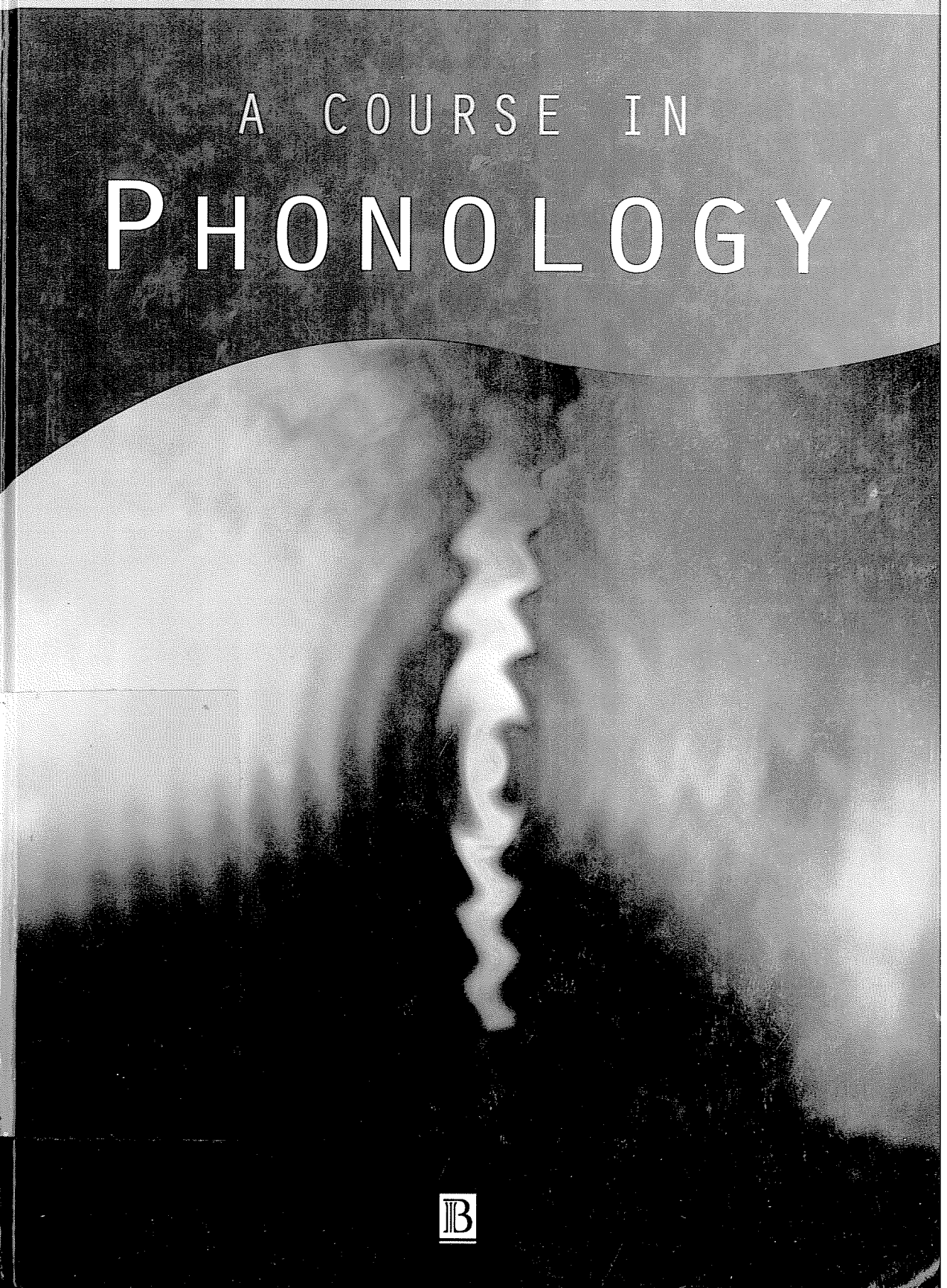
IGGY ROCA AND WYN JOHNSON

A COURSE IN PHONOLOGY



CHAPTER THREE

SONORANT CONSONANTS

Chapter Objectives

In this chapter you will learn about:

- A type of consonant sound known as "sonorant", that does not involve constriction of the airflow.
- The secondary channels involved in the articulation of these sounds.
- The existence of two major types of sonorant: air escapes either through the nose, or out of the mouth over the top of the tongue or down the sides.
- The articulation of some sonorant sounds which may be less familiar to the English speaker.
- The phonetic symbols used for sonorants.

In the previous chapter we offered a succint sketch of phonology, backed up by an analysis of some assimilation phenomena involving obstruents. The phonetic properties of obstruents and glottals were examined in detail in chapter 1. Clearly, though, there are many speech sounds besides obstruents and glottals.

> List a few speech sounds that you are aware of and have not been dealt with in chapter 1.

In line with our policy of alternating the presentation of phonetics and phonology in these preliminary chapters, we now turn our attention to the phonetics of sonorant consonants. We will make some further remarks pertinent to phonology as we go along, but will of course reserve the bulk of the phonological discussion on sonorants for chapter 4.

1 General Properties of Sonorants

The common denominator in obstruents is the presence of an obstruction to the airflow in the mouth; hence the label "obstruent". The contrasts between the various obstruents follow from differences in place of articulation (the anatomical point where the obstruction is made), manner of articulation (the degree of obstruction, according to which we classified obstruents into stops, affricates and fricatives), or vocal fold activity, by which obstruents are divided into voiced (pronounced with vocal fold vibration) and voiceless (without vocal fold vibration).

> Jog your memory by providing at least one sound exemplifying each of the categories just mentioned.

At this point you may be tempted to think that the production of speech sound necessarily involves some such obstruction – how else could sound be made?, you may wonder. As we shall see in this and successive chapters, however, this is in fact far from being the case. Indeed, in all the sounds to be introduced from now on, the air comes out through a channel wide enough to avoid friction. Such unobstructed sounds are known as SONORANTS, because, as follows from the greater openness of the channel, they carry a greater amount of sound than their obstruent counterparts – cf. Latin *sonus* 'sound', *sonor* 'resonance', *sonorus* 'sonorous'.

