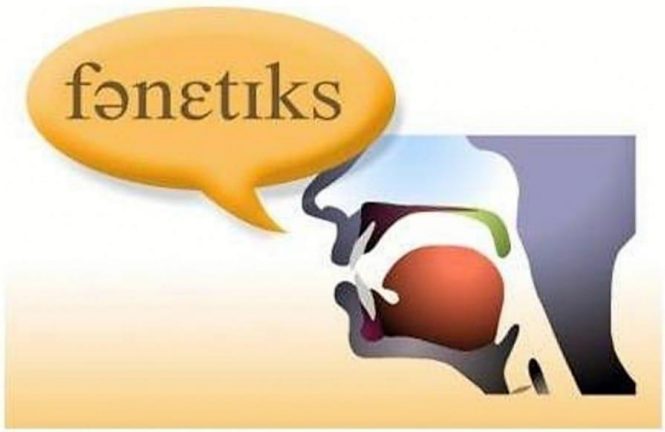

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PHONETICS

SECOND YEAR

ENGLISH DEPARTMENT

BASIC EDUCATION

DR. REWAA AHMED ANWER

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Phonetics & Phonology

II

ABSTRACT

When you open any English dictionary, you will find some kind of signs after the word, just before the meaning of the word, those signs are called Phonetics. Phonetics will help you, how to pronounce a particular word correctly. It gives the correct pronunciation of a word both in British and American English. Phonetics is based on sound.

Learning the basics of phonetics is very simple. The first or the second page of every dictionary will have an index of phonetics. If, you know to read them. That is more than enough to help pronounce any word correctly.

The index will show a sign, and against it you will have a word in which a letter or two of the word will be highlighted, which means the sound that comes on the letter when you pronounce the word, is the sound for that sign. You will have different signs for vowels, diphthongs and others. You just have to spend some time to get them right. Once you get an idea, then nobody can stop you.

Once you know to use phonetics, then you don't have to go behind anybody asking them to help you, to pronounce a particular word. You can do it yourself; you can even teach others and correct them when they do not pronounce a word correctly.

If you don't know to use phonetics, then what happens is, in case you don't know to pronounce a particular word, what you generally would do is look for teachers, parents or elders, whom you have the confidence would give you the correct pronunciation of the word. But, there are chances that the pronunciation given by them may not be always correct. And we start pronouncing the word that way, which is wrong.

The following book is composed of two sections; the first section is adopted from
http://wac.colostate.edu
English Phonetics and Phonology; A practical course by Peter Roach

4 Phonetics and Phonology

KEY CONCEPTS
Articulatory phonetics, phonetic symbols
Consonants, approximants, vowels
Syllables, feet
Phonology, phonemes, allophones, phonological rules

INTRODUCTION

In this chapter we sketch the pronunciation system of English. We begin with **phonetics**, a system for describing and recording the sounds of language objectively. Phonetics provides a valuable way of opening our ears to facets of language that we tend to understand by reference to their written rather than their actual spoken forms. **Phonology** concerns itself with the ways in which languages make use of sounds to distinguish words from each other.

Teachers should be knowledgeable about the phonetics and phonology of English because (1) the sound system is primary and the basis for the spelling system; (2) they may have to teach English pronunciation to students who are not native speakers of English; (3) they may have to teach poetry, which requires that they teach about rhyme, alliteration, assonance, and other poetic devices that manipulate sound; (4) it is important to understand accents and language variation and to react appropriately to them and to teach appropriate language attitudes about them to students (see our chapters on Language and Society and Usage in Book II); (5) we are so literate that we tend to "hear" the sounds of our language through its spelling system, and phonetics/phonology provides a corrective to that; and (6) phonetics and phonology provide systematic and well-founded understandings of the sound patterns of English.

ARTICULATORY PHONETICS

We have three goals in this section. First, we introduce you to the ways in which the sounds of English are produced. Second, we develop a system for classifying speech sounds on the basis of how they are produced. Simultaneously we introduce an alphabet approximating that developed by the International Phonetics Association (IPA), which will allow us to refer to sounds quite precisely. When we want to indicate that letters are to be interpreted as phonetic symbols, we enclose them in square brackets, [ ], and when we want to indicate that letters are to be interpreted as letters from an ordinary spelling system, we enclose them in angled brackets, < >.

The phonetic alphabet uses many of the letters of the English alphabet, but their pronunciations are very restricted and are not always the ones you might expect. In this system, there are no "silent" letters—every phonetic symbol represents an actual sound. Every letter always has the same pronunciation regardless of its context, no letter has more than one pronunciation, and no sounds are represented by more than one letter. To make fine distinctions, phoneticians add special symbols, called **diacritics**, to the basic letters. For some English sounds and for languages other than English, symbols not from the English alphabet have been devised. (You might visit the IPA web site for a full listing of the symbols.)

In the sections to follow, we describe the sounds represented by these symbols and how these sounds are made. As we go through these sections, pay attention to the ways in which individual sounds are ordinarily spelled in English, as well as to the phonetic spellings.

To produce speech, air must flow from the **lungs** through the **vocal tract**, which includes the **vocal folds** (popularly called the vocal cords, though they are more like thick elastic bands than strings), the nose or **nasal cavity**, and the mouth or **oral cavity** (See Figure 1). The vocal folds vibrate for some sounds but not for others. Air flows through the nose for certain sounds but not others. But the main creator of speech sounds is the mouth. We will describe the roles that each of these elements plays in the following paragraphs.

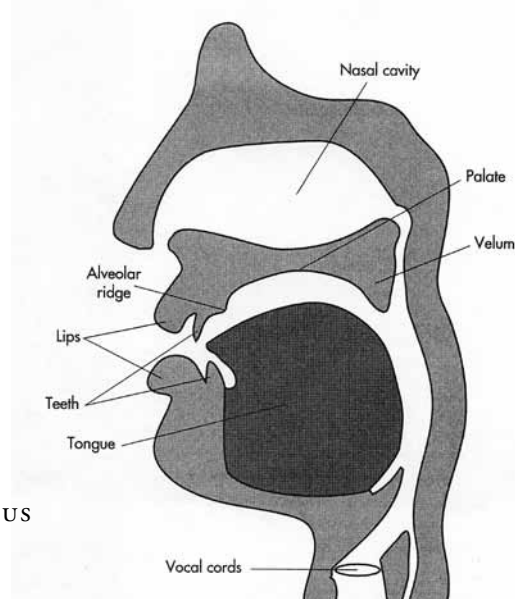


FIGURE 1: VOCAL APPARATUS

CONSONANTS

Consonants include the sounds we represent as <p, b, t, d, m, n, f, v, s, z, l, r, h> in the ordinary alphabet. All **consonants** are produced by entirely or almost entirely stopping the airstream coming from the lungs. When we almost entirely stop the airstream we force it through such a narrow opening that the airflow at that point is turbulent and noisy.

We classify consonants according to the following characteristics: (a) whether or not the vocal folds are vibrating (**voicing**); (b) whether the sound is made with a fully stopped or merely constricted airstream (its **manner of articulation**); (c) where in the mouth the stoppage or constriction is made (its **place of articulation**); (d) whether or not air is flowing through the nasal cavity (**nasality**); and (e) whether or not the lips are pursed (**lip-rounding**).

Voicing

As a warm-up exercise, make the sound fffff, and keep it going for a count of five. Now make the sound vvvvv, and keep it going for a count of five. Now alternate these two: fffffvvvvvfffffvvvvv. You probably noticed that vvvvv had a "buzz" that fffff did not have. That "buzz" is caused by the vibrating of your vocal folds—which you can check by putting your fingers on your throat or by covering your ears as you alternate fffff and vvvvv. Now try the same exercises with the first sounds of the following words: *thigh*, *thy*; *sip*, *zip*. You should be able to feel the vocal folds vibrate as you make the second sound of each pair.

Sounds produced with vibrating vocal folds (see Figure 1) are said to be **voiced**; those produced without vocal cord vibration are **voiceless**. Table 1 lists the voiced and voiceless consonants of English. The letters in [ ] are the phonetic symbols for the sounds.

VOICED	VOICELESS
by [b]	**p**ie [p]
my [m]	
wet [w]	
vie [v]	**f**ie [f]
thy [ð]	**th**igh [θ]
die [d]	**t**ie [t]
nigh [n]	
zip [z]	**s**ip [s]
lie [l]	
rye [r]	

bei**ge** [ʒ]	ba**sh** [ʃ]
jive [dʒ]	**ch**ive [tʃ]
yet [j]	
guide [g]	**k**ite [k]
go**ng** [ŋ]	
	hive [h]

TABLE 1: VOICED AND VOICELESS CONSONANTS

Exercise

1. Collect a set of words in which each of the voiced and voiceless sounds listed in the two columns above occurs as the first sound of a word, in the middle of a word (specifically between two vowels), and at the end of a word, as in: [b] ***b**ird, rub**b**ing, rub;* [p] ***p**an, tap**p**ing, tap**p***. How are each of these sounds ordinarily spelled? (Note: English single and double consonants, as in *rub* and *rubbing*, *tap* and *tapping*, represent the same sound. The doubled consonants tell us how the vowel before them is to be pronounced; cf. *tapping, taping*.)

2. Identify the sound represented by each of the following phonetic symbols and for each sound collect five words in which it occurs: [p, b, f, v, θ, ð, ʃ, ʒ, tʃ, dʒ, s, z]. How is each of these sounds ordinarily spelled?

Nasality

Make the sound represented by <m> in the word *Pam* and continue it for some seconds. As you continue it, pinch your nose and observe what happens to the sound. It should stop immediately. This shows that air was flowing through your nose as you produced this sound. Now try the same little experiment with the <n> of *pan* and the <ng> of *pang*. You should find that the air flows through the nose in these two cases also. Sounds in which air flows through the nose are called **nasal** sounds. The air is allowed into the nose by lowering the **velum**, the soft palate at the back of the mouth (see Figure 1). English has three main nasal sounds:

[m]	Pa**m**	cla**mm**y	**m**at
[n]	pa**n**	cla**nn**ish	**N**at
[ŋ]	pa**ng**	cli**ng**y	----

Exercise

Using the data just above, say where [ŋ] **cannot** occur in a word. How are each of these nasal sounds ordinarily spelled?

Manner of articulation

By **manner of articulation** we mean the kind of closure or constriction used in making the sound. We classify English consonants according to three manners of articulation: **stops** (full stoppage of the airstream somewhere in the *oral* cavity between the vocal folds and the lips, as in [p], [b], [m]); **fricatives** (constriction of the airstream in the oral cavity producing turbulence and noise, as in [f], [v]); **affricates** (full stoppage of the airstream followed immediately by constriction, as in [tʃ], [dʒ]). Table 2 summarizes the different manners of articulation.

Stops

[p]	**p**ad	[b]	**b**ad	[m]	**m**at
[t]	**t**ad	[d]	**d**a**d**	[n]	**N**at
[k]	**c**ad	[g]	**g**ad	[ŋ]	ta**ng**

Fricatives

[f]	**f**ie	[v]	**v**ie
[θ]	**th**igh	[ð]	**th**y
[s]	**S**ue	[z]	**z**oo
[ʃ]	**sh**oe	[ʒ]	**j**us (au jus)
[h]	**h**ow		

Affricates

[tʃ]	**ch**in
[dʒ]	**g**in

TABLE 2: MANNERS OF ARTICULATION

Exercise

For each of the sounds listed in Table 2, collect five words in which the sound occurs as the last sound of the word and another five in which the sound occurs in the middle of the word (specifically, between two

vowels), as [ŋ] is in *ring, ringing*. How is each sound ordinarily spelled?

Place of articulation

By **place of articulation** we mean the area in the mouth at which the consonantal closure or constriction occurs. English uses only seven places of articulation (see Figure 1) which we describe and illustrate below.

Bilabial sounds are made by bringing both lips together to stop the airstream:

[p]	**p**ie	cu**pp**ing	cu**p**
[b]	**b**y	clu**bb**ing	cu**b**
[m]	**m**y	co**m**ing	co**m**e

Labiodental sounds are made by bringing the top teeth into contact with the bottom lip and forcing air between the two to create the fricatives:

[f]	**f**eel	ra**ff**le	tou**gh**
[v]	**v**eal	ra**v**el	do**v**e

Interdental sounds are made by placing the tip of the tongue between the top and bottom teeth and forcing air through. Again, these are both fricatives:

[θ]	**th**igh	e**th**er	mou**th**	ba**th** (noun)
[ð]	**th**y	ei**th**er	mou**th**	ba**the** (verb)

Alveolar sounds are made by bringing the tongue and the alveolar ridge (the bony ridge just behind the top teeth) together to create either a stop or fricative:

[t]	**t**ub	boa**t**ing	boa**t**	[s]	**s**ip	fu**ss**y	gra**ce**
[d]	**d**ub	bo**d**ing	bo**d**e	[z]	**z**ip	fu**zz**y	gra**z**e
[n]	**kn**it	bo**n**ing	bo**n**e	[r]	**r**ip	te**rr**or	tea**r**

(Alveo-)palatal sounds are made by bringing the blade of the tongue to, or close to, the alveo-palatal area of the roof of the mouth to create fricatives and affricates:

[ʃ]	**s**ure	vi**ci**ous	ru**sh**
[ʒ]	**g**enre	vi**si**on	rou**ge**
[tʃ]	**ch**in	ca**tch**er	e**tch**
[dʒ]	**g**in	e**dge**r	e**dge**

Velar sounds are created by stopping the airstream by bringing the back of the tongue into contact with the velum:

[k]	**c**ould	ba**ck**er	tu**ck**
[g]	**g**ood	ba**gg**er	tu**g**
[ŋ]	------	ba**ng**er	to**ng**ue

Glottal sounds are created by either narrowing the vocal folds sufficiently to create a fricative or closing them to create a stop:

[h] **h**at ca**h**oots [ʔ] bu**tt**er (some varieties of English)

Exercise

For each of the sounds listed under Place of Articulation, find five words in which the sound occurs. How are each of these sounds ordinarily spelled?

Approximants

Approximants are sounds made by narrowing the oral cavity but not enough to cause turbulence in the airstream; the airstream is said to be smooth. The beginning sounds of *lye* and *rye* are approximants. The narrowest point in the airstream is wider in approximants than in fricatives, but is not as wide as it is in vowels. Approximants are more **sonorant** (**resonant**, i.e., naturally loud) than consonants, but less so than vowels. They are like consonants in that they typically occur before or after the vowels of syllables (see below). English has three kinds of approximants.

Lateral approximants are made by touching the tongue to the alveolar ridge while allowing the air to pass along one or both sides, as in [l]—in *lack*, *call*, and *callow*.

Central approximants are made by raising the sides of the tongue so that the air flows along the center of the tongue, as in [r]—in *rock*, *roll*, and *Rory*. [r] is regarded as an alveolar sound.

Glides (**semivowels**) come in two kinds: palatal and labio-velar. **Palatal**

glides are made by raising the tongue toward the hard palate, close to where the vowel in *eat* is made. The first sound of *yet*, *yolk*, and *y'all* is a palatal glide, represented phonetically as [j]. **Labio-velar** glides are made by rounding the lips and simultaneously raising the back of the tongue toward the velum, close to where the vowel sound of *ooze* is made. Labio-velar glides thus have two places of articulation—they are both labial and velar. The first sound of *wet*, *wall*, and *wink* is a labio-velar glide, represented phonetically as [w].

