of these consonants in all these languages. Around one-third of Californian English speakers (the only regional accent for which I have seen reliable data) have dental stops, and many French speakers have alveolar rather than dental consonants—well over half of them in the case of the lateral /l/. Say words such as *tip*, *dip*, *nip*, *lip* and try to feel where your tongue touches the roof of the mouth.

Some languages, such as Malayalam, a Dravidian language spoken in southern India, contrast dental and alveolar consonants. Examples of contrasting Malayalam nasals are shown in Table 7.2. The table also includes other consonantal gestures that are used in Malayalam but not in most forms of English. We will discuss these in subsequent paragraphs.

(4) Alveolar stops, nasals, and fricatives all occur in English and in many other languages. They need no further comment here.

7.2 Contrasts involving bilabial, dental, alveolar, retroflex, palatal, and velar places of articulation in Malayalam, illustrating the necessity for six points of articulation. As we saw in Chapter 3, dental articulations are indicated by a subscript [_n].

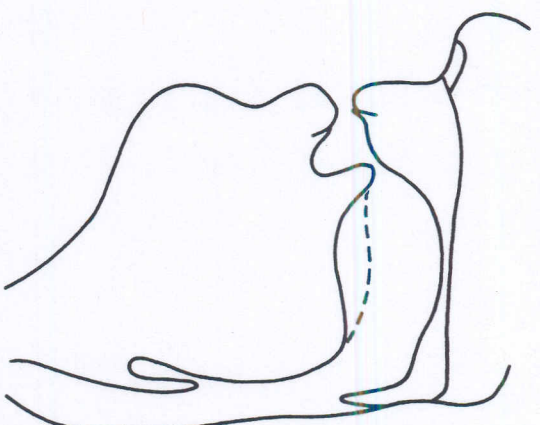
	Bilabial	Dental	Alveolar
	kammi	pammi	kammi
'shortage'		'pig'	'first'
Retroflex		Palatal	Velar
kanpi	kanpi		kanpi
'link in chain'		'boiled rice and water'	'crushed'

Retroflex stops, nasals, and fricatives do not occur in most forms of English.

Outstanding exception is the English spoken in India. Retroflex sounds are made by curling the tip of the tongue up and back so that the underside is or approaches the back part of the alveolar ridge. The symbols used by retroflex sounds include [t̪, d̪, ŋ]. Remember that, just as dental is a gesture that can be defined as an articulator (the tip of the tongue) and a target (the teeth), so also retroflex defines a gesture involving the underside of the tip of the tongue and a target, the back of the alveolar ridge. Students sometimes note that the term retroflex describes a manner of articulation, but in fact it is a gesture of articulation like dental and alveolar. At each of these places of articulation it is possible to produce stops, nasals, fricatives, and sounds made with manners of articulation. As we saw in Tables 6.2 and 6.7, the languages of India and Hindi contrast several types of retroflex stops. Malayalam (Table 7.2) contrasts three coronal gestures—dental, alveolar, and retroflex. In addition, Malayalam has bilabial, palatal, and velar sounds, so that it contrasts nasals with six types of gesture, six places of articulation, all of which are exemplified in Table 7.2.

To produce a retroflex gesture is made with the undersurface of the tip of the tongue touching or near the back of the alveolar ridge, the blade (the upper surface) of the tip of the tongue is usually a considerable distance from the roof of the mouth. As a result, the tongue is somewhat hollowed, as shown in the diagram of a retroflex fricative [s̪] in Figure 7.2. Try making this sound yourself with [s], in which the tip of the tongue is raised toward the front part of the alveolar ridge. Now, while maintaining the fricative noise, slowly slide the tip of the tongue back, curling it up as you move it backward. You will be producing a palatal [ʃ], which sounds something like [ʃ], although the articulatory position is different. (See (6) below for discussion of the articulatory position of [ʃ].) When you have learned to say [s̪], try adding voice so that you produce [z̪]. Later the voiced and voiceless sounds [s̪ s̪ s̪ z̪ z̪ s̪ s̪ z̪ z̪]. Next, still with the tongue curled up and back in this position, make the stops [ta, da]. How do the stops affect the quality of the following vowel, giving it a sort of

FIGURE 7.2 The articulation of the retroflex fricative [s̪]. The dashed lines indicate the position of the sides of the tongue.



r-coloring at the beginning. Now produce the corresponding nasal [ŋ]. Learn to say all these sounds before and after different vowels. Finally, try to say the Malayalam words in Table 7.2. Retroflex stops and nasals occur in many of the major languages of India, and retroflex fricatives are not at all uncommon. They vary somewhat in the degree to which the tip of the tongue is curled backward. In Hindi and other languages of northern India, retroflex sounds often have the tip of the tongue only slightly behind the most prominent part of the alveolar ridge, much as indicated in Figure 7.2. In Malayalam and other languages spoken in the southern India, the tip is curled farther back, so that the underside of the tip of the tongue touches the roof of the mouth.