Unobstructed sounds are known as SONORANTS

Actually, sonorancy can be construed as a specific setting for manner of articulation. It should be obvious by now that the articulatory channel exhibits increasing openness progressively along the scale stops–affricates–fricatives–sonorants. This means that sonorants are the most open of consonants. In table 3.1 we summarize the settings we have now available for manner of articulation. You will see that the degree of channel opening is relative for all categories but stops – "f > a", for instance, indicates that the channel for fricatives is more open than the channel for affricates, without specifying the precise size of the opening:

Sonorants are the most open of consonants

The degree of channel opening is relative for all categories but stops

Table 3.1 Manner of articulation settings

Category	*Degree of channel opening*
Stops	Ø
Affricates	a (a > Ø)
Fricatives	f (f > a)
Sonorants	s (s > f)

Rank the following segments with regard to their sonority load: [ʤ], [s], [f], [p], [ʒ], [k].

A further property of sonorants is that they are voiced, under normal circumstances, in most languages. This means that, of the three criteria we introduced in chapter 1 for the classification of consonants, namely, voice, manner of articulation, and place of articulation, usually only place of articulation implements contrasts between sonorants. However, the articulation of sonorants involves additional channels or gestures that play no part in the articulation of obstruents, and divide the class of sonorants into several subclasses.

2 Nasality

The blockage or constriction of the air characteristic of obstruents is located at some point in the mouth. This point, therefore, defines the place of articulation of the obstruent.

However, in all the sounds we have examined so far, the airflow is also systematically blocked at a second location, which we left unstated in our descriptions. In particular, we have taken it for granted all along that, as we attempted to pronounce each of the sounds we presented, the soft palate would be raised to prevent the exit of air through the nose – you will recall that the soft palate, or "velum", is the softish area at the back of the roof of the mouth (figure 3.1).

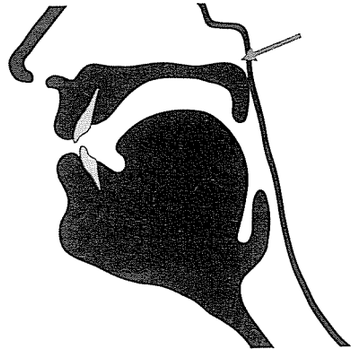


Figure 3.1 Raised soft palate

Now, what will happen if the soft palate is not raised during the production of speech? See figure 3.2.

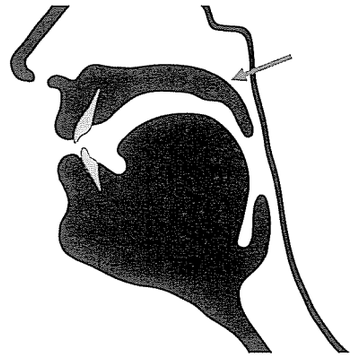


Figure 3.2 Lowered soft palate

Let us experiment by deliberately lowering the soft palate as we pronounce [b].

Pronounce *stabber* several times (the sound represented as *bb* in the spelling here is of course a single [b]), and then lower the velum while continuing to articulate [b] with the lips. What sound comes out?

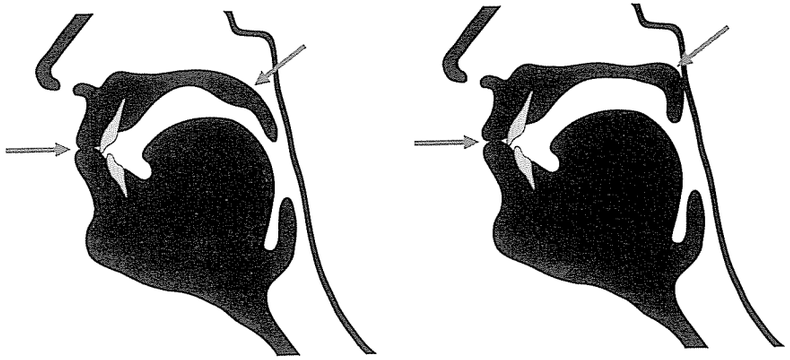
The resulting sound will obviously be different from [b]: if you utter *stabber* while lowering the velum for the sound represented as *bb*, you will hear *stammer*. This can only mean that [m] (the phonetic symbol for the sound spelled *mm* in *stammer*) is identical to [b] in all respects but one: the position of the soft palate.

Write down a full phonetic description of both [b] and [m] and underline the difference(s).

The difference between the two sounds, therefore, involves nasality. On the one hand, [b] is an ORAL SOUND, since during its production no air comes out through the nose due to the raised soft palate. By contrast, [m] is a NASAL SOUND, since the lowered velum allows air to come out through the nose.

Try and figure out what happens to your speech when your nose is blocked by a cold.

Nasality aside, [b] and [m] are identical: bilabial stops (figure 3.3).



[m] [b]

Figure 3.3 Articulation of [m] and [b]

They are bilabial because they are articulated with the two lips. They are stops because they involve total blockage of air in the mouth, even though in the case of [m] air keeps coming out through the nose.

> Try to lengthen the [m] as you pronounce *stammer*. Now try the same with [b] in *stabber*. Do you notice any differences? What is their cause?

At first sight, the continuous stream of nasal air makes the classification of [m] as a stop appear contradictory: in chapter 1 we said that sounds with no air blockage, such as fricatives, are not stops by definition.

> Try and guess why [m] and other nasals, to be examined directly, are classified as stops.

The answer is that, of the two articulatory actions you now know partake in the production of [m] and other nasals (the stricture in the mouth and the lowering of the velum), the stricture in the mouth is more important. Because sounds are characterized by their PRIMARY ARTICULATOR, [m] will be defined as a (bilabial) stop.

Sounds are characterized by their PRIMARY ARTICULATOR

Turning now to vocal fold activity, you know that both [b] and [m] are voiced, and that [b] without voice is in fact [p]. What will a voiceless [m] amount to?

> Think about this question for a few seconds.

In fact, no voiceless [m] exists in English at the level at which the basic sound contrasts between the words of the language are catalogued, the lexical level. Thus, while English could have a word *stapper* forming a minimal pair with *stabber*, it could not have a word *sta*[m̥]*er* minimally contrasting with *stammer* – the IPA underscripted diacritic "̥" indicates voicelessness, and consequently [m̥] is the symbol for a voiceless [m].

> Does the availability of the diacritic "̥" for voicelessness render such a symbol as [p] otiose? You ought to understand the logic of the question, even if you cannot give it a full answer at this stage.

Indeed, we have already mentioned that sonorants (of which nasals, and therefore [m], are instantiations) are typically voiced in all languages, for reasons of physics which need not concern us here. The upshot of this is that English lacks a phoneme /m̥/, and voiceless sonorant phonemes in general.

Some languages of South East Asia do have voiceless nasal phonemes, however: for example, the words [ma] and [m̥a] form a minimal pair in Burmese, the former signifying 'hard' and the latter 'notice'.

3 The Universal Nasal

The sound [m] does not exhaust the inventory of nasal sounds.