Lateral	[l]	**l**et	
Central	[r]	**Rh**ett	
Glides	Labio-velar	[w]	**w**et
	Palatal	[j]	**y**et

Articulatory descriptions

An **articulatory description** of any consonant or approximant must specify (at least) its place and manner of articulation, whether it is voiced or voiceless, and whether it is nasal or oral. For example, [m] is made at the lips by stopping the airstream, is voiced, and is nasal. These features are represented as:

	[m]	[w]	[l]
Voicing	voiced	voiced	voiced
Place	bilabial	labio-velar	alveolar
Manner	stop	glide	lateral approximant
Nasality	nasal	oral	oral
Example word	**mime**	**wow**	**low**

We can gather all of the consonants that we have described into a single chart:

	bilabial	labio-dental	inter-dental	alveolar	(alveo-)palatal	velar	glottal
stop	p b			t d		k g	(ʔ)
nasal stop	m			n		ŋ	
fricative		f v	θ ð	s z	ʃ ʒ		h
affricate					tʃ dʒ		
approximants							
glides	(w)				j	(w)	
lateral				l			
central				r			

TABLE 3: ENGLISH CONSONANTS AND APPROXIMANTS

Exercise

You should now be able to provide an articulator description for each of the following sounds. Consult Tables 1-3.

	[t]	[k]	[b]	[d]	[g]
Voicing					
Place					
Manner					
Nasality					
Example word					

	[n]	[ŋ]	[f]	[v]	[θ]
Voicing					
Place					
Manner					
Nasality					
Example word					

	[ð]	[s]	[z]	[ʃ]	[ʒ]
Voicing					
Place					
Manner					
Nasality					
Example word					

	[tʃ]	[dʒ]	[l]	[r]	[h]
Voicing					
Place					
Manner					
Nasality					
Example word					

	[w]	[j]
Voicing		
Place		
Manner		
Nasality		
Example word		

VOWELS

Vowels include the sounds we ordinarily represent as the letters <a, e, i, o, u>, as well as a number of other sounds for which the ordinary alphabet has no unique symbols.

Vowels are distinguished from consonants in several ways. As we have seen, consonants are produced by constricting the airstream to various degrees as it flows through the oral tract. **Vowels** are produced with a smooth, unobstructed airflow through the oral tract.

Differences in vowel quality are produced by different shapes of the oral cavity. Characteristic vowel qualities are determined by (a) the height of the tongue in the mouth; (b) the part of the tongue raised (front, middle, or back); (c) the configuration of the lips; and (d) the tension of the muscles of the oral tract. An articulatory description of a vowel must include all of these features.

Tongue height

Pronounce the words *eat* and *at*. Now pronounce just the vowels of these two words. Notice that as you go from the vowel of *eat* to the vowel of *at*, your mouth opens. If this is not obvious to you just by playing with these two vowels, look in a mirror as you produce them. Alternate the words, and then just the two vowels.

Once you've become accustomed to the different degrees of openness of these two vowels, pronounce *ate* between *eat* and *at*. The degree of openness of its vowel falls between those of *eat* and *at*, so there is a continuous increase in mouth openness as you go from one vowel to another. These degrees distinguish **high**, **mid**, and **low** vowels. We will use the following symbols for this sequence of vowels:

(1)	**ea**t	[i]	High
	at**e**	[e]	Mid
	at	[æ]	Low

Exercise

For each of the three vowels above, find five words in which the vowel occurs. Be clear about which symbol most accurately applies to each vowel. How is each of these vowels ordinarily spelled?

Front and back vowels

Now compare the vowel of *beat* with that of *boot*. Alternate the words, and then just the vowels. It will be more difficult this time to monitor the activities of your tongue as you shift from one of these to the other, but try anyway.

You produce the [i] of *beat* with the front (blade) of your tongue raised toward your palate. If you draw in your breath as you make this vowel, you will feel the cold air against your palate. As you shift from [i] to [u], the vowel of *boot*, you will find yourself raising the back of your tongue. (You will also find yourself pursing (**rounding**) your lips, but disregard this for the moment.) Because of the relative positions at which these vowels are made in the mouth, phoneticians call [i] and the other vowels in (1) **front vowels**, and [u] a **back vowel**.

The back vowels, like the front ones, descend from high, through mid, to low, in a continuous sequence. You can observe this by pronouncing the words *coot*, *coat*, and *cot*, and then just their vowels. As you produce this series of vowels you'll find your mouth opening (monitor your lower jaw) as you go from *coot* to *coat* to *cot*. We use the following symbols for these back vowels:

(2)	c**oo**t	[u]	High
	c**oa**t	[o]	Mid
	c**o**t	[ɑ]	Low

Exercise

For each of the three vowels just above, find five words in which the vowel occurs. Be clear about which symbol most accurately applies to each vowel. How is each of these vowels ordinarily spelled?

We combine these two series of vowels in Table 4:

	FRONT		BACK
HIGH	i		u
MID	e		o
LOW		æ	ɑ

TABLE 4: FRONT AND BACK VOWELS

Exercise

For each of the vowels in Table 4, find five more words in which the vowel occurs. Be clear about which symbol most accurately applies to each vowel. How is each of these vowels ordinarily spelled?

Lip rounding

As you compared [i] and [u] you probably noticed that your lips changed shape as you shifted from the front vowel to the back one. Your lips were **rounded** as you produced [u]. They were **unrounded** (**spread** or **neutral**) as you produced [i]. As you moved through the series of back vowels you may also have noticed that lip rounding decreased as you moved from high to low. In fact the lips are unrounded during the pronunciation of [ɑ]. In English, the only rounded vowels are back, though many languages, such as French and German, have rounded front vowels.

Exercise

Find five pairs of words to illustrate lip rounding. The first member of each pair of words must include a rounded vowel; the second member should be as similar as possible to the first, but must include a corresponding vowel that is not rounded. Assign a phonetic symbol to each vowel, e.g., *heat* [i], *hoot* [u]. As always, note how each vowel is ordinarily spelled.

Intermediate vowels

First, pronounce the words *meat*, *mitt*, *mate*, *met*, and *mat*. Then pronounce just their vowels:

m**ea**t	m**e**	[i]
m**i**tt		[ɪ]
m**a**t**e**	m**ay**	[e]
m**e**t		[ɛ]
m**a**t		[æ]

The vowels we've just added, [ɪ] and [ɛ], are intermediate in height between [i] and [e], and [e] and [æ], respectively.

Exercise

For each of the vowels we've just discussed, find 5 more words in which they occur. Note how they are ordinarily spelled.

Now pronounce the series of words *suit*, *soot*, *sowed*, *sought*, *sot*. Then pronounce just their vowels:

s**ui**t	c**ooe**d	fl**ew**	[u]
s**oo**t	c**oul**d		[ʊ]
s**owe**d	c**o**d**e**	fl**ow**	[o]
s**ough**t	fr**augh**t	c**aw**	[ɔ]
s**o**t	c**o**t	sp**a**	[ɑ]

We've added two more intermediate vowels to the back series, [ʊ] and [ɔ].

Exercise

For each of the vowels we've just discussed, find 5 more words in which they occur. Note how they are ordinarily spelled.

Now say the following words, paying attention to their vowels, and especially to the movement of your tongue as you go from one vowel to the next: *ate*, *up*, *oat*. The vowel in *ate* is [e] and that in *oat* is [o]. The vowel in *up* is represented by [ʌ], called "wedge" or "caret."

We hope that you noticed your tongue pull back as you went from [e] to [ʌ], and back farther as you went from [ʌ] to [o]. [e] is a mid, front vowel, and [o] is a mid back vowel. As [ʌ] is between these two and at about the same height, it is a mid central vowel.

We've now added five intermediate vowels: [ɪ] as in *mitt*, *hid*, *rip*; [ɛ] as in *wept*, *bed*, *flex*; [ʊ] as in *hood*, *could*; [ɔ] as in *caw*; and [ʌ] as in *mutt*. Of these, [ɪ] and [ɛ] are front and unrounded, while [ʊ] and [ɔ] are back and rounded, and [ʌ] is central and unrounded. These new vowels differ from the ones we introduced earlier in several ways:

1. In length: [i], [e], [u], [o], [ɔ], and [ɑ] are longer than [ɪ], [ɛ], [æ], [ʊ], and [ʌ], when they occur in the same contexts.
2. In position in the mouth: [i] and [e] are higher and farther front than [ɪ] and [ɛ], respectively; [u] and [o] are higher and farther back than [ʊ] and [ɔ], respectively.

3. All vowels can occur in syllables (see below) that end in at least one consonant (**closed** syllables); [i], [e], [u], [o], [ɔ], and [ɑ] can occur as the final sound in a syllable (**open** syllables).
4. Muscle tension: [i], [e], [u], [o], [ɔ], and [ɑ] are produced with greater muscle tension in the articulators than [ɪ], [ɛ], [æ], [ʊ], and [ʌ] are. The former are **tense** vowels; the latter are **lax**. The greater tension in [i], [e], [u], [o], [ɔ], and [ɑ] may explain why they are longer and more peripheral, i.e., closer to the boundary of the mouth, than the other vowels.

Even though there are several differences separating these two sets of vowels, we will refer to them as **tense** and **lax** vowels. Table 5 lists all of them:

	TENSE		LAX
b**ea**t, b**ee**	[i]	h**i**t	[ɪ]
b**oo**t, b**oo**	[u]	h**oo**d	[ʊ]
b**ai**t, b**ay**	[e]	h**ea**d	[ɛ]
b**oa**t, b**eau**	[o]	h**a**t	[æ]
b**ough**t, p**aw**	[ɔ]	h**u**t	[ʌ]
p**o**t, sp**a**	[ɑ]		

TABLE 5: TENSE AND LAX VOWELS

You may have noticed that all of the example words we have used to exemplify the vowels we have distinguished consist of a single syllable. This is because vowels in multi-syllabic words can differ from those in monosyllables, and we wanted to compare vowels in similar contexts. We have now distinguished the following vowels:

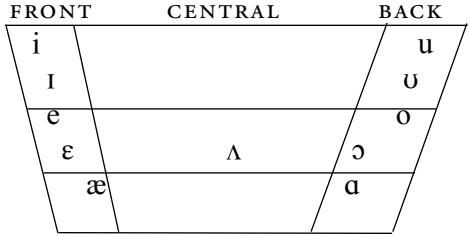


TABLE 6: ENGLISH VOWELS IN MONOSYLLABIC WORDS

Not all American English speakers distinguish [ɔ] and [ɑ] in all contexts.

In some dialects of American English (California, Midwest), the vowels [ɔ] and [ɑ] in pairs of words such as *sought* and *sot*, *caught* and *cot*, and *wrought* and *rot* are pronounced identically, though the vowel used is neither [ɔ] nor [ɑ], but one intermediate between them.

Vowels in multi-syllabic words

Pronounce the words ***a**bove*, *soda**a***, *sofa**a***, *comma**a***, *arena**a***, *patina**a***, *phot**o**graph*, paying particular attention to the vowel represented by the bold letters. Then pronounce this vowel in isolation. This vowel is called **schwa** and written [ə]. Schwa is made at approximately the same place as [ʌ], that is, farther forward than the back vowels and farther back than the front ones. Hence, it is central. In addition, [ə] is mid, lax, and unrounded. It is heard primarily in unstressed syllables, as in the words above. It is the vowel we produce if we vocalize as we prepare to speak—*uh*. The tongue is said to be in its neutral position as we pronounce this vowel.

Exercise

Find five words to illustrate the vowel [ə]. Can you estimate how common this vowel is in English? What letters of the alphabet ordinarily indicate this sound?

We can present the vowels as we presented the consonants, on a chart indicating their articulatory properties.

	FRONT	CENTRAL	BACK	
	Unrounded			Rounded
Upper high	i			u
Lower high	ɪ			ʊ
Upper mid	e	ə		o
Lower mid	ɛ	ʌ		ɔ
Low	æ		ɑ	

TABLE 7: ENGLISH VOWELS

Exercise

1. Find five words to illustrate each of the vowels we distinguish in Table 7. Be clear about which symbol most accurately applies to each vowel.

2. Provide an articulatory description for each of the following vowels; that is, indicate its height, position (front or back), tension, and lip configuration.

	[ɪ]	[e]	[u]	[ʊ]	[ɛ]	[ʌ]
Height						
Position						
Tension						
Rounding						
Example word						
	[ɑ]	[æ]	[o]	[i]	[ə]	[ɔ]
Height						
Position						
Tension						
Rounding						
Example word						

Diphthongs

We have approached vowels as if they were articulated by a specific configuration of the tongue, lips, and oral cavity, which is held constant throughout their pronunciation. Vowels made like this are called **monophthongs**; others, called **diphthongs**, involve a change in the configuration of the mouth.

The vowel sounds in the words *boy*, *by*, and *how* involve a change in the shape of the mouth as the vowel is being produced. The vowel of *boy* begins with approximately the mid back vowel [ɔ] and finishes with approximately the high front lax vowel [ɪ] (or the palatal glide [j]). The vowel of *by* begins with approximately the low back vowel [a] (a low back vowel slightly more forward than [ɑ], but not as forward as [æ]) and also finishes with approximately [ɪ] (or [j]). The vowel of *how* begins with approximately [a] and finishes with approximately the high lax rounded vowel [ʊ] (or the labio-velar glide [w]). We represent these diphthongs as [ɔɪ], [aɪ], and [aʊ], respectively (though many linguists use [ɔj], [aj], and [aw]).

Exercise

1. For each of the three diphthongs symbolized below provide four more example words. In two of these words the diphthong should appear in a closed syllable (i.e., before a consonant, e.g., *Boyd*) and in the other two words it should appear in an open syllable (i.e., not followed by a consonant, e.g., *boy*).

[ɔɪ] _____ _____ _____ _____
[aɪ] _____ _____ _____ _____
[aʊ] _____ _____ _____ _____

2. Are the English diphthongs tense or lax? (Hint: they can occur in open syllables.)

A second set of English diphthongs is not as clearly distinguished as the first, primarily because we tend to perceive them as simple vowels. However, in a precise (**narrow**) phonetic transcription they must be represented as diphthongs. The tense front vowel [e] is diphthongized. If you listen carefully you will notice that the vowel of *bate* is actually pronounced [eɪ]. The tense back vowel [o] is also diphthongized: if you listen carefully you will notice that the vowel of *boat* is actually pronounced [oʊ]. So, the front tense vowel is diphthongized by the addition of a front vowel and the back tense vowel is diphthongized by the addition of a back vowel. We can express this pattern as a rule: *Mid and high tense vowels are diphthongized by the addition of a high lax vowel that matches the original vowel in frontness or backness.*

Diphthongization of these vowels is a feature of English rather than a universal feature of natural language. Other languages, notably Spanish and German, do not diphthongize their corresponding vowels. The tendency to diphthongize these vowels is one characteristic of the "foreign accent" that betrays English speakers when they begin to learn these languages.

