PHONETICS & PHONOLOGY

PHONETICS AND PHONOLOGY

FIRST YEAR

BASIC EDUCATION

FACULTY OF EDUCATION

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INTRODUCTION TO PHONETICS

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CONTENTS

1.01 What is Phonetics?

Languages can basically be thought of as systems — highly complicated ones — which enable us to express our thoughts by means of "vocal noises", and to extract meaning from the "noises" (*speech sounds* from now on) that are made by other people. Linguistics is the study of the nature and properties of these systems, and its various branches focus on different aspects of the communication process.

Phonetics is the branch concerned with human speech sounds, and itself has three different aspects:

- ***Articulatory Phonetics*** (the most anatomical and physiological division) describes how vowels and consonants are produced or "articulated" in various parts of the mouth and throat.

- ***Acoustic Phonetics*** (the branch that has the closest affinities with physics) studies the sound waves that transmit the vowels and consonants through the air from the speaker to the hearer.

- ***Auditory Phonetics*** (the branch of most interest to psychologists) looks at the way in which the hearer's brain decodes the sound waves back into the vowels and consonants originally intended by the speaker.

Closely associated with Phonetics is another branch of linguistics known as *Phonology*. This focuses on the way languages use differences between sounds in order to convey differences of meaning between words, each language having its own unique sound pattern. Phonology is really the link between Phonetics and the rest of

Linguistics.

This course focuses on the first of these aspects: Articulatory Phonetics.

Warning. The word *phonetics* is often incorrectly used to refer to the symbols of the International Phonetic Alphabet (the IPA). So people say: "How is this written in phonetics?", "It was all in phonetics, so I couldn't understand it", or "Dictionaries use phonetics to show pronunciation".

This isn't how the term should be used. As has just been explained, Phonetics is a branch of Linguistics, not an alphabet. So it would be more appropriate to say: "How is this written in phonetic script?", "It was all in phonetic transcription...", or "Dictionaries show pronunciation by using the phonetic alphabet".

You will be introduced to the IPA as you work through this course. Its symbols are identified by square brackets: [p], [u], [ð], etc. Ordinary letters and spellings, on the other hand, will always be given in italics. As you can see, some of the phonetic symbols are the same as ordinary letters, but others will be new to you.

1.02 Why Study Phonetics?

Obviously it's a fundamental part of Linguistics, so no-one studying this subject can ignore it. But for students of languages, there are also practical advantages to be gained from knowing some basic Phonetics.

Firstly, you should be able to improve your pronunciation of foreign languages if you have a clearer idea of how the sounds are actually produced. Troublesome sounds like French *r*, German *ü* or Spanish *j* lose their mystery and become less daunting once you know how they relate to other more familiar sounds. And there are various general features of the "British accent" which can be characterized by phonetic analysis: when you know what it is that makes British accents so British, you'll be well on the way to getting rid of yours (if you have one: most people do to some extent at least). What's more, you'll be able to look up the pronunciation of words in the dictionary once you're familiar with the phonetic alphabet.

Secondly, many of you will at some stage or other find yourselves teaching a language to other people: either French, German, Spanish, etc. if you make a career of teaching, or English if you are involved in ESOL (English as a Second Language, also known as EFL: English as a Foreign Language). ESOL is not just a

useful source of vac jobs: it is a serious career in itself. And many Modern Languages students spend a year of their degree course working abroad as English language teachers. In all such cases, you are likely to have to help learners to improve their accents. If someone is having difficulty with English *th*, it's not much help just to tell them "don't say it like that, say it like I do". (Unless they're natural mimics, in which case they won't need instruction from you anyway.) Much better if you can guide them to make the appropriate tongue movements, on a basis of your knowledge of phonetics.

In short, Phonetics always looks good on a language teacher's cv.

1.03 Working Through This Course

It contains a section describing the organs of speech, a section on vowels, a section on consonants, and a concluding section on phonetic transcription, together with a few suggestions for optional further reading.

There are also a large number of exercises, answers to all of which can be accessed. Some of the exercises are to enable you to check that you've absorbed

and understood the material covered, others encourage you to think more about the languages you are studying and more particularly to draw on your experience and knowledge of English.

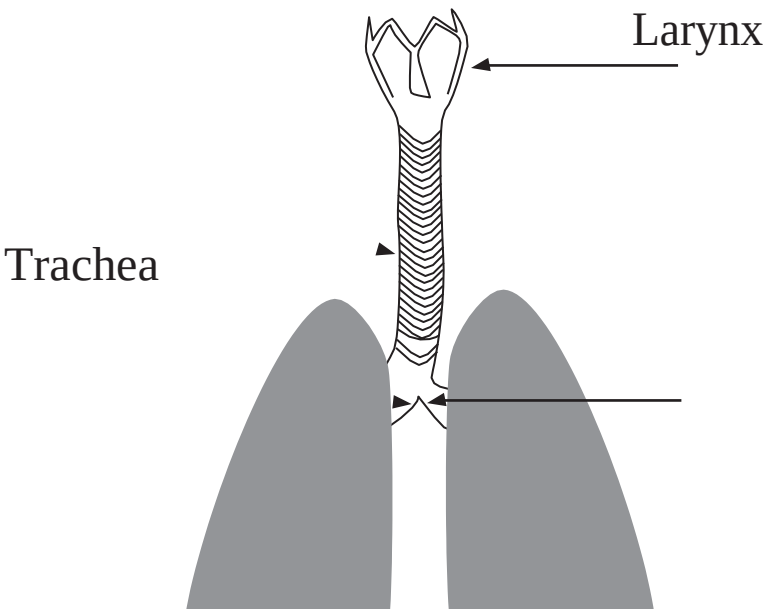
the vocal tract

2.01 Speaking and Breathing

All speech sounds in all languages are produced by modifying ordinary respiration. In quiet breathing, air enters and leaves the lungs without any obstruction, passing freely through the throat and mouth (or nose). If, however, the tongue or some other organ is placed in the path of the airstream, this free passage of air is disturbed; the air from the lungs may be set into vibration or the flow momentarily interrupted. For example, the lips close and briefly cut off the airstream for [p] and [b]. Any such disturbance generates a sound wave — a ripple effect that travels through the air between speaker and hearer(s) and is then interpreted as a particular speech sound. Articulatory phonetics studies the various ways in which airstreams can be "interfered with".

2.02 The Source of Air for Speech Sounds

The LUNGS (Fig. 1) are basically sponge-like in design, except that they hold air (in a myriad of tiny airsacs), not water. When we breathe in, we enlarge the chest cavity (in part by lowering the diaphragm). This in turn expands the lungs, and air rushes in to fill the vacuum. Breathing out involves the opposite procedure. The chest is contracted and air is squeezed out of the lungs, passing through the two BRONCHI (or bronchial tubes), then through the windpipe (more technically the TRACHEA), and finally emerging in the throat.



Right Bronchus

Left Bronchus

One or two refinements on this simple picture might be noted in passing.

First, we normally speak only while breathing out. It's also quite possible to speak while breathing in (for example when counting and not wishing to pause to draw breath), but this is an inefficient way of making sounds and therefore not a regular feature of any language. In some speech-communities, though, people use "ingressive air" as a conventional means of disguising their voices.

Second, there are various ways of making speech sounds with air that *doesn't* originate in the lungs. The disapproving noise conventionally represented as *tut tut!* is an example. Some languages make regular use of "click" sounds like this one, as well as other "non-pulmonic" sounds that from a European point of view seem even more exotic.

Third, if we used the same breathing rhythm for talking as for just breathing quietly, we'd have to pause for breath every couple of words. (Try it and see.) In speech, quite complex adjustments of the

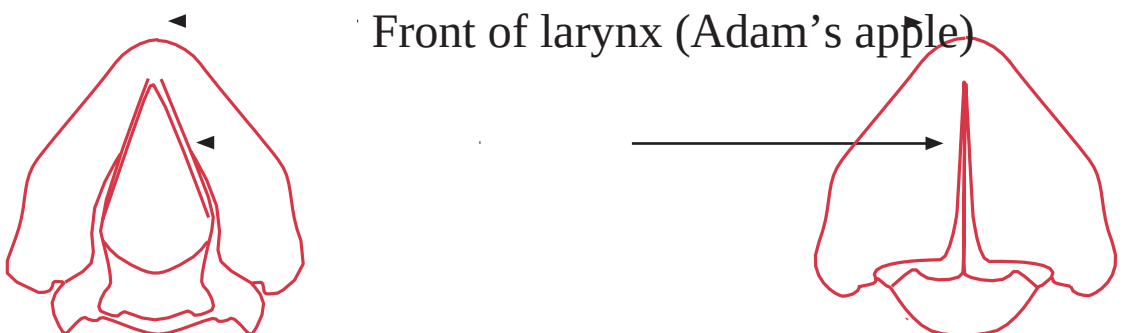
chest muscles and diaphragm are constantly being made in order to slow down the airstream and hold it back as it leaves the lungs.

2.03 The Larynx

The statement above that the airstream "emerges from the trachea (windpipe) into the throat" is actually an over-simplification. Before the air reaches the "throat", it has to pass through one of the most important speech organs, the LARYNX. It's at this point that the first possibilities occur of modifying the airstream and generating sound.

The larynx can conveniently be thought of as an irregularly-shaped, hollow box made of cartilage, which sits on top of the trachea. (This is reflected in the non-technical name for it: the "voice-box".) The front of the larynx can easily be seen and touched: it forms the projection an inch or two below the chin, known as the "Adam's apple" (more prominent in males than in females — hence presumably the name).

Across the interior of the larynx are stretched two horizontal sheets of muscle tissue. When these are relaxed and wide apart, then the air is free to pass between them. This is how they are held for normal respiration (Fig. 2). But if they are brought together with their inner edges in close contact, then air is prevented from entering or leaving the lungs: the only way in or out is through the larynx cavity, which is now sealed off (Fig. 3). This is the configuration for swallowing: it prevents not only air but, more importantly, foreign bodies from getting into the lungs.



Vocal Folds

Fig. 2

Fig. 3

A third possibility is shown in Fig. 4. The sheets of muscle are again in contact, but very loosely this time, instead of being pressed firmly together as they were in Fig. 3. As a result, air is able to pass through, but not freely: it has to force its way, so to speak. This sets the inner edges of the muscles into vibration, and this vibration causes a disturbance in the airstream — i.e. a sound wave. The sound is greatly amplified by the resonance of the mouth and throat cavities, and the result is: the human voice. As a consequence, the inner edges of the muscles stretched across the larynx are known as the *vocal folds* (alternatively *vocal cords* or, occasionally, *vocal lips*). Say *aaah*, for instance: the sound you're producing is amplified vocal fold vibration. In essence, the vibration is similar to the effect which you get by folding over a piece of thin paper and blowing between the edges.

The space between the vocal folds is known as the GLOTTIS. So Fig. 2 shows an open glottis, Fig. 3 a closed glottis, and Fig. 4 a vibrating glottis.

The vocal folds also control the pitch of the voice. As with the strings of a musical instrument, the greater the tension, the higher the pitch. The larynx is provided with a number of muscles which, together with the vocal fold muscles themselves, carry out the complex adjustments of vocal fold tension that take place continually during speech.

Fig. 4

The larynx and vocal folds of women and children are smaller than those of adult males: hence the difference between soprano and bass voices. When a boy's voice "breaks" at puberty, this is due to a rapid increase in the size of the larynx.

Subtle and complex adjustments of the glottis give rise not just to "normal" voice at a range of pitches, but also to such varied vocal effects as stage whisper, falsetto and so-called "breathy voice". But it's worth remembering that voice is a only secondary adaptation of the "vocal" folds, despite the name. (Other mammals and even reptiles have a larynx too.) Biologically the primary function of the larynx in general and the vocal folds in particular is to serve as a valve for the lungs. As has been mentioned already, it's advisable to close the glottis firmly when swallowing — we all do so instinctively in fact. A second important reason for having a larynx is that the closed vocal folds, by holding back the airstream, can create a firm column of air in the chest, against which we can push during various kind of physical exertion. Weightlifting, defecation and childbirth all involve a tightly closed glottis!

2.04 Voicing

Although it's merely a biological by-product, the importance of voice for languages can't be overestimated. All vowel sounds are normally uttered with the vocal folds in vibration (i.e. they are *voiced*) and so are around half the consonants. Take [s] and [z],

for instance. As we'll see in more detail later, for both these sounds there is a constriction of the airflow just behind the upper front teeth. The difference between them is that
[s] is *voiceless* (vocal folds held apart in the Fig. 2 position and the airstream able to pass between them unhindered) whereas [z] is *voiced*, with the vocal folds in the Fig. 4 position and consequently in vibration. You should be able to spot the absence or presence of voicing easily enough if you say [s] ... [z] ... [s] ... [z] loudly several times in alternation. The difference becomes even more obvious if you place your fingers firmly over your ears while doing so.

The same relationship exists between the *th* in *thin* and the *th* in *this*. This time, unfortunately, the spelling doesn't show any difference. But by repeating these two words in alternation you should be able to tell that in the case of *thin* we have a voiceless *th* and in the case of *this* a voiced one. The phonetic alphabet uses a separate symbol for each: [T] (read "theta") for the *th* of *thin* and [ð] (read "eth") for the *th* of *this*. [ð] is also sometimes called "thorn" (from the name of a letter of the Old English alphabet).

Yet another voiceless/voiced pair is [p] and [b]. Try to say [apa] and [aba] in alternation. In both cases there's a momentary blockage of the airstream between the lips when the consonant is made. What makes the difference between them is voicing (present for [b], absent for [p]).

In fact almost all consonants come in voiced and voiceless pairs — an very efficient use of a single feature (*voicing*) in order to double, at a stroke, the number of available sounds.

Exercises

1. Choose an appropriate term from the list, and insert it into one (or more) of the gaps in the paragraph that follows:

bronchi	*lungs*
glottis	*trachea*
larynx	*vocal folds*

The_____supply the air for almost all speech sounds. Air passes from them into the_____ _____, one from each of the two_____, and these two airstreams merge in the____, a short tube situated in the lower part of the neck. On top of this is a valve known as the_____. Here the supply of air to the throat and mouth is controlled by opening or closing the_____the gap between the two____. In ordinary quiet breathing the____ _____is open; for swallowing it is closed in order to protect the_. A noteworthy evolutionary adaptation in humans allows voice

to be produced by positioning the_in such a way that passage of air between them causes them to vibrate.

2. Say whether the following consonants are voiced or voiceless. The first group have already been mentioned — see if you can answer without looking at the text. For the second group the decision is up to you.

(a) [z], [T], [b], [p], [D], [s].