> Mention at least one more nasal sound of English.

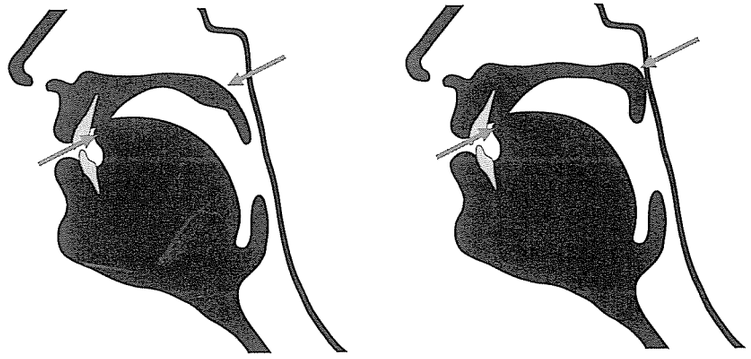
One obvious additional nasal sound in English, and probably in all of the world's languages, is present in such words as *knit* or *tin*, initially and finally, respectively (notice the purely orthographic value of *k* in *knit*). Having established the close correspondence of [m] with [b], you will not be surprised to hear that the sound symbolized as [n] also has an oral counterpart.

> Try to work out the oral congener of [n] before you continue reading.

In order to discover which this is, you have to work out the place of articulation of [n], and then identify the English voiced oral stop articulated at the same place.

> You can now have a second go at finding the oral correlate of [n], after ascertaining the place of articulation of [n] through the appropriate exploration: go back to chapter 1 to refresh your memory, if necessary.

The articulation of [n] takes place on the alveolar ridge, and consequently [n] is an alveolar stop. It is also voiced, as we know all nasals (and other sonorants) are in English and most other languages. On the basis of these settings, the identification of the oral partner of [n] will offer no special difficulty: it must be a voiced alveolar oral stop. Familiarity with the information presented in the preceding two chapters will enable you to identify this sound as [d] (figure 3.4).



[n] [d]

Figure 3.4 Articulation of [n] and [d]

Nasal consonants are characterized by the presence of a second resonating chamber: the nasal cavity

It should be clear by now, both conceptually and experientially, that nasal consonants are characterized by the presence of a second resonating chamber, the nasal cavity, in addition to the oral chamber that also characterizes obstruents – the precise meaning of the term "resonating chamber" bears on the physics of sound, or "acoustics", and need not concern us here: we can be satisfied with the idea of a space filled with air in which sound is produced. The fact that there are two resonating chambers in nasals confirms our statement at the outset that the articulation of sonorants involves channels that are not present in the articulation of obstruents.

The articulation of obstruents can, however, also involve two sources.

> Can you say which these are?

In particular, you will recall that, in addition to the oral source, the articulation of obstruents can involve a glottal source contributing voice. It follows that the pronunciation of nasals involves three (rather than just two) sound sources: the oral source (also present in obstruents), the nasal source (defining nasals), and the glottal source – remember that nasals are usually voiced. We can construe these various sound sources as sound-defining parameters, alongside manner of articulation. A PARAMETER is therefore a criterion for classification, akin to one type of building block. Within the musical universe we have been drawing analogies from, a parameter can be likened to an instrument in the orchestra: the tune played by this instrument is obviously one of the components that make up the symphony.

A PARAMETER is a criterion for classification

4 Other Nasal Consonants

A third nasal consonant is quite common in English.

> Can you think which this nasal is? Give at least one word that includes it.

The nasal in question never occurs at the start of a word. In fact, we will see that there are reasons to believe that this nasal is not a lexical segment of English, that is, that it is not present in the lexical level, from which alternation is excluded, as you know.

> Explain briefly to yourself the notion of alternation and the difference between the lexical and surface levels, as presented in chapter 2.

This third English nasal does, however, occur at the phonetic level in non-word-initial position. It is exemplified in such words as *wing*, *sung* or *gong*, which contrast minimally with *win*, *sun* and *gone* in most accents. *Wing* and *win*, for instance, make up a minimal pair in these accents. Even if the the

final orthographic *g* is pronounced, as is typical, for instance, of Birmingham or Liverpool, in England, the *n* of *wing* will be phonetically different from the *n* of *win*, in spite of their orthographic identity.

> Explore the pronunciation of the *n* of *wing*, trying to elucidate its place of articulation.

The place of articulation of the *n* in *wing* is identical to the place of articulation of [g]. Accordingly, such *n* is the nasal counterpart of [g] (figure 3.5).

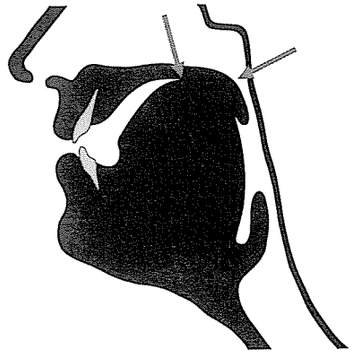


Figure 3.5 Articulation of [ŋ]

> Write down the defining traits of both [g] and its nasal counterpart in terms of our familiar parameters.

The phonetic symbol for the velar nasal is [ŋ].

If [ŋ] is absent from the lexical inventory of English, the question arises of why it occurs at the phonetic level. The answer is that English [ŋ] comes about as the result of assimilation of the place of articulation of a lexical /n/ to that of a following /g/, which is subsequently deleted in many accents. As we are seeing repeatedly, assimilation is one of the major factors responsible for the differences between the lexical and the phonetic levels postulated in chapter 2.

> Explain how assimilation accounts for many of the differences between the lexical and the phonetic levels.

In some languages, [ŋ] is a legitimate lexical segment. In those languages we would not expect the same limited distribution of [ŋ] we find in English, where it can never occur word-initially. For example, in Malay [ŋ] can occur in all positions, including word-initially: [ŋ]*eri* 'terrified' forms a minimal pair with [n]*eri*, a type of plant.

> Pronounce the word *singer* a few times. Do you pronounce the *g*? If you don't, try to slow down the delivery and split *singer* into two words, making each of them consonant-initial: *si-nger*. The initial sound of the second word ought to be [ŋ] (but do not worry unduly if you can't get it: the experiment is somewhat artificial for an English speaker, and therefore you may not get the desired results).

Looked at from a more traditional perspective, [ŋ] is therefore phonemic in languages like Malay, hence formally /ŋ/. Phonemic status has also been claimed for English [ŋ], on the basis of minimal pairs like those given above: *wing* vs. *win*, etc. You can now see that phonemic status does not necessarily imply lexical status: phonemic status follows from the existence of systematic contrastiveness in the surface, whereas lexical status requires constrastiveness at the lexical level.