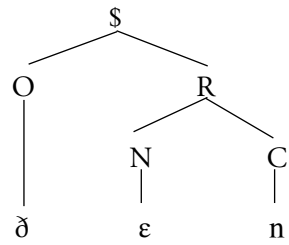
SYLLABLES AND FEET

It's a lot easier to count syllables than to give them a satisfactory definition. If the entire class were to count the syllables in this paragraph, there would be considerable agreement about the number, but probably not about where each syllable begins and ends. The fact that syllabic writing systems developed before alphabetic systems (see our Spelling chapter in Book II) suggests that syllables are very salient linguistic units. That children seem to be able to associate symbols with syllables before they can associate symbols

with phonetic segments also points to the importance of the syllable.

Every **syllable** (symbolized as $) consists of at least a **nucleus** (symbolized as N), which is typically a vowel. The nucleus may be preceded by an **onset** (symbolized as O), consisting of one or more consonants, and followed by a **coda** (symbolized as C), again consisting of one or more consonants. The nucleus and the coda together make up a unit called the **rhyme** (R). The diagram (3) illustrates the constituent of the single-syllable word *then*.

(3)



Because vowels are high in sonority, a syllable nucleus is usually a vowel. However, a consonant with high sonority, such as [l,r,m,n,ŋ] may also be a nucleus. The sonority level of a syllable thus rises from the onset (if there is one) up to a peak in the nucleus and falls off again in the coda. In this respect, the onset and coda are (almost) mirror images of each other.

Parts of syllables may be repeated for poetic effects. Of these repetitions, rhyme is the most important: it involves repeating the rhyme of syllables, usually at the ends of lines, as the rhyming words in the following stanza show:

(4) Piping down the valleys wild,
Piping songs of pleasant glee,
On a cloud I saw a child,
And he laughing said to me:
(William Blake, Introduction to *Songs of Innocence*)

The syllable onsets, [w] of *wild*, [tʃ] of *child*, [gl] of *glee*, and [m] of *me* are not part of Blake's rhymes.

Repeating onsets, or first sounds in onsets, as in ***th**en and **th**ere*, creates **alliteration**. Repeating nuclei, as in *M**i**key l**i**kes it*, or *the incr**e**dible **e**dible **e**gg* creates **assonance**.

In speech, syllables are combined into rhythmic units called feet, which are also of considerable importance in scanning lines of poetry. Each **foot** consists of at least one stressed syllable (its energy peak) and one or two

unstressed syllables. Feet are differentiated from each other by the number of stressed syllables they contain and by the position of the stressed (S) syllable(s) relative to other syllables in the foot. In (5), S represents a stressed syllable and U an unstressed one; the stressed syllable of each example word is bolded.

(5)	Iambic:	[U S]	to**day**
	Trochaic:	[S U]	**tro**chee
	Anapestic:	[U U S]	inter**vene**
	Dactylic:	[S U U]	**per**sonal
	Spondaic:	[S S]	**good news**

In English, stressed syllables tend to be approximately equally far apart in time; as a result unstressed syllables may be articulated slower or faster, depending on the type of foot. (See Beers (2003: 339) Appendix I: the 175 most common syllables (as ordinarily spelled) in the 5,000 most frequently occurring English words.)

Exercise

1. In the stanza given in (4) above, identify each stressed syllable, determine the feet, and identify the kind of meter (iambic, trochaic, etc.) used.

2. How does your dictionary identify syllables and the stressed syllable(s) in words? Why does your dictionary indicate syllabication of words? (You'll probably have to read the relevant section of your dictionary's front matter for this.) Would your dictionary and our system always give the same syllabic analysis of words?

3. Compare the phonetic alphabet we introduced here with the system used in your dictionary to indicate pronunciation. Which is simpler to learn? Which is simpler to use? For whom? What other pros and cons can you think of for each?

PHONOLOGY

While phonetics is the study of the ways in which speech sounds are produced, **phonology** is the study of (1) how the speech sounds of a language are used in that language to distinguish meaningful units (such as words)

from each other, and (2) how sounds are patterned in a language. Consequently, the study of phonology requires us to take meaning into consideration, while phonetics does not. In this section we explore phonology and the basic unit of phonological analysis, the **phoneme**.

PHONEMES

You might reasonably have assumed that whenever speakers distinguish between a pair of sounds, they will use that difference to distinguish between words. For example, we know that English speakers distinguish between [s] and [z], and we use this difference to signal the difference between the words *sip* and *zip*. We will say that [s] and [z] **contrast** with each other in English. In fact, all of the sounds we have described so far contrast with each other in English and so are used by English speakers to distinguish words from each other. You can test this out by taking any pair of sounds (as we took [s] and [z]) and creating a pair of words (like *sip* and *zip*) which are identical, except that where one has one sound, the other has the other sound, just as where *sip* has [s], *zip* has [z]. Pairs of words like this are called **minimal pairs**, and are used to demonstrate that pairs of sounds are used in a language to distinguish words from each other. Sound units that distinguish words from each other are called **phonemes**. We enclose phonemes in / / (e.g., /s/, /z/) to distinguish them from sounds ([s], [z]) and ordinary letters (<s>, <z>).

Exercise

Phonemes are most easily identified through minimal pairs. Thus *Pete* [pit] and *beat* [bit] differ only in that where [pit] has [p], [bit] has [b]. These two words make a minimal pair that shows that [p] and [b] represent separate phonemes in English, which we symbolize as /p/, /b/. For each pair of sounds below, identify a minimal pair that shows that they represent different phonemes.

[k]–[g]	[θ]–[ð]	[ɑ]–[æ]	[l]–[r]
[n]–[ŋ]	[w]–[j]	[aɪ]–[aʊ]	[f]–[dʒ]
[f]–[s]	[i]–[ɪ]	[aɪ]–[oɪ]	[tʃ]–[dʒ]
[s]–[ʃ]	[ɛ]–[æ]	[tʃ]–[s]	[k]–[ŋ]

ALLOPHONES

Now listen to the vowels in the words *cat* and *cad*. Are they identical or different? We hope you said "different." Can you now say how they differ? We

hope you said that one was longer than the other. Now listen to the consonants after the vowels. Are these the same or different? Again, we hope you said different, and that you know that [t] is voiceless and [d] is voiced. Now, which vowel, the longer or the shorter, precedes [d] and which precedes [t]? We hope you said that the longer vowel precedes the voiced consonant.

Are the two vowels similar in any way? Again, we hope you said that they seem to be longer and shorter versions of the same vowel, [æ]. Let's use [ː] to indicate extra length. So, the vowel before voiceless [t] is just [æ], but the one before voiced [d] is [æː].

Now let's listen to some more word pairs like *cat* and *cad*:

root	rood
moat	mode
leaf	leave
gape	Gabe

Listen to the vowels in each pair. You should hear that the vowel in the second word in each pair is a little longer than the vowel in the first.

Now determine the similarities and differences between the consonants after the vowels in each word pair. You should find that the consonant in the first word is the voiceless version of the consonant in the second word.

Turning our attention again to the vowels in each word pair: how are they related? We hope you said that they were very similar vowels, specifically, short and long versions of the same vowel.

You should now be able to determine a very general rule of English. When are vowels lengthened and when are they not lengthened?

Your answer should be something along the lines of: *English vowels are lengthened when they occur before a voiced consonant; otherwise they are not lengthened*.

So far we've seen [æ] and [æː], [u] and [uː], [o] and [oː], [i] and [iː], and [e] and [eː]; in each case the longer vowel occurs before a voiced consonant. We've also noted that the vowels are otherwise virtually identical—they differ only in length. So it makes good sense to regard these pairs of vowel sounds as slightly different pronunciations of the same vowel, and that whether the vowel is lengthened or not depends on whether the consonant that follows it is voiced or not.

Importantly, the long and short pairs of vowels do not contrast with each other: English contains no pairs of words that are identical except that where one contains a short version of a vowel, the other contains the longer version of the same vowel. Consequently, the long and short versions of

vowels do not represent separate phonemes.

Let's now turn our attention to some consonants. For example, English speakers pronounce the [t] in *toll* differently from that in *stole*. The [t] of *toll* is breathier than the [t] of *stole*. The former is said to be **aspirated**, and the latter **unaspirated**. We represent the aspirated [t] as [t^h], with the **diacritic** [^{h}] indicating aspiration. We represent the unaspirated [t] as [t] with no diacritic. The important point here is that English speakers do not signal any difference in meaning with the difference between [t^h] and [t]. They treat the two sounds as variant ways of pronouncing the "the same sound." Substituting one of these sounds for the other would not affect the meaning of a word, but it would create an odd and perhaps non-native pronunciation of the word. No pair of English words is distinguished solely by the difference between [t] and [t^h]. You can satisfy yourself that this is so by trying to find a minimal pair of English words differentiated solely by the fact that where one has an aspirated consonant the other has an unaspirated version of that same consonant. (Don't spend too long trying!)

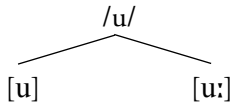
Let's now look at a different pair of English sounds. If we replace the [t] in [rɑt] (*rot*) with [d], then we get the sequence of sounds [rɑd] (*rod*), which, of course, is quite distinct in meaning from *rot*. Clearly, English speakers treat the difference between [d] and [t] differently from the way they treat the difference between [t^h] and [t] and between longer and shorter versions of vowels. In the case of [t] and [d], the difference can signal a difference in meaning; in the other cases it cannot. Differences in sound that signal differences in meaning are said to be **phonemic**, **distinctive**, or **contrastive**. Differences in sound that do not signal meaning differences are **non-distinctive** or **non-contrastive**. One objective of phonology is to identify which sound differences are contrastive and which are not. As we have seen, the contrastive sound units are called phonemes.

Phonemes and allophones

A good way to think about a phoneme is as a group of phonetically similar sounds that are treated as members of the same sound category. Because the members of a sound category are treated as "the same sound" in a language, they cannot be used for communicating differences in meaning. English speakers treat [t^h] and [t] as belonging to the same sound category, so they cannot be used to distinguish one word from another. Different phonemes are different categories of sounds and the differences among these categories can signal differences in meaning. English speakers treat [t] and [d] as belonging to different sound categories—/t/ and /d/, respectively—and so

these can be used to differentiate one word from another.

Sound categories are abstractions. We can only perceive them when one of their members is pronounced. The sounds that make up the category are called the **allophones** of that phoneme. Thus [t] and [tʰ] are allophones of the English phoneme /t/. Notice that the individual sound symbols are the same as those we used for phonetics, but to distinguish phonology from phonetics, we enclose phonemes in **slanted brackets** / / and use square brackets [ ] for phonetic notation. Perhaps the following diagram will help. It represents the phoneme /u/ and two of its allophones:



That is, the phoneme /u/ is pronounced in (at least) two ways, [u] and [uː], depending upon its context. Table 8 lists the phonemes of English.

Consonants:	/p, t, k, b, d, g, m, n, ŋ/
	/f, θ, s, ʃ, h, v, ð, z, ʒ/
	/tʃ, dʒ/
	/r, l, w, j/
Vowels:	/i, ɪ, e, ɛ, æ, ɑ, ɔ, o, ʊ, u, (ə)/
Diphthongs:	/ɔɪ, aʊ, aɪ/

TABLE 8: ENGLISH PHONEMES

As you have no doubt noticed, there are nearly 40 phonemes of English (the number varies somewhat from dialect to dialect), while there are only 26 letters in the English alphabet. This is one of the reasons why the alphabet appears to fit the language so poorly. (For more on English spelling see our chapter on Spelling in Book II.)

Exercise

1. What phoneme is represented by the bolded letter(s) in the following words? Make sure to enclose the symbols you choose in the phoneme slashes //.

***t**on, **b**ump, **d**ip, **c**omb, **ch**in, **z**oom, **sh**ave, **m**ango, thi**ng**, **l**ame, **r**ead, sl**ee**p, **r**ed, **m**at, **g**ood, **c**au**gh**t, **k**ite, **b**id, **c**o**y**.*

2. Transcribe the following words in a phonemic (**broad**) transcription. That is, just represent the phonemes that each word is composed of and ignore the allophonic detail.

thin, then, cheese, rouge, June, shin, fling, heave, yak, cow.

Allophones and their contexts

We have already noted that if we substitute the aspirated allophone of /t/ for its unaspirated relative, then we create an odd pronunciation of a word. [tʰɪl] is the typical American English pronunciation of *till*, but [tɪl] is not. What, if any, patterns can we observe in where allophones of a phoneme can and cannot occur?

Some allophones of a phoneme are in **complementary distribution**, that is, they occupy different positions (**contexts** or **environments**) in words—where one can occur the other cannot. As we have seen, English has a very general pattern of lengthening vowels before voiced consonants. That is, the allophone of a vowel phoneme before a voiced consonant will be appreciably longer (up to three times longer) than the allophone of the same vowel phoneme before a voiceless consonant. For example, listen to the pronunciation of /ɛ/ in *bet* and *bed*. You should have little difficulty in hearing the difference in vowel length. We can represent the pattern of occurrence (**distribution**) of these two allophones of the phoneme /ɛ/ as the following **phonological rule**: *When the phoneme /ɛ/ occurs before a voiceless consonant it is pronounced as its allophone [ɛ]; when it occurs before a voiced consonant it is pronounced as its allophone [ɛː].* (Remember: [ː] is a diacritic indicating a lengthened sound.)

In fact, the rule is much more general than this. Because it applies to all vowels, we can write it as: *In English a vowel is longer before a voiced consonant than it is before a voiceless one.* One of our objectives in studying a language is to be able to describe these sound patterns, i.e., to be able to specify in the most general terms possible the phonetic environments in which each allophone occurs.

Let's look at another very systematic set of English vowel allophones. The vowels of *cap* and *can* differ phonetically: that of *cap* is a plain [æ]; that of *can* is **nasalized**, represented by [æ̃]. (If you have trouble hearing the difference, try starting to say each word normally and then omit the final consonant.) The phoneme /æ/ thus has the allophones, [æ] and [æ̃]. In fact, all English vowels have both nasalized and non-nasalized allophones. We can represent this as the rule: *Whenever an English vowel occurs before a nasal consonant, it becomes nasalized; otherwise it is non-nasalized.*

In fact, the situation is a bit more intricate that this. Because nasals are voiced, we should expect a vowel before them to be lengthened relative to the same vowel before a voiceless sound. And, indeed, this is what we find. Listen to the vowels in *cat*, *cad*, and *can*. You should notice that the first vowel is unlengthened, [æ]; the second one is lengthened, [æː]; and the third one is both lengthened (in fact, probably even more than the second one) and nasalized, [æ̃ː].

Exercise

1. What sounds are presented by the bolded letter(s) in the following words? Provide an allophonic (**narrow**) transcription.

   m**a**d, b**a**ck, s**p**ill, **c**at, t**a**ng

2. Try your hand at distinguishing allophones of phonemes. Using the discussion above as a guide, see if you can describe the phonetic differences between the allophones of the designated phoneme in the example words.

   a. /k/: kin, skin
   b. /ɛ/: bet, Ben
   c. /e/: rate, raid
   d. /æ/: bat, bad
   e. /l/: lead, pull
   f. /k/: cool, keel

PHONOLOGICAL RULES

As we saw above, a **phonological rule** is a general statement about the distribution of a phoneme's allophones, e.g., those of /t/. There are several types of phonological rules to represent the several patterns of distribution of sounds in a language.