(b) [f], [v], [t], [d], [k], [g], [S] (this is the symbol for the *sh* of *ship)*

3. The following pairs of words are distinguished in pronunciation partly or solely according to whether they contain a voiced (*vd*) or a voiceless (*vl*) consonant. Say which is the crucial consonant in each case, and specify its voicing status.

pin, bin	*zoo, sue*
fail, veil	*wreath, wreathe* (“in smiles”)
toll, dole	*either, ether* (a kind of gas)
gin, chin	*Aleutian, allusion.*

4. Changing the voicing of a single consonant in each of the following results in a different word. Which consonant and which word? (Sometimes there's more than one possibility. Concentrate on the pronunciation, not on the spelling.)

seal	*bicker*
raz	*lun*
or	*ge*
ice	*Je*
scar	*ws*
ce	*cho*
ank	*ke*
le	*thig*
dug	*h*
	Confuci an

2.05 The Upper Vocal Tract

The next thing you need to get a clear idea about is the configuration of the cavities through which the air passes once it has left the larynx. These are referred to collectively as the UPPER VOCAL TRACT — "upper" because the vocal tract as a whole includes the larynx as well. You can call it the *supra-glottal tract* if you prefer (*supra* is a Latin word meaning "above"). Fig. 5 gives the overall picture. You can see from this that the upper vocal tract consists of the mouth and throat cavities (together referred to as the *oral tract*) and the nasal cavity (or *nasal tract*). The oral tract has a part to play in all speech sounds. Sounds like [n] or [m] or the nasal vowels of French or Portuguese involve the nasal tract as well, as will be seen later.

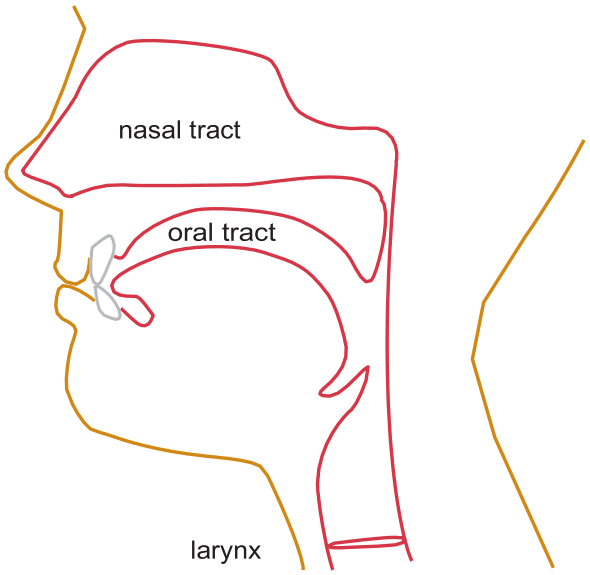


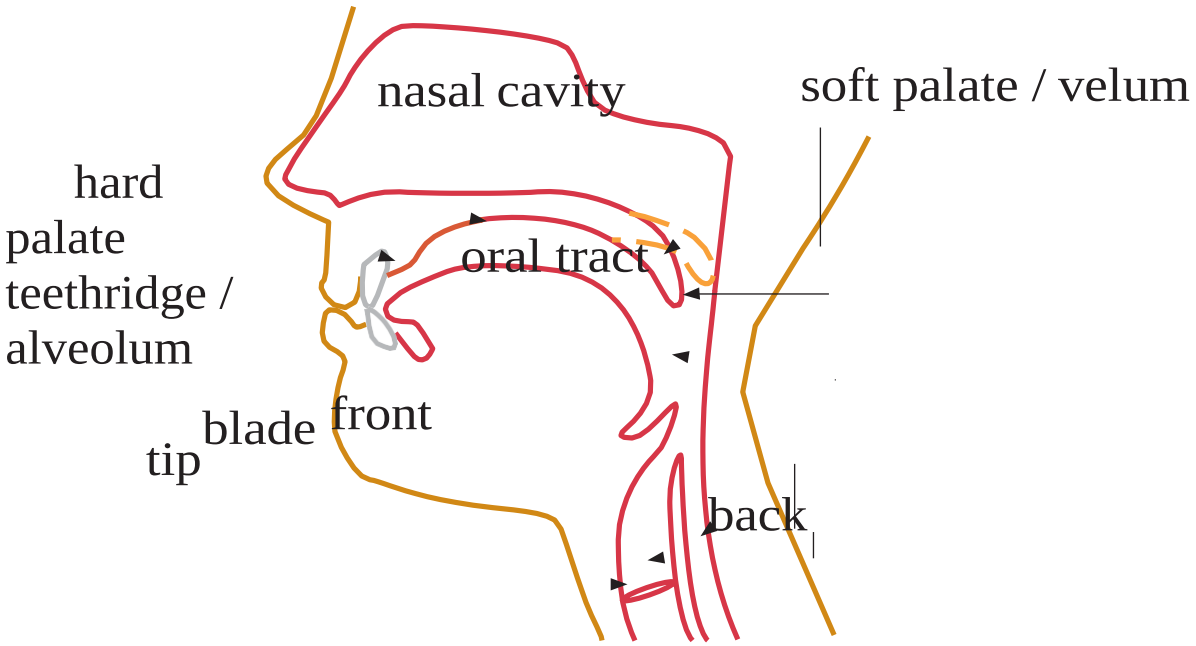
Fig. 5

Let's go through the various parts of the oral tract, drawing attention to those that are directly involved in the production (or articulation) of speech sounds, and are therefore known as *articulators*. A number of consonant sounds will be mentioned in passing in order to illustrate the part played by different articulators, but there's no need to concentrate too much on individual sounds at this stage: they will be presented in more detail in later chapters. For the moment you should aim at understanding the location and names of the various "organs of speech" labelled in Fig. 6.

2.06 The Oral Tract from Lips to Uvula

a. THE LIPS. These are too familiar to need further comment, and the involvement of the upper and lower lip in sounds like [p] and [b] is also very obvious. (Details

about exactly what happens will be provided later.)



b. THE UPPER FRONT TEETH. These are involved for example in the production of [T] and [ð] (as in *thin* and *this*), for which the tongue comes into contact with the back of the teeth. As the tongue is the moveable organ which initiates the contact, it is said to be an active articulator, and the teeth, which don't move, are a passive articulator. The lower teeth and the remaining upper teeth don't appear to have any role in language.

c. THE ALVEOLAR RIDGE. Place the tip of your tongue against the rear of your upper front teeth. Then draw it slowly backwards along the roof of the mouth. You'll notice that there is a bulge or ridge just behind the teeth, after which the roof of the mouth rises in quite a steep, domelike way. This is the *teethridge* — in phonetics more commonly called the *alveolar ridge* or *alveolum*. It's an important passive articulator for sounds like [t], [d], [s] or [z]. Again the tongue is the active articulator.

d. THE HARD PALATE. This is the steeply rising section of the roof of the mouth behind the alveolar ridge. It serves as a passive articulator in sounds like the *h* of *huge*.

e. THE SOFT PALATE or VELUM. If you continue to run your tongue backward along the roof of the mouth (as far back as it can go) you will come to a point where the hard bone of the palate gives way to soft tissue. This section of the roof of the mouth is accordingly known as the soft palate, or, more commonly, the velum. The back of the tongue comes into contact with the velum for consonants like [k] and [g].

The velum is an important organ of speech because it's

moveable and its movement controls the entrance to the nasal cavity. (That's why it's soft not hard: it consists of muscle tissue.) Raising the velum so that it's pressed against the rear wall of the throat has the effect of closing off the nasal tract, so that air is diverted into the mouth (dashed line in Fig. 6). If you want to breathe through your nose, you have to lower the velum (solid line in Fig. 6).

Nasal consonants like [m] or [n] and nasalized vowels are articulated with the velum lowered. For non-nasal sounds (that's the vast majority), the velum must be in the raised position, so that the airstream passes into the mouth. Note that the velum can't block the entrance to the oral cavity, even when it's lowered. So even for nasal sounds, some air enters the mouth. More about this point in 3.08 and 4.09.

f. THE UVULA. This is the extreme tip of the velum, and isn't directly involved in the closure of the nasal cavity: you can see from Fig. 6 and several of the other figures how it dangles down instead of being pressed against the rear wall. Some *r* sounds in French and German involve the uvula. More about these in 4.11.

2.07 The Tongue.

The tongue has long been thought of the speech organ *par excellence,* even though its biological role lies in tasting and swallowing, not in vocalizing. In many languages the word for "tongue" and the word for "language" are one and the same (French *langue*, Spanish *lengua*, Russian *iazyk* for instance, or *tongue* in Biblical and Shakespearean English). In actual fact the larynx is also important, as we have seen — but as people are much less conscious of it, it seems to have attracted less attention.

Anyway, the tongue is certainly involved in the articulation of a large number of sounds, just a few of which have been mentioned above. Its versatility is due to the fact that it consists entirely of nerve and muscle tissue, so it is highly flexible and mobile. You can see from Fig. 6 that the tongue is not thin and flat (even though it may feel that way), but has a considerable amount of depth or body.

It's convenient to consider the tongue as consisting of a number of different sections (see Fig. 6). As there are no clear cut-off points on the tongue itself, these division are somewhat arbitrary, and can vary from one authority to another. But most phoneticians distinguish between the TIP, the BLADE, the FRONT (not a good name, as it's more like the middle than the front!), the BACK and the ROOT. These articulate against different parts of the roof of the mouth, giving sounds like the *s* of *so* (with the blade), the *sh* of *shall* (with the front), and so on.

2.08 The Pharynx

Even more so than *roof of the mouth* and *tongue*, the term *throat* is somewhat vague and general. (Should it be taken as including the larynx, for example?) Consequently throat isn't a word that's used much by phoneticians, who prefer more specific terms. *Larynx* is one which you already know, and another — not to be confused with it — is PHARYNX. This designates the tubular cavity bounded by the larynx, the root of the tongue and the soft palate, shown in Fig. 6.

> You can see from the figure that the pharynx is a kind of crossroads: air passes through it from the lungs to the nasal cavity; food passes through it from the mouth to the oesophagus or

food-pipe.

On the face of it, this mingling of food passage and airway sounds a rather unsatisfactory arrangement. And in fact in animals the larynx is situated higher up, so that it's linked directly with the nasal cavity: no danger of choking for our dumb friends. But a high larynx is much less efficient for the articulation of speech sounds. It looks as though the "low-slung" human larynx has been favoured by evolution, as it allows better vocal communication. That the occasional unfortunate individual should choke to death is presumably a price well worth paying! Incidentally human babies have a high larynx, which "migrates" downwards during the first months of life: a nice example of "ontogeny recapitulating phylogeny".

In some languages, the rear wall of pharynx serves as a passive articulator. The root of the tongue is pulled back towards it, causing a constriction used for certain characteristically "guttural" sounds in Arabic or Hebrew (see 4.06).

Remember the difference: the larynx is a cartilaginous box immediately above the trachea; the pharynx is the cavity or "crossroads" above the larynx.

2.09 Pronunciation: an Acquired Skill

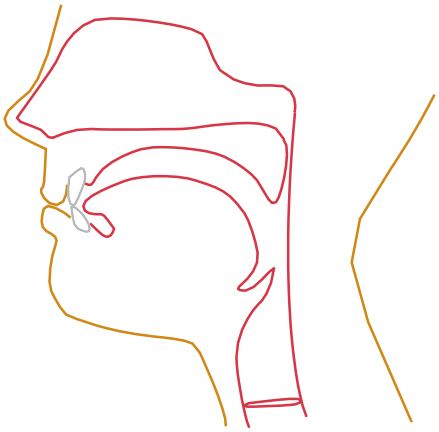
Two points by way of conclusion.

Firstly, the structures described above are universal in humans: whatever the race or speech-community, the speech organs are the same. There are of course differences in the size and even precise shape of particular parts of the vocal tract, but differences between individuals in a given speech-community are greater than the average differences between one community and another.

It follows from this that the pronunciation difficulties experienced by people learning a foreign language are due to psychological factors, not to anatomical ones. After the age of 10 or so, most people find it difficult to break away from their native sound system. So someone who finds French *r*, German *ü* or Spanish *j* troublesome doesn't have anything wrong with their uvula, tongue or velum (or at least this is highly unlikely): it's just that their brain is finding it hard to adapt to new articulatory habits. A person's knowledge of his or her mother tongue is in no way congenital. Had you been kidnapped at the age of six months and brought up in France, Germany or Spain — or China or the Amazon Basin for that matter — you'd be speaking the local language in a totally "native-like" manner ... and no doubt having problems with English.

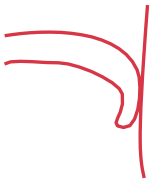
Exercises

5. Show where the following are situated on this diagram of the upper vocal tract:
    1. *blade of tongue, 2. front of tongue, 3. velum, 4. pharynx, 5. larynx,*



6. uvula, 7. alveolum, 8. root of tongue.

6. Identify these close-ups of sections of the upper vocal tract.

(a) 

(b) 

(c) 

(d) 

7. Which of the following parts of the vocal tract are moveable?

   lips, tongue, alveolum, pharynx, velum, uvula, nasal cavity.

8. Say whether the following are TRUE or FALSE. If false, say what the correct statement should be.

   (a) *The pharynx is a cartilaginous structure attached to the trachea.*

   (b) *The alveolum serves to open and close the entrance to the nasal cavity.*

   (c) *The lower front teeth are not involved in speech.*

   (d) *The uvula is the extreme tip of the soft palate.*

   (e) *Larynx is an alternative name for the teethridge.*

9. Give the technical names for the following:

wind-pipe, voice-box, space between the vocal cords, food-pipe, soft palate, teethridge, cavity at the back of the throat.

10. Distinguish (when appropriate) between the following:

the vocal tract
the upper vocal tract the supra-glottal tract the oral tract
the nasal tract.

The story so far:

Speech sounds are produced (articulated) by placing an obstacle of some kind in the path of air passing through the laryngeal, pharyngeal and/or oral cavities.

3.01 Tongue Position for Vowels

There are a huge number of different vowel sounds in the languages of the world, and, as will be seen in a moment, one of the jobs of phonetics is impose order on chaos by providing a way of describing them coherently and concisely. But whatever their differences, all vowels involve free passage of lung air through the upper vocal tract. (This is what distinguishes them from consonants, for which, as you began to see in the last chapter, there is always some obstruction above the level of the larynx). The impediment to the airstream for vowels is located at the glottis, not in the supra-glottal tract: the vocal folds are in close enough contact for vibration to occur. The sound wave that this generates is amplified by the resonance of the cavities above the larynx.

> This means that vowels are normally voiced: "normally" because voiceless vowels are a possibility — they can best be thought of as whispered vowels. Although the vocal folds aren't actually vibrating for these, there's still sufficient constriction at the glottis for the airstream to be impeded and for turbulence (i.e. a sound wave) to be generated — you can feel this constriction if you say a few vowels in as loud a whisper as you

can.

Quite a few languages (Portuguese is a well-known example) have voiceless or whispered vowels in unstressed syllables. (They aren't sonorous enough to be much use in stressed syllables). Voiceless vowels are even possible in English in words like *police* or *polite*: here the stress is on the last syllable, so the *o* in the first syllable, instead of being fully voiced, may, with some speakers, be devoiced as a preliminary to disappearing altogether: *p'lice*, *p'lite*.

Now, although the air passes freely through the vocal tract, the shape of the tract varies from one vowel to another according to the position taken up by the tongue. (But it never gets so constricted that the airstream is slowed down or blocked.)

Figures 7, 8, 9 and 11 below are from tracings of X-ray photographs taken while the vowel sound of the word in question was being uttered, so they give a true

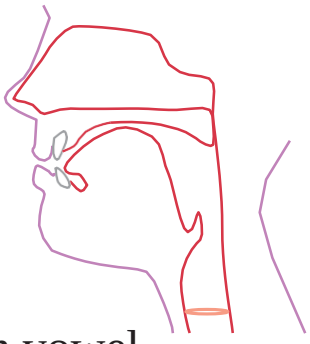
representation of the shape of the tongue — something which we're usually only very dimly aware of.