> Remind yourself why [ŋ] does not appear to be contrastive at the lexical level in English.

A fourth nasal, reasonably common across languages, is very marginal in English. This nasal can turn up in such words as *onion* or *canyon* when said casually.

> Pronounce these words and see if the nasal you pronounce is different from [m], [n] or [ŋ]. If it is, try and figure out where in the mouth you are articulating the nasal. (This exercise is not as easy as it sounds, because as soon as you pay attention to your delivery you will tend to slow down and lose spontaneity.)

The place of articulation of this new sound, [ɲ], standard in French, Spanish or Italian, among others, is similar, although not identical, to the place of articulation of the [ʤ] of *judge* (figure 3.6 below). In particular, as we

explained in chapter 1, [ʤ] is a palatoalveolar sound, pronounced in the area between the palate and the alveolar ridge. By contrast, [ɲ] is purely palatal: the blockage takes place entirely on the hard palate. Notice that the term PALATAL is reserved for sounds articulated on the hard palate: you already know that sounds articulated on the soft palate are referred to as "velar", the adjective of "velum", which we said in chapter 1 is the Latin word for the soft palate.

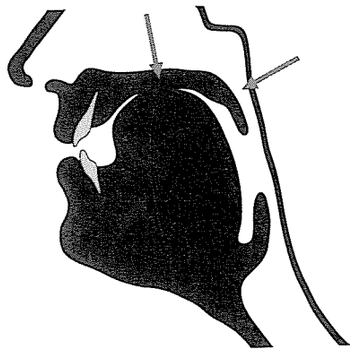


Figure 3.6 Articulation of [ɲ]

Define [ɲ] in terms of all the familiar phonetic parameters.

Although many languages have a contrastive palatal nasal, conventional orthographies do not have a letter for it. Thus, in French and Italian, [ɲ] is spelled by means of the digraph *gn* (French *agneau* 'lamb'; Italian *ogni* 'every'), in Spanish as *n* with a tilde (*ñ*, as in *año* 'year'), in Dutch as the digraph *nj* (*Spanje* 'Spain'), in Portuguese as the digraph *nh* (*anho* 'lamb'), and so on. The historical reason for this spelling diversity is that this sound did not exist in Latin, and therefore there was no letter for it in the Roman alphabet, from which the alphabets of these and other Western European languages were taken.

In Spanish, French and many other languages, there are many minimal pairs involving [ɲ] and the other nasals: Spanish *ca*[ɲ]*a* 'rod' vs. *ca*[n]*a* 'grey hair' and *ca*[m]*a* 'bed', for instance. In the absence of contrary evidence, /ɲ/ must therefore be analysed as a phoneme in these languages. From the updated perspective on phonology we are adopting here, it is reasonable to assume that /ɲ/ also has lexical status in these languages, but obviously not in English.

Explain the difference between being a phoneme and having lexical status. Why doesn't /ɲ/ have lexical status in English?

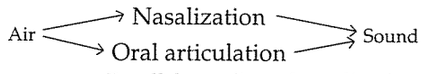
5 Liquids

So far in this chapter we have been seeing that nasal consonants are characterized by a second resonating chamber, the nasal cavity. Nasalization thus functions in a similar way to voice: it provides an additional source of sound which supplements the oral source to give rise to a complex sound. An important difference between nasalization and voicing is the manner in which the two sound sources are connected, sequentially for voice, but in parallel for nasality, as we represent in the following diagrams:

Nasalization functions in a similar way to voice: it provides an additional source of sound which supplements the oral source to give rise to a complex sound

Air ⟶ Voice ⟶ Oral articulation ⟶ Sound

Sequential coupling of voice



Parallel coupling of nasalization

Resorting once more to a musical analogy, we suggested in chapter 1 that the addition of voice to an oral articulation is reminiscent of the plugging of a recorder into a trumpet: the wind will first power one instrument and then the other. In the case of nasality, however, a more apposite analogy would be the bagpipes, where the chanter pipe, responsible for the main melody, and the drone pipe(s), providing the typical background buzz, are activated *simultaneously* by the air coming out of the bag.

Sketch out the progression of the air in the bagpipes and in the trumpet-cum-recorder contraption.

You also know from the preceding discussion that the primary articulation of nasals, located in the mouth, is of a stop kind, whereas their secondary articulation, responsible for their nasality, is of a continuant kind: the sound continues for as long as air is available in the lungs. In nasals, therefore, a CONTINUANT and a NON-CONTINUANT mode of articulation are effectively superimposed onto one another.

Sonorants have a simultaneous continuant and non-continuant articulation

Sonorants can also be articulated exclusively in the mouth, with no nasal component. These non-nasal sonorants still have a simultaneous continuant and non-continuant articulation: during their production one part of the oral channel is blocked, while another part remains unobstructed and allows the air to escape freely. Such sounds are commonly referred to as LIQUIDS (perhaps because they sound fluid), and we now turn our attention to them.

6 Laterals

Let us compare the middle consonant in *mellow* (the doubling of the letter in the spelling is of course immaterial) with its counterpart in *meadow*.

> Spend a few seconds exploring the respective articulations and making a comparison between them.

The articulation of both these sounds is alveolar, that is, it involves placing the blade of the tongue on the upper alveolar ridge. Both sounds are also voiced. Last, they both involve a complete closure at the upper front alveolar area. Given these striking similarities, what is it that makes these two sounds different?

> Think about this question and advance an answer.

If you pay close attention to the articulation of the two sounds in question, you will notice that, in the case of [d], the tongue presses firmly against the upper teeth all around, not just at the front, but also on the sides, to prevent any air from escaping.

By contrast, for the sound found in the middle of *mellow*, represented by the phonetic symbol [l], the sides of the tongue (only one side in some speakers) do not touch the complete set of upper teeth, and air comes out continuously through the resulting gap. Because the air flows over sides of the tongue, these sounds are known as LATERALS: Latin *lateralis* means 'of the side(s)', from *latus* 'side' (compare such English expressions as *lateral thinking*, *collateral*, etc.).

As regards place of articulation, [l] is defined as an alveolar sound, exactly like [d] (figure 3.7).