The rule for the [tʰ] allophone of /t/ can be seen as adding extra breathiness after the release of a voiceless stop. This rule adds the aspiration feature to the consonant. Such rules are referred to as **feature addition rules**.

Exercise

Listen carefully to the sounds represented by the bolded letters in each of the following pairs of words: ***st**eal, **t**eal; s**p**in, **p**in; s**k**ate, **K**ate*. What phonetic difference can you hear between the [t] of *steal* and the

[t] of *teal*? Write the two sounds in narrow (allophonic) phonetic transcription. Where does each of these two sounds occur in the example words? Answer the same questions for the [p] of *spin* and *pin* and the [k] of *skate* and *Kate*. What general pattern applies to all three pairs of sounds? Express this general pattern as a phonological rule.

Feature changing rules change the value of a component feature of a sound, for instance, from non-nasal to nasal or from short to long. The nasal pronunciation of the vowel of *can* is due, as we've seen, to the influence of the nasal consonant /n/ that comes immediately after it. In this case, the rule changes an oral (non-nasal) sound to a nasal one.

Segment deletion rules remove sound segments. For instance, in informal speech, a segment deletion rule removes the second of a pair of consonants at the end of one word when the next word begins with a consonant. Thus words such as *frost* and *ask* are pronounced as [fras] and [æs] when they occur before consonants (e.g., *Ask Katie*). This effect is especially likely when the last consonant of the first word is phonetically similar to the first consonant of the next word, as in *used to* [jus tə], instead of [just tə], (which leads to the incorrect spelling *use to*). French adjectives which end in consonants routinely lose those consonants if the following word begins with a consonant: 'small friend' *petit ami* [pətit ami] vs. 'small book' *petit livre* [pəti livr].

Phonological rules may also reverse the order of segments in words. In some dialects of English the verb *ask* is pronounced as [æks], reversing [s] and [k]. Several hundred years ago, the word *bird*, now pronounced as [bərd] was pronounced [brɪd]. The vowel and the [r] switched places. Rules that reverse a sequence of segments are called **metathesis rules**.

Some rules, such as the vowel nasalization rule, make a segment and its neighbor more alike. Such rules are called **assimilation rules**.

Exercise

1. (a) Identify the rapid, natural pronunciation of the sound represented by the letter <n> in the words *input, intake,* and *inquest*. (b) Identify the sound immediately after the sound represented by <n> in each word. (c) In what ways are the sound represented by <n> and the sound immediately following it in each word similar? (d) Express the similarity between the members of the pairs of sounds in all three words in one general rule. (e) What kind of phonological rule is this?

2. Examine the rapid, natural pronunciation of <n> in the phrases below. Write each entire phrase phonemically. Then try to state a rule that accounts for the different pronunciations. What type of rule did you discover?

a. In Bill's house
b. In Ted's house
c. In Greg's house

3. Describe the phonetic difference between the allophones of /k/ (written as <c> and <k> in ordinary spelling) in the two columns of words:

coop	keep
could	kid
coat	Kate
cot	cat

Express the difference and the distribution of the allophones as a phonological rule. What kind of rule did you come up with?

Assimilation can be so thoroughgoing that two sounds can merge into one. For example, [t,d,s,z] are palatalized—i.e., pronounced [tʃ, dʒ, ʃ, ʒ] respectively—when they occur at the ends of words and the next word begins with the palatal glide [j]. For example, *Did you?* is typically pronounced as [dɪdʒə] or even [dʒə]; the [dʒ] results from the coalescence of [dj].

The study of phonology shows that languages make use of unpredictable units (phonemes) to differentiate words from each other. It also shows that languages employ very general patterns of sounds. By representing the general, predictable patterns as phonological rules, we leave only that information which is unpredictable and idiosyncratic to be listed in the set of phonemes. This way we minimize the number of basic phonemic units we need to posit; we also minimize the number of times any given piece of information is mentioned, thus simplifying the overall grammar or description of the language. For example, English has two series of vowels, those with and those without nasalization. The nasalized vowels occur only before nasal consonants; the non-nasalized ones occur everywhere else. If we merely listed all these vowels as belonging to the language, then we would have postulated far more basic units than we—or native speakers—really need. And we would have missed the generalization that the two series of vowels are really quite alike, one series being merely a predictable positional

variant of the other. We capture this generalization by eliminating the series of nasalized vowels from our inventory of basic units and replacing it with the nasalization rule.

Exercise

1. Arabic speakers learning English often produce [b] where English requires [p], e.g., saying "bark" instead of "park." Describe the phonetic difference between [b] and [p].

2. We noted that English has approximately 40 phonemes but only 26 letters of the ordinary alphabet to represent them. Illustrate with appropriate examples at least three ways in which the English spelling system uses those 26 letters to represent its almost 40 phonemes.

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GLOSSARY

AFFRICATE: sound produced with full stoppage of the airstream followed immediately by constriction.

ALLOPHONE: non-distinctive phonetic variant of a phoneme.

ALVEO-PALATAL: sound produced at the hard palate just behind the alveolar ridge.

ALVEOLAR: sound produced at the alveolar ridge, the bony ridge behind the teeth.

APPROXIMANTS: sounds produced when the articulators approach each other but not so closely as to cause turbulence in the airstream; they include laterals (the tongue touches the top of the mouth but the air is allowed to pass along one or both sides, as in [l]); central (the sides of the tongue are raised so that air flows along the center of the mouth, as in [r]); as well as the labiovelar [w] and palatal [j].

ASPIRATED: consonant sound released with a puff of air.

ASSIMILATION RULE: phonological rule that makes a sound similar to a nearby sound. e.g., palatalization.

BACK VOWEL: vowel produced with the back of the tongue raised toward the soft palate.

BILABIAL: sound produced with constriction or closure of the lips.

BROAD TRANSCRIPTION: the attempt to record pronunciation without regard to non-contrastive details. See **NARROW TRANSCRIPTION.**

CENTRAL: vowel—e.g., [ə]—produced with the tongue raised at the center of the mouth rather than at the front or back.

CODA: last part of a syllable; follows the nucleus.

COMPLEMENTARY DISTRIBUTION: when the allophones of a phoneme occupy different positions in words.

CONSONANT: sound produced with complete or partial obstruction of the air flow through the mouth. See **VOWEL.**

CONTRASTIVE (also **DISTINCTIVE**): sounds used in a language to signal differences of meaning.

DIACRITIC: phonetic symbols used to represent fine differences in pronunciation, e.g., the [ʰ] that indicates aspiration.

DIPHTHONG: vowel unit that begins with one oral configuration and ends with another. See **MONOPHTHONG.**

DISTINCTIVE: See **CONTRASTIVE.**

DISTRIBUTION: specific circumstances (**ENVIRONMENTS**) in which a sound oc-

curs, e.g., at the beginning, middle, or end of a word.

ENVIRONMENT: See **DISTRIBUTION**.

FEATURE CHANGING RULE: rule that changes the value of a component feature of a sound, e.g., from stop to fricative, from non-nasal to nasal, or from lax to tense.

FOOT: a rhythmic unit consisting of at least one stressed syllable and 1-2 other syllables, typically unstressed.

FRICATIVE: sound produced with constriction of the airstream, producing friction.

FRONT VOWEL: vowel produced with the front of the tongue raised toward the hard palate.

GLIDES: sounds, e.g., [j] and [w], that are intermediate in openness and sonority between consonants and vowels. Also called **SEMIVOWELS**.

GLOTTAL: sound produced by constricting or stopping the airstream at the vocal folds.

HIGH VOWEL: vowel pronounced with the mouth in the least degree of openness. See **MID VOWEL** and **LOW VOWEL**.

INTERDENTAL: sound produced with the tongue protruding between the teeth.

LABIODENTAL: sound produced with constriction between the bottom lip and top teeth.

LABIOVELAR: sound produced by raising the back of the tongue to or toward the velum and rounding the lips, e.g., [w].

LATERAL: sound produced with the tongue touching the top of the mouth with air allowed to pass along one or both sides, as in [l].

LAX: sound produced with musculature of the mouth relatively relaxed. See **TENSE**.

LOW VOWEL: vowel pronounced with the mouth in the greatest degree of openness. See **HIGH VOWEL** and **MID VOWEL**.

MANNER OF ARTICULATION: the kind of closure or constriction used in making a consonant sound.

METATHESIS RULE: phonological rule that reverses the order of segments in words.

MID VOWEL: vowel pronounced with the mouth in an intermediate degree of openness. See **HIGH VOWEL** and **LOW VOWEL**.

MINIMAL PAIR: two words of different meaning that are phonetically the same except for one sound, e.g., **p**it and **b**it (used to demonstrate that [p] and [b] contrast with each other).

MONOPHTHONG: vowel unit consisting of a single segment held constant during its pronunciation. See **DIPHTHONG**.

NARROW TRANSCRIPTION: attempt to record non-contrastive details of pronunciation. See **BROAD TRANSCRIPTION**.
NASAL, NASALIZED: sounds articulated with air flowing through the nasal cavity.
NON-CONTRASTIVE (also **NON-DISTINCTIVE**): sounds not used in a language to signal different meanings.
NUCLEUS: central part of a syllable, i.e., the segment with the highest sonority.
ONSET: initial part of a syllable; precedes the nucleus.
PHONEME: contrastive or distinctive sound category; distinguishes words from each other.
PHONETICS (**ARTICULATORY**): the study of how speech sounds are produced.
PHONOLOGICAL RULE: a general statement about the distribution of a phoneme's allophones and about other phonological processes.
PHONOLOGY: the study of the ways in which a given language shapes sounds into distinctive categories of perception and of its rules of pronunciation.
PLACE OF ARTICULATION: the area in the mouth at which the consonantal closure or constriction occurs.
RHYME: the nucleus and coda of a syllable.
ROUNDED: vowel sound produced with the lips pursed. See **UNROUNDED**.
SCHWA: a mid central unrounded vowel, represented as [ə].
SEGMENT DELETION RULE: phonological rule that eliminates a sound from pronunciation in a word or phrase.
SEMIVOWEL: see **GLIDE**.
SONORANT: sounds produced with a smooth airflow, allowing for a high degree of resonance.
STOP: sound produced with full stoppage of the airstream anywhere in the *oral* cavity from the vocal folds to the lips.
TENSE: sound produced with musculature of the mouth relatively tight. See **LAX**.
UNROUNDED: vowel produced without lip rounding. See **ROUNDED**.
VELAR: sound produced with constriction at the soft palate.
VOICED: sound produced with the vocal folds vibrating.
VOICELESS: sound produced with the vocal folds not vibrating.
VOWEL: sound produced with smooth, unobstruction air stream through the mouth. See **CONSONANT**.

1 Introduction

You probably want to know what the purpose of this course is, and what you can expect to learn from it. An important purpose of the course is to explain how English is pronounced in the accent normally chosen as the standard for people learning the English spoken in England. If this was the only thing the course did, a more suitable title would have been "English Pronunciation". However, at the comparatively advanced level at which this course is aimed, it is usual to present this information in the context of a general theory about speech sounds and how they are used in language; this theoretical context is called phonetics and phonology. Why is it necessary to learn this theoretical background? A similar question arises in connection with grammar: at lower levels of study one is concerned simply with setting out how to form grammatical sentences, but people who are going to work with the language at an advanced level as teachers or researchers need the deeper understanding provided by the study of grammatical theory and related areas of linguistics. The theoretical material in the present course is necessary for anyone who needs to understand the principles regulating the use of sounds in spoken English.

1.1 How the course is organised

You should keep in mind that this is a *course*. It is designed to be studied from beginning to end, with the relevant exercises being worked on for each chapter, and it is therefore quite different from a reference book. Most readers are expected to be either studying English at a university, or to be practising English language teachers. You may be working under the supervision of a teacher, or working through the course individually; you may be a native speaker of a language that is not English, or a native English-speaker.

Each chapter has additional sections:

- **Notes on problems and further reading: this section gives you information on how to find out more about the subject matter of the chapter.**
- **Notes for teachers: this gives some ideas that might be helpftil to teachers using the book to teach a class.**
- **Written exercises: these give you some practical work to do in the area covered by the chapter. Answers to the exercises are given on pages 200-9.**
- **Audio exercises: these are recorded on the CDs supplied with this book (also convertible to mp3 files), and there are places marked in the text when there is a relevant exercise.**

- **Additional exercises: you will find more written and audio exercises, with answers, on the book's website.**

Only some of the exercises are suitable for native speakers of English. The exercises for Chapter 1 are mainly aimed at helping you to become famihar with the way the written and audio exercises work.

1.2 The *English Phonetics and Phonology* website

If you have access to the Internet, you can find more information on the website produced to go with this book. You can find it at www.cambridge.org/elt/peterroach. Everything on the website is additional material - there is nothing that is essential to using the book itself, so if you don't have access to the Internet you should not suffer a disadvantage.

The website contains the following things:

- **Additional exercise material.**
- **Links to useful websites.**
- **A discussion site for exchanging opinions and questions about English phonetics and phonology in the context of the study of the book.**
- **Recordings of talks given by Peter Roach.**
- **Other material associated with the book.**
- **A Glossary giving brief explanations of the terms and concepts found in phonetics and phonology.**

1.3 Phonemes and other aspects of pronunciation

The nature of phonetics and'phonology will be explained as the course progresses, but one or two basic ideas need to be introduced at this stage. In any language we can identify a small number of regularly used sounds (vowels and consonants) that we call phonemes; for example, the vowels in the words 'pin' and 'pen' are different phonemes, and so are the consonants at the beginning of the words 'pet' and 'bet'. Because of the notoriously confusing nature of Enghsh spelhng, it is particularly important to learn to think of English pronunciation in terms of phonemes rather than letters of the alphabet; one must be aware, for example, that the word 'enough' begins with the same vowel phoneme as that at the beginning of 'inept' and ends vrith the same consonant as 'stuff'. We often use special symbols to represent speech sounds; with the symbols chosen for this course, the word 'enough' would be written (transcribed) as ɪnʌf. The symbols are always printed in blue type in this book to distinguish them from letters of the alphabet. A fist of the symbols is given on pp. x-xi, and the chart of the International Phonetic Association (IPA) on which the symbols are based is reproduced on p. xii.

The first part of the course is mainly concerned with identifying and describing the phonemes of English. Chapters 2 and 3 deal with vowels and Chapter 4 with some consonants. After this preliminary contact with the practical business of how some Enghsh sounds are

pronounced, Chapter 5 looks at the phoneme and at the use of symbols in a theoretical way, while the corresponding Audio Unit revises the material of Chapters 2—4. After the phonemes of English have been introduced, the rest of the course goes on to look at larger units of speech such as the syllable and at aspects of speech such as stress (which could be roughly described as the relative strength of a syllable) and intonation (the use of the pitch of the voice to convey meaning). As an example of stress, consider the difference between the pronunciation of'contract' as a noun ('they signed a contract') and 'contract' as a verb ('it started to contract'!. In the former the stress is on the first syllable, while in the latter it is on the second syllable. A possible example of intonation would be the different pitch movements on the word 'well' said as an exclamation and as a question: in the first case the pitch will usually fall from high to low, while in the second it will rise from low to high.