You can see how the position of the tongue differs from one vowel to another. This is the crucial factor that distinguishes, say, an *i* from an *a*, or a *u* from an *o*. For each vowel the differently shaped interior of the oral cavity generates a sound wave with unique properties, and this gives the hearer an auditory impression of vowels that are different in "quality". (The shape of the lips can also have an effect, though it doesn't show up on these pictures, as they are taken from sideways on: the role of the lips will be considered in 3.03.)

Vowel quality (determined by tongue — and lip — position) is independent of loudness (determined by the force with which the air is expelled from the lungs) and pitch (controlled by the tension of the vocal folds — see 2.03). Even when pronounced at the same pitch and with the same degree of loudness, an *i* will always be different in quality from an *a*, or an *e* from an *o*. In much the same way, an identical note will differ in quality according to whether it's played on a violin or a trumpet: violins and trumpets being different in shape (and indeed in material).

Classifying vowels is in large part a matter of specifying tongue positions. Here is the diagram for *heed* (*i*-type vowel). The surface of the tongue is high in the mouth — close to the hard palate, but not close enough for the airflow to be impeded, which would turn the vowel into a consonant.

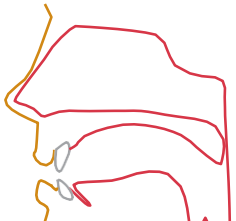
Fig. 7 *heed*



[i] is said to be a high vowel.

For *had*, the tongue is low in the mouth — almost flat; the mouth is much more open inside than for *heed*.

Fig. 8 *had*



[a] is said to be a low vowel.

Having seen these diagrams, you should be able to sense the high/low difference simply by saying [i] and [a] to yourself, and feeling the difference in tongue posture.

> In some books you'll find the terms *close* and *open* instead of *high* and *low* respectively. But there's no difference in meaning: a high vowel is the same thing as a close vowel; a low vowel is the same as an open vowel. *High* and *low* are the commonest terms,
> and they will be used in most of what follows.

Now the [u] of *who'd* is also a high vowel. What makes it different in quality from [i]?

Fig. 9

It's not quite so easy to sense the answer just by saying [i] and [u] and trying to compare the effects. But Fig. 9 should be clear enough: for [u] the tongue is pulled backwards ("retracted"), in such a way that it's arched towards the soft rather than the hard palate. So [u] is a back vowel as well as a high one. Vowels like [i] and [a], by contrast, are said to be front vowels:

Fig. 10

[i] high + front	[u] high + back
[a] low + front	

The [A] of *spa* differs from each of these three. For [A] the tongue is low (unlike [i] and [u]), but retracted (unlike [i] and [a]).

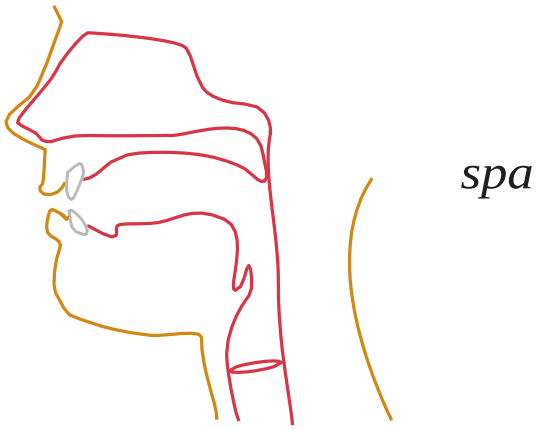


Fig. 11

So the gap in Figure 10 can now be filled in:

[i] high + front	[u] high + back
[a] low + front	[A] low + back

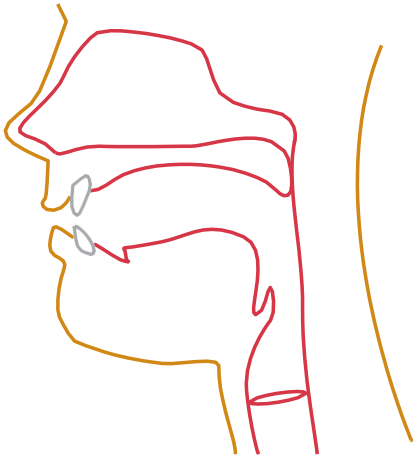
The high-low and front-back "parameters" thus operate independently of one another, intersecting to give four basic vowel sounds which occur in a great many languages.

Notice how the IPA makes a distinction between the [a]

symbol (known as "front *a*") and the [A] symbol ("back *a*"). These represent different sounds and are not interchangeable, as they would be in the ordinary alphabet. In other words, [kat] *cat* is one word, [kAt] *cart* is quite another.

Exercises

11. Without looking at the above text, say which of the vowels [i, u, A] is represented in each of the following diagrams.



(a)

(b)

(c) 

13. Again without looking at the text, say whether the following statements are true or false. Correct any that are false.

a. [a] is a high back vowel.

b. [i] is a high front vowel.

c. [u] is a low back vowel.

d. [a] is a low front vowel.

14. Practise using the alternative terminology:

a. Which is [i], open or close?

b. Which is [u], open or close?

c. Which is [a], open or close?

15. Match the articulatory terms in the first column with the descriptions in the second column

a. low "surface of tongue raised towards hard palate"

b. open "tongue advanced"

c. front "tongue retracted"

d. high "narrow oral cavity"

e. back "tongue flat"

f. close "wide oral cavity"

3.02 The Cardinal Vowels

[i], [a], [u], and [A] are the basis of the standard "international" chart of vowels — devised in the 1920s by the London University phonetician Daniel Jones, and a particularly useful invention for anyone studying Modern Languages. This chart is independent of any individual language: it provides a general grid or matrix in terms of which vowels in particular languages can be specified.

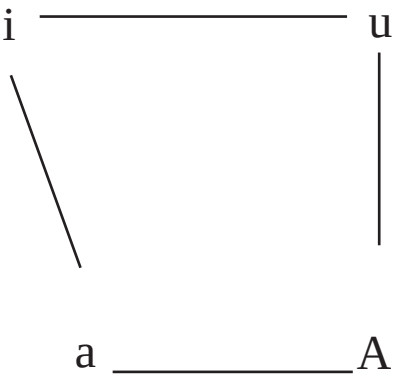
Jones's starting-point was to make a recording of the highest and "frontest" vowel which the human vocal apparatus can produce (move the tongue any higher or further forward, and the vowel will turn into a consonant because the airstream will become constricted). This is a kind of archetypal [i] vowel. For the English vowel of *heed*, the tongue is somewhat lower and less fronted than

this; Jones's "Cardinal Vowel No. 1" is much more like the [i] vowels of French, German or Spanish.

The other three "cardinal points" of the "vowel compass" were provided by the lowest possible front and back vowels (physically impossible for the tongue to be lowered any further), and by the highest and "backest" possible vowel (again, any further tongue raising or backing results in a consonant).

Here are these four vowels displayed around a quadrilateral. For anatomical reasons low front vowels can't be as far forward as high front vowels, so the resulting figure isn't quite symmetrical.

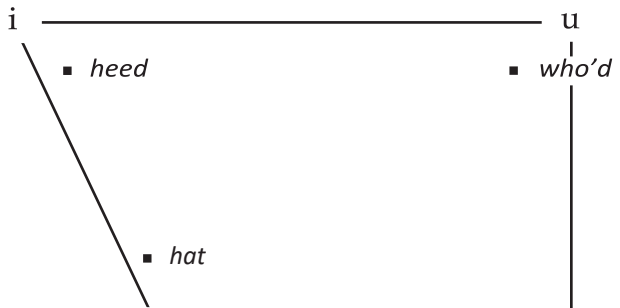
Fig. 13



The English vowel of *spa* is a fairly good approximation to [a], but, in Southern British pronunciation at any rate, the vowels in *hat* and *who'd* are respectively higher and lower than cardinal [a] and [u]. French *patte* and *sous*, German *hat* and *Fuß*, Spanish *más* and *su* have vowels that are much closer to these two cardinals in quality.

Here is the chart again, with ▪ marking the position of three "non-cardinal" English vowels in relation to the "basic four".

Fig. 14



Such diagrams are schematic representations of the "vowel area" of the mouth: just like the vowels of *heed*, *hat* and *who'd* in Fig. 14, each of the hundreds of different vowels that the the human vocal apparatus can produce is locatable at some point within the space bordered by [i, a, u, a]. Not that there is any need actually to include hundreds of vowels on the chart: another dozen cardinals are enough to allow all the others to be specified.

So in between the highest and lowest vowels we have "mid vowels" at equidistant intervals:

[e] (mid-high front) as in Fr *bébé*, Ger *Weh,* Sp *de*

[E] (mid-low front) as in Eng *head,* Fr *terre,* Ger *Hemd,* Sp *estar*

[O] (mid-low back) as in Fr *donne*, Ger *toll,* Sp *donde*

[o] (mid-high back) as in Fr *rose*, Ger *Kohl,* Sp *boca*.

Figure 15 shows how the four mid-vowels fit into the quadrilateral alongside the previous four. We now have a set of eight cardinal vowels that are numbered anticlockwise, starting with [i] (no. 1). Often they are referred to just by their numbers.

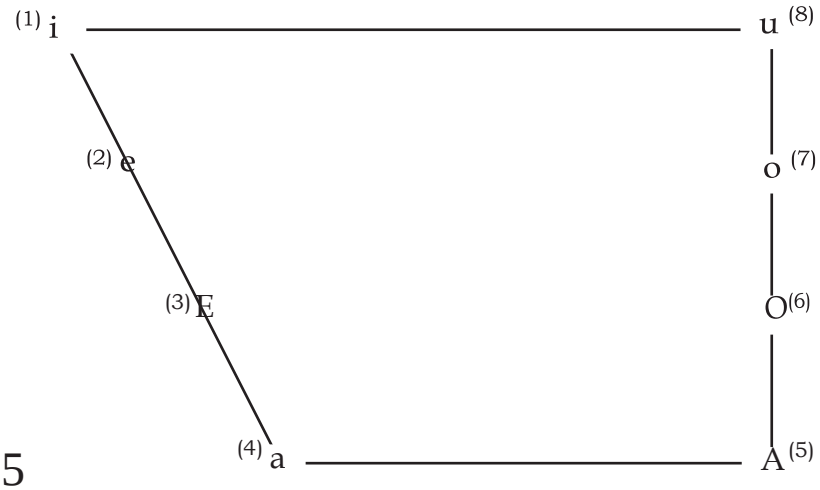


Fig. 15

As before, Southern British English isn't much of a guide. The vowel of *on* is a bit lower than Cardinal 6, though not very different from it. But the vowels of *day* and *own* really are very unlike Cardinals 2 and 7 (they're actually diphthongs — see 3.07).

> Note the name of the special phonetic symbol for Cardinal 3 [E]: "open *e*" (recall that a low vowel is also known as an open vowel, and that [E] is open compared with [e], or "close e"). Similarly "open *o*" for No. 6 [0] — this resembles an o which has been "opened up" on one side (printers use a backwards-facing c for this
> symbol.)

One more vowel to complete this section. This is actually the commonest vowel in English, although it doesn't have its own letter in the spelling (probably because it only occurs in unstressed syllables). It's the vowel spelt *a* in *about*, *e* in *patent*, *i* in *virginity*, *o* in *convince*, *u* in *pursue*. It also occurs in German (e.g. in the last syllable of *haben*)

and in French words like *le*, *de*. As the IPA operates on a strict principle of each sound having its own symbol, with no overlapping of the sort that occurs in English spelling, this vowel is represented as [@]. The name of the symbol is *schwa* (it was adapted from

the Hebrew alphabet). So *header* would be transcribed [hEd@] and you would read this out as "aitch, open *e*, dee, schwa".

> Make sure you write the *schwa* symbol as an inverted (upside-down) *e*, not as a reversed (back-to-front) *e*. And certainly not as an inverted and reversed *e*!

For [@] the tongue is held in a neutral position: neither particularly high nor particularly low (but "mid"); neither particularly front nor particularly back (but "central"). You can see this if [@] is added to the vowel chart:

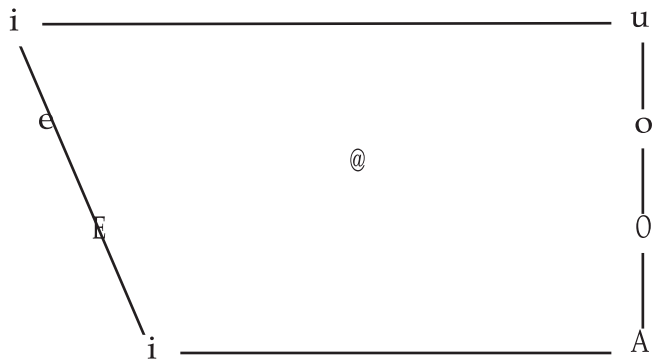


Fig. 16

This mid-central position explains why in English (and many other languages) [e] serves as a "hesitation noise" — a sound uttered when you're not sure what you're going to say next, but want to signal that you've not finished yet. The tongue is, so to speak, poised to move in any direction once you've made up your mind. So the phonetic transcription of *um*, *er* would be [@ m, @], or better still [@:] with a length mark (see 3.08).

Exercises

16. Multiple-choice revision test (don't look at the text!)

a. Daniel Jones was Professor of Phonetics at the University of:

- London
- Oxford
- Southampton
- Derby
- Edinburgh

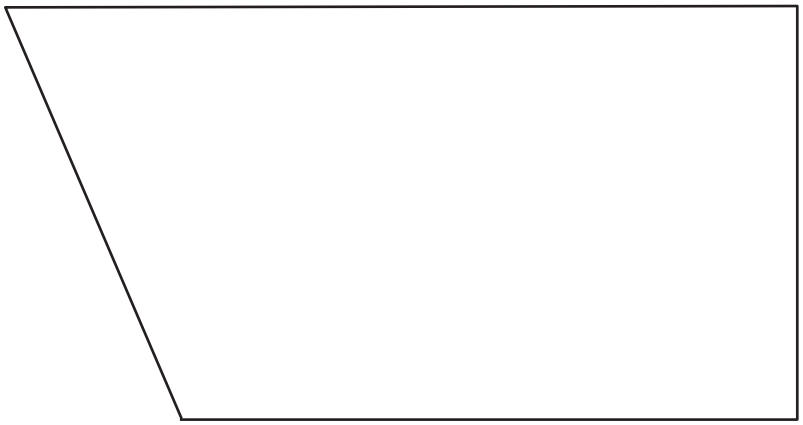
b. Cardinal vowels are so called because:

- the symbols used for them look like cardinal's hats
- they are more important than the other vowels
- they guide you like the cardinal points of a compass
- they occur in all languages

c. The cardinal vowel chart is important because:

- it provides a framework for the description of the vowel sounds of any language
- it makes the difference between vowels and consonants clearer
- the first eight cardinal vowels are exactly the same as those of Southern British English.
- it shows the most important vowels of any language

17. Without referring back to the text, complete this chart by inserting the symbols for cardinal vowels 1-8.



18. Write out the schwa symbol a few times, then check that you've done it properly by turning the page upside down. What you've written should now look like an **e**.