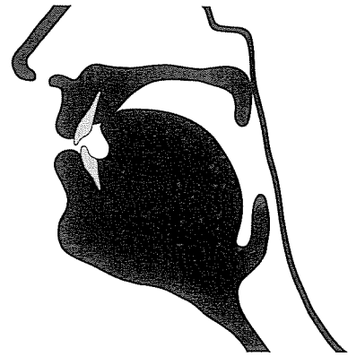


Figure 3.7 Articulation of [l] and [d]

The definition of [l] and [d] as alveolar obviously suggests that the gesture made by the blade of the tongue is regarded as primary, and the gesture made by the sides of the tongue (closing for [d] and opening for [l]) as subsidiary. Indeed, primary articulation is commonly related to the median line of the tube through which the air flows out: to the mouth's median plane, in more technical parlance. In addition, [l] is voiced, also like [d], unsurprisingly so, since we stated above that sonorants (of which class liquids, and thus [l], are members) are characteristically voiced across languages. Finally, [l] is also oral, since the velum remains raised during the whole of its production, just as it does with [d]. The difference between [l] and [d], therefore, lies exclusively in the respective status of these two sounds with regard to LATERALITY, the term referring to the lowering of the sides of the tongue during articulation: [l] is lateral, while [d] is not.

Primary articulation is commonly related to the central area of the mouth

> Make a list of all the defining phonetic traits of [t], [d], [l] and [n], highlighting the differences between them.

In the opening paragraph of the section we said that [l], like [d], involves air stoppage at the front. We now know that during the articulation of [l] air continues to flow out of the mouth through the gap formed by the sides of the tongue and the upper teeth on the sides of the mouth. We came across a similar situation earlier for nasals, characterized by air stoppage in the mouth but continuous airflow through the nose, and we attributed their conventional description as stops to the fact that the articulation in the mouth is regarded as primary.

Phonologically, nasals always function as stops, and therefore their classification as such is uncontroversial. The tendency for [l] is also to function as a stop, but in a few languages it appears to pattern with the continuants. Consequently, we must leave the classification of this sound somewhat flexible. Articulatorily, however, [l] is always considered alveolar: this confirms the privileged status of the central region of the mouth in the identification of the primary articulatory gesture.

An additional lateral sound, a patalal lateral, bears a similar relationship to [l] to that which [ɲ] bears to [n]. The phonetic symbol for the palatal lateral is [ʎ], an inverted "y". The articulation of this sound, spelled *gli* in Italian (*zabaglione*) and *ll* in Spanish (*paella*), is a bit exotic for the English speaker, and we will accordingly put some extra care into its description. Pronunciation guides tend to suggest the lateral sound in *million* as a close English equivalent, but this correspondence is subject to a number of caveats. To produce [ʎ], the body of the tongue (that is, the area behind the blade) must be raised to the roof of the mouth to block the exit of air, as was the case for the nasal [ɲ]. However, for [ʎ] the sides of the tongue must be allowed to hang free, to let the air flow out through the resulting gap, in the familiar lateral gesture.

Experiment with the articulation of [ʎ], which you may find a trifle difficult. Try to listen to the pronunciation of native speakers of this sound if you have the opportunity.

In the British context it is perhaps advisable to caution the reader about the Welsh sound spelled *ll*, as in such place names as *Llandaf*, *Llandudno*, *Llangollen*, *Llanelli*, *Llanfairpwllgwyngyllgogerychwyrndrobwilllantysiliogogogoch*, etc. (*llan* simply means 'church, village' in Welsh). Although also an alveolar lateral, this sound involves frication, caused by a considerable narrowing of the lateral gap(s). Therefore, it is not a sonorant, since the defining criterion for sonorants is unobstructed exit of air. Indeed, the Welsh sound in question is an obstruent, which is moreover voiceless. The phonetic symbol for this sound is [ɬ].

Give yourself a little practice of [ɬ]. As usual, try to listen to native speakers if you can.

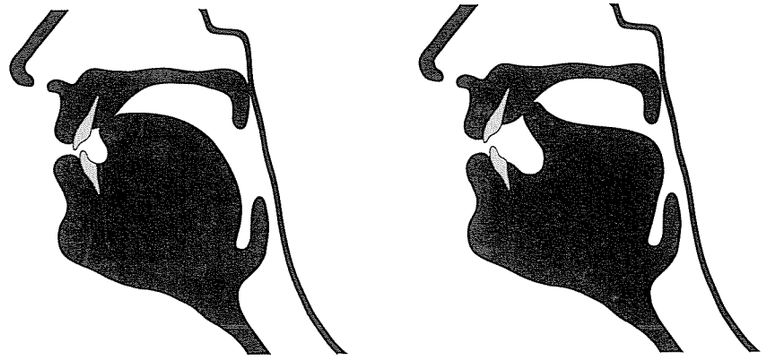
The correspondences in place of articulation between nasals and laterals are completed with the velar laterals that exist in a handful of languages.

In the Mid-Waghi language of New Guinea, for instance, the word [ᴀʟᴀʟᴇ] 'dizzy', with the velar lateral [ʟ], contrasts (although not minimally) with the word [alala] 'speak incorrectly', with the ordinary alveolar [l]. The sound [ʟ] is also reported to occur in some English accents in some contexts (for instance, before labial or velar consonants), but it is otherwise rare. The velar lateral [ʟ] must not be confused with the *velarized* alveolar lateral [ɫ]. The sound [ɫ] occurs allophonically in English in word-final position, and syllable-finally generally (syllables are dealt with in chapters 9 and 10), as in *pill*, *mole* or *cool*, although some accents only have plain, or "clear", *l*s (general Irish), or velarized, or "dark", *l*s (general Scottish).

Pronounce *pill*, *mole* and *cool* trying to notice the difference in the sound of the *l* with their close phonetic correlates *pillar*, *molar*, *cooler*. Now pronounce each pair paying particular attention to the different positioning of the back of the tongue for each type of *l*.

In languages like Russian, [ɫ] functions phonemically: *moł* 'pier' and *połka* 'polka', with [ɫ], contrast with *mol* 'moth' and *polka* 'shelf', without. The articulatory difference between the velarized *l*, [ɫ], and its plain counterpart [l] lies in the additional bunching of the body of the tongue at the back that characterizes [ɫ] (figure 3.8).

Repeat the last exercise if you had difficulties in finding this out.



Plain [l] Velarized [ɫ]

Figure 3.8 Plain and velarized *l*

In some accents (London Cockney, for instance) the velar lateral [ɬ] loses its alveolar contact and takes on lip rounding, effectively becoming the sound represented by *w* in *bow*.

We have seen that both laterals and nasals can be realized at a range of articulatory places. However, all laterals must by our definition involve the tongue in their articulation; labial nasals, by contrast, are realized exclusively with the lips.

All laterals involve the tongue in their articulation

7 Rhotics

"Rho" is the Greek name for the letter *r*, and the label RHOTICS therefore refers to a class of sounds that are "*r*-like". It will soon become apparent, however, that the members of this class do not necessarily have much in common with each other phonetically: their common grouping as "rhotics" is grounded on similarity of phonological behaviour, rather than on shared phonetic substance.