You will have to learn a number of technical terms in studying the course: you will find that when they are introduced in order to be defined or explained, they are printed in bold type. This has already been done in this Introduction in the case of, for example, phoneme, phonetics and phonology*. Another convention to remember is that when words used as examples are given in spelling form, they are enclosed in single quotation marks - see for example 'pin', 'pen', etc. Double quotation marks are used where quotation marks would normally be used - that is, for quoting something that someone has said or might say. Words are sometimes printed in *italics* to mark them as specially important in a particular context.

1.4 Accents and dialects

Languages have different accents: they are pronounced differently by people from different geographical places, from different social classes, of different ages and different educational backgrounds. The word *accent* is often confused with dialect. We use the word *dialect to* refer to a variety of a language which is different from others not just in pronunciation but also in such matters as vocabulary, grammar and word order. Differences of accent, on the other hand, are pronunciation differences only.

The accent that we concentrate on and use as our model is the one that is most often recommended for foreign learners studying British English. It has for a long time been identified by the name Received Pronunciation (usually abbreviated to its initials, RP), but this name is old-fashioned and misleading: the use of the word "received" to mean "accepted" or "approved" is nowadays very rare, and the word if used in that sense seems to imply that other accents would *not* be acceptable or approved of. Since it is most familiar as the accent used by most announcers and newsreaders on BBC and British independent television broadcasting channels, a preferable name is BBC pronunciation. This should not be taken to mean that the BBC itself imposes an "official" accent — individual broadcasters all have their own personal characteristics, and an increasing number of broadcasters with Scottish, Welsh and Irish accents are employed. However, the accent described here is typical of broadcasters with an English accent, and there is a useful degree of consistency in the broadcast speech of these speakers.

' You \yIII find these words in the Glossary on the website.

This course is not written for people who wish to study American pronunciation, though we look briefly at American pronunciation in Chapter 20. The pronunciation of English in North America is different from most accents found in Britain. There are exceptions to this - you can find accents in parts of Britain that sound American, and accents in North America that sound English. But the pronunciation that you are likely to hear from most Americans does sound noticeably different from BBC pronunciation.

In talking about accents of English, the foreigner should be careful about the difference between England and Britain; there are many different accents in England, but the range becomes very much wider if the accents of Scotland, Wales and Northern Ireland (Scotland and Wales are included in Britain, and together with Northern Ireland form the United Kingdom) are taken into account. Within the accents of England, the distinction that is most frequently made by the majority of English people is between northern and southern. This is a very rough division, and there can be endless argument over where the boundaries lie, but most people on hearing a pronunciation typical of someone from Lancashire, Yorkshire or other counties further north would identify it as "Northern". This course deals almost entirely with BBC pronunciation. There is no implication that other accents are inferior or less pleasant-sounding; the reason is simply that BBC is the accent that has usually been chosen by British teachers to teach to foreign learners, it is the accent that has been most fully described, and it has been used as the basis for textbooks and pronunciation dictionaries.

A term which is widely found nowadays is Estuary English, and many people have been given the impression that this is a new (or newly-discovered) accent of English. In reality there is no such accent, and the term should be used with care. The idea originates from the sociolinguistic observation that some people in public life who would previously have been expected to speak with a BBC (or RP) accent now find it acceptable to speak with some characteristics of the accents of the London area (the estuary referred to is the Thames estuary), such as glottal stops, which would in earlier times have caused comment or disapproval.

If you are a native speaker of English and your accent is different from BBC you should try, as you work through the course, to note what your main differences are for purposes of comparison. I am certainly not suggesting that you should try to change your pronunciation. If you are a learner of English you are recommended to concentrate on BBC pronunciation initially, though as you work through the course and become familiar with this you will probably find it an interesting exercise to listen analytically to other accents of English, to see if you can identify the ways in which they differ from BBC and even to leam to pronoimce some different accents yourself.

Notes on problems and further reading

The recommendation to use the name *BBC pronunciation* rather than *RP* is not universally accepted. 'BBC pronunciation' is used in recent editions of the *Cambridge English Pronouncing Dictionary* (Jones, eds. Roach, Hartman and Setter, 2006), in Trudgill (1999)

and in Ladefoged (2004); for discussion, see the Introduction to the *Longman Pronunciation Dictionary* (Wells, 2008), and to the *Cambridge English Pronouncing Dictionary* (Jones, eds. Roach *et al*, 2006). In Jones's original *English Pronouncing Dictionary* of 1917 the term used was *Public School Pronunciation* (PSP). Where I quote other writers who have used the term *RP* in discussion of standard accents, I have left the term unchanged. Other writers have suggested the name *GB {General British)* as a term preferable to RP; I do not feel this is satisfactory, since the accent being described belongs to England, and citizens of other parts of Britain are understandably reluctant to accept that this accent is the standard for countries such as Scotland and Wales. The BBC has an excellent Pronunciation Research Unit to advise broadcasters on the pronunciation of difficult words and names, but most people are not aware that it has no power to make broadcasters use particular pronunciations: BBC broadcasters only use it on a voluntary basis.

I feel that if we had a completely free choice of model accent for British English it would be possible to find more suitable ones: Scottish and Irish accents, for example, have a more straightforward relationship between spelling and sounds than does the BBC accent; they have simpler vowel systems, and would therefore be easier for most foreign learners to acquire. However, it seems that the majority of English teachers would be reluctant to learn to speak in the classroom with a non-English accent, so this is not a practical possibility.

For introductory reading on the choice of English accent, see Brown (1990: 12-13); Abercrombie (1991: 48-53); Cruttenden (2008: Chapter 7); Collins and Mees (2008: 2-6); Roach (2004,2005). We will return to the subject of accents of English in Chapter 20.

Much of what has been written on the subject of "Estuary English" has been in minor or ephemeral publications. However, I would recommend looking at Collins and Mees (2008: 5-6, 206-8, 268-272); Cruttenden (2008: 87).

A problem area that has received a lot of attention is the choice of symbols for representing English phonemes. In the past, many different conventions have been proposed and students have often been confused by finding that the symbols used in one book are different from the ones they have learned in another. The symbols used in this book are in most respects those devised by A. C. Gimson for his *Introduction to the Pronunciation of English,* the latest version of which is the revision by Cruttenden (Cruttenden, 2008). These symbols are now used in almost all modern works on English pronunciation published in Britain, and can therefore be looked on as a *de facto* standard. Although good arguments can be made for some alternative symbols, the advantages of having a common set of symbols for pronunciation teaching materials and pronunciation entries in dictionaries are so great that it would be very regrettable to go back to the confusing diversity of earlier years. The subject of symbolisation is returned to in Section 5.2 of Chapter 5.

Notes for teachers

Pronunciation teaching has not always been popular with teachers and language-teaching theorists, and in the 1970s and 1980s it was fashionable to treat it as a rather outdated activity. It was claimed, for example, that it attempted to make learners try to sound like

native speakers of Received Pronunciation, that it discouraged them through difficult and repetitive exercises and that it failed to give importance to communication. A good example of this attitude is to be found in Bro\vn and Yule (1983: 26-7). The criticism was misguided, I believe, and it is encouraging to see that in recent years there has been a significant growth of interest in prommciation teaching and many new publications on the subject. There are very active groups of pronunciation teachers who meet at TESOL and lATEFL conferences, and exchange ideas via Internet discussions.

No pronunciation course that I know has ever said that learners must try to speak with a perfect RP accent. To claim this mixes up models with goals: the *model* chosen is BBC (RP), but the *goal* is normally to develop the learner's pronunciation sufficiently to permit effective communication with native speakers. Pronunciation exercises can be difficult, of course, but if we eliminate everything difficult from language teaching and learning, we may end up doing very little beyond getting students to play simple communication games. It is, incidentally, quite incorrect to suggest that the classic works on pronunciation and phonetics teaching concentrated on mechanically perfecting vowels and consonants: Jones (1956, first published 1909), for example, writes " 'Good' speech may be defined as a way of speaking which is clearly intelligible to all ordinary people. 'Bad' speech is a way of talking which is difficult for most people to understand ... A person may speak with sounds very different from those of his hearers and yet be clearly intelligible to all of them, as for instance when a Scotsman or an American addresses an English audience with clear articulation. Their speech cannot be described as other than 'good' " (pp. 4r-5).

Much has been written recently about English as an International Language, with a view to defining what is used in common by the millions of people around the world who use English (Crystal, 2003; Jenkins, 2000). This is a different goal from that of this book, which concentrates on a specific accent. The discussion of the subject in Cruttenden (2008: Chapter 13) is recommended as a survey of the mam issues, and the concept of an International English pronunciation is discussed there.

There are many different and well-tried methods of teaching and testing pronunciation, some of which are used in this book. I do not feel that it is suitable in this book to go into a detailed analysis of classroom methods, but there are several excellent treatments of the subject; see, for example, Dalton and Seidlhofer (1995); Celce-Murcia *et al.* (1996) and Hewings (2004).

Written exercises

The exercises for this chapter are simple ones aimed at making you familiar with the style of exercises that you will work on in the rest of the course. The answers to the exercises are given on page 200.

1 Give three different names that have been used for the accent usually used for teaching the pronunciation of British English.

2 What is the difference between *accent* and *dialect*^

3 Which word is used to refer to the relative strength of a syllable?

4 How many sounds (phonemes) do you think there are in the following words?

a) love b) half c) wrist d) shrink e) ought

Now look at the answers on page 200.

2 The production of speech sounds

2.1 Articulators above the larynx

All the sounds we make when we speak are the result of muscles contracting. The muscles in the chest that we use for breathing produce the flow of air that is needed for almost all speech sounds; muscles in the larynx produce many different modifications in the flow of air from the chest to the mouth. After passing through the larynx, the air goes through what we call the vocal tract, which ends at the mouth and nostrils; we call the part comprising the mouth the oral cavity and the part that leads to the nostrils the nasal cavity. Here the air from the lungs escapes into the atmosphere. We have a large and complex set of muscles that can produce changes in the shape of the vocal tract, and in order to learn how the sounds of speech are produced it is necessary to become familiar with the different parts of the vocal tract. These different parts are called articulators, and the study of them is called articulatory phonetics.

Fig. 1 is a diagram that is used frequently in the study of phonetics. It represents the human head, seen from the side, displayed as though it had been cut in half. You will need to look at it carefully as the articulators are described, and you will find it useful to have a mirror and a good light placed so that you can look at the inside of your mouth.

i) **The pharynx is a tube which begins just above the larynx. It is about 7 cm long in women and about 8 cm in men, and at its top end it is divided into two, one**

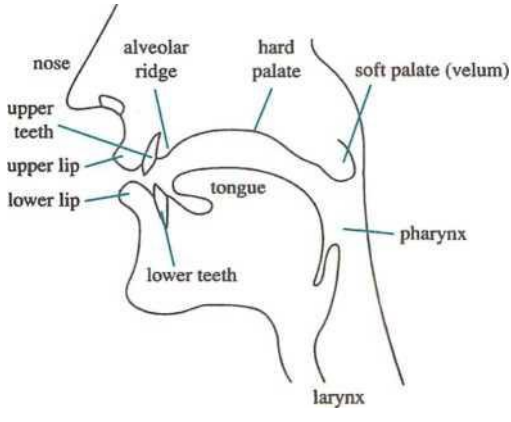


Fig. 1 The articulators 8

part being the back of the oral cavity and the other being the beginning of the way through the nasal cavity. If you look in your mirror with your mouth open, you can see the back of the pharynx.

ii) The soft palate or velum is seen in the diagram in a position that allows air to pass through the nose and through the mouth. Yours is probably in that position now, but often in speech it is raised so that air caimot escape through the nose. The other important thing about the soft palate is that it is one of the articulators that can be touched by the tongue. When we make the sounds k, g the tongue is in contact with the lower side of the soft palate, and we call these velar consonants.

iii) The hard palate is often called the "roof of the mouth". You can feel its smooth curved surface with your tongue. A consonant made with the tongue close to the hard palate is called palatal. The sound j in 'yes' is palatal.

iv) The alveolar ridge is between the top front teeth and the hard palate. You can feel its shape with your tongue. Its surface is really much rougher than it feels, and is covered with little ridges. You can only see these if you have a mirror small enough to go inside your mouth, such as those used by dentists. Sounds made with the tongue touching here (such as t, d, n) are called alveolar.

v) The tongue is a very important articulator and it can be moved into many different places and different shapes. It is usual to divide the tongue into different parts, though there are no clear dividing lines within its structure. Fig. 2 shows the tongue on a larger scale with these parts shown: tip, blade, ft'ont, back and root. (This use of the word "front" often seems rather strange at first.)

vi) The teeth (upper and lower) are usually shown in diagrams like Fig. 1 only at the front of the mouth, immediately behind the lips. This is for the sake of a simple diagram, and you should remember that most speakers have teeth to the sides of their mouths, back almost to the soft palate. The tongue is in contact with the upper side teeth for most speech sounds. Sounds made with the tongue touching the front teeth, such as English 0, d, are called dental.

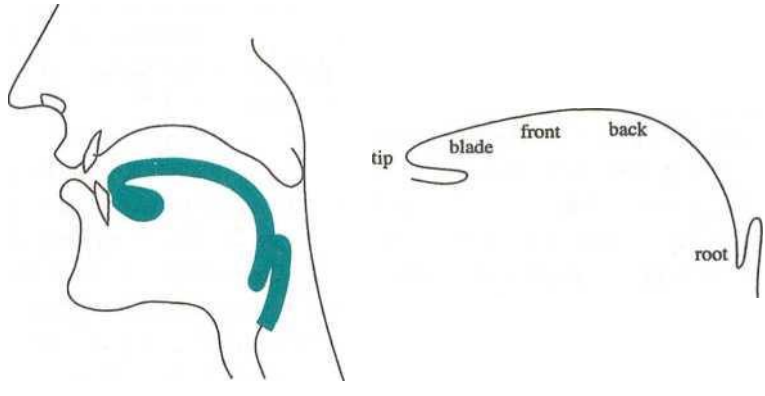


Fig. 2 Subdivisions of the tongue

vii) **The Kps are important in speech. They can be pressed together (when we produce the sounds p, b), brought into contact with the teeth (as in f, v), or rounded to produce the lip-shape for vowels like u:. Sounds in which the lips are in contact with each other are called bilabial, while those with lip-to-teeth contact are called labiodental.**

The seven articulators described above are the main ones used in speech, but there are a few other things to remember. Firstly, the larynx (which will be studied in Chapter 4) could also be described as an articulator - a very complex and independent one. Secondly, the jaws are sometimes called articulators; certainly we move the lower jaw a lot in speaking. But the jaws are not articulators in the same way as the others, because they cannot themselves make contact with other articulators. Finally, although there is practically nothing active that we can do with the nose and the nasal cavity when speaking, they are a very important part of our equipment for making sounds (which is sometimes caUed our vocal apparatus), particularly nasal consonants such as m, n. Again, we cannot really describe the nose and the nasal cavity as articulators in the same sense as (i) to (vii) above.