(6) The palato-alveolar gestures for [ʃ, ʒ] differ from retroflex gestures in the part of the tongue involved. A palato-alveolar gesture is one in which the target for the upper surface of the tip of the tongue is near the roof of the mouth. In addition, the front of the tongue is slightly domed, as opposed to being hollowed. Compare Figure 1.7, which shows the position of the vocal organs in the palato-alveolar fricative [ʃ] as in *shy*, with the retroflex fricative in Figure 7.2. Note that in both [s̪] and [ʃ] the maximum constriction of the vocal tract occurs near the back of the alveolar ridge. But these two sounds are said to have different places of articulation, because the terms specify different gestures. The place of articulation designates both the target on the roof of the mouth and the part of the tongue moving toward that target. In retroflex sounds it is the movement of the underside of the tip of the tongue that forms the gesture, but in palato-alveolar sounds the gesture is made by the upper surface of the tip of the tongue.

Another way of distinguishing between retroflex and palato-alveolar sounds is to call them all post-alveolar and, in addition, name the part of the tongue involved. Sounds made with the tip of the tongue may be called **apical**, and those made with the blade may be called **laminar**. Then the term retroflex is exactly equivalent to apical post-alveolar, and palato-alveolar is equivalent to laminar post-alveolar.

There are advantages in introducing the terms apical and laminar in that they may also apply to other gestures. Dental sounds may be made with the tip of the tongue, or with the blade of the tongue, and so may alveolar sounds. With the use of these extra terms we can distinguish between the apical dental stops that occur in Hindi (Table 6.7 on the CD) and the laminar dental stops that occur in French. In Australian aboriginal languages, the difference between apical and laminar sounds is often very important. If you want to pursue this further, go to the map index on the CD, and check out the aboriginal languages spoken in Australia.

In English, the only palato-alveolar sounds are the fricatives and affricates [ʃ, ʒ, tʃ, dʒ]. In other languages, such as French and Italian, there are nasals made in either the same or a very similar position. These nasals are often, arbitrarily, considered to be palatal sounds. No language that I know of makes a distinction between a palato-alveolar nasal and a palatal nasal. Some of the palatal sounds in Italian will be discussed later in this chapter.

The IPA chart puts palato-alveolars into the post-alveolar column. A section labeled “other symbols” also mentions **alveolo-palatals** and provides the symbols [ç, ʒ]. These symbols are used for voiceless and voiced fricatives in Polish and Chinese. Though similar to [ʃ, ʒ], they have considerable raising of the front of the tongue. They are also made in the post-alveolar region. Tables illustrating contrasting fricatives in Polish and Chinese are on the CD. Both these languages are interesting because they have dental or alveolar, post-alveolar (retroflex), and alveolo-palatal fricatives. (Note: There are some disagreements among authorities as to the best descriptions of these sounds.)

(7) Palatal sounds can be defined as being made with the front of the tongue approaching or touching the hard palate, and with the tip of the tongue down behind the lower front teeth. There is no clear-cut distinction between these sounds and palato-alveolar sounds. The only true palatal in English is /j/, which is usually an approximant but may be allophonically a voiceless fricative in words such as *hue*. The symbol for a voiceless palatal fricative is [ç], so this word may be transcribed phonemically as /hju/ and phonetically as [çju]. Voiceless palatal fricatives occur in German in words such as *ich* [ç], meaning ‘I’, and *nicht* [nɪçt], ‘not’.

Say [ç] as in *hue* and then try to prolong this sound. Add voice so that you make a fricative something like the [j] as in *you*, but with the front of the tongue nearer the hard palate. The symbol [j], a curly-tailed *j*, is used for a voiced alatal fricative. Say [çççççççççççççççç], making sure that the tip of the tongue is down behind the lower front teeth. Now change the fricative [ç] into a stop by

raising the front of the tongue still more, while keeping the tip of the tongue down. The symbols for voiceless and voiced palatal stops are [c, ɟ]. Say sequences such as [aca] and [aɟa], making sure that the front of your tongue touches the hard palate but that the tip of the tongue is down. Then try making similar sequences with a palatal nasal (for which the symbol is [ɲ]), reminding one of [n] and [j] combined).

Palatal nasals occur in several languages, including French, Spanish, Italian, and many non-Indo-European languages. Try saying French words such as *agneau* [aɲo] ‘lamb’ and Spanish words such as *Señor* [seɲor] ‘Mr.’. Examples of Italian palatal nasals (and laterals) are on the CD. Palatal stops are slightly less common than palatal nasals. They occur, for example, in Hungarian (you can search for them on the CD), and they are part of the set of Sindhi stops discussed in the previous chapter and exemplified in Table 6.2 on the CD. Because of the shape of the roof of the mouth, the contact between the front of the tongue and the hard palate often extends over a fairly large area. As a result, the formation and release of a palatal stop is often not as rapid as in the case of other stops, and they tend to become affricates.

(8) Velar stops and nasals [k, g, ŋ] occur in English. But unlike other languages such as German, we no longer have velar fricatives. They are not, however, hard to make. Starting from a syllable such as [ak], build up pressure behind the velar closure, and then lower the tongue slightly. The result will be a voiceless velar fricative, which we write as [x]. The symbol for the corresponding voiced sound is [ɣ]. As with other fricatives, learn to say [xxxxxyyyyyxx]. Then produce sequences such as [axa, exe, oyo, aya].