The label RHOTICS refers to a class of sounds that are "*r*-like". The members of this class do not necessarily have much in common with each other phonetically

Explain carefully the difference between these two criteria.

The sound represented by the letter *r* in most accents of English is very different from its counterpart in many other languages. In turn, the *r* sound typical of Scottish English is different from its common English equivalent, as we will see below. The phonetic symbol for the common English *r* is [ɹ], an inverted *r*. The articulatory gesture for [ɹ] is almost the opposite of the articulatory gesture for [l], hence the tongue twister "red lorry, yellow lorry".

Say this tongue twister out loud a couple of times, to experience for yourself the articulatory connection between [l] and [ɹ].

In the previous section we explained that for [l] we blocked the air in the central part of the mouth by pressing the blade of the tongue firmly against the alveolar ridge, while letting it flow freely down the sides. By contrast, for [ɹ] the sides of the tongue touch the back teeth, while a fairly wide gap is created in the centre of the mouth for the air to pass through without causing friction (figure 3.9).

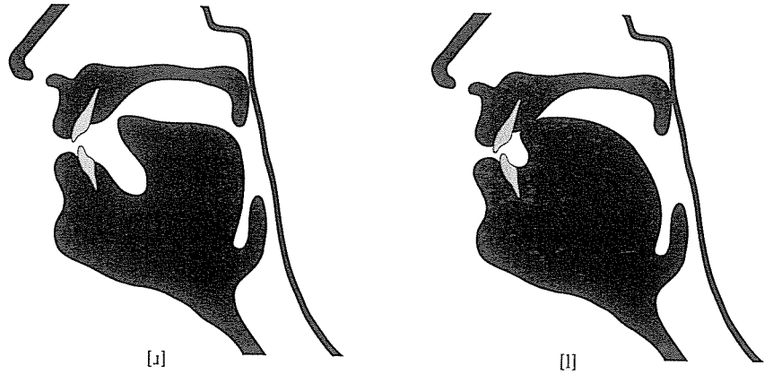


Figure 3.9 Articulation of [ɹ] and [l]

Try comparing the action of the tongue during [ɹ] and during [l]. Then focus your attention on where exactly you place the tip of your tongue.

There are two ways in which the blade of the tongue may be positioned for [ɹ]. The chances are that speakers from Britain will keep the blade flat, leaving a channel open at the front for the air to escape (figure 3.10).

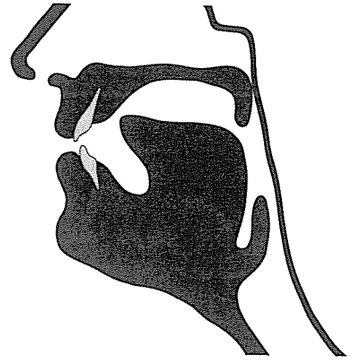


Figure 3.10 Plain (British) [ɹ]

American speakers, on the other hand, are more likely to curl back the blade towards the roof of the mouth (without of course touching it or drawing the tongue too close to it). See figure 3.11.

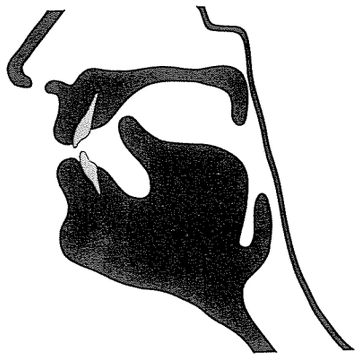


Figure 3.11 Retroflex (American) [ɻ]

Fortunately, the effect of this articulatory difference on the resulting sound is not great. The action of curling back the tongue is known as RETROFLECTION, and the sounds thus produced are referred to as RETROFLEXES.

> Try pronouncing *rip* and *rye* and see if you can decide how you form your *r*.

Not only *r*s can be retroflected, but also all other sounds that involve the tip of the tongue in their articulation. For instance, the *d* at the end of the Swedish word *smörgåsbord* is retroflex. In IPA phonetic transcription, retroflection is indicated by the addition of a tail to the symbol of the corresponding non-retroflex, hence [ɻ] for the English retroflex *r*, [ɖ] for the Swedish retroflex *d*, and so on. In an alternative notation, in common use for typographical convenience, retroflection is represented diacritically by means of an underscripted dot: [ɻ̣], [ɖ], etc. Retroflex sounds are particularly frequent in languages of the Indian subcontinent. For instance, in Malayalam, the main language of the state of Karala, in Southern India, *ku*[ʈ]*i* 'child', with a retroflex [ʈ], makes up minimal pairs with *ku*[t̪]*i* 'stabbed', with a dental [t̪], and *ku*[t]*i* 'peg', with an alveolar [t].

> Retroflection tends to carry over to English in the speech of speakers originating in the Indian subcontinent. Experiment with a range of sounds that are alveolar in ordinary English to see how much you can retroflect them.

A minimal amount of self-observation will make it obvious that the mechanics of tongue positioning for [ɹ] are rather subtle, if not downright fiddly.

Not surprisingly, therefore, children often have difficulty in pronouncing [ɹ] and substitute *w*, so *rock* becomes *wok*. Some adult speakers (including some well-known personalities) also have a so-called "defective" *r*, similar, but not identical, to *w*: the typical "defective" *r* is produced by drawing the upper teeth onto the inside of the lower lip further back than for [f] or [v], and not quite close enough to cause friction.

> You may want to have a go at this sound, which is noticeable as a feature of popular speech both in London and in New York.

The "defective" *r* is perceptually similar to the more common English *r*, in spite of the striking articulatory difference between the two. The "defective" *r* is defined phonetically as a (voiced oral) labiodental approximant. Its IPA symbol is [ʋ]. The term APPROXIMANT, related lexically to *approximate* and *approximation*, in turn connected to *approach*, is applied to sounds that are continuant and frictionless.

A very common rhotic, found in Spanish, Russian, Greek and many other languages, as well as in Scottish English, at least historically, involves vibrating the tip of the tongue against the upper tooth ridge, hence the label "alveolar TRILL" (also, informally, "rolled *r*"): Spanish *rosa*, Russian *roza*, Greek (arch.) *roðo*, all 'rose'. Mechanically, and aerodynamically, the production of this sound parallels the production of voice, although, obviously, the articulators are different. You will recall that voice is caused by the vibration of the vocal folds. Most importantly, such vibration is not created by actively moving the vocal folds against one another, in the way we actively move our hands against one another to clap. Rather, it is brought about by positioning the vocal folds appropriately (not too close, not too far apart; not too tight, not too loose) and letting the high-pressure air passing through induce the vibration, like the flapping of a flag in the wind.