2.2 Vowel and consonant

The words vowel and consonant are very familiar ones, but when we study the sounds of speech scientifically we find that it is not easy to define exactly what they mean. The most common view is that vowels are sounds in which there is no obstruction to the flow of air as it passes from the larynx to the hps. A doctor who wants to look at the back of a patient's mouth often asks them to say "ah"; making this vowel sound is the best way of presenting an unobstructed view. But if we make a sound like s, d it can be clearly felt that we are making it difficult or impossible for the air to pass through the mouth. Most people would have no doubt that sounds like s, d should be called consonants. However, there are many cases where the decision is not so easy to make. One problem is that some English sounds that we think of as consonants, such as the sounds at the beginning of the words 'hay' and 'way', do not really obstruct the flow of air more than some vowels do. Another problem is that different languages have different ways of dividing their sounds into vowels and consonants; for example, the usual sound produced at the beginning of the word 'red' is felt to be a consonant by most Enghsh speakers, but in some other languages (e.g. Mandarin Chinese) the same sound is treated as one of the vowels.

If we say that the difference between vowels and consonants is a difference in the way that they are produced, there wiU inevitably be some cases of uncertainty or disagreement; this is a problem that cannot be avoided. It is possible to estabhsh two distinct groups of sounds (vowels and consonants) in another way. Consider Enghsh words beginning with the sound h; what sounds can come next after this h? We find that most of the sounds we normally think of as vowels can follow (e.g. e in the word 'hen'), but practically none of the sounds we class as consonants, with the possible exception of j in a word such as 'huge' hju:dʒ. Now think of English words beginning with the two sounds bi; we find many cases where a consonant can follow (e.g. d in the word 'bid', or ɪ in the word 'biU'),

but practically no cases where a vowel may follow. What we are doing here is looking at the different contexts and positions in which particular sounds can occur; this is the study of the distribution of the sounds, and is of great importance in phonology. Study of the sounds found at the beginning and end of English words has shown that two groups of sounds with quite different patterns of distribution can be identified, and these two groups are those of vowel and consonant. If we look at the vowel-consonant distinction in this way, we must say that the most important difference between vowel and consonant is not the way that they are made, but their different distributions. It is important to remember that the distribution of vowels and consonants is different for each language.

We begin the study of English sounds in this course by looking at vowels, and it is necessary to say something about vowels in general before turning to the vowels of English. We need to know in what ways vowels differ from each other. The first matter to consider is the shape and position of the tongue. It is usual to simplify the very complex possibilities by describing just two things: firstly, the vertical distance between the upper surface of the tongue and the palate and, secondly, the part of the tongue, between front and back, which is raised highest. Let us look at some examples:

i) **Make a vowel like the i: in the English word 'see' and look in a mirror; if you tilt your head back slightly you will be able to see that the tongue is held up close to the roof of the mouth. Now make an ar vowel (as in the word 'cat') and notice how the distance between the surface of the tongue and the roof of the mouth is now much greater. The difference between *h* and æis a difference of tongue height, and we would describe i: as a relatively close vowel and ae as a relatively open vowel. Tongue height can be changed by moving the tongue up or down, or moving the lower jaw up or down. Usually we use some combination of the two sorts of movement, but when drawing side-of-the-head diagrams such as Fig. 1 and Fig. 2 it is usually found simpler to illustrate tongue shapes for vowels as if tongue height were altered by tongue movement alone, without any accompanying jaw movement. So we would illustrate the tongue height difference between i: and ae as in Fig. 3.**

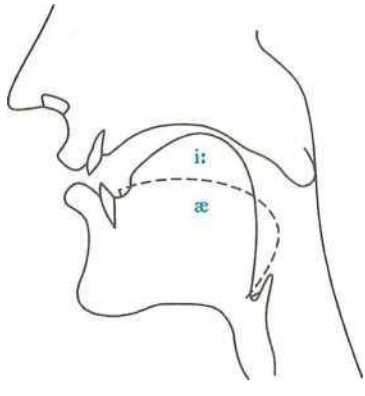


Fig. 3 Tongue positions for i: and ae

ii) **In making the two vowels described above, it is the front part of the tongue that is raised. We could therefore describe i; andse as comparatively front vowels. By changing the shape of the tongue we can produce vowels in which a different part of the tongue is the highest point. A vowel in which the back of the tongue is the highest point is called a back vowel. If you make the vowel in the word 'calm', which we write phonetically as a: > you can see that the back of the tongue is raised. Compare this withae in front of a mirror; ae is a front vowel andai is a back vowel. The vowel in 'too' (ui) is also a comparatively back vowel, but compared witha: it is close.**

So now we have seen how four vowels differ from each other; we can show this in a simple diagram.

	Front	Back
Close	i:	u:
Open	ae	a:

However, this diagram is rather inaccurate. Phoneticians need a very accurate way of classifying vowels, and have developed a set of vowels which are arranged in a close-open, front-back diagram similar to the one above but which are not the vowels of any particular language. These cardinal vowels are a standard reference system, and people being trained in phonetics at an advanced level have to learn to make them accurately and recognise them correctly. If you learn the cardinal voweb, you are not learning to make English sounds, but you are learning about the range of vowels that the human vocal apparatus can make, and also learning a useful way of describing, classifying and comparing vowels. They are recorded on Track 21 of CD 2.

It has become traditional to locate cardinal vowels on a four-sided figure (a quadrilateral of the shape seen in Fig. 4 - the design used here is the one recommended by the International Phonetic Association). The exact shape is not really important - a square would do quite well - but we will use the traditional shape. The vowels in Fig. 4 are the so- called primary cardinal vowels; these are the vowels that are most familiar to the speakers of most European languages, and there are other cardinal vowels (secondary cardinal vowels) that sound less familiar. In this course cardinal vowels are printed within square brackets [ ] to distinguish them clearly from English vowel sounds.

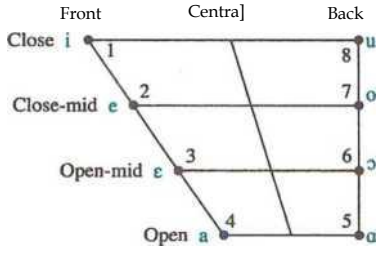


Fig. 4 Primary cardinal vowels

Cardinal vowel no. 1 has the symbol [i], and is defined as the vowel which is as close and as front as it is possible to make a vowel without obstructing the flow of air enough to produce friction noise; friction noise is the hissing sound that one hears in consonants like s or f. Cardinal vowel no. 5 has the symbol [a] and is defined as the most open and back vowel that it is possible to make. Cardinal vowel no. 8 [u] is fully close and back and no. 4 [a] is fully open and front. After establishing these extreme points, it is possible to put in intermediate points (vowels no. *2, 3, 6* and 7). Many students when they hear these vowels find that they soimd strange and exaggerated; you must remember that they are *extremes* of vowel quality. It is useful to think of the cardinal vowel framework like a map of an area or country that you are interested in. If the map is to be useful to you it must cover all the area; but if it covers the whole area of interest it must inevitably go a little way beyond that and include some places that you might never want to go to.

When you are familiar with these extreme vowels, you have (as mentioned above) learned a way of describing, classifying and comparing vowels. For example, we can say that the English vowel ae (the vowel in 'cat') is not as open as cardinal vowel no. 4 [a]. We have now looked at how we can classify vowels according to their tongue height and their frontness or backness. There is another important variable of vowel quality, and that is lip-position. Although the Ups can have many different shapes and positions, we wiU at this stage consider only three possibilities. These are:

i) **Rounded, where the corners of the lips are brought towards each other and the lips pushed forwards. This is most clearly seen in cardinal vowel no. 8 [u].**
ii) **Spread, with the corners of the lips moved away from each other, as for a smUe. This is most clearly seen in cardinal vowel no. 1 [i].**
iii) **Neutral, where the Ups are not noticeably rounded or spread. The noise most English people make when they are hesitating (written 'er') has neutral Up position.**

Now, using the principles that have just been explained, we wiU examine some of the English vowels.

2.3 English short vowels

O AU2, Exs 1-5

English has a large number of vowel sounds; the first ones to be examined are short vowels. The symbols for these short vowels are: ье,аЕ,л,о,и. Short vowels are only *relatively* short; as we shaU see later, vowels can have quite different lengths in different contexts.

Each vowel is described in relation to the cardinal vowels.

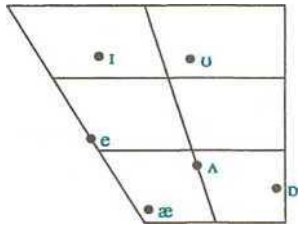


Fig. 5 English short vowels

ɪ (example words; 'bit', 'pin', 'fish') The diagram shows that, though this vowel is in the close front area, compared with cardinal vowel no. 1 [i] it is more open, and nearer in to the centre. The lips are slightly spread, e (example words: 'bet', 'men', 'yes') This is a front vowel between cardinal vowel no. 2 [e] and no. 3 [e]. The lips are slighdy spread, se (example words: 'bat', 'man', 'gas') This vowel is front, but not quite as open as cardinal vowel no. 4 [a]. The lips are slightly spread.

ʌ (example words: 'cut', 'come', 'rush') This is a central vowel, and the diagram shows that it is more open than the open-mid tongue height. The lip position is neutral.

ɒ (example words: 'pot', 'gone', 'cross') This vowel is not quite fully back, and between open-mid and open in tongue height. The hps are slightly rounded, ʊ (example words: 'put', 'puli', 'push') The nearest cardinal vowel is no. 8 [u], but it can be seen that ʊ is more open and nearer to central. The lips are rounded.

There is one other short vowel, for which the symbol is ə This central vowel — which is called schwa — is a very familiar sound in English; it is heard in the first syllable of the words 'about', 'oppose', 'perhaps', for example. Since it is different from the other vowels in several important ways, we will study it separately in Chapter 9.

Notes on problems and further reading

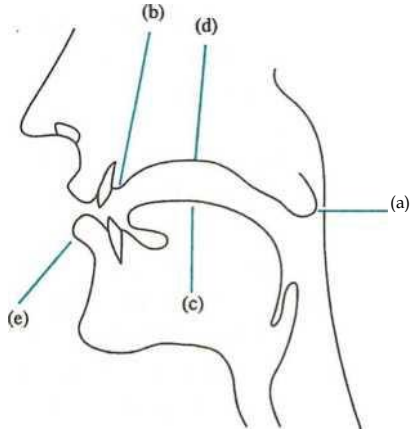
One of the most difficult aspects of phonetics at this stage is the large number of technical terms that have to be learned. Every phonetics textbook gives a description of the articulators. Useful introductions are Ladefoged (2006: Chapter 1), Ashby (2005), and Ashby and Maidment (2005: Chapter 3).

An important discussion of the vowel-consonant distinction is by Pike (1943:66—79). He suggested that since the two approaches to the distinction produce such different results we should use new terms: sounds which do not obstruct the airflow (traditionally called "vowels") should be called vocoids, and sounds which *do* obstruct the airflow (traditionally called "consonants") should be called contoids. This leaves the terms "vowel" and "consonant" for use in labelling phonological elements according to their distribution and their role in syllable structure; see Section 5.8 of Laver (1994). While vowels are usually vocoids and consonants are usually contoids, this is not always the case; for example, j in 'yet' and w in 'wet' are (phonetically) vocoids but function (pho- nologically) as consonants. A study of the distributional differences between vowels and consonants in English is described in O'Connor and Trim (1953); a briefer treatment is in Cruttenden (2008: Sections 4.2 and 5.6). The classification of vowels has a large literature: 1 would recommend Jones (1975: Chapter 8); Ladefoged (2006) gives a brief introduction in Chapter 1, and much more detail in Chapter 9; see also Abercrombie (1967: 55-60 and Chapter 10). The *Handbook of the International Phonetic Association* (1999: Section 2.6) explains the IPA's principles of vowel classification. The distinction

between primary and secondary cardinal vowels is a rather dubious one which appears to be based to some extent on a division between those vowels which are familiar and those which are unfamiliar to speakers of most European languages. It is possible to classify vowels quite unambiguously without resorting to this notion by specifying their front/back, close/open and lip positions.

Written exercises

On the diagram provided, various articulators are indicated by labelled arrows (a-e). Give the names for the articulators.



Using the descriptive labels introduced for vowel classification, say what the following cardinal vowels are:

a) [u] b) [e] c) [a] d) [i] e) [o]

Draw a vowel quadrilateral and indicate on it the correct places for the following English vowels:

a) ae b) л c) i d) e

Write the symbols for the vowels in the following words:

a) bread b) rough c) foot d) hymn

3 Long vowels, diphthongs and triphthongs

3.1 English long vowels

In Chapter 2 the short vowels were introduced. In this chapter we look at other types of English vowel sound. The first to be introduced here are the five long vowels; these are the vowels which tend to be longer than the short vowels in similar contexts. It is necessary to say "in similar contexts" because, as we shall see later, the length of all English vowel sounds varies very much according to their context (such as the type of sound that follows them) and the presence or absence of stress. To remind you that these vowels tend to be long, the symbols consist of one vowel symbol plus a length mark made of two dots •. Thus we have i;, 3;, a:, on u;- We will now look at each of these long vowels individually.

The five long vowels are different from the six short vowels described in Chapter 2, not only in length but also in quality. If we compare some similar pairs of long and short vowels, for example i with i;, or и with u:> or ae with a:> we can see distinct differences in quality (resulting from differences in tongue shape and position, and lip position) as well as in length. For this reason, all the long vowels have symbols which are different from those of short vowels; you can see that the long and short vowel symbols would still all be different from each other even if we omitted the length mark, so it is important to remember that the length mark is used not because it is essential but because it helps learners to remember the length difference. Perhaps the only case where a long and a short vowel are closely similar in quality is that of э and 3:, but э is a special case - as we shall see later.

O AU3, Exs 1-5

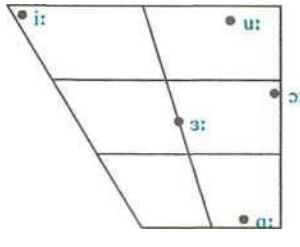


Fig. 6 English long vowels 16

i: (example words: 'beat', 'mean', 'peace') This vowel is nearer to cardinal vowel no. 1 [i] (i.e. it is closer and more front) than is the short vowel of'bid', 'pin', 'fish' described in Chapter 2. Although the tongue shape is not much different from cardinal vowel no. 1, the lips are only slightly spread and this results in a rather different vowel quality.

3: (example words; 'bird', 'fern', 'purse') This is a mid-central vowel which is used in most Enghsh accents as a hesitation sound (written 'er'), but which many learners find difficult to copy. The lip position is neutral, a: (example words: 'card', 'half', 'pass') This is an open vowel in the region of cardinal vowel no. 5 [a], but not as back as this. The Up position is neutral, o: (example words: 'board', 'torn', 'horse') The tongue height for this vowel is between cardinal vowel no. 6 [o] and no. 7 [o], and closer to the latter. This vowel is almost fuUy back and has quite strong lip-rounding, u: (example words: 'food', 'soon', 'loose') The nearest cardinal vowel to this is no. 8 [u], but BBC u: is much less back and less close, while the Ups are only moderately rounded.