Examples of words in other languages containing velar fricatives are Lakhotá, as shown in Table 6.1; German *Achtung* [ˈʌxtuŋ] ‘warning’; *Bach* [ˈbax] ‘Bach’ (proper name); and Spanish *jamás* [ˈxamas] ‘never’, *ojó* [ˈoxo] ‘eye’, *pago* [ˈpaxo] ‘I pay’, and *diga* [ˈdiya] ‘speak’. The Spanish [ɣ] is often not very fricative, and more like an approximant. It may be more accurately transcribed using the symbol for a voiced velar approximant, which is [ɣ]. The part of the tongue involved in making velar sounds, the back of the tongue, is called the **dorsum**; these sounds are referred to as dorsal sounds.

(9) Uvular sounds are made by raising the back of the tongue toward the uvula. In a broader grouping of sounds, they, like velar sounds, can be called dorsal. They do not occur at all in most forms of English. But in French a voiced uvular fricative—[ʁ]—is the common form of *r* in words such as *rouge* [ʁuʒ] ‘red’ and *rose* [ʁoz] ‘rose’. The voiceless uvular fricative, [χ], also occurs in French as an allophone of /ʁ/ after voiceless stops, as in *lettre* [lɛtʁ] ‘letter’. French differs from English in that it often has perseverative assimilations in which, for example, the voicelessness of one sound continues on through the following sound.

Uvular stops, written [q, ɢ], and nasals, written [ɴ], occur as idiosyncratic pronunciations in English and as part of the regular sound systems of Eskimo,

Palato-alveolar	Velar	Uvular
ʃjaka 'bridge'	kujij 'to move'	qaku 'tongue'
ʃpaka 'large ant'	k ^h ujij 'to whistle'	q ^h aku 'shawl'
ʃʔaka 'hoarse'	k ^ʔ ujij 'to twist'	q ^ʔ aku 'tomato sauce'

and other American Indian languages. Table 7.3 illustrates contrasts in uvular and velar stops and palato-alveolar affricates in Quechua, an Indian language widely spoken in Bolivia, Chile, and Peru. Note that Quechua has voiceless unaspirated plosives, aspirated plosives, and ejectives.

2. way of learning to produce uvular sounds is to start from a voiceless fricative [x]. While making this sound, slide your tongue slightly farther in your mouth so that it is close to the uvula. The result will be the voiceless uvular fricative [χ]. Learn to make this sound before and after vowels, in places such as [axa, oχo, uχu]. You will find it easier to use back vowels at first. Then go on to sequences such as [exχe, ixχi]. Next, add voice to this sound, [xxxχxxxχxxxχ]. Practice saying [χ] before and after vowels. Try saying [χ] in French words cited in the first paragraph of this section, (9).

3. you have mastered the pronunciation of uvular fricatives, try changing into uvular stops. Say [axa], then make a stop at the same place of articulation saying [aga]. Now produce a voiced uvular stop [aga] and a uvular nasal [ana]. Practice all these sounds before and after different vowels.

(11) The gestures for pharyngeal and epiglottal sounds involve the root of the tongue or the epiglottis back toward the back wall of the mouth. Many people cannot make a stop gesture at this position. Furthermore, it would be literally impossible to make a pharyngeal or epiglottal nasal. Closure in the vocal tract would prevent the airstream from coming through the pharynx. Pharyngeal fricatives, shown by the symbols [ħ, ʕ], can be made, and they do occur in Semitic languages such as Arabic and Hebrew. The Arabic symbol [ħ] is [ħammaam], for 'uncle', [ʕamm]. The articulation varies in the Semitic languages, some speakers using epiglottal and others using pharyngeal gestures. These sounds also vary considerably with regard to the degree of constriction. For many speakers there is little or no actual friction, so they are pharyngeal rather than fricatives are produced. The voiced fricative made in the region usually has a great deal of laryngealization (creaky voice), perhaps the necessary constriction in the pharynx also causes a constriction in the vocal tract. Neither Hebrew, Arabic, nor any of the other Semitic languages distinguish between pharyngeal and epiglottal fricatives; but some of the languages

of the Caucasus contrast these two possibilities. The CD has recording of Agul, which contrasts voiceless pharyngeal and epiglottal fricatives.

At a first stage in learning phonetics, it is sufficient to be able to produce either pharyngeal or epiglottal fricatives. If you try to constrict your pharynx as much as possible, you will probably be doing so by retracting the epiglottis. Try to produce the voiceless sound [ħ]. Now, if you can, produce this sound before a vowel. Next, try to make the voiced sound [ʕ], not worrying if it turns out to have creaky voice. Produce these sounds in the Arabic words cited above.

Before finishing this section on gestures at different places of articulation, we must note that some sounds involve the simultaneous use of two gestures. The English approximant [w] has both an approximation of the lips (making it a bilabial sound) and of the back of the tongue and the soft palate (making it a velar sound). Sounds that involve these two gestures are called **labial velars**, or, in some more old-fashioned books, **labiovelars**.