19. For whichever of the languages you know, indicate the cardinal vowels that correspond to the vowels underlined in the spelling:

French: **bête, foule, premier, patte, été, rose, prêt, pré, dehors, sortie, petit, sous**

German: **sehen, Hände, wenden, ruhen, Sonne, Sohn, hatte, Vater, Tier, See, wahr**

Spanish: **ser, amigo, hombre, hoja, cabo, verde, clase, hemos, rojo, grande, salir.**

20. Read out the following nonsense words (i.e. words not actually occurring in any of the languages). Don't just pronounce them as though they were English words: the more "foreign" you can make them sound, the more likely your cardinal vowels are to be authentic!

pEm, fep, lak, lAk, tOb, tob,
fuba, esiv melAg, wOp@s,
sEtAf, akamAz, AkAmaz, fusEki
kOmus@, ponOsE, ohelEg, tim@nA, @pezu, elOkEso

3.03 Lip Rounding

The two high cardinal vowels 1 and 8 aren't only differentiated by the fact that [i] is front and [u] is back. For [u] the lips take on a rounded position, much as for whistling. But for [i] the lips aren't rounded in this way — in fact the most authentic cardinal [i] is obtained if the lips are spread energetically sideways (as if the teeth were being bared). This difference between "rounded" and "unrounded" applies to other vowels as well. The front vowels [e, E, and a] are unrounded just like [i]; the back vowels [o and O] are rounded like [u].

As before, English isn't the best language to illustrate this point. The lips are indeed somewhat rounded for the vowels of words like *food* or *on* (try these for yourself), and rounding is unquestionably absent in the case of *heed* or *head* (try these too). But the rounded vowels aren't very strongly rounded, nor are the lips noticeably spread for the unrounded ones. In French, German or Spanish, the rounding/unrounding effect is more marked — this is something to be imitated if you want to make your pronunciation more "authentic".

So we can add a further parameter to the two we met before. Vowels are distinguished by tongue position (the high/low axis and the front/back axis) AND by lip position (the rounded/unrounded axis). In practice there are significant intermediate positions between high and

low (the mid-vowels described in 3.3) and sometimes between front and back: on the other hand, the rounded/unrounded axis operates in a binary way, with vowels counting as either one or the other.

Exercises

21. Which of the following words contain rounded vowels and which unrounded vowels?

French: **tête, fou, patte, cru, rose, prêt, pré** *German:* **Reh, Hand, hoch, Sohn, früh, Tier, wahr** *Spanish:* **ser, loco, verde, cara, tu, lo, si**.

22. Characterize the following vowels in terms of the three parameters. For example:
[i] = *high, front, unrounded*.

[u]
[e]
[E]
[a]
[O]
[@]

3.04 Reversing the Lip Position

With the vowels considered so far, if they are FRONT they're UNROUNDED and if they are BACK they're ROUNDED. But things don't have to be that way: these parameters are independent of one another, and both French and German contain examples of FRONT vowels that are *ROUNDED*. Thus the vowel of French *lune* or German *für* resembles [i] in tongue

position (high, front), but is like [u] in lip position (rounded). Anyone studying these languages knows only too well that this is an entirely distinct vowel: *rue* is not the same as *roue* or *ri*; *für* is different from *fuhr* and *vier*. Therefore it needs its own phonetic symbol, and [y] is used for it. (In the IPA *y* has the same value as in ordinary German spelling where it's identical to *ü*: *Psychologie*, etc.).

Be sure that you're clear about the difference between:

[i] high, front, unrounded

[u] high, back, rounded

[y] high, front, rounded

And clear about how the vowels in the various words just mentioned are transcribed:

[ri] = *ri*, [ru] = *roue*, [ry] = *rue*

[fir] = *vier*, [fur] = *fuhr*, [fyr] = *für*

English speakers tend to mispronounce [y] as [u], i.e. they keep it rounded, but use a high back instead of a high front tongue position. So in French they confuse *rue* and *roue*. This is because all the rounded vowels of English happen to be back, so the reflex of English speakers is to retract the tongue for *any* rounded vowel they come across.

An alternative anglophone subterfuge is to make French *pu* sound like English *pew*. This time the single French front rounded [y] vowel is being split into a sequence of two vowels: a short [i] (front) then a [u] (rounded). Ingenious, but it won't do either.

Curiously, speakers of Spanish or Italian, whose languages don't have front rounded vowels either, often mispronounce [y] in the "opposite" way — as [i]. That is, they keep the front tongue position, but make the vowel unrounded.

So the only way to get it right is to try as hard as you can to keep the vowel front (tongue position for [i]) while strongly rounding the lips (lip position for [u]). At all costs avoid retracting the tongue — this turns front [y] into back [u], which is precisely what is *not* wanted.

Exercises

23. Give the IPA symbols for the vowels underlined in

each of the following words, in either or both languages:

French: **pu, pou, pis, voulu, lugubre, fourrure**

German: **Ufer, über, Mühe, Fuß, Füße, Zypresse, Statue.**

Now read the words aloud, using the appropriate vowel.

24. Rewrite, using ordinary spelling:

French: [ful] [lyn] [bude] [fyme] [vu] [vy] [fu] [fy] [u] [y]

German: [hyg@l] [mut] [ku] [zys] [fyl@n] [hun] [nud@l]

3.05 The secondary Cardinal Vowels

French and German have more front rounded vowels than just [y]. If the mid-high front [e] is pronounced with rounded lips, the the result is the vowel of *peu* or the first syllable of *mögen*. In other words this is a vowel that has the same relationship to [e] as [y] has to [i]. It's a distinct and important item, and therefore it too has its own symbol: [ø] ("slashed *o*").

Try to keep the front tongue position of [e] while rounding the lips. A common anglophone mispronunciation is to pronounce [ø] like a long version of [@]. But this is too far back, and it isn't rounded, so it won't do.

As Spanish and Italian don't have [@], the usual hispanophone or italophone mispronunciation is simply to unround [ø] and

pronounce it as [e], so that *deux* and *des* become identical.

Yet another front rounded vowel in both French and German is the counterpart of [E]. This occurs in *peur* or *Götter*, and is transcribed [œ], following the spelling of French words like *soeur*. Get the distinction between [e] and [E] fixed in mind, then say [e] with rounded lips, and the result should be a perfect [œ]. Again, a long [e] isn't acceptable: *purr* is a very poor substitute for *peur*!

> The correct term for a composite letter like [œ] is *digraph*, not *diphthong*: diphthongs are something different, as will be seen [illegible]
> term *ligature* referring to the tie-bar 7 sometimes used as an linking two elements of a

One problem with [ø] and [œ] is that French and German spelling don't distinguish clearly between them: the vowels of *peu* and *peur* are not in fact the same. As a rule of thumb, in French the letter sequence *eu* is pronounced [ø] at the ends of words, but [œ] before a consonant. Accordingly *heureux* is [œrø].

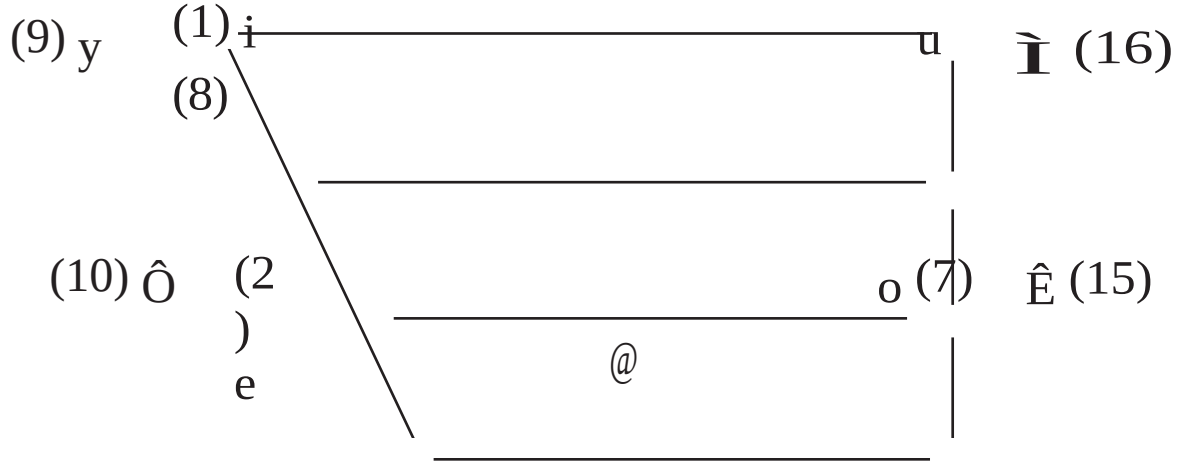
To summarize, we've looked at the following examples of reversal of lip rounding:

[y] high, front,	[i] high, front,
[ø] mid-high, front,	[e] mid-high, front,
[œ] mid-low, front,	[E] mid-low, front,

It should come as no surprise if it's now revealed that the lip position of any of cardinal vowels 1 to 8 can be reversed in this way. Many languages of the Far East, for example, have BACK UNROUNDED vowels. Try saying the Japanese name *Suzuki* with lips resolutely spread throughout (not rounded), but no less resolutely keeping a back tongue position for the two *u*'s, and this should give you an idea of what [ɯ] — the unrounded equivalent of [u] — sounds like. Again, schwa won't do — this time because it's too far forward.

> Japanese lacks a back rounded vowel of a [u] type altogether — in fact the only one of this language's five vowels that's to any extent rounded is [ɔ]: all the others ([i, e, a, ɯ]) are unrounded. This relative lack of rounded vowels naturally has a marked effect on Japanese pronunciation of European languages, especially French, which, with more rounded than unrounded vowels, is the "opposite" of Japanese in this respect.

So alongside the "primary" series of cardinal vowels (1 to 8), there is a "secondary" series (9 to 16) — identical in tongue position, but opposite in respect of lip rounding. This too figures on Daniel Jones's historic recording. Here is the chart with both primary and secondary cardinals included:



(11) ◦ (3) E O (6) ^ (14)

At this stage, you should be able to reproduce the chart of the eight primary vowels from memory, and also locate on it [@] and cardinals 9, 10 and 11. You neednt worry about 12-16 — apart from noting their existence. You should also have a clear auditory image of what

Exercises

25. Match the vowels in the first column with the descriptions in the second.

[y]	high, front, unrounded
[e]	mid-low, front, unrounded
[E]	high, front, rounded
[ø]	mid-high, front, unrounded
[i]	mid-low, front, rounded
[œ]	mid-high, front, rounded

26. Say whether the following statements are True or False:

- front vowels are always unrounded in English
- any vowel can be rounded or unrounded
- intermediate lip positions between rounded and unrounded are important in distinguishing vowels
- intermediate tongue positions between high and low are important in distinguishing vowels.

27. Which of the following languages make(s) use of lip rounding to distinguish between vowels?

English, French, German, Italian, Japanese, Spanish.

28. Give the IPA symbols corresponding to the underlined vowels in one or more of the languages indicated:

French: **bonheur, soeur, deux, milieu, jeune, stupeur, peut-être.**

German: **Söhne, völlig, Körper, mögen, köstlich, Goethe, töten.**

29. What words do you get if you reverse the lip rounding in the following (concentrate on pronunciation, not on spelling)?

French: **père, mère, ces, des, si, cri, heure, noeud**

German: **Heere, Hölle, Tier, Kölner, lügen, kennen, fühle**

30. Rewrite in ordinary spelling:

French: **[sœl], [famÔ], [idÔ]**

German: **[fÔg@l], [gœn@n], [hÔl@].**

3.06 Focus on English

In this section, you will see how the cardinal vowel

system can be used to identify and characterize a few of the pronunciations of English vowels heard in the British Isles and across the world.

One term you should note at this point is *Received Pronunciation* or *RP* (another Daniel Jones invention). This slightly odd expression refers to the "standard British English accent", the one used for example by most BBC television and radio newsreaders and presenters — or, in a somewhat more conservative form, by the Queen herself. (Hence the expression *Queen's English*, which is roughly equivalent; *BBC English* is another term sometimes encountered). Middle-class pronunciation in England approximates to RP. This is especially true in the South, as Received Pronunciation derives from southern — particularly London — varieties, not from Midland, northern, Scots, Welsh, Irish, etc.

As has been hinted already, the vowels of RP are not particularly close to the cardinal values. The pronunciation is less tense than that of, say, standard French: the tongue takes up positions that are less "extreme", and the lips are less energetically spread or rounded. So RP vowels tend to be located towards the centre of the vowel area, not around its edge. For the more obviously "non-cardinal" RP vowels, the IPA uses additional symbols; for the others the cardinal symbols are retained — with the proviso that the pronunciation may deviate from the strict cardinal value (compare the [i] in Eng *need* with the one in Fr *midi*).

Here are a few extra symbols commonly used in the transcription of English. The sounds they represent aren't unique to English of course, and the symbols can be used for other languages if appropriate. None of them are required for French or Spanish, but two of them are needed for German.

[{] This symbol ("*a-e* ligature") is for the vowel of *pat*, which is somewhat higher than Cardinal 4, though still front — it's midway between [a] and [E] in fact:

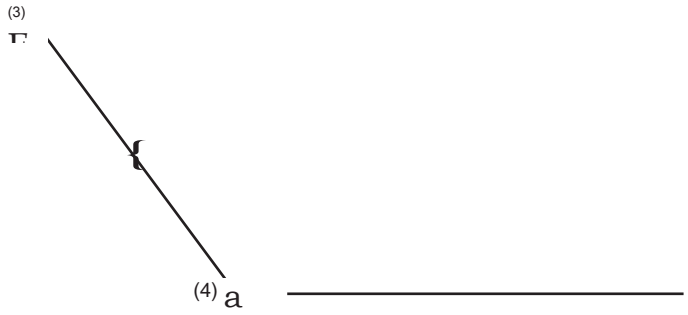


Fig. 18

This is why the symbol consists of an *a* and an *e* linked in a digraph.

As for the pronunciation, think of the difference between an authentically French pronunciation of *patte* and the usual S. British pronunciation of this word that makes it sound too much like *pat*. But many speakers from other parts of the British Isles pronounce *pat* with a vowel that is close to, or identical with Cardinal 4 — and accordingly close to or identical with the French, German or Spanish [a].

[I] This is for the vowel of *hit*, which is lower and backer than the [i] of *heed*

— itself a little lower and backer than Cardinal No. 1:

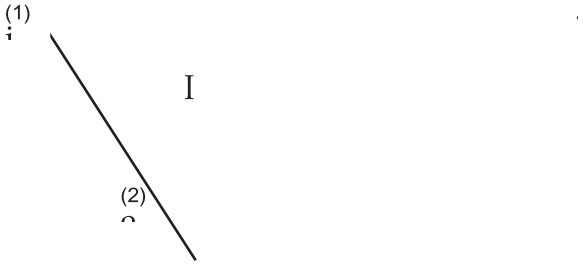


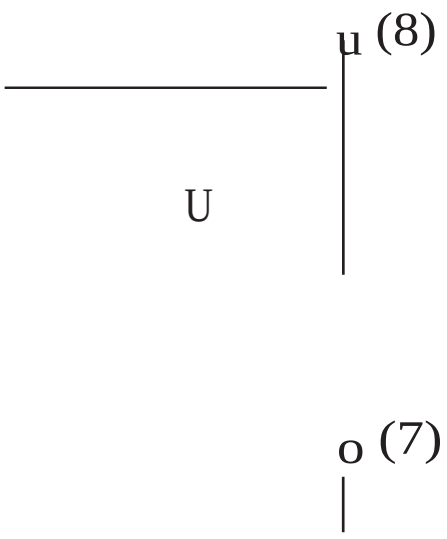
Fig. 19

The [i]/[I] distinction is a crucial one in English, as hundreds of pairs of words depend on it: *feet, fit; meal, mill; relieve, relive,* etc. It is no less important in German (*ihn, in; Miete, Mitte*). But standard French and Spanish have only an [i] and no [I]. However,
[I] is a feature of the French of Belgium and Canada.