3.2 Diphthongs

O AU3, Exs 6 & 7

BBC pronunciation has a large number of diphthongs - sounds which consist of a movement or glide from one vowel to another. A vowel which remains constant and does not gUde is caUed a pure vowel.

In terms of length, diphthongs are similar to the long vowels described above. Perhaps the most important thing to remember about aU the diphthongs is that the first part is much longer and stronger than the second part; for example, most of the diphthong ai (as in the words 'eye', 'T) consists of the a vowel, and only in about the last quarter of the diphthong does the glide to i become noticeable. As the glide to i happens, the loudness of the sound decreases. As a result, the i part is shorter and quieter. Foreign learners should, therefore, always remember that the last part of English diphthongs must not be made too strongly.

The total number of diphthongs is eight (though uois increasingly rare). The easiest way to remember them is in terms of three groups divided as in this diagram (Fig. 7):

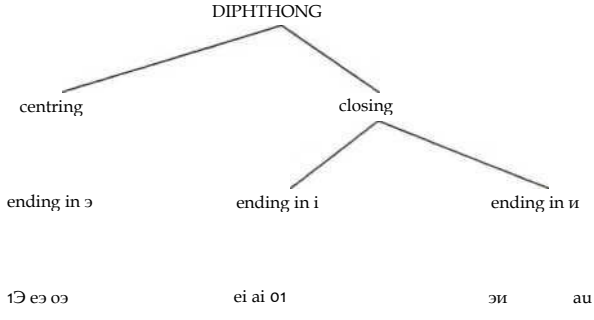


Fig. 7 Diphthongs

The centring diphthongs glide towards the э (schwa) vowel, as the symbols indicate.

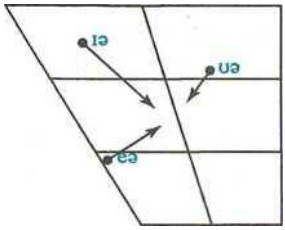


Fig. 8 Centring diphthongs

ɪЭ (example words; 'beard', 'weird', 'fierce') The starting point is a little closer than i in 'bit', 'bin',
eэ (example words: 'aired', 'caim', 'scarce') This diphthong begins with a vowel sound that is more open than the e of'get','men'.
иэ (example words; 'moored', 'tour', 'lure') For speakers who have this diphthong, this has a starting point similar to и in 'put', 'puli'. Many speakers pronoxmce э: instead.

The closing diphthongs have the characteristic that they all end with a glide towards a closer vowel. Because the second part of the diphthong is weak, they often do not reach a position that could be called close. The important thing is that a glide from a relatively more open towards a relatively closer vowel is produced.

Three of the diphthongs glide towards i, as described below:

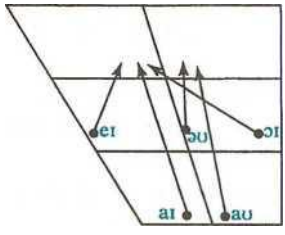


Fig. 9 Closing diphthongs

ei (example words: 'paid', 'pain', 'face') The starting point is the same as the e of'get', 'men'.
ai (example words: 'tide', 'time', 'nice') This diphthong begins with an open vowel which is between front and back; it is quite similar to the л of the words 'cut', 'bun'.
01 (example words: 'void', 'loin', 'voice') The first part of this diphthong is slightly more open than oi in 'ought', 'born'.

Two diphthongs glide towards u, so that as the tongue moves closer to the roof of the mouth there is at the same time a rounding movement of the lips. This movement is not a large one, again because the second part of the diphthong is weak.

эи (example words: 'load', 'home', 'most') The vowel position for the beginning of this is the same as for the "schwa" vowel э, as foimd in the first syllable of the word 'about'. The lips may be slightly rounded in anticipation of the ghde towards u, for which there is quite noticeable lip-rounding, au (example words: 'loud', 'gown', 'house') This diphthong begins with a vowel similar to ai. Since this is an open vowel, a glide to и would necessitate a large movement, and the tongue often does not reach the и position. There is only slight Ир-rounding.

3.3 Triphthongs

The most complex English sounds of the vowel type are the triphthongs. They can be rather difficult to pronounce, and very difficult to recognise. A triphthong is a glide from

one vowel to another and then to a third, all produced rapidly and without interruption. For example, a careful pronunciation of the word 'hour' begins with a vowel quality similar to cu, goes on to a ghde towards the back close rounded area (for which we use the symbol u), then ends with a mid-central vowel (schwa, э). We use the symbol аиэ to represent the pronunciation of'hour', but this is not always an accurate representation of the pronunciation.

The triphthongs can be looked on as being composed of the five closing diphthongs described in the last section, with э added on the end. Thus we get:

ei + Э = ei3	эи + Э = эиэ
ai -f- Э = ai3 01 -I- Э = 01Э	au + э = аиэ

The principal cause of difficulty for the foreign learner is that in present-day English the extent of the vowel movement is very smah, except in very careful pronunciation. Because of this, the middle of the three vowel qualities of the triphthong (i.e. the i or и part) can hardly be heard and the resulting sound is difficult to distinguish from some of the diphthongs and long vowels. To add to the difficulty, there is also the problem of whether a triphthong is felt to contain one or two syllables. Words such as 'fire' faia or 'hour' аиэ are probably felt by most English speakers (with BBC pronunciation) to consist of only one syllable, whereas 'player' pleio or 'slower' зlэиэ are more likely to be heard as two syllables.

We will not go through a detailed description of each triphthong. This is partly because there is so much variation in the amount of vowel movement according to how slow and careful the pronunciation is, and also because the "carefiil" pronunciation can be found by looking at the description of the corresponding diphthong and adding э to the end. However, to help identify these triphthongs, some example words are given here:

С1Э 'layer', эиэ 'lower', 'mower' 'player' аиэ 'power', 'hour' ахэ 'liar','fire'

Notes on problems and further reading

For more information about vowels, see Ashby (2005, Chapter 4), Ladefoged (2004, Chapter 3). Long vowels and diphthongs can be seen as a group of vowel sounds that are consistently longer *in a given context* than the short vowels described in the previous chapter. Some writers give the label *tense* to long vowels and diphthongs and *lax* to the short vowels. Giegerich (1992) explains how this concept applies to three different accents of English: SSE (Standard Scottish English), RP (BBC pronunciation) and GA (General American). The accents are described in 3.1 and 3.2; the idea of pairs of vowels differing in tenseness and laxness follows in 3.3. Jakobson and Halle (1964) explain the historical background to the distinction, which plays an important role in the treatment of the English vowel system by Chomsky and HaUe (1968).

As mentioned in the notes on Chapter 1, the choice of symbols has in the past tended to vary from book to book, and this is particularly noticeable in the case of length marks

for long vowels (this issue comes up again in Section 5.2 of Chapter 5); you could read Cruttenden (2008: Section 8.5). As an example of a contemporary difference in symbol choice, see Kreidler (2004, 4.3).

The phonemes i:, u: are usually classed as long vowels; it is worth noting that most English speakers pronounce them with something of a diphthongal glide, so that a possible alternative transcription could be li, uu, respectively. This is not normally proposed, however.

It seems that triphthongs in BBC pronunciation are in a rather unstable state, resulting in the loss of some distinctions: in the case of some speakers, for example, it is not easy to hear a difference between 'tyre' taia, 'tower' tauo, 'tar' to:. BBC newsreaders often pronounce 'Ireland' as adand. Gimson (1964) suggested that this shows a change in progress in the phonemic system of RP.

Notes for teachers

I mention above that i:, u: are often pronounced as slightly diphthongal: although this glide is often noticeable, I have never found it helpful to try to teach foreign learners to pronounce i:, u; in this way. Foreign learners who wish to get close to the BBC model should be careful not to pronounce the "r" that is often found in the spelling corresponding to a:, o:, з: ('ar', 'or', 'er').

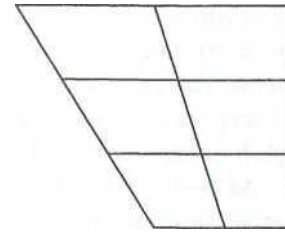
Most of the essential pronunciation features of the diphthongs are described in Chapter 3. One of the most common pronunciation characteristics that result in a learner of English being judged to have a foreign accent is the production of pure vowels where a diphthong should be pronounced (e.g. [e] for ei, [o] for эи).

Two additional points are worth making. The diphthong uois included, but this is not used as much as the others - many English speakers use o: in words like 'moor', 'mourn', 'tour'. However, I feel that it is important for foreign learners to be aware of this diphthong because of the distinctiveness of words in pairs like 'moor' and 'more', 'poor' and 'paw' for many speakers. The other diphthong that requires comment is эи. English speakers seem to be specially sensitive to the quality of this diphthong, particularly to the first part. It often happens that foreign learners, having understood that the first part of the diphthong is not a back vowel, exaggerate this by using a vowel that is too front, producing a diphthong like eu. Unfortunately, this gives the impression of someone trying to copy a "posh" or upper- class accent: eu for эи is noticeable in the speech of the Royal Family.

Written exercises

1 On the vowel diagram provided, indicate the glides for the diphthongs in the following words:

a) fright **c) clear**
b) home **d) cow**



Write the symbols for the long vowels in the following words:

a) broad d) learn g) err
b) ward e) cool h)seal
c) calf f) team i) curl

Write the symbols for the diphthongs in the following words:

a) tone d) way g)hair
b) style e) deer h)why
c) out f) coil i)prey

4 Voicing and consonants

4.1 The larynx

We begin this chapter by studying the larynx. The larynx has several very important functions in speech, but before we can look at these functions we must examine its anatomy and physiology - that is, how it is constructed and how it works.

The larynx is in the neck; it has several parts, shown in Fig. 10. Its main structure is made of cartUage, a material that is similar to bone but less hard. If you press down on your nose, the hard part that you can feel is cartilage. The larynx's structure is made of two large cartilages. These are hollow and are attached to the top of the trachea; when we breathe, the air passes through the trachea and the larynx. The front of the larynx comes to a point and you can feel this point at the front of your neck - particularly if you are a man and/or slim. This point is commonly called the Adam's Apple.

Inside the "box" made by these two cartilages are the vocal folds, which are two thick flaps of muscle rather like a pair of lips; an older name for these is vocal cords. Looking down the throat is difficult to do, and requires special optical equipment, but Fig. 11 shows in diagram form the most important parts. At the front the vocal folds are joined together and fixed to the inside of the thyroid cartilage. At the back they are attached to a pair of

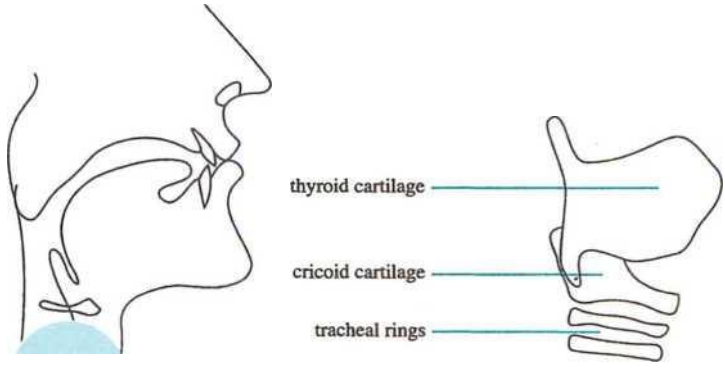


Fig. 10 The larynx

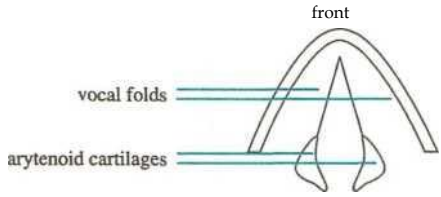


Fig. n The inside of the larynx seen from above

small cartilages called the arytenoid cartilages so that if the arytenoid cartilages move, the vocal folds move too.

The arytenoid cartilages are attached to the top of the cricoid cartilage, but they can move so as to move the vocal folds apart or together (Fig. 12). We use the word glottis to refer to the opening between the vocal folds. If the vocal folds are apart we say that the glottis is open; if they are pressed together we say that the glottis is closed. This seems quite simple, but in fact we can produce a very complex range of changes in the vocal folds and their positions.

These changes are often important in speech. Let us first look at four easily recognisable states of the vocal folds; it would be usefial to practise moving your vocal folds into these different positions.

i) **Wide apart: The vocal folds are wide apart for normal breathing and usually during voiceless consonants like p, f, s (Fig. 13a). Your vocal folds are probably apart now.**
ii) **Narrow glottis: If air is passed through the glottis when it is narrowed as in Fig. 13b, the result is a fricative sound for which the symbol is h. The sound is not very different from a whispered vowel. It is called a voiceless glottal firicative. (Fricatives are discussed in more detail in Chapter 6.) Practise saying hahahaha - alternating between this state of the vocal folds and that described in (iii) below.**
iii) **Position for vocal fold vibration: When the edges of the vocal folds are touching each other, or nearly touching, air passing through the glottis will usually cause vibration (Fig. 13c). Air is pressed up from the lungs and this air pushes the vocal folds apart so that a little air escapes. As the air flows quickly past the edges of**

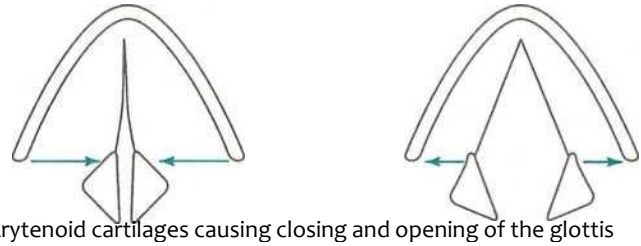


Fig. 12 Arytenoid cartilages causing closing and opening of the glottis

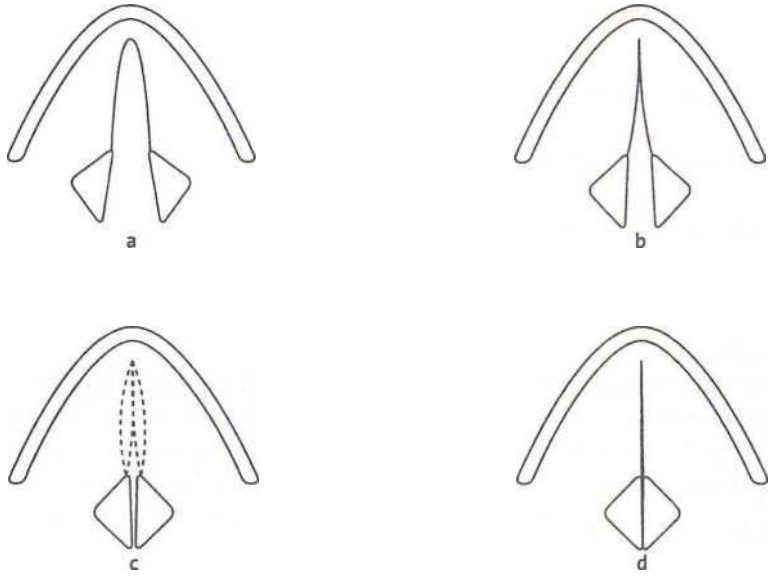


Fig. 13 Four different states of the glottis

the vocal folds, the folds are brought together again. This opening and closing happens very rapidly and is repeated regularly, roughly between two and three hundred times per second in a woman's voice and about half that rate in an adult man's voice.

iv) **Vocal folds tightly closed: The vocal folds can be firmly pressed together so that air cannot pass between them (Fig. 13d). When this happens in speech we call it a glottal stop or glottal plosive, for which we use the symbol ?. You can practise this by coughing gently; then practise the sequence a?a?a?a?a?a-**

4.2 Respiration and voicing

Section 4.1 referred several times to air passing between the vocal folds. The normal way for this airflow to be produced is for some of the air in the lungs to be pushed out; when air is made to move out of the lungs we say that there is an egressive pulmonic airstream. AΠ speech sounds are made with some movement of air, and the egressive pulmonic is by far the most commonly found air movement in the languages of the world. There are other ways of making air move in the vocal tract, but they are not usuaUy relevant in the study of English pronunciation, so we wiU not discuss them here.