Yoruba, Ewe, Tiv, and many other languages spoken in West Africa have labial velar stops. Some of the languages spoken in this area also have labial velar nasals. As in the case of nasal and voiced clicks, we can symbolize two co-occurring articulations with a tie bar joining two symbols. The Yoruba for 'arm' is [akpá] and for 'adult' is [aḡbá]. In these words, the two closures occur almost simultaneously. One of the best ways of learning to say these sounds is to start by making a bilabial click (a kissing sound, but with the lips being simply compressed and not puckered) in between vowels. Say [a] 'kiss' [a] at first slowly, and then as fast as you can. Then weaken the suction component of the kiss, so that you are making little more than a labial velar articulation between vowels. The result should be a labial velar stop much as in the Yoruba word [akpá], 'arm'. (More information about Yoruba labial velars than is appropriate at this point can be found on the CD by using the language index.)

This is a convenient place to review all the places of articulation we have discussed so far. Table 7.4 is a consonant chart showing the symbols for all the

TABLE 7.4 Symbols for nasals, stops, and fricatives. As in all consonant charts, when there are two symbols within a single cell, the one on the left indicates a voiceless sound.

	bilabial	labiodental	dental	alveolar	retroflex	palato-alveolar	palatal	velar	uvular	pharyngeal	labial velar
nasal	m	ɱ	ɲ	n	ɳ	ɲ	ɲ	ŋ	ɴ		ɲm ɲb
stop	p b	t̪ d̪	t̪ d̪	t d	ʈ ɖ	t̠ d̠	c ɟ	k g	q ɢ		kp gb
fricative	ɸ β	f v	θ ð	s z	ʂ ʐ	ʃ ʒ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	

nasals, stops, and fricatives that have been mentioned, except for the epiglottal consonants. Check that you know the values of all these symbols. Remember that you can hear my pronunciation of them on the CD representation of the IPA chart on the inside front cover.

TYPES OF ARTICULATORY GESTURES

Stops

We can begin our consideration of the different manners of articulatory gestures that occur in the languages of the world by reviewing what has been said already about stop consonants. Table 7.5 illustrates a number of different types of stops, most of which have been discussed earlier in this book. The first seven possibilities were discussed in Chapter 6. Make sure you understand all these terms and know what all these stops sound like, even if you cannot make them all yourself.

The only comment on the first seven sounds that it is necessary to add here—where they are all listed together—is that no language distinguishes between (5), an implosive [ɓ], and (6), a laryngealized (creaky-voiced) [ɓ̚]. Certain languages have the one sound, and others the other. In a few languages, both sounds occur as allophones or as free variants of the same phoneme. They have not been found in contrast with one another.

Stops with nasal release, the eighth possibility listed in Table 7.5, were discussed in relation to English in Chapter 3. Nasal plosion occurs in English at the ends of words such as *hidden* and *sudden*. In some languages, however, it can

TABLE 7.5 Examples of stop consonants.

Description	Symbol	Example
1. voiced	b	bannu (Sindhi 'forest')
2. voiceless unaspirated	p	pannu (Sindhi 'leaf')
3. aspirated	p ^h	phannu (Sindhi 'snake hood')
4. murmured (breathy)	b ^h	b ^h annu (Sindhi 'manure')
5. implosive	ɓ	Banni (Sindhi 'field')
6. laryngealized (creaky)	ɓ̚	ɓ̚anni (Hausa 'spoil')
7. ejective	k ^ʼ	k ^ʼ aràà (Hausa 'increase')
8. nasal release	ɖ	ɖno (Russian 'bottom')
9. prenasalized	nd	ndizi (Swahili 'banana')
10. lateral release	ɬ	ɬàh (Navajo 'oil, ointment')
11. ejective lateral release	ɬ ^ʼ	ɬ ^ʼ éç? (Navajo 'night')
12. affricate	ts	tsant (German 'time')
13. ejective affricate	ts ^ʼ	ts ^ʼ áal (Navajo 'cradle')

occur at the beginning of a word. Try to say the Russian word for 'bottom', which is [ɖno].

The next possibility listed in Table 7.5 is the prenasalized stop [nd], which is in some senses the reverse of a nasally released stop. In a prenasalized stop, the oral closure—in this case an alveolar gesture—is formed first, while the soft palate is lowered. Then there is a short nasal consonant, after which the soft palate is raised so that there is a stop. This stop is released by removing the oral closure (in this case by lowering the tongue tip) while the soft palate remains raised. Prenasalized stops occur in many African languages. Say the Swahili words *ndege* [ndege] 'bird, airplane', *ntu* [ntu] 'wax'. (Swahili is a language in which the orthography itself is equivalent to a broad IPA transcription.) When you make these sounds, be careful not to make the initial nasal component into a separate syllable. Make it as short as possible.