The symbol is referred to as "small capital *i*". For languages like English and German which need [I] as well as [i], the latter can be referred to as "lower-case *i*" when clarity is required.

[U] Read "upsilon". It's the mirror-image of [I] in the opposite corner of the vowel chart, being further forward and lower than back [u], which itself is slightly further forward and lower than Cardinal No. 8. *Full* [U] and *fool* [u] illustrate the difference in English; *Fluß* [U] and *Fuß* [u] in German.

Fig. 20



Germanists should note a further symbol! English has two high vowels [i] and [u], each with a more central equivalent [I] and [U], as you've just seen. But German has three high

vowels [i], [u] and [y], and, symmetrically enough, each of the three has a "centralized" equivalent [I], [ʊ] AND [Y]. This last vowel (read "small capital y") is found in many common words (*fünf*, *müssen*) and sometimes serves to distinguish pairs, e.g. *hüte*, with [y], and *Hütte*, with [Y]. Standard French, on the other hand, which lacks [I] and [U], also — not surprisingly — lacks [Y]. (But the latter, like [I] and [U], is used in Canada and Belgium.)

[ɐ] This is sometimes used for the vowel of *on, hot, lost* (read "reversed italic *a*"). It's actually the symbol for Cardinal 13. The English vowel in question is located between this and Cardinal 6 [O], so some transcribers prefer to use [O] for *on, hot, lost*, etc.

[O:] This is Cardinal 6 with a length-mark (see 3.08) and the normal way of representing the vowel of *horse, caught, lawn*: [hO:s], [kO:t], [lO:n].

[ʌ] "Turned *v*" is actually the symbol for Cardinal 14 (one of the back unrounded vowels you were told not to worry about in 3.05). The RP vowel found in words like *up, butter, come* is close enough to this for [u] to be used to represent it in transcriptions of English. Note it carefully: it's a very common sound in RP, where *put*, with [U], is not at all the same thing as the golfing term *putt*, with [ʌ].

These symbols are in general use for transcribing English. Less widely adopted is [ɜ] ("reversed open *e*"), which some phoneticians use for the vowel in *her, girl, first*,

etc. But this sound is really just a long schwa, so it's OK to represent it as [@:] and economize on a symbol (see 3.08 for the length-mark :).

Exercises

31. Can you remember?

a. what the standard British accent is called?
b. the term used for composite symbols like [æ] or [œ]?
c. the names of the symbols [i],[u] and [ ]?
d. the characteristic general difference between Southern British vowels and those of standard French, German or Spanish?

32. Southern pronunciation is the basis for the British standard because:

a. London is the capital of the UK
b. It is a more attractive way of pronouncing words
c. Southern vowels are less like the vowels of continental languages
d. It is an easier, more natural way of speaking.

33. Say what IPA symbols would best represent the vowels underlined in the following words:

hand, car, alphabet, foot, butter, further, roar, swan, wish, monkey, some, cough, enough, yawn, pull, knowledge.

34. The following are all identical in pronunciation: *hallo*, *hello*, *hullo*. What's the transcription?

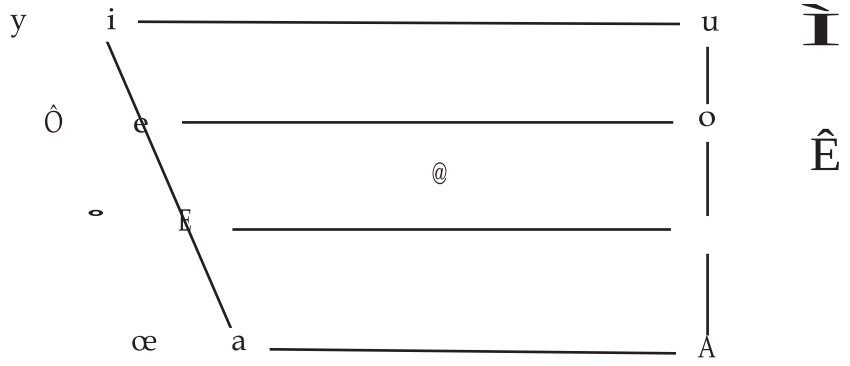
35. Here are some common English words in IPA transcription. Rewrite them in ordinary spelling and/or read them out. Make sure you are clear *why* the symbols are used in the way they are.

[lif] [lIv] [bˆt] [bæt] [but] [lUk] [kOd]
[kO:d] [gUd] [kˆntrI**] [s**E**k@nd]**
[stˆm@k] [E**ks**E**pt] [b**U**z@m] [hæb**I**t]**.

36. The pronunciation of the vowels in the following words differs from RP in the localities indicated. Insert the vowel symbol appropriate to the local pronunciation.

foot (Scotland) [ ], *fast* (N. England) [ ], *fast* (USA) [ ] , *up* (N. England)
[ ], *cap* (S. Africa) [ ], *off* (Buckingham Palace) [ ], *cross* (USA) [ ].

37. Complete this vowel chart by inserting [I, {, U, ¡, O:, ˆ].



The story so far:

Vowels are classified in terms of three parameters affecting the shape of the oral cavity: tongue height, tongue fronting, lip rounding.

Diphthongs are vowels involving a change of tongue position.

4.01 Classifying Consonants

You'll recall that the basic way in which vowels and consonants differ is that, whether it's voiced or voiceless, producing a consonant involves some sort of constriction above the level of the glottis, with ensuing airstream turbulence. The obstruction may be partial (as for *s*), intermittent (as for a trilled *r*) or complete (as — momentarily — for *p*). But consonants, unlike vowels, always involve a "supra-glottal" constriction of some kind.

Consequently, although consonants are also classified according to three parameters, these are different from the ones you have been studying for vowels. One consonant parameter has already been described in 2.04: *voicing*.

There are two others: *place of articulation* and *manner of articulation*. Respectively they specify where the airstream is constricted and how it's constricted.

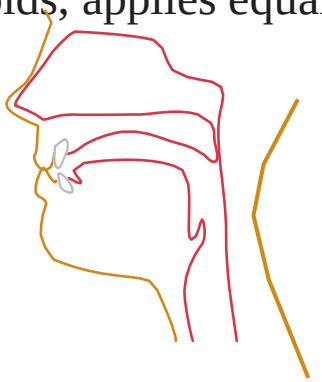
4.02 Place of Articulation: Bilabials, Dentals, Alveolars and Velars

Where, for each consonant, is the point of narrowest constriction along the vocal tract? Compare three pairs of consonants which occur in all European languages:

[p, b], [t, d], [k, g].

[p] and [b] are both produced by means of a constriction involving the lips, as is obvious if you just say [apa], [aba] slowly to yourself. The vocal folds continue to vibrate in the case of [b], but not in the case of [p]: otherwise there's no difference between them, and the following diagram, which doesn't show the vocal folds, applies equally well to both.

Fig 24



[p, b]

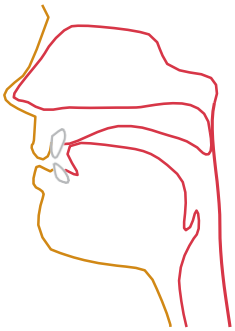
Consonants like [p] and [b] are **BILABIAL** (this word is simply the Latin for "both lips").

For [t] and [d] the lips aren't involved in the obstruction of the airstream. This time (in English at least) the

constriction is produced by bringing the tip of the tongue into contact with the teethridge (alveolum). Say [ata], [ada] to confirm this.

Fig 25

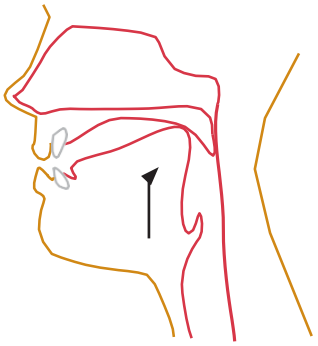
[t, d]



So English [t] and [d] are **ALVEOLAR**. (Strictly speaking, as the tongue is involved as well as the teethridge, the term ought to be *lingual-alveolar*: however, most consonants involve the tongue in some way or other, so there's no point in specifying *lingual-* each time.)

Finally, for [k] and [g], the constriction involves the back of the tongue, which is brought into contact with the soft palate (velum). Therefore these are **VELAR** consonants. Although this part of the oral cavity is less easy to monitor than the area around the lips and teeth, you can get a rough impression of the tongue position by saying [aka] and [aga] slowly to yourself. But only a diagram can show the surprising extent to which the back of the tongue is raised for velars.

Fig 26

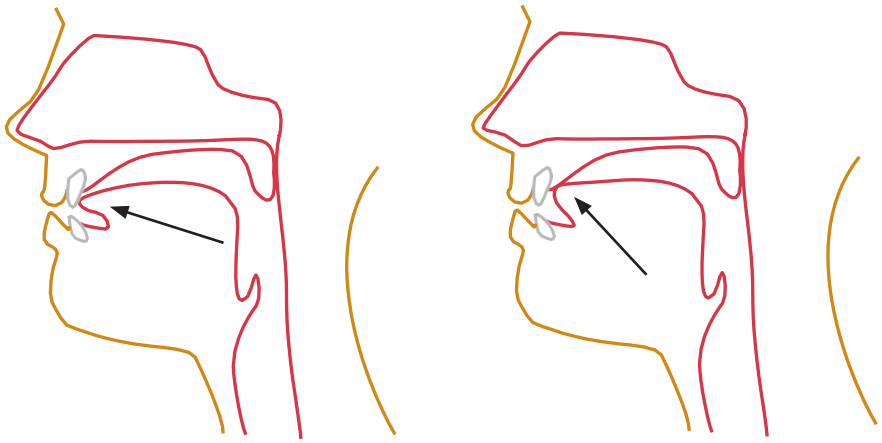


[k, g]

There's a slight but significant difference between [t,

d] in English as compared with the corresponding consonants in French, Spanish and Italian. In the last three languages the tongue is always placed against the back of the upper front teeth for [t, d], not against the teethridge, and this results in a slightly "sharper" sound. The term DENTAL is used in this case. (German [t] and [d] are alveolar, just as in English.) Fig. 27 shows the difference between the places of articulation for dental and alveolar consonants.

Fig 27



Dental [t̪, d̪] Alveolar [t, d]

As you can see from Fig. 27, the IPA specifies the dental/alveolar difference by placing a "tooth mark" below the dentals: [t̪ d̪].This is obviously useful when languages are being compared. However, in everyday transcription of French, Spanish or Italian, the mark can be omitted: [t, d] are always dental in these languages, so it's unnecessary to specify the fact every time one of them comes up.

Though not exactly one of the most crucial

pronunciation differences between English or German on the one hand and French, Spanish or Italian on the other, the [t d]/[t̪ d̪] distinction isn't difficult to achieve, and it's worth the effort to make your pronunciation that little bit more authentic. Just remember to place your tongue fractionally further forward when you make the consonant.

There's no difference in place of articulation between English and the other languages in the case of [p, b] or [k, g].

Now we can start building up the IPA consonant chart. Here are the four places of articulation mentioned so far. As with the vowel chart, the left-hand side corresponds to the front of the mouth, the right-hand side to the back.

FIG. 28

bilabial	dental	alveolar	velar

Exercises

38. Resisting the temptation to look at the text again, place the following consonants in the appropriate square in Fig. 28 above (say the sound to yourself if in doubt). Voiceless and voiced pairs go next to one another in the same square (voiceless first).

[k, d, p, g, θ, b, ð, t]

39. Complete the following characterizations by inserting, in each case, two of the following terms: *voiced*, *voiceless*, *bilabial*, *dental*, *alveolar*, *velar*. N.B. voicing comes before place of articulation in such characterizations.

[b] is a _____ consonant

[k] is a _____ consonant

[d] is a _____ consonant

[t] is a _____ consonant.

40. Give the IPA consonant symbol corresponding to each of the following characterizations:

voiceless alveolar _____

voiced velar _____

voiced dental _____

voiceless bilabial _____

4.03 Manner of articulation.

If we now take two further consonants — [s] and [z] — and specify them in terms of voicing and place of articulation, we get the following characterization:

[s]: voiceless
alveolar [z]:
voiced
alveolar.

Just like [t] and [d]: airstream obstruction at the alveolar ridge. So what's the difference between [s, z] on the one hand, and [t, d] on the other?

The answer is that different *kinds* of obstruction are involved. Or, as the phoneticians put it, [s] has the same place of articulation as [t], but a different ***manner of articulation***.

Let's consider in more detail *how* consonants like [p, b, t, d, k, g] are produced (now that we've seen *where* they're produced). Then we'll consider how the "mechanism" differs for consonants like [s, z].

4.04 Stops (or Plosives)

[p, b, t, d, k, g] all involve a complete blockage of the airstream, albeit one of very short duration. Taking the nonsense word [apa] again, here are your instructions for articulating the [p], in three "slow motion" stages.

Say the first [a] vowel. Then:

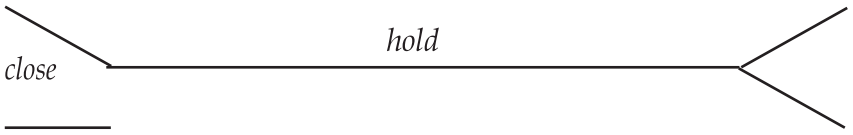
1. Close the lips firmly.

2. Keep them closed while continuing to allow air to come up from the lungs: air pressure builds up behind the closed lips.
3. Now part the lips. The air under pressure will suddenly be released, generating a disturbance (a sound-wave) in the surrounding air.

Then say the second [a] vowel.

These three stages are known respectively as (1) closure, (2) hold, (3) release. Fig. 28 shows them in diagram form.

FIG. 28



The X-ray tracings that were given in 3.01 represent the "hold" stage. But it is of course not until the moment of "release" in stage 3 that the actual consonant sound is perceived, thanks to the sound wave that reaches the ear a fraction of a second later. In stages 1 and 2, there's no sound. Say [apa] to yourself extremely slowly, and you should become aware of this period of silence, and also, during it, of the build-up of air-pressure behind the point of closure. But in normal speech we aren't conscious of any of these processes: they occur far too quickly and automatically for us to notice them, and in any case we're too busy thinking about what we want to say next.