Vocal fold vibration is undoubtedly part and parcel of the sound inventory of all languages, and consequently it is unlikely that readers of this book will face difficulties with voicing (naturally, pathologies aside). This is not the case with the alveolar trill, which at least some speakers of English emphatically claim they are unable to produce, even though this sound is used extensively by young boys to mimic the firing of machine guns! Obviously, this inability cannot be physiological (again, true pathologies aside), and must simply be attributed to a failure to take the articulatory steps needed for the production of this sound, which we will now make explicit.

In fact, whether or not you think you can pronounce the alveolar trill, it is most likely that you already have another trill in your non-linguistic repertoire, namely, the trill we use more or less unconsciously to indicate cold, and which involves bilabial vibration.

> Produce this sound and observe what exactly you do to make it: not just in the lips, but also elsewhere, particularly in the lungs.

As was the case with the production of voice (humming), the production of a bilabial trill requires the lungs to be well filled with air, in order to increase the air pressure inside, and concomitantly the force with which the air comes out. The lips must also be positioned next to each other, without undue tightening up or slackening. When pressurized air is let out, the lips vibrate automatically.

Suppose now that, instead of bringing the lips together, you place the tip of the tongue just above the upper tooth ridge, again neither too tightly nor too loosely, taking care that the sides of the tongue press against the set of lateral upper teeth tightly enough to prevent air from escaping through the sides. If you now let through a substantial amount of high-pressure air, this air will automatically set the tip of the tongue vibrating, exactly as it sets the two lips vibrating in the cold gesture. An apposite musical analogy is the reed of a wind instrument, which obviously the player does not manipulate directly, but rather through the intermediary of the current of air.

> Have a good go at articulating the alveolar trill. If you can't do it, keep on trying until you succeed. Remember that the goal will inevitably be achieved if you take all the necessary measures to produce the trill: follow the instructions in the text, adapting them to your own idiosyncrasies as you go along.

The phonetic symbol for the alveolar trill is [r]. This symbol is obviously identical to the letter *r*, and it is sometimes used loosely (for typographical convenience, particularly when there is no likelihood of misinterpretation) for other phonetic varieties of *r* also. This includes the English *r*, which we saw above is a very different sound, and must strictly speaking be transcribed as [ɹ]. Such liberal use of phonetic symbols is for better or worse a fact of transcription life, and must be accepted by the budding phonologist philosophically, if perhaps not always joyfully.

The reader familiar with Spanish will be aware that there is another *r* in this language besides the alveolar trill just described, as demonstrated by the phonetic contrast between such words as *pero* 'but' and *perro* 'dog', with the digraph *rr* representing the alveolar trill. This softer *r* is also found in other languages, whether or not in contrast with [r]. Indeed, it is nowadays more typical of Scottish English than the alveolar trill, contrary to popular stereotype.

We will ease our way into describing the soft *r* by thinking of the typical American pronunciation of *t* in such words as *waiting* (similarly in many Irish varieties). Such a *t* does not of course sound anything like the [t] we described in chapter 1: it is indeed a different sound, which substitutes for [t] in various contexts in American English (see chapter 11 for details).

> Think of a context where even Americans would use [t] under any circumstances. Then think of another context (or contexts) where you know (or suspect) they may not use it.

How exactly is the sound we are referring to produced?

> Have a go at it, whatever your national origin: the chances are you will have come across American speech (on television, in songs, in films, etc.) more than once during your lifetime.

It clearly involves a single flap or tap of the tongue tip, which is essentially thrown against the alveolar ridge. This means that we are dealing with yet another alveolar sound.

> You will have noticed that there is no shortage of these, in English, as in other languages. List a few such sounds you have already come across.

The sound in question is also oral, since the velum is raised during its production, and, being a sonorant, it is voiced.

> Make the sound again and observe carefully its characteristics.

You may find the classification of this sound as a sonorant somewhat puzzling, given the fact that its production involves oral closure, and it is neither a nasal nor a lateral. The reason it is thought of as a sonorant is that the contact between the tongue tip and the alveoli is fleeting in the extreme, and therefore the airflow remains essentially unaltered. The argument

carries over to the interruptions that make up the trill, also commonly considered a sonorant.

The American *t* in *waiting* we have just described is usually referred to as a FLAP. The Spanish *r* in *pero* 'but', or the typical Scottish *r*, is similar, but perhaps not absolutely identical, and is usually dubbed a TAP. The difference between a tap and a flap is subtle, but has been argued in the specialized literature. It is not in our interest to go into this level of detail here, and we will accordingly leave the matter as it stands. The phonetic symbol for the tap (as in Spanish *pero* 'but') is [ɾ]. This symbol is also proposed for the flap of the American *waiting* in the latest version of the IPA symbol chart. American authors, however, have tended to use a capital *d* to represent the flap, hence [D].

Rhotics can differ considerably from each other in their articulation

We shall now wind up our survey of rhotics – there are still more across languages, but the present inventory is quite sufficient for our purposes. As we pointed out at the outset, while they are spelled *r* in most languages, rhotics can differ considerably from each other in their articulation. To add to the confusion, the letter *r* is also used to represent sounds that are not even sonorants. For instance, the standard French and German *r*s are uvular fricatives, rather than rhotics as such: [ʁ] (voiced) or [χ] (voiceless). The UVULA is the appendix found at the end of the soft palate, and therefore the place of articulation of these sounds lies between the place of articulation of such velars as [x] or [ɣ] and the place of articulation of the glottal [h] (figure 3.12).

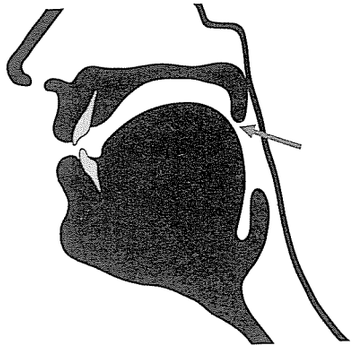


Figure 3.12 Uvular fricative

*r*s tend to function as sonorants, even when they are not so phonetically

What is interesting, indeed puzzling, is that all the phonetically quite different *r*s function similarly in the respective phonological systems. In particular, they tend to function as sonorants, even when they are not so phonetically, undoubtedly the reason they are generally construed as rhotics.

Explain what we mean when we say that rhotics tend to have a similar phonological function.