Stops with lateral release (see (10) in Table 7.5) were previously discussed in relation to their occurrence in English (for example, in *little*, *ladle*). In other languages, they can occur initially in a word. Sometimes, as indicated by (11) in Table 7.5, laterally released stops can occur with an ejective airstream mechanism. On these occasions, the stop closure for [t] is formed, the glottalic egressive (ejective) airstream mechanism is set in motion, and then the stop is released laterally by lowering the sides of the tongue. The examples in (10) and (11) in Table 7.5 are from an American Indian language, Navajo.

The only affricates that can occur initially in most forms of English are [tʃ, dʒ]. Some dialects (for example, London Cockney) have a slightly affricated stop of a kind that might be written [tʃ̚] in words such as *tea* [tʃ̚eɪ]. Alveolar affricates also occur in German, as shown in (12) in Table 7.5. In addition, German has a bilabial affricate [pf], as in *Pflug* [pfluk] 'plough'. Affricates can also occur with an ejective airstream mechanism. Example (13) in Table 7.5 is from Navajo, which, in addition to the ejective [ts^ʼ], also has the affricate [tsʃ] made with a pulmonic airstream mechanism as in German.

NASALS

We will now consider the other manners of articulation used in the languages of the world. Little more need be said about nasals. Like stops, they can occur voiced or voiceless (for example, in Burmese, which can be found in the language index on the CD). As voiceless nasals are comparatively rare, they are symbolized simply by adding the voiceless diacritic [̥] under the symbol for the voiced sound. There are no special symbols for voiceless nasals.

FRICATIVES

There are two ways to produce the rough, turbulent flow that occurs in the airstream during a fricative. It may be just the result of the air passing through a

narrow gap, as in the formation of [f]. Or it may be because the airstream is first speeded up by being forced through a narrow gap and then is directed over a sharp edge, such as the teeth, as in the production of [s]. Partly because there are these two possible mechanisms, the total number of different fricatives that have been observed is larger than the number of stops or the number of nasals. Table 7.4 shows ten pairs of fricative symbols, compared with seven pairs of stop symbols and eight nasal symbols.

So far, we have classified fricatives as voiced or voiceless and as made with a number of different articulatory gestures. But we can also subdivide fricatives in accordance with other aspects of the gestures that produce them. Some authorities have divided fricatives into those such as [s], in which the tongue is grooved so that the airstream comes out through a narrow channel, and those such as [θ], in which the tongue is flat and forms a wide slit through which the air flows. Unfortunately, not enough is known about fricatives to be sure how this distinction should be applied in all cases. It is also clearly irrelevant for fricatives made with the lips and the back of the tongue.

A slightly better way of dividing fricatives is to separate them into groups on a purely auditory basis. Say the English voiceless fricatives [f, θ, s, ʃ]. Which two have the loudest high pitches? You should be able to hear that [s, ʃ] differ from [f, θ] in this way. The same kind of difference occurs between the voiced fricatives [z, ʒ] and [v, ð]. The fricatives [s, z, ʃ, ʒ] are called **sibilant** sounds. They have more acoustic energy—that is, greater loudness—at a higher pitch than the other fricatives.

The sound patterns that occur in languages often arise because of auditory properties of sounds. We can divide fricatives into sibilant and nonsibilant sounds only by reference to auditory properties. We need to divide them into these two groups to show how English plurals are formed. Consider words ending in fricatives, such as *cliff, moth, kiss, dish, church, dove, lathe, maze, rouge, judge*. Which of these words add an extra syllable in forming the plural? If you say them over to yourself, you will find that they are all monosyllables in the singular. But those that end with one of the sounds [s, ʃ, z, ʒ]—that is, with a sibilant fricative or an affricate containing a sibilant fricative—become two syllables in the plural. It seems as though English does not favor two sibilant sounds together. It breaks them up by inserting a vowel before adding a sibilant suffix to words ending in sibilants.

TRILLS, TAPS, AND FLAPS

Even in the case of a very short trill in which there is only a single contact with the roof of the mouth, the movement is different from that in a tap, or a flap. In a **trill**, the tip of the tongue is set in motion by the current of air. A **tap** or a **flap** is caused by a single contraction of the muscles so that one articulator is thrown against another. It is often just a very rapid stop gesture.

It is useful to distinguish between taps and flaps. In a tap, the tip of the tongue simply moves up to contact the roof of the mouth in the dental or alveolar region, and then moves back to the floor of the mouth along the same path. In a flap, the tip of the tongue is first curled up and back in a retroflex gesture, and then strikes the roof of the mouth in the post-alveolar region as it returns to its position behind the lower front teeth. The distinction between taps and flaps is thus to some extent bound up with what might be called a distinction in place of articulation. Flaps are typically retroflex articulations, but it is possible to make the articulatory gesture required for a flap at other places of articulation. The tongue can be pulled back and then, as it is flapped forward, made to strike the alveolar ridge or even the teeth, making alveolar or dental flaps. Flaps are distinguished from taps by the direction of the movement—from back to front for flaps, up and down for taps—rather than by the exact point of contact.

Some forms of American English have both taps and flaps. Taps occur as the regular pronunciation of /t, d, n/ in words such as *latter, ladder, tanner*. The flap occurs in words that have an *r*-colored vowel in the stressed syllable. In *dirty* and *sorry*, speakers who have the tongue bunched or retracted for the *r*-colored vowel will produce a flap as they move the tongue forward for the non-*r*-colored vowel.