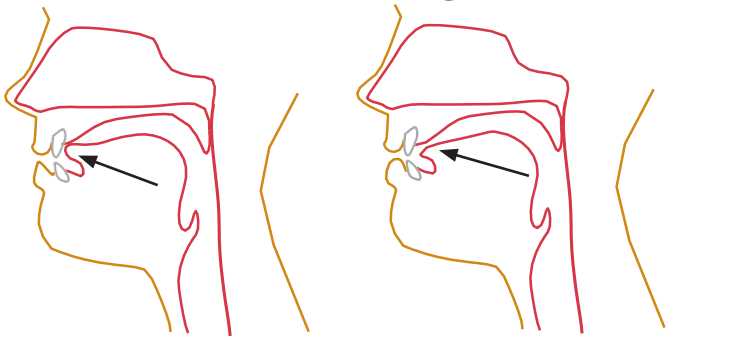
The same three stages are involved for [b], [t, d], [t d] and [k, g]. For the dentals the airstream is blocked at the teeth (by the tip of the tongue), for the alveolars at the teethridge (by the blade of the tongue) and for the velars at the soft palate (by the back of the tongue). But the "close-hold-release" mechanism is identical in all cases.

Consonants like these are known either as STOPS (this term relates to the blockage of the airflow in stage 1) or as PLOSIVES (this relates to the explosive release of air in stage 3). But both terms refer to the same category of consonant: nowadays, *stop* is used more often than *plosive*.

4.05 Fricatives

[s] and [z] *don't* involve a complete obstruction of the airstream. The blade of the tongue is held against the teethridge as for [t, d], but sufficiently loosely for the air to be able to force its way through. Nonetheless, there is enough resistance at the point of constriction for turbulence to be caused and a sound wave generated. So [s] and [z] are examples of consonants with partial obstruction of the air-stream, and are known as FRICATIVES (this term refers to the friction caused by the air as it passes through the narrow gap).

The following diagram should make the difference between [t] and [s] clear. (The voiced pair [d] and [z] would look the same, as voicing isn't shown here.)



Stop [t] Fricative [s]

FIG. 29

So now we can give a complete characterization of the sounds considered so far. This time we specify (a) voicing, (b) place

of articulation, AND (c) manner of articulation. Thus:

[s] is a voiceless alveolar fricative

[t] is a voiceless alveolar stop

[b] is a voiced bilabial stop.

Many other fricatives can be produced at various points along the vocal tract. In all cases, the airstream is forced through a narrow channel or aperture, and there's always the same hissing or scraping effect.

Take for example [T] and [D]. The point of articulation is dental, but the manner of articulation is fricative, not stop. You should easily be able to feel the air passing between the tongue-tip and the back of the teeth, and the loose contact between them. (With voicing added in the case of [ð] of course.)

It follows from the difference between these two manners of articulation that you can prolong a fricative until you run out of breath (try it with [s]), whereas a stop is an instantaneous sound (an explosion can't be prolonged). Try to prolong a [t]: you won't be able to (and saying [t@:] is cheating!).

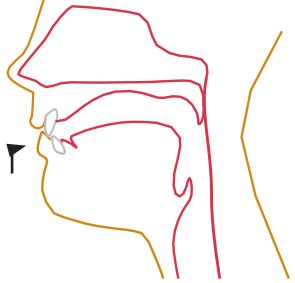
Here is an expanded version of our embryonic IPA consonant chart (still far from complete though), with all the consonants discussed so far — and a few more. This time there are two extra points of articulation (underlined), and *fricative* has been brought in as a second manner of articulation.

F$_{IG}$. 30

	bilabial	labio-dental	dental	alveolar	post-alveolar	velar
STOP	p b		t d	t d		k g
FRICATIVE		f v	□ D		□ □	

Note the two additional pairs of fricatives here:

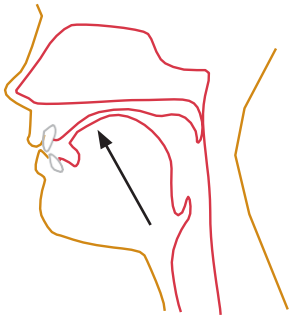
For [f] and [v] the air is forced between the upper lip and the lower front teeth (hence
labio-dental at the top of the column).



[f, v]

FIG. 31

[S] is the voiceless consonant commonly written *sh* in English, *ch* in French, and *sch* in German. The IPA symbol is read "esh", or "long s". Its voiced partner [Z] (read "ezh" or "long *z*") is of frequent occurrence in French (spelt *j*, as in *jour*), but is relatively rare in English, where it's the second consonant of *leisure*, or the last one of *camouflage*. In German [Z] is only used in words taken from French (*Passage*). Neither [S] nor [Z] occur in standard (Castilian) Spanish, but [Z] is a common pronunciation of *-ll-* (e.g. in *calle*) and of *-y-* (e.g. in *yo*) both in Latin America and in Spain (where, however, it is frowned upon as "substandard").



[S, Z]

FIG. 32

As you can see from Fig. 32, the constriction for [S] and [Z] involves the front, rather than the blade of the tongue, and is located just behind the teethridge. Hence the term *post-alveolar* at the top of the column (*post-* meaning "behind").

So [s] is alveolar and [S] is post-alveolar. Say them in succession and you should feel the difference.

There are still some empty squares in Fig. 30. They can be filled up with pronounceable consonants — though not ones that are encountered in standard English (or French). The following are worth knowing about — particularly if you are studying the language in question.

The voiced bilabial fricative (IPA symbol ¬, read "beta"). In Spanish, this often replaces the voiced bilabial stop [b], in particular between vowels (*haber* [a¬Er], *se baja* [se¬axa]). The closure made by speakers for the *b* isn't quite complete, and this results in a fricative [¬] rather than a stop [b].

The voiceless velar fricative. This is spelt *ch* in German and *j* in Spanish — and occurs in words like *Buch* and *baja*. This consonant has the same point of articulation as *k*, but, again, partial not complete closure of the vocal tract. The IPA uses the symbol [x] to represent it: so *Buch* is transcribed [bux] and *baja* [baxa].

A voiced velar fricative, transcribed [□] — read "gamma" — replaces the voiced velar stop [g] between vowels in Spanish words like *luego* [lwe□o] or *pagar* [pa□ar]. This parallels the replacement of the bilabial stop [b] by the fricative [¬].

Non-specialist accounts of pronunciation try to describe sounds like [g] or [□] by means of expressions such as "hard vs. soft g". Hopefully you'll agree that *stop* and *fricative* are a lot more precise and informative, at least when used in conjunction with the name of a place of articulation. "Soft g" could as easily refer to the *ɡ*

of *germ* as to [□], but a term like "voiced velar fricative" is unambiguous.

Exercises

41. Complete the blank diagram as follows:

a. Insert the names of the points of articulation studied so far, involving (listed here in random order):

(1) tip of tongue + teethridge

(2) lower lip + upper lip

(3) back of tongue + soft palate

(4) lower lip + upper teeth

(5) front of tongue + hard palate

(6) tip of tongue + back of upper front teeth.

Use the appropriate technical terms, making sure that you insert them in the right squares and arrange them in the correct order.

b. Insert the two manners of articulation studied so far: (1) with complete closure, (2) with partial closure.

c. Insert the sounds represented by the following IPA symbols: [x]

[z] [S] [¬] [ ] [g] [t]

42. The consonants in each of the following pairs are alike in some respects, but different in others. Specify the resemblances and differences. Example: [p] and [b]. Both are bilabial. Both are stops. [p] is voiceless, [b] is voiced.

[z] and [d]

[s] and [d]

[t] and [k]

[v] and [g]

[b] and [¬]

[v] and [¬]

[b] and [v]

[s] and [S]

43. Though the voiceless velar fricative [x] doesn't occur in RP (or most other varieties of English) it is a feature of Scots English and Liverpool English, and occurs in some Irish place and personal names. Think of examples of words containing it.

44. If the IPA symbol [x] represents a velar fricative (unknown in most varieties of English), how would a word containing *x* in the spelling be transcribed? *Extra*, for instance. (Think carefully about what this letter corresponds to in the pronunciation.)

45. Non-technical books sometimes try to describe Spanish [¬] by talking about "a cross between *b* and *v*". What are they getting at?

46. Rewrite in ordinary (English) spelling:

[lA:fs] [kl@UDz] [hi:Dnz] [peISns] [@UT] [w@:Tl@s] [Tˆm]
[f{Sen] [kl@UZe] [lˆS@s] [beIZ] [ju:ZU@l] [S@rA:d] [lˆkS@rI].

47. Transcribe, using IPA symbols:

cake, bouquet, bagpipes, oaths, gnaw, sash, pleasure, Asia, breath, breathe, photo, physics, warmth, theatre, though.

4.06 More Places: Palatal, Uvular, Pharyngeal, Glottal

So far six places of articulation have been introduced, from bilabial to velar. In actual fact, a constriction giving rise to a consonant can be made at any point along the vocal tract by bringing two "articulators" into contact. The tongue in particular being highly mobile, different parts of it can close against different parts of the roof of the mouth, giving a range of subtly varied consonants, all of which occur in some language or another.

However, the IPA contents itself with ten places of articulation, so here is the chart again with the remaining four added (underlined). Finer intergradations can be indicated if required by use of *pre-* ("in front of") or *post-* (*pre-velar*, *post-palatal*, etc.)

F$_{IG}$. 33

	bilabial	labio-dented	dental	alveolar	post-alveolar	palatal	velar	uvular	pharyn-geal	glottal
STOP										?
FRICA-TIVE						ç				h

Most of these additional places of articulation are relevant to at least one of the well- known European languages, and you should note the existence of the others. So a few further symbols have been inserted. Here is some information about the sounds that they represent.

[h] (read as "aitch" — it's incorrect to call it "haitch", whether you're using the ordinary alphabet or the IPA!). This is for the first consonant of English or German *hat*. It's classified as a ***voiceless glottal fricative***: the vocal folds

constrict the airflow, but aren't close enough together to vibrate. Effectively [h] is a whispered version of the (voiced) vowel that follows it: compare the [h] of *hard* with the [h] of *he*: during the articulation of the [h] the tongue takes up the appropropriate position for the vowel that is to follow.

> [ç] ("*c* cedilla") is for a ***voiceless palatal fricative***, with a constriction between the centre part of the tongue and the hard palate. It occurs in English as a variant of
> [h] in words like *hue* (i.e. [çju:] — with the tongue high and front in anticipation of [j]). But the [ç] symbol is used only in very detailed or "narrow" transcriptions of English: normally *hue* would be written with [h].
>
> [ç] is an important sound in standard German, where it alternates with its neighbour on the consonant chart, the velar fricative [x]. Both correspond to *ch* in the spelling: the [ç] variant occurs after high or mid front vowels (*ich*, *Bücher*, *echt*), the [x] variant after other vowels (*Buch*, *Bach*, *hoch*). Note that the diminutive suffix *-chen* is pronounced with [ç] not [x]: *tauchen* ("to dive") is [tau**x**@n], but *Tauchen* ("little rope") is [tau**ç**@n].

[?] is for the glottal stop. (The symbol — read "glottal stop" — is adapted from the Arabic alphabet: in Arabic glottal stops are important enough to have a letter to themselves.) As the name suggests, this consonant is produced at the glottis (i.e. between the vocal folds), using the same three-stage manner of articulation as all the other stops. One example of its use in English is the exclamation commonly spelt *uh-uh* (an expression of wary agreement, slight surprise, or refusal, depending on the intonation).

Phonetically this might be transcribed [@?@]: after the first schwa the vocal folds are (1) closed tightly, then (2) held together while air-pressure builds up beneath them, and finally (3) released suddenly. Though there's no perceptible "explosion", the sudden release gives a distinctively sharp onset to the second schwa, and the silent pause between the two vowels is very noticeable. Another situation where a glottal stop can used in English is to separate adjacent vowels in phrases like *India [?] and Pakistan* (though many speakers insert an *r* instead: *India [r] and Pakistan*).

> Separating adjacent syllables (the second of which begins with a vowel) is a common function of the glottal stop in German. Thus in *der* [?] *Apfel*, it would be positively incorrect to run the first word on to the second by means of a "linking *r*". In French, on the other hand, it would be just as incorrect to insert a glottal stop in equivalent phrases (e.g. after the *r* of *cher ami*). Similarly a more authentic effect is obtained in *le homard* if a glottal stop is avoided between the two words, and the [@] of *le* run directly on to the
> [O] of *homard*.

That leaves the places of articulation labelled **UVULAR** (involving the tip of the soft palate) and **PHARYNGEAL** (involving the wall of the pharynx). The *r* sounds used in standard French and German are uvular, and will be discussed separately in 4.11. Meanwhile, though the following uvulars and pharyngeals don't occur in English or any of the European languages you are studying, you may like to note them for interest's sake (and remember that they are important in the languages in which they *do* occur).

In some languages (Arabic for example), stops

occur which are produced by closing the back of the tongue against the uvula. The effect is that of a retracted, rather hollow-sounding [k] or [g]: the IPA uses the symbol [q] for the voiceless uvular stop
— as does the ordinary Western alphabet when Arabic names are written in it: the Al Qaida network, for instance. [G] is the symbol for the corresponding voiced uvular stop.

It is also possible to pull back the root of the tongue so as to create a constriction between it and the rear wall of the pharynx, giving rise to the pharyngeal fricatives which are a feature of Arabic and Hebrew (midway between [x] and [h]). These can
be voiceless [ħ] (“crossed *h*”) or voiced [ʕ] (“reversed glottal stop”). It's not possible for most people to to retract the tongue root far enough to close the pharynx completely, so pharyngeal stops don't occur.

Exercises

48. You are now in a position to enter on the IPA chart all the stops and fricatives that have been presented, so do so — together with the names of the ten points of articulation and the two manners. You might as well include the “exotic” uvulars and pharyngeals, making 11 stops and 15 fricatives altogether.

49. Glottal stops are a conspicuous (and often frowned-on) feature of some non- standard varieties of English, in words like *daughter* or *butter* — or *glottal* itself. Say how they would be used, and in which accents.

50. You may have noticed in the above text the two spellings *uvula* and *uvular*. This isn't a misprint, and they are not interchangeable: work out when each should be used.

51. With reference to as many as possible of the following languages (in their standard version), say whether these sounds are part of the repertoire or not: English, French, German, Spanish. [x], [ç], [ʔ], [q], [h].

4.07 Aspirates

Here's an final point about stops which has been kept from you so far. But it should be noted, as it's another important difference between English and German on the one hand, French, Spanish and Italian on the other.

Say the English word *pa* very slowly, clearly and deliberately. You may notice that the
[A] vowel doesn't begin immediately after stage (3) of the stop (the "release" stage). Instead there's a short pause before the vocal folds begin to vibrate, during which air passes freely through the glottis. Hence the effect of a puff of breath, or brief [h] sound, between the [p] and the vowel. The same applies to the other voiceless stops,
e.g. in *tar* or *car*.

If the same syllables are pronounced in the French, Spanish or Italian way, the vowels begin immediately after the release of the [p], [t] or [k] — no delay, so no suggestion of a puff of breath or an [h]. It is incorrect in these languages to delay the onset of the vowel.