Indeed, in languages like German, Dutch, Swedish and others, *r* is pronounced as the alveolar sonorant trill [r] in some dialects, or even individually, and as the voiced uvular fricative [ʁ], a phonetic obstruent, in other dialects or idiolects.

8 Summing Up

In this chapter we have examined the articulation of sonorant consonants: nasals, laterals and rhotics, the last two grouped together as liquids. Following our practice in chapter 1, we now tabulate all of these sounds under their respective IPA symbols (table 3.2).

Table 3.2 Sonorant consonants

	Bilabial	*Labiodental*	*Alveolar*	*Postalveolar*	*Palatal*	*Velar*
Nasals	m		n		ɲ	ŋ
Laterals			l		ʎ	
Rhotics		ʋ (in "defective" English)	ɾ (flap or tap) r (trill)	ɹ (in standard English)		

Study table 3.2 carefully, until you are satisfied that you understand it.

We have also described the lateral fricative alveolar [ɬ] (as in the Welsh place name *Llandaf*). While not a sonorant, this sound is of course closely related to the lateral sonorant [l]. Also obstruents, rather than sonorants, are the uvular fricatives [ʁ] and [χ], which we have just mentioned are used for *r* in several languages. On the other hand, there exists a uvular trill [ʀ], which, as a trill, must be considered a phonetic sonorant. This uvular trill is somewhat reminiscent of gargling to the ear of the English speaker. It occurs in some older dialects of French, and can be heard in recordings of the singer

Edith Piaf (cf. her classic "Je ne regrette rien"). It is also found in Lisbon Portuguese, while the usual sound for *r* in Brazilian varieties of this language is [x] or [h]. We gather all these heterogeneous sounds in table 3.3, to facilitate comparison.

Table 3.3 Additional consonant sounds discussed in the text

	Alveolar	*Palatal*	*Velar*	*Uvular*	*Glottal*
				ʁ	
Plain			x	χ	h
Laterals	ɬ				
Trills				ʀ	

Chapter Summary

In this chapter we have further extended our repertoire of consonant sounds by introducing sonorants. These sounds are so called because they are louder than the obstruents introduced in chapter 1, by virtue of the fact that they involve a greater volume of air. As in the case of obstruents, a constriction is set up in the primary channel, but in addition air is deflected through a secondary channel. Because sonorants are usually voiced, of the three parameters encountered in chapter 1 effectively only place of articulation is relevant to their description. Sonorants fall into two major categories in terms of the place of the primary constriction and the identity of the secondary source. The first is nasals, in which the air is diverted from the blocked oral cavity (hence their construal as stops) into the nasal cavity through the outlet created by the lowering of the soft palate. The other category of sonorant is known as liquids. In this case both the primary constriction and the secondary source are located in the mouth: in the articulation of lateral sounds air is deflected from an obstruction made at the centre of the tongue to pass laterally (down the sides of the tongue), whilst in the case of rhotics it is deflected from a lateral obstruction to pass centrally over the tongue. We have also offered some help with the articulation of sounds which may prove difficult for some readers. As in the case of chapter 1, the IPA symbols of these newly introduced sounds are tabulated to ease recognition. The discussion of the various phonetic parameters we have introduced anticipates the core matter of the next chapter.

Key Questions

1 How does a sonorant sound differ from an obstruent?
2 What role does the soft palate play in the articulation of speech sounds beyond those listed in chapter 1?
3 Define "nasality".
4 What do we mean by a "primary articulator"? Suggest what a secondary articulator is.
5 List the parameters relevant to the description of consonant sounds.
6 How does the relationship of nasality with oral articulation differ from that of voice with oral articulation?
7 What does a "continuant" mode of articulation refer to?
8 Define "laterality". What is lateral airflow?
9 Why do lateral sounds always involve the tongue?
10 Enumerate the variety of "rhotic" sounds. Why are they generally grouped together?

Further Practice

Sound to Spelling

We have represented the consonant sounds in the words below by phonetic symbols according to our pronunciation. Work out what the spelling is.

[n]e[v]er	[n]eu[m]o[n]ia	[n]ow[l]e[ʤ]e	au[t]u[m]
[n]e[m]o[n]i[k]	[θ]i[ŋ]	[θ]i[ŋk]	fi[ŋ]ger
[b]o[m]	[k]u[ɹ]y	[ɹ]i[t]	[t$_{\underline{\text{ɻ}}}$]y
[l]i[t]	[f]u[ɬ]	[f]u[l]y	[k$_{\underline{\text{ɻ}}}$]ear
[m]e[nʃn]	[t]a[l]ia[t]e[l]i	[n]a[t]	ca[ɲ]on

Odd One Out

Find the odd one out in the following sets and state reasons.

a. [v x k p ʃ s]
b. [m v β p b]
c. [l k ɹ ɾ]
d. [z d ð ʃ χ v]
e. [k d b ʧ t g]
f. [ɣ k ŋ g ɲ x]
g. [q χ ɴ n ɢ]
h. [l r ʎ ɮ ʟ]
i. [θ ʃ t p s ʧ]

Articulation and Phonetic Symbols

a. Give the IPA symbol which corresponds to the descriptions below:

A labiodental approximant
A retroflex nasal stop
A voiceless uvular fricative
A velar nasal stop
An alveolar lateral stop
A voiced lateral fricative

b. Provide full phonetic descriptions for the sounds represented by the symbols below:

[ʟ] [ɻ] [ɽ] [ɱ] [ʙ] [ɴ] [ʎ] [ŋ]

NATURAL CLASSES OF SOUNDS

DISTINCTIVE FEATURES

Chapter Objectives

In this chapter you will learn about:

- Interpreting phonetic parameters as phonological dimensions we call "distinctive features".
- Minimizing the number of distinctive features to ensure maximum clarity and economy of lexical representation.
- The active articulator being criterial in the identification of the place of articulation.
- A linguistically more revealing formalism for writing rules.
- The grouping of sounds into natural classes.
- How different distinctive features may have a similar function.
- How the presence of certain features is contingent on the presence of others.

In the previous chapters we have described the phonetic characteristics of both obstruent and sonorant consonants. In addition, in chapter 2 we presented phonology and disentangled its concerns from those of phonetics, against the backdrop of the general structure of language. In the present chapter we introduce a number of formal devices central to the model of phonology we are concerned with. We first introduce the phonological correlate of the phonetic parameter: the "distinctive feature". We will see that most distinctive features are naturally binary, with two complementary values, but some features are intrinsically unary, and that distinctive features define natural classes of segments. Most importantly, we will see that the elements that make up phonological structure, the features in particular, are in principle structurally independent of each other, a state of affairs commonly referred to by the label "autosegmental phonology".