Trills are rare in most forms of English. The stage version of a Scottish accent with trilled /r/ is not typical of most Scots. In Scottish English /r/ is more likely to be pronounced as a tap. The American pronunciation of *petal* with a voiced alveolar tap in the middle will sound to a Scotsman from Edinburgh like his regular pronunciation of *pearl*.

The distinction between trills and different kinds of taps and flaps is much more important in other languages. But before this point can be illustrated, we must review the symbols that can be used for different types of *r* sounds. In a broad transcription, they can all be transcribed as /r/. But in a narrower transcription, this symbol may be restricted to voiced alveolar trills. An alveolar tap may be symbolized by the special symbol [ɾ], and the post-alveolar (retroflex) flap by [ɽ]. The approximant that occurs in many people's pronunciation of /r/ may be symbolized by [ɹ], an upside-down *r*. If it is important to show that this sound is particularly retroflex, the symbol [ɻ] may be used. Most speakers of American English do not have a retroflex approximant, but for those who do, [ɻ] is an appropriate symbol in a narrow transcription. All these symbols are shown in Table 7.6.

As illustrated in Table 7.6, Spanish distinguishes between a trill and a tap in words such as *perro* [perro] 'dog' and *pero* [pero] 'but'. Similar distinctions also occur in some forms of Tamil, a language of southern India. This language, like Hausa (Nigeria), may also distinguish between an alveolar and a retroflex flap. Trills may also have accompanying friction, as in the Czech example in Table 7.6, which uses the IPA diacritic [̤], meaning raised (and thus more fricative).

TABLE 7.6 Specific symbols for types of *r*, and for bilabial trills. Note the use of [*] as a special symbol that can be defined and used when there is no prescribed symbol.

r	voiced alveolar trill	[pero]	(Spanish 'dog')
r	voiced alveolar tap	[pero]	(Spanish 'but')
ɾ	voiced retroflex flap	[bãɾã]	(Hausa 'servant')
ɽ	voiced alveolar approximant	[ɽɛ]	(English 'red')
ɻ	voiced retroflex approximant	[ɻɛ]	(some American English 'red')
ʀ	voiced alveolar fricative trill	[ʀɛk]	(Czech 'ivers')
ʁ	voiced uvular trill	[ʁʊz]	(Provençal French 'red')
ʁ	voiced uvular fricative or approximant	[ʁʊz]	(Parisian French 'red')
ʙ	voiced bilabial trill	[m̩um̩]	(Kele 'your face')
*	voiced labiodental flap	[bá*ú]	(Margi 'flying away')

Learning to make a trill involves placing the tongue, very loosely, in exactly the right position so that it will be set in vibration by a current of air. The easiest position seems to be with the tongue just behind the upper front teeth and very lightly touching the alveolar ridge. If you get the tongue in just the right position and relaxed, you can blow across the top of it, setting it vibrating in a voiceless trill. Many people find it easier to start with a voiceless trill and then add voicing once they can make steady vibrations. The jaw should be fairly closed, leaving a space of 5 mm between the front teeth. Check this by inserting the top of a pencil between your teeth, and then removing it before making the sound. The problem experienced by most people who fail to make trills is that the blade of the tongue is too stiff.

Most people can learn to produce a voiced tap by adopting the typical American English pronunciation of words such as *Betty* (which can be transcribed as [ˈbeɾi]). You should also be able to produce a retroflex flap. As we have seen, many speakers of American English use this type of articulation in sequences such as *herding*, in which the tongue is curled up and back after the *r*-colored vowel, and then strikes the back part of the alveolar ridge as it moves down during the consonant.

- When you have mastered all these sounds, try saying them in different contexts. You might also learn to say voiced and voiceless trills, taps, and flaps. Try varying the place of articulation, producing both dental and post-alveolar trills and flaps. Some languages, such as Malayalam and Toda, spoken in southern India, contrast alveolar and dental trills. The word for 'room' in Malayalam is [ara], whereas the word for 'half' is [ara]. The Toda thotics on the CD illustrate an even more complex situation in which three kinds of trill are contrasted.

The tongue tip is not the only articulator that can be trilled. Uvular trills occur in some dialects of French, although, as we have noted already, most forms of French have a uvular fricative in words such as 'rose' [roz]. The symbol for a uvular trill is [ʀ]. There is no symbol to distinguish between uvular fricatives and approximants. Both sounds are symbolized by [ʀ].

Trills involving the lips occur in a few languages. The IPA symbol for these sounds is a small capital [ɸ] (just as a small capital [r] is used for a uvular trill). In Kele and Tïan, two languages spoken in Papua New Guinea, bilabial trills occur in a large number of words. The Tïan for 'rat' is [m̩m̩ɛi]. To pronounce the first part of this word you need to hold the lips loosely together while making [m], and then blow the lips apart. Some people find it easier to trill the lips than the tongue tip. If you are having difficulty making an alveolar trill [r], see if you can get the sensation of making a trill by making a bilabial trill [ɸ]. Kele and Tïan bilabial trills are included on the CD.