Voiceless stops followed by a puff of breath (more technically "followed by delayed vowel onset") are said to be *aspirated*. Those without the "aspiration" are — obviously
— said to be *unaspirated*. The IPA uses a superscript *h* to

indicate aspiration: [p^{h}], [t^{h}], [k^{h}], but there's no need to include this detail in an ordinary transcription of English. Diagramatically the process can be represented as follows (aspirated stop in Fig. 33, unaspirated stop in Fig. 34):

Fig. 33

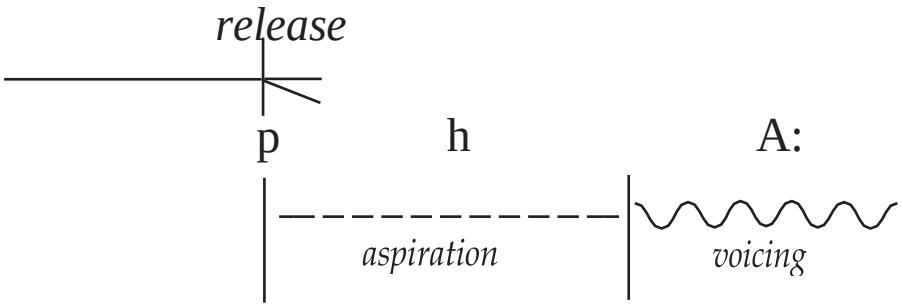
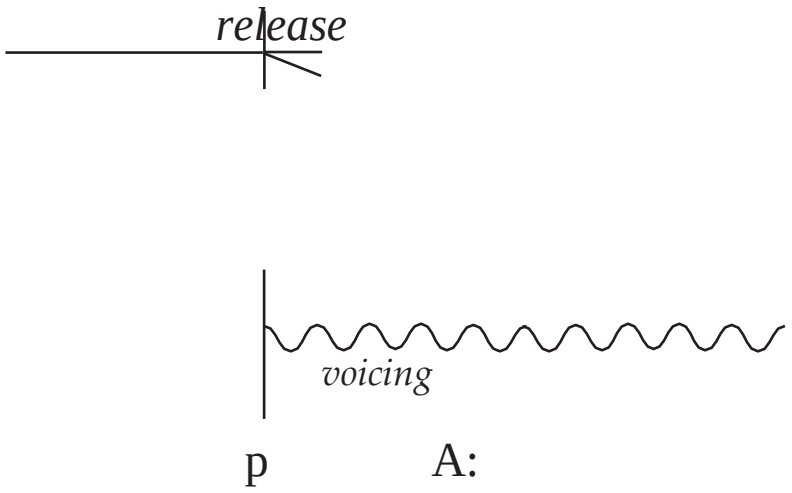


Fig. 34



Remember: In English and German voiceless stops are aspirated at the beginning of stressed syllables. In French, Spanish and Italian they are never aspirated. If you disregard this point, your pronunciation won't sound authentic, however good it may be in other respects, and native speakers will notice: when French people, for example, try to imitate a “British accent”, they go to great lengths in an attempt to produce aspirated stops.

Occasionally it's necessary to specify that a stop is unaspirated. The symbols [p=], [t=], [k=], are used for this purpose.

Note that in English and German, voiceless stops are unaspirated if preceded by a fricative. Thus: [st=□□] *star*, [sp=□□□] *spare*, [sk=a□] *sky* in English; [□t=a□t] *Staat*, [□p=its□] *Spitze* in German. The presence of [s] or [□] at the beginning of the syllable allows more time for the voicing of the vowel to be initiated, so there is no reason for any delay in onset.

The traditional way of checking that you're making voiceless stops without aspiration is to hold a thin piece of paper in front of your mouth while saying [p=a], [t=a], [k=a]. If you aspirate the consonant, the puff of breath will make the paper jump; if you're saying it correctly, the paper will remain motionless, however loudly you speak. A time-honoured practice sentence for French is: *Tintin, ton thé t'a-t-il ôté ta toux*? (Make the French [t] dental as well as unaspirated.)

4.08 Affricates

You may recall from 4.05 that [Z] (as in *camouflage*) isn't a very common sound in English and that [S] and [Z] don't occur at all in standard Castilian Spanish. But what about the *ch* of Spanish *mucho*, the second *g* of most people's pronunciation of *garage* or the *dg* of everyone's pronunciation of *porridge*? Or the two *ch's* of *church*? These sounds do contain [S] or [z], but the fricatives are combined with a [t] or a [d], so that *ch* or *dg* actually represent composite sounds known as **AFFRICATES**.

These consist of a stop immediately followed by a fricative with the same or similar point of articulation: [t + S] or [d + Z]. Compare *hash* (fricative) with *hatch* (affricate) or *leisure* (fricative) with *ledger* (affricate), and you will appreciate the difference. Say the *tch* or the *dg* very slowly, and you'll see how a [t] or [d] is fused with the following [S] or [Z]. To indicate the close fusion of the stop and the fricative, the IPA symbols for them are digraphs: [tS] and [dZ]. The official names are "T-Esh ligature" and "T- Ezh ligature" respectively. These two affricates are classified as post-alveolar (this is the point of articulation of the fricative element): [tS] is a ***voiceless post-alveolar affricate***; [dZ] is a ***voiced post-alveolar affricate***.

> There's a fairly obvious difference between an affricate like [tS], which counts as a single consonant, and a sequence of stop + fricative (two consonants). Compare *he cheats* (affricate: [hitSits]) and *heat sheets* (stop + fricative: [hitSits]). In *heat sheets*, the separate identity of the [t] and the [S] should be quite perceptible.

> [tS] and [dZ] are the two commonest affricates found in the world's languages, but stops and

fricatives can be merged at other points of articulation. Thus a voiceless alveolar affricate [ts] is common in German, and a voiced alveolar affricate [dz] in Italian. Both are represented by the letter *z* in ordinary spelling (often *zz* in Italian).

Affricates are a manner of articulation in their own right, so we have now encountered three manners: stop, fricative and affricate.

Exercises

52. What two features make [t] in French, Spanish and Italian doubly different from [t] in English and German?

53. Show the difference between the following phrases by rewriting them in ordinary spelling and restoring the spaces between the words:

[waItSu:z] [waitSu:z].

54. What day of the week is [tSu:zdeI]? What kind of dish is [stSu:]? In what city can you travel by [tSu:b]? What religion is practised by [krIstS@nz]? At what kind of institution can you be [EdZ ukeItId]? How can the sixth month of the year and a mountain of sand have the same pronunciation? What can you conclude about [tju, dju] in British English? And in American English?

55. Insert these affricates in the appropriate places on the following chart: [tS], [dZ], [ts], [dz].

bilabial	labio-dental	dental	alveolar	post-alveolar	palatal	velar	uvular	pharyn-geal	glottal

56. Are there post-alveolar affricates in (a) French, (b) German? If "yes", say whether voiced or voiceless or both, and give example words.

57. How would a voiceless velar affricate be transcribed, and what would it sound like? (They are found in some southern dialects of German.)

58. Underline the correct features for the following sounds, and give the correct IPA symbol.

(a) English *t* in *tar*: stop, fricative, affricate, aspirated, unaspirated, alveolar, dental, palatal, velar, voiceless, voiced.

(b) French *qu* in *quand*: stop, fricative, affricate, aspirated, unaspirated, alveolar, post-alveolar, dental, palatal, velar, voiceless, voiced.

(c) French *d* in *donne*, Spanish *d* in *dar*. stop, fricative, affricate, aspirated, unaspirated, alveolar, post-alveolar, dental, palatal, velar, voiceless, voiced.

(d) Spanish *ch* in *muchacho*. stop, fricative, affricate, aspirated, unaspirated, alveolar, post-alveolar, dental, palatal, velar, voiceless, voiced

.

(e) Spanish *j* in *trabajo*, German *ch* in *Koch*. stop, fricative, affricate, aspirated, unaspirated, alveolar, post-alveolar, dental, palatal, velar, voiceless, voiced.

(f) German *z* in *Zeit*. stop, fricative, affricate, aspirated, unaspirated, alveolar, post- alveolar, dental, palatal, velar, voiceless, voiced.

59. Rewrite in ordinary (English) spelling:

[tʃu:] [mIdʒ It] [lektʃ e] [dʒ @:k] [dʒ i@] [neitʃ @] [s@dʒ Estʃ n] [w ɪ tʃ]

60. Transcribe:

adventure, righteous, lounge, issue, luncheon, question, wretched, Norwich, Jewish, culture, butcher, merchant, cheer.

4.09 Nasals

Nasals are our fourth manner of articulation, after stops, fricatives and affricates.

For all the consonants so far, the soft palate (velum) has been raised, closing off the nasal cavity, so that all the air from the lungs has had to pass through the mouth (getting partly or completely blocked en route).

The uniqueness of nasals is the fact that, during their articulation, the velum is lowered, allowing air to exit through the nose. Nasality is such a usefully distinctive feature that few, if any, languages in the world lack these characteristic *n* or *m* type sounds. Three conditions are normally present for a nasal:

(1) The vocal folds are vibrating (nasals are typically voiced).

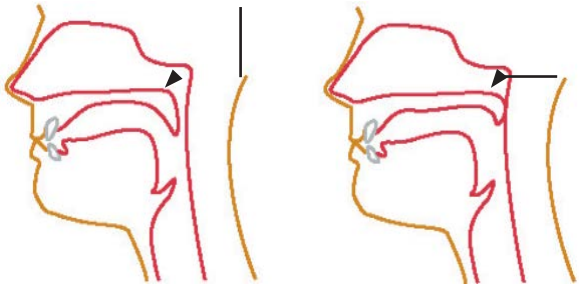
(2) Thoughout the duration of the sound, the oral cavity is closed at some point, so that the air set into vibration by the vocal folds enters the mouth, but can't leave through it.

(3) The velum is lowered, so that the vibrating air escapes via the nose.

Check this by saying [mmm] to yourself. In the case of [m]

the oral cavity is closed at the lips (same place of articulation as [p], [b]). So [m] is a ***voiced bilabial nasal***. Fig. 35 shows that [m] differs from [p, b] only in respect of the position of the velum: the entrance to the nasal cavity remains open throughout the duration of [m], so that it can be prolonged in spite of the stop-like closure at the lips.

Fig. 35



[m] [p, b]

If the oral closure is alveolar instead of bilabial, [n] is the result. (The slightly different shape of the oral cavity gives rise to a slightly different sound wave). As you might expect, the [n] of French, Spanish or Italian — like the corresponding stops — is dental not alveolar: [n̪].

Also to be noted is the velar nasal, which is of frequent occurrence in English (*ng* in the spelling, e.g. *singer*, *singing*). This has the same place of articulation as [k] and [g], but the same manner of articulation as [m] and [n], specified above. The IPA uses the symbol [Œ] for this sound: [sIŒ@], [sIŒIŒ]. Its official name is "eng".

> At least that's the RP pronunciation of *singer*, *singing*. Many speakers in the UK always have a [g] after their [Œ] and therefore pronounce these words [sIŒg@], [sIŒgIŒg]. In RP the [g] is present only in the pronunciation of some words: *finger* for example [fIŒg@] (where *er* is not a suffix).

Fig. 36 shows the resemblance between [Œ] and [k] — and the crucial difference: the lowered velum in the case of [Œ].

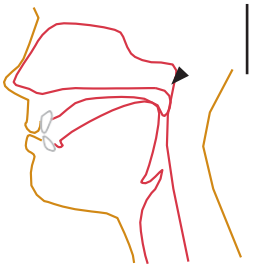


Fig. 36 [Œ] [k]

Here is the nasal row of the consonant chart, with an impressive array of symbols included. The palatal nasal m (“left-tail N”) occurs in French (*signe*) and Spanish (*señor*). Note that a few languages outside Europe even make use of a uvular nasal.

Fig. 37

bilabial	**labio-dental**	**dental**	**alveolar**	**post-alveolar**	**palatal**	**velar**	**uvular**	**pharyn-geal**	**glottal**
m	Õ	n̪	n		Æ	Œ	N		

Voiceless nasals are also a possibility. French has a voiceless [m] in a few words like *rythme*, where it follows a voiceless [t]. As there's little point in devising a special symbol for such a relatively rare sound, the IPA uses a diacritic (see 3.08) and simply puts a small circle under the ordinary symbol: [n̥] or [n̥]. (A subscript circle always signifies “voiceless”, whatever consonant it's placed under.)

Exercises

61. As well as being common in English, [Œ] occurs in French (but only in a rather special category of words), in Spanish (though in Spanish it’s not separately represented in the spelling) and in German. Give examples of words with [Œ] from at least one of these

languages.

62. Those very old-fashioned RP speakers who go “huntin’, shootin’ and fishin’” are accused of “dropping their *g’s*”. Why is this an odd way of describing their pronunciation (from a phonetic point of view at least)? How might it be improved on?

63. The above chart includes a symbol for a labio-dental nasal. This sound actually occurs in English — though it’s not recognized separately in the spelling. Which of the following contains a labio-dental nasal, and why? *impossible, invalid, inglorious, indiscrete*.

64. How, in rapid speech, is the letter *n* pronounced in: (a) *ten people*, (b) *unclear*,
(c) *unveil*?

65. Rewrite in ordinary (English) spelling:

[tˆŒ] [l¡ŒIŒ] [k{Œg@ru:] [{Œk@] [tSuŒk] [streŒkT] [{ŒkS@s]

66. Transcribe, using IPA symbols:

language, nightingale, anger, anxiety, hung, anything, dinghy.

4.10 Laterals (the *l* sounds).

This chapter and the one that follows are particularly important for modern linguists, since they include many of the most conspicuous consonant differences between English, French, German and Spanish.

For an *l* in any language (e.g. the one at the beginning of *like*), the following conditions usually have to be met. Check them by saying the [l] of [laik] as you read through this.

(1) the velum is raised (as it is for all consonants except nasals)
(2) the vocal folds are vibrating
(3) the blade of the tongue is closed tightly against the alveolum (or occasionally the front of the tongue against the hard palate)
(4) the side of the tongue is grooved, so that the air leaves through the corner of the mouth.

Condition 3 means that the point of articulation is alveolar (or palatal). But, uniquely among consonants, the air escapes "along the side" (condition 4), so the manner of articulation is said to be **LATERAL**.

Whether the air flows out through the right-hand corner of the lips or the left-hand corner, or even through both corners (i.e. with a groove on either side of the tongue) is something that varies from one individual to another, irrespective of the language being spoken. So you can carry on using whichever side you're used to. (Indeed it's quite difficult to produce a lateral using the opposite side!)

Laterals are usually alveolar, but Hispanists will have met a palatal lateral in words like *llama* or *calle*. The IPA symbol is [ˇ], and, as the tongue position is similar to that for the high front semi-vowel [j], the effect is not unlike that of [lj] in English *value*. In fact there is a strong tendency in Spanish to replace [ˇ] by [j] altogether, so that *pollo* ("chicken") and *poyo* ("bench") fall together as

[pojo] — or even as [poZo] (see 4.05).

Few speakers of English are aware of it, but there are actually two variants of [l] in most English accents (including RP and American and Australian varieties). At the end of a word or before a consonant (*well, child*), the [l], in addition to having the features listed above, is pronounced with the back of the tongue raised slightly towards the soft palate. But this doesn't apply at the beginning of a word or after a consonant, e.g. in *like* or *play*. It's not easy to sense these tongue positions, but the difference between the "dark" [ɫ] of *well* and the "clear" [l] of *play* shouldn't be to difficult to hear, particularly if you try to interchange them, i.e. to say *well* with the [l] of *play*, and vice versa.