I have also heard a labiodental flap—in Margi, of northern Nigeria—in which the lower lip is drawn back inside the upper teeth and then allowed to strike against them in passing back to its normal position. There is no IPA symbol for this sound. I included this sound in Table 7.6 to demonstrate how to symbolize a sound for which there is no IPA symbol. In all such cases, it is possible to use an asterisk and define it, as I have done in the table.

LATERALS

In Chapter 1, we regarded the term lateral as if it specified a manner of articulation in a way comparable to other terms such as fricative, or stop, or approximant. But this is really an oversimplification. The central–lateral opposition can be applied to all these manners of articulation, producing a lateral stop and a lateral fricative as well as a lateral approximant, which is by far the most common form of lateral sound. The only English lateral phoneme is /l/ with, at least in British English, allophones [l] as in *led* [led] and [ɫ] as in *bell* [beɫ]. In most forms of American English there is not such a large difference between syllable initial and syllable final /l/ as there is in British English. In all forms of English the air flows freely without audible friction, making this sound a voiced alveolar lateral approximant. It may be compared with the sound [ɾ] in *red* [ɾɛd], which is for many people a voiced alveolar central approximant. Laterals are usually presumed to be voiced approximants, unless a specific statement to the contrary is made.

Try subtracting and adding voice while saying an English [l] as in *led*. You will probably find that the voiceless lateral you produce is a fricative, not an approximant. When the vocal folds are apart, the airstream flows more rapidly, so that it produces a fricative noise in passing between the tongue and the side teeth. The symbol for this sound is [ɬ], so in alternating the voiced and voiceless sounds you will be saying [lɬlɬlɬlɬ]. It is possible to make a nonfricative

voiceless lateral, but you will find that to do this you will have to move the side of the tongue farther away from the teeth. The alternation between a voiced and a voiceless lateral approximant may be symbolized [l̥lllllllllll].

It is also possible to make a voiced lateral that is a fricative. Try doing this by starting from an ordinary [l] as in *led*, and then moving the sides of your tongue slightly closer to your teeth. You may find it easier to produce this sound by starting from the voiceless alveolar lateral fricative described in the previous paragraph and then adding voicing, but making sure that you keep the fricative component.

To summarize, there are four lateral sounds under discussion: voiced alveolar lateral approximant, [l]; voiced alveolar lateral fricative, [k]; voiceless alveolar lateral approximant, [l̥]; and voiceless alveolar lateral fricative, [t̥]. No language uses the difference between the last two sounds contrastively. But some languages make a phonemic distinction between three of the four possibilities. Zulu, for example, has a three-way contrast, as shown in the first row of Table 7.7. As you can see in the second set of Zulu words in Table 7.7, after a nasal the voiceless fricative may be an ejective. And the final Zulu word in the table illustrates an initial voiceless velar lateral ejective affricate, using the symbol [ɭ] for a velar lateral. Listen to this sound on the CD, but don't worry if you can't produce it in your first year of phonetics. Voiceless lateral fricatives can also be exemplified by Welsh words such as [tan] 'church' and [kətɨ] 'knife'.

The distinction between a central and a lateral articulation can be applied to other manners of articulation in addition to approximants and fricatives. Thrills are always centrally articulated, but flaps can be made with either a central or a lateral articulation. If, when making [ɾ] or [ɽ], you allow the airstream to flow over the sides of the tongue, you will produce a sound that is intermediate in quality between those sounds and [l]. This will be a voiced alveolar or retroflex lateral flap. The symbol for either of these possibilities is [ɭ]. A sound of this kind sometimes occurs in languages such as Japanese that do not distinguish between /r/ and /l/. But some African languages, for example Chaga, spoken in East Africa, make a phonemic distinction among all three of these sounds.

The central-lateral distinction can in some senses be said to apply to stops as well. English stops with lateral plosion, as in *little*, *ladle*, can, of course, be considered to be sequences of stop plus lateral. But the Navajo sound [tʃ], in

which the ejective airstream mechanism applies to both the stop and the lateral, is appropriately called a lateral ejective. Similarly, we clearly want to distinguish between the central and lateral clicks [ɰ] and [ɮ].

Having seen that the central-lateral distinction can apply to a number of different manners of articulation, we must now consider whether it applies to gestures with different target places of articulation. Here the limitations are obvious. Generally speaking, laterals are made with the tip, blade, or front of the tongue. They may be either dental (as in Malayalam and Toda), alveolar (as in English), retroflex (also in Malayalam and other Indian languages), or palatal (as in Italian). Velar laterals do occur. We noted a velar lateral in Zulu, but in that language it does not contrast with other laterals in the same context. There are, however, contrastive velar laterals in a few languages spoken in Papua New Guinea such as Mid-Waghi, which you can find on the CD. The symbol for palatal laterals is [ɲ]. Try saying Italian words such as *famiglia* [famɲika] 'family' and *figlio* [ˈfiɲko] 'son'. In both of these words, the lateral sound is doubled, acting as the final consonant of one syllable and the first consonant of the next. Additional examples of Italian laterals are in the material for this chapter on the CD. Note that some forms of Spanish distinguish between [ɲ] and similar sounding sequence [ʎ] in words such as *pollo* [ˈpoɲo] 'chicken' and *pollo* [ˈpoʎo] 'polio'. See if you can make this distinction. There are also retroflex laterals for which the symbol is [ɭ]. Try to find these on the CD using the "Sounds index," which can be accessed from the title page.