> The technical term for "dark" [ɫ] is "velarized [l]". When it's important to register the distinction, the IPA uses [l] for the clear variety and [ɫ] ("*l* tilde") for the dark variety. But in ordinary transcription of English, [l] can be used for both clear and dark versions.

This alternation between two types of [l] is a feature of English which is not shared by standard French, German, Spanish or Italian. In each of these languages, [l] is always clear and dark [ɫ] is unknown. For example the French word *belle* doesn't sound like the English *bell* as far as its final consonant is concerned. Similarly for German (*voll*, etc.) and Spanish (*arból*, etc.). Using dark [ɫ] in these languages is a typical and all too conspicuous feature of a British accent. (However, in languages like Dutch, Portuguese or Russian, both types of [l] do occur, as in English, though they may be distributed differently.)

Exercises

67. Say which of the following varieties of English has/have only clear (and no dark) [l]:

Scots, Irish, Welsh, Geordie, Cockney, Yorkshire.

68. Can you transcribe with IPA symbols the Cockney pronunciation of words like *meal* or *milk* ?

69. Rewrite in ordinary (English) spelling:

[aɪlənd] [jɛləʊ] [iːgl] [miːzlz] [feɪljə] [ljuːd] [ɔːfl] [wɛlʃ] [ɒzwəld]

70. Transcribe, distinguishing if you wish between [l] and [ɫ]:

bill, foolish, possible, lady, handled, splice, Holborn, blow, cold, fly, wealthy, should, Ethel, leer, gimlet, ugly.

4.11 The *r* Sounds

These are more varied even than the laterals: there are at least half-a-dozen different types. Taken together, English, French, German and Spanish provide examples of all of them, but of course they differ from one another as regards which particular ones they use.

Indeed it's quite surprising that the various kinds of *r* should be perceived as having something in common: significantly perhaps there isn't any widely-used collective name for them, apart from *r sounds* and the technical term *rhotics* (*rho* being the Greek letter corresponding to *r*). Oddly enough though, there is a well-known term covering the *l* and *r* sounds taken together: **LIQUIDS**.

Fortunately, the *r* sounds can be classified quite easily.

There are two possible areas of the vocal tract in which an *r* can be made: dental/ alveolar and uvular. Typically the *r*'s used in English and Spanish are dental or alveolar; those of standard French and northern varieties of German are uvular. (There are plenty of regional exceptions to this general rule of course.) As only two main areas of articulation are involved, people sometimes simply talk about "front" vs. "back" *r*.

In addition to this, there are three different manners of articulation for each type. The
r's used in English and Spanish illustrate the different "front" varieties.

First the **TRILL**, for which the tip of the tongue vibrates rapidly against the alveolar ridge. Unknown in RP, but the commonest kind of *r* in Spanish. It's the normal *r* in Italian and Russian, as well as in the German of Austria, Switzerland and southern Germany. And it's found in many regional varieties of French. It may be voiced or voiceless, depending on its position in the word. So common is it in the world's languages generally that the letter *r*, when used as an IPA symbol [r], designates the ***alveolar trill***, and not any of the other varieties.

Second the **FLAP**, which, as its name implies, involves a single tap of the tongue- tip against the rear of the upper front teeth or the alveolar ridge. Indeed, **TAP** is an alternative term for this sort of *r*. A flap can be thought of as a truncated trill. The IPA symbol for both the ***dental flap*** and the ***alveolar flap*** is [ɾ] ("fish-hook r"), i.e. [r] minus its ornamental bits and pieces. Flaps (often dental) are found in Spanish as well as alveolar trills, but the two aren't interchangeable: sometimes the difference between

them serves to distinguish one word from another: [karo] (*carro*) means "coach" (with a trill), but [kaɾo] (*caro*) means "dear" (with a flap). Note how the spelling uses single versus double *r* to convey the difference. In American English an alveolar flapped [ɾ] commonly replaces [t, d] between vowels ([siɾi] *city*, [leiɾi] *lady*, etc.

Thirdly the **APPROXIMANT** — unknown in Spanish, but the normal variety of *r* in most accents of English, and most likely the kind that you use yourself. Prolong the first consonant of *red* so as to get the feel of it. You'll notice that the tip of your tongue is close to the teethridge, but probably not quite touching, and certainly not close enough for a fricative to be produced. (And obviously there's no question of trilling or flapping.) The sound is actually rather like a vowel produced with the tongue turned towards the palate (contrast the position for [i], where the surface of the tongue is much flatter). The term *approximant* will remind you that the sound isn't quite a fricative, but not a proper vowel either. The IPA symbol for the ***alveolar approximant*** is [ɹ] (read "turned *r*"). But in ordinary transcription of English it's acceptable to use [r] instead (on the understanding that it's not being used to represent a trill). Note how alveolar flaps and approximants can be adjacent to one another in American English: [la:ɾɹ] *ladder*, [d@ɹɾi] *dirty*.

> Occasionally in English the [ɹ] is devoiced to [ɹ̥] — e.g. when it follows a voiceless stop in a word like *train*. The loss of voicing has the effect of turning the approximant into a fricative, as you can see if you say *train* slowly to yourself. What's more, in words like this, the fricative combines with the *t* to form an affricate, so that in many people's pronunciation there's little difference between *train* and *chain*, or *chip* and *trip*.

r serves to demarcate two major accent types of English worldwide. In RP (and some other varieties), *r* is heard only *before* vowels (*red*, *rich*); after vowels, any *r* in the spelling is silent in the pronunciation (*car, bird*), UNLESS a word begining with a vowel immediately follows it, in which case a "linking r" is present (*drive the car* [r] *away*). But in many accents of English (notably American), *r* is always pronounced

— after vowels (post-vocalically) as well as before them (pre-vocalically). Accents of the latter type are known as *rhotic*, accents of the RP type as *non-rhotic* (after the Greek letter *rho*).

Now let's see how three manners of articulation (trill, fricative and approximant) are used with the uvular place of articulation, this being particularly relevant to French and German. Recall that the uvula is the extreme tip of the soft palate (velum).

For a **TRILL**, the uvula itself vibrates against the back of the tongue (this is the converse of the alveolar trill, for which it's the tongue, or at least the tip of it, that vibrates). The IPA symbol for the ***uvular trill*** is [R] (read "small capital r"). This symbol is the one customarily used in transcribing French, since the uvula trill is the traditional way of pronouncing standard French *r*. Thus [RaR] for *rare*, [ReEl] for *réel*, etc. Nowadays though, French uvular [R] tends to be pronounced with little or no vibration or trilling, being "weakened" to a **FRICATIVE**, with the back of the tongue simply in loose contact with the uvula. This sound is represented by [□(¶"inverted capital *r*"): it can either be voiced [□] (as in [a□b□] *arbre*), or else voiceless [□□] (as in [t□□□t□] *traître*), depending on whether neighbouring consonants are voiced or voiceless.

Parallel to the alveolar approximant characteristic of English is the uvular ***APPROXIMANT***: a vowel-like sound with "back *r* colouring". The IPA represents this as [ ]. The diacritic [4] indicates that the tongue is lowered slightly relative to the uvular fricative [ ] enough to rule out any friction, but remaining sufficiently close to the uvula for an approximant to be possible. This sound is to be heard increasingly often in contemporary French, particularly at the end of a word ([œ] heure), or between vowels ([pa i] Paris). In the latter case, though, it is still considered a somewhat "vulgar" pronunciation.

In northern pronunciations of German, a trilled [R] is possible at the beginning of words, after consonants and between vowels (*rot, treffen, waren*); but, as in French, the usual tendency is to weaken the trill, and to use a fricative [ ] or [ ] instead. Between vowels an approximant [ ] may also occur (*Ehre*). After vowels (as in *wird, Uhr*) any *r*-quality is lost altogether and [ ]/[ ]/[ ]/[ ] is replaced by a lowish central vowel, not unlike RP [ ], for which the IPA and many dictionaries use the symbol [ ] ("turned *a*"). Thus: [vi t] *wird*, [u] *Uhr*. Here it is on the vowel chart:

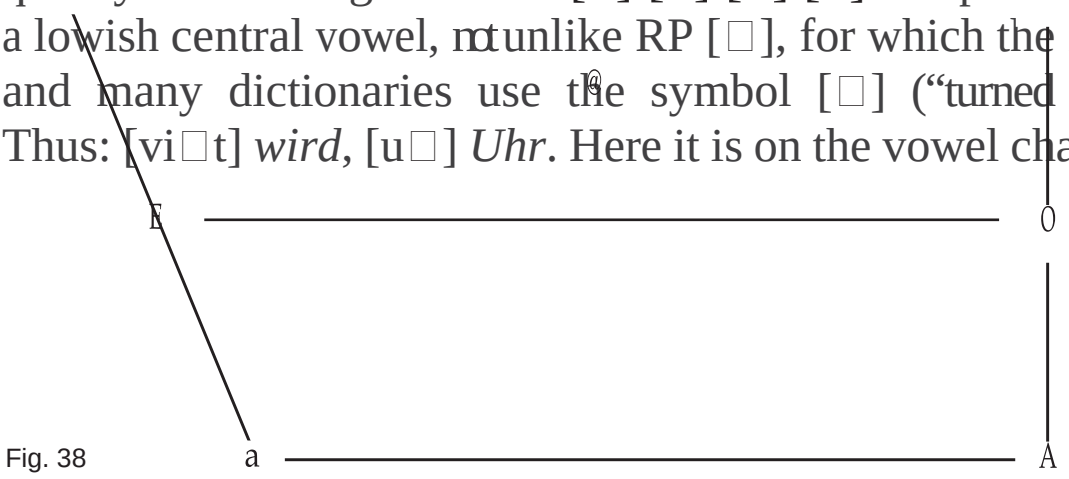


Fig. 38

Unstressed *er* in the spelling (*hundert, höher*) corresponds to [·] not to [@], the erstwhile *r* having absorbed the *e* altogether: [hund·t], [hø:·]. The difference between [·] (low central) as in *bitter* and [@] (mid central) as in *bitte*, is

quite an important one: think of the [ˆ] of S. English *up*, rather than the [@] of *rather* and you'll be on the right track.

To resume the complexities of r:

English, Spanish and southern German use dental or alveolar *r*s of one sort or another (the IPA symbols are always variants on lower-case *r*). Northern German and standard French use various kinds of uvular *r* (the IPA symbols are variants on upper-case *R*).

English (RP) has the approximant, but doesn't normally use trills or flaps. German uses voiced or voiceless fricatives (sometimes approximants) and Spanish has trills and flaps, but no approximant. In

Exercises

71. What does the term *liquid* refer to?

72. State the various places and manners of articulation associated with *r* .

73. Say whether the English accents typical of the following places are "rhotic" or "non-rhotic":

Edinburgh, Cardiff, Dublin, Manchester, Preston, Bristol, Southampton, Brighton, Sydney, Chicago, Basildon.

74. The *r* in RP "take the car away" is known as a "linking *r*". The following contain examples of so-called "intrusive *r* ". Why "intrusive"?

Russia [r] and China, India [r] and Pakistan, drama [r] and music, law [r] and order.

And what makes some people insert an [r] into *drawing, sawing* and *awe-inspiring?*

75. Can you transcribe and/or comment on the rather "posh" or "stagey" variety of *r* heard from some RP speakers in words like *very* ? And how might the same speakers pronounce the *r* of *rather* ?

76. Rewrite in ordinary (English) spelling:

[rˆt] [rut] [ri@] [rO:] [f@:rI] [hˆrI] [i@rI] [dE:rI] [daI@rI] [mIr@]

77. Transcribe:

royal, rude, rag, arrow, fury, dowry, gregarious, treasury, umbrella, birthright.

4.12 The IPA consonant chart.

Here is the chart for reference, including all the consonants mentioned in this chapter. It's still incomplete compared with the full official chart, which you will find reproduced in many of the books listed in the Further Reading section (e.g. Gimson's *Pronunciation of English*).

The exercises following the chart are intended to help you to revise the material on consonants (including one or two finer points).

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Uvular	Pharyn-geal	Glottal
STOP	p b		t d	t d			k g	q G		?

FRICATIVE	¬	f v	T D	s z	S Z	C	x □	□□ □	h □	h
AFFRICATE				ts dz	tS dZ					
NASAL	m	Õ	n	n		Æ	Œ	N		
LATERAL				□ □		⌣				
TRILL				r				R		
FLAP				Q						
APPROXIMANT				ɹ				□		

Exercises

78. Why is there no voiced/voiceless pairing in the case of the glottal stop?

79. Why aren't voiced/voiceless pairs given in the nasal row?

80. Why are two alveolar lateral symbols given?

81. Why is no uvular flap symbol given?

82. Which symbols are used in ordinary transcriptions of RP?

83. Which additional symbols might be used in more detailed transcriptions of RP?

84. Which symbols represent consonants occurring in the standard pronunciation of: (a) French, (b) German (northern), and (c) Spanish?

5.01 Guidelines for Transcription

If you've worked through the various exercises given so far, you will already have a good idea of the basic principles of phonetic transcription. But for convenience, they will now be stated explicitly, and some further practice material will be given from English.

Phonetic transcription of other languages follows the same principles as it does for English (see below), and, as you know, the same phonetic alphabet is used — plus or minus various symbols. So anyone who can transcribe English can adapt without much difficulty to French, German, Spanish, etc. You can see this for yourself by looking at the phonetic spellings in an up-to-date bilingual dictionary — by now you should be able to follow them.

English is a good language to train with: it contains a larger than average number of vowels and diphthongs, uses several of the less common IPA symbols, its spelling is often highly idiosyncratic and unrelated to modern pronunciation, and its vowels are prone to appear and disappear mysteriously according to where the stress falls (see below). All this makes the transcription of many other languages seem easy in comparison.

There are two "golden rules" for transcription:

- **Think of the pronunciation, not the spelling**. Instead of letting yourself be mesmerized by the written form of the word, look away, or close your eyes, and ask yourself how you actually *pronounce* it. Among a thousand other pitfalls,

this will help you to avoid inserting an [l] into your transcription of *salmon*, it will ensure that you transcribe the *s* of *his* with [z] not with [s], or the *f* of *of* with [v] not with [f], and it will prevent you from including the silent *b* of *doubt* in your transcription.

- **Use one symbol for each identifiable sound.** In many cases, the orthography (i.e. the spelling system) uses more than one letter in cases where a single symbol is required in a transcription: *ps*, *sh*, *ch*, *tch* are cases in point. And a transcription, though it may be shorter, can convey more precise information than the orthographic form (the spelling): *th* corresponds to either [T] or [D]) and the notorious -*ough* to [ʌf], [uː], [ə], [aʊ], [əʊ] or [ɒf] (*enough*, *through*, *borough*, *bough*, *although*, *cough*).

Here are some punctuation conventions which you should note:

Capital letters and apostrophes are used only if some special IPA value is intended (as with [I] and [R] for example). So *Tony Blair's Britain* would be transcribed [te □bl□ □br□z ,□t□n] with lower-case throughout, and no apostrophe. Otherwise you can use the same punctuation and word spacing as the original. But it's usually best to transcribe numbers and dates in full, and also initials like *U.S.A.* [ju □.□s.e□]

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