SUMMARY OF MANNERS OF ARTICULATION

Table 7.8 presents a summary of the manners of articulation we have been discussing. Note that the terms central and lateral have been placed separately, to indicate that they can be used in conjunction with many of the terms in the upper part of the table. This table also lists many of the symbols that have been mentioned in the latter part of this chapter. You should be sure that you can pronounce each of them in a variety of contexts. Again, don't forget that you can find examples of all of them on the IPA chart on the CD.

The only consonants we have not considered in detail in this chapter are approximants. Alveolar approximants—both central [ɹ] and lateral [ɻ]—have been discussed. But sounds such as [w, j] as in *wet*, *yet* have not. Approximants of the latter kind are sometimes called semivowels, or glides. It will be more appropriate to discuss them after we have considered the nature of vowels more fully. But in order to describe vowels, we must first leave the field of articulatory phonetics and consider some of the basic principles of acoustic phonetics.

A more complete summary of the terms required so far for describing consonant gestures is given in the first exercise (see page 177). Note that in order to define a consonant fully, you may need to say up to eight things about it: (1) What is the airstream mechanism; (2) what is the direction of the airstream;

TABLE 7.7 Some Zulu laterals (see text for the contrasts in each row).

1	lala	balala	lanzana
	'sleep'	'play' (imperfect)	'vomit'
2	lala	ɭala	ɭala
	'hungry'	'hungry'	'good luck'
3		ɭala	ɭala
		'the naughty'	'the naughty'

TABLE 7.8 Manners of articulation.

Phonetic Term	Brief Description	Symbols
Nasal (stop)	Soft palate lowered so that air flows out through the nose; complete closure of two articulators	m, n, ŋ, etc.
(Oral) stop	Soft palate raised, forming a velic closure; complete closure of two articulators	p, b, t, etc.
Fricative	Narrowing of two articulators so as to produce a turbulent airstream	f, v, θ, etc.
Approximant	Approximation of two articulators without producing a turbulent airstream	w, j, l, r, etc.
Trill	An articulator set in vibration by the airstream	r, R, B
Tap	Tongue tip hitting the roof of the mouth; a single movement in a trill	ɾ
Flap	One articulator striking another in passing	ɾ, ɽ
Lateral	With a central obstruction, so that air passes out at the side	l, ɫ, ʎ, ɭ, ʎ, ʟ
Central	Articulated so that air passes out the center	s, ʃ, w, etc.

(3) what is the state of the glottis; (4) what part of the tongue is involved; (5) what is the primary place of articulation; (6) is it central or lateral; (7) is it oral or nasal; and (8) what is the manner of articulation. As we will see in Chapter 9, consonants may be even more complicated, so in addition to stating all the characteristics of the primary gesture, it may also be necessary to mention so-called secondary gestures, such as added lip rounding.

EXERCISES

(Printable versions of all the exercises are available on the CD.)

There are fewer exercises at the end of this and subsequent chapters, because by this stage in a course in phonetics it is appropriate for students to think in terms of larger projects. A possible project for students of general linguistics is to find a speaker of another language and give a description of the major phonetic characteristics of that language. Students of English might try to do the same with someone who has an accent of English that is very different from their own. Speech pathologists might describe the speech of a particular child. In each case, students should compile a list of words illustrating the major characteristics of the speech of the person being analyzed. They should then make a recording of this list of words and use it as a basis for their description. A good model to follow is that of the International Phonetic Association, which publishes a series of short

(four- to six-page) papers describing the phonetic structures of a language. Their recommended format for the description is in Sources at the back of the book. Good students should be able to publish papers of this kind.

The table below lists most of the terms required for classifying consonants. Make sure you know the meaning of all these terms. The exercises below refer to the table.

	(1)	(2)	(3)	(4)	(5)
Alstream	pulmonic	egressive	voiced	apical	bilabial
	glottalic	ingressive	voiceless	laminal	labiodental
	velaric		murmured	(neither)	dental
			laryngealized		alveolar
			closed		retroflex
					palato-alveolar
					palatal
					velar
					uvular
					pharyngeal
					labial velar

(6)	(7)	(8)
Centrality	Nasality	Manner
central	oral	stop
lateral	nasal	fricative
		approximant
		trill
		flap
		tap

A. Give a full description of the following sounds, using one term from each of the eight columns in the table above.

- [b] _____
- [tʰ] _____
- [rʰ] _____
- [ʃ] _____
- [l] _____
- [ɫ] _____
- [r] _____

B. List five combinations of terms that are impossible.

- _____
- _____
- _____
- _____
- _____