How is air moved into and out of the lungs? Knowing about this is important, since it vvdU make it easier to understand many aspects of speech, particularly the nature of stress and intonation. The lungs are like sponges that can fiU with air, and they are contained within the rib cage (Fig. 14). If the rib cage is lifted upwards and outwards there

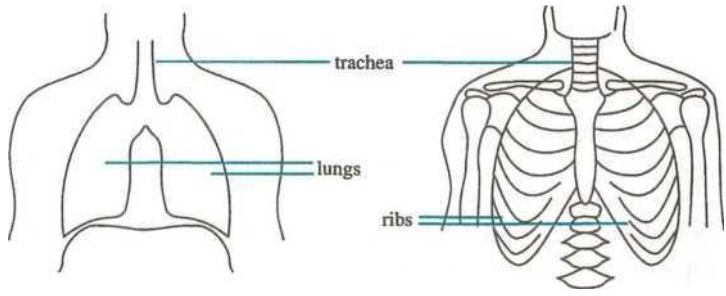


Fig. 14 The iungs and the rib cage

is more space in the chest for the lungs and they expand, with the result that they take in more air. If we allow the rib cage to return to its rest position quite slowly, some of the air is expelled and can be used for producing speech sounds. If we wish to make the egres- sive pulmonic airstream continue without breathing in again - for example, when saying a long sentence and not wanting to be interrupted - we can make the rib cage press down on the lungs so that more air is expelled.

In talking about making air flow into and out of the lungs, the process has been described as though the air were free to pass with no obstruction. But, as we saw in Chapter 2, to make speech sounds we must obstruct the airflow in some way - breathing by itself makes very little sound. We obstruct the airflow by making one or more obstructions or strictures in the vocal tract, and one place where we can make a stricture is in the larynx, by bringing the vocal folds close to each other as described in the previous section. Remember that there will be no vocal fold vibration unless the vocal folds are in the correct position and the air below the vocal folds is under enough pressure to be forced through the glottis.

If the vocal folds vibrate we will hear the sound that we call voicing or phonation. There are many different sorts of voicing that we can produce - think of the differences in the quality of your voice between singing, shouting and speaking quietly, or think of the different voices you might use reading a story to young children in which you have to read out what is said by characters such as giants, fairies, mice or ducks; many of the differences are made with the larynx. We can make changes in the vocal folds themselves - they can, for example, be made longer or shorter, more tense or more relaxed or be more or less strongly pressed together. The pressure of the air below the vocal folds (the subglottal pressure) can also be varied. Three main differences are found:

i) **Variations in intensity: We produce voicing with high intensity for shouting, for example, and with low intensity for speaking quietly.**
ii) **Variations in frequency: If the vocal folds vibrate rapidly, the voicing is at high frequency; if there are fewer vibrations per second, the frequency is lower.**
iii) **Variations in quality: We can produce different-sounding voice qualities, such as those we might call *harsh, breathy, murmured* or *creaky.***

4.3 Plosives

A plosive is a consonant articulation with the following characteristics:

a) **One articulator is moved against another, or two articulators are moved against each other, so as to form a stricture that allows no air to escape from the vocal tract. The stricture is, then, total.**
b) **After this stricture has been formed and air has been compressed behind it, it is released - that is, air is allowed to escape.**
c) **If the air behind the stricture is still under pressure when the plosive is released, it is probable that the escape of air will produce noise loud enough to be heard. This noise is called plosion.**
d) **There may be voicing during part or all of the plosive articulation.**

To give a complete description of a plosive consonant we must describe what happens at each of the following four phases in its production;

i) **The first phase is when the articulator or articulators move to form the stricture for the plosive. We call this the closing phase.**
ii) **The second phase is when the compressed air is stopped from escaping. We call this the compression phase.**
iii) **The third phase is when the articulators used to form the stricture are moved so as to allow air to escape. This is the release phase.**
iv) **The fourth phase is what happens immediately after (iii), so we will call it the post-release phase.**

4.4 English plosives

English has six plosive consonants: p,t,k,b,d,g. The glottal plosive ? occurs frequently but it is of less importance, since it is usually just an alternative pronunciation ofp ,t ,k in certain contexts. The plosives have different places of articulation. The plosives p,b are bilabial since the lips are pressed together (Fig. 15);t,d are alveolar since the tongue blade is pressed against the alveolar ridge (Fig. 16). Normally the tongue does not touch the front teeth as it does in the dental plosives found in many languages. The plosives κ, g are velar; the back of the tongue is pressed against the area where the hard palate ends and the soft palate begins (Fig. 17).

The plosivesp ,t ,k are always voiceless;b ,d,g are sometimes fully voiced, sometimes pardy voiced and sometimes voiceless. We will consider what b, d, g should be called in Section 4.5 below.

AIJ six plosives can occur at the beginning of a word (initial position), between other sounds (medial position) and at the end of a word (final position). To begin with we will look at plosives preceding vowels (which can be abbreviated as CV, where C stands for a consonant and V stands for a vowel), between vowels (VCV) and following vowels (VC). We will look at more complex environments in later chapters.

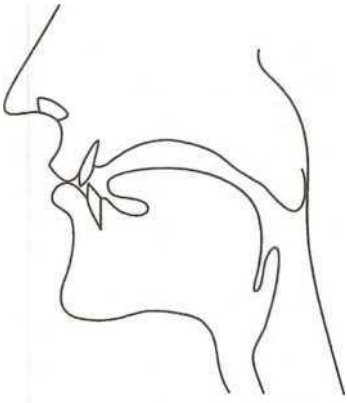


Fig. 15 Bilabial articulation

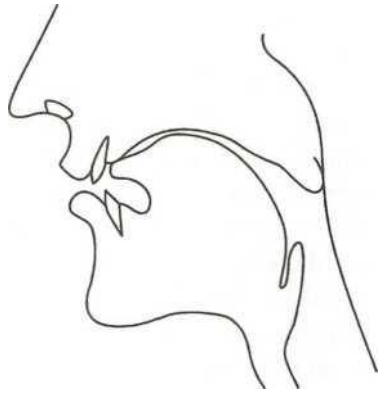


Fig. 16 Alveolar articulation

OAU4,EX 1

i) Initial position (CV): The closing phase for p, t, κ and b, 4 g takes place silently. During the compression phase there is no voicing in p, t, k; in b, d, g there is normally very little voicing - it begins only just before the release. If the speaker pronounces an initid b, d, g very slowly and carefully there may be voicing during the entire compression phase (the plosive is then fuUy voiced), while in rapid speech there may be no voicing at all.

The release of p, t, κ is followed by audible plosion - that is, a burst of noise. There is then, in the post-release phase, a period during which air escapes through the vocal folds, making a sound like h. This is cahed aspiration. Then the vocal folds come together and voicing begins. The release of b, d, g is followed by weak plosion, and this happens at about the same time as, or shortly after, the beginning of voicing. The most noticeable and important difference, then, between initial p, t, κ and b> d, g is the aspiration of the voiceless plosives p, t, k. The different phases of the plosive all happen very

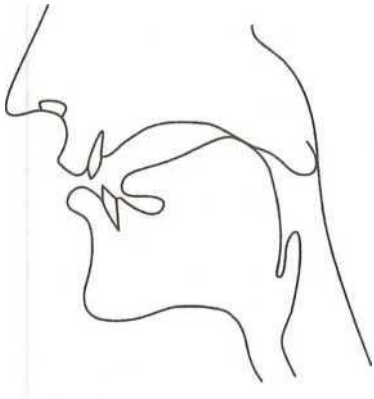


Fig. 17 Velar articulation

rapidly, but the ear distinguishes clearly between p, t, κ and b, d, g. If English speakers hear a fully voiced initial plosive, they will hear it as one of b, d, g but will notice that it does not sound quite natural. If they hear a voiceless unaspirated plosive they will also hear that as one of b, d, g, because it is aspiration, not voicing which distinguishes initial p, t, k from b, d, g. Only when they hear a voiceless aspirated plosive will they hear it as one of p, t, k; experiments have shown that we perceive aspiration when there is a delay between the sound of plosion and the beginning (or onset) of voicing.

In initial position, b, d, g cannot be precededby any consonant, but p, t, κ may be preceded by s. When one ofp ,t ,k is preceded by s it is imaspirated. From what was said above it should be clear that the imaspiratedp ,t ,k of the initial combinations sp,st ,sk have the sound quality that makes English speakers perceive a plosive as one of b, d, g; if a recording of a word beginning with one of sp, st, sk is heard with the s removed, an initial b ,d or g is perceived by English speakers.

ii) Medial position (VCV): The pronunciation of p, t, k and b, d, g in medial position depends to some extent on whether the syllables preceding and following the plosive are stressed. In general we can say that a medial plosive may have the characteristics either of final or of initial plosives.

O AU4, Exs 2 & 3

iii) Final position (VC); Final b, d, g normally have little voicing; if there is voicing, it is at the beginning of the compression phase; P, t, k are always voiceless. The plosion following the release of p, t, κ and b, d, g is ve^ weak and often not audible. The difference betweenp,t ,k and b, d, g is primarily the fact that vowels precedingp,t,κ are much shorter. The shortening effect of p, t, k is most noticeable when the vowel is one of the long vowels or diphthongs. This effect is sometimes known as pre-fortis clipping.

4.5 Forils and lenis

Areb ,d ,g voiced plosives? The description of them makes it clear that it is not very accurate to call them "voiced"; in initial and final position they are scarcely voiced at all, and any voicing they may have seems to have no perceptual importance. Some phoneticians say that P, t, κ are produced with more force than b, d, g, and that it would therefore be better to give the two sets of plosives (and some other consonants) names that indicate that fact; so the voiceless plosivesp,t ,k are sometimes called fortis (meaning 'strong') and b, d, g are then called lenis (meaning'weak'). It may well be true that p, t, k are produced with more force, though nobody has really proved it - force of articulation is very difficult to define and measure. On the other hand, the terms fortis and lenis are difficult to remember. Despite this, we shall follow the practice of many books and use these terms.

The plosive phonemes of English can be presented in the form of a table as shown here:

	PLACE OF ARTICULATION		
	Bilabial	Alveolar	Velar
Fortis ("voiceless")	p	t	κ
Lenis ("voiced")	b	d	q

Tables like this can be produced for all the different consonants. Each major type of consonant (such as plosives like p, t> k> fricatives like s> z> and nasals like m, n) obstructs the airflow in a different way, and these are classed as different manners of articulation.

Notes on problems and further reading

4.1,4.2 For more information about the larynx and about respiration in relation to speech, see Raphael *et al,* (2006); Laver (1994: Chapters 6 and 7); Ashby and Maidment (2005: Chapter 2).

4.3 The outline of the stages in the production of plosives is based on Cruttenden (2008: 158). In classifying consonants it is possible to go to a very high level of complexity if one wishes to account for all the possibilities; see, for example, Pike (1943: 85—156).

4.4 It has been pointed out that the transcription sb> sd> sg could be used quite appropriately instead of sp, st> sk in syllable-initial position; see Davidsen-Nielsen (1969). The vowel length difference before final voiceless consonants is apparently found in many (possibly all) languages, but in English this difference - which is very slight in most languages - has become exaggerated so that it has become the most important factor in distinguishing between final p, t> κ and b> di g; see Chen (1970). Some phonetics books wrongly state that b> d> g lengthen preceding vowels, rather than that p, t, κ shorten them. The conclusive evidence on this point is that if we take the pair 'right' rait and 'ride' raid> and then compare 'rye' rai> the length of the ai diphthong when no consonant follows is practically the same as in 'ride'; the ai in 'right' is much shorter than the ai in 'ride' and 'rye'.

4.5 The *fortis/lenis* distinction is a very complicated matter. It is necessary to consider how one could measure "force of articulation"; many different laboratory techniques have been tried to see if the articulators are moved more energetically for fortis consonants, but all have proved inconclusive. The only difference that seems reasonably reliable is that fortis consonants have higher air pressure in the vocal tract, but Lisker (1970) has argued convincingly that this is not conclusive evidence for a "force of articulation" difference. It is possible to ask phonetically untrained speakers whether they feel that more energy is used in pronouncing p, t> κ than in b> d. g> but there are many difficulties in doing this. A useful review of the "force of articulation" question is in Catford (1977: 199-208). I feel the best conclusion is that any term one uses to deal with this distinction (whether *fortis/lenis* or *voiceless/voiced)* is to be looked on as a cover term - a term which

has no simple physical meaning but which may stand for a large and complex set of phonetic characteristics.

Written exercises

1 Write brief descriptions of the actions of the articulators and the respiratory system in the words given below. Your description should start and finish with the position for normal breathing. Here is a description of the pronunciation of the word 'bee' bi: as an example:

> **Starting from the position for normal breathing, the lips are dosed and the lungs are compressed to create air pressure in the vocal tract. The tongue moves to the position for a close front vowel, with the front of the tongue raised close to the hard palate. The vocal folds are brought close together and voicing begins; the lips then open, releasing the compressed air. Voicing continues for the duration of an i: vowel. Then the lung pressure is lowered, voicing ceases and the articulators return to the normal breathing position.**

Words to describe: (a) goat; (b) ape.

2 Transcribe the following words:

a) bake	d) bought	g) bored
b) goat	e) tick	h) guard
c) doubt	f) bough	i) pea

5 Phonemes and symbols

5.1 The phoneme

In Chapters 2—4 we have been studying some of the sounds of English. It is now necessary to consider some fundamental theoretical questions. What do we mean when we use the word "sound"? How do we establish what are the sounds of English, and how do we decide how many there are of them?

When we speak, we produce a continuous stream of sounds. In studying speech we divide this stream into small pieces that we call segments. The word 'man' is pronounced with a first segment m, a second segment ae and a third segment n. It is not always easy to decide on the number of segments. To give a simple example, in the word 'mine' the first segment ism and the last isn, as in the word 'man' discussed above. But should we regard the ai in the middle as one segment or two? We will return to this question.

As well as the question of how we divide speech up into segments, there is the question of how many different sounds (or segment types) there are in English. Chapters 2 and 3 introduced the set of vowels found in English. Each of these can be pronounced in many slightly different ways, so that the total range of sounds actuaEy produced by speakers is practically infinite. Yet we feel quite confident in saying that the number of English vowels is not greater than twenty. Why is this? The answer is that if we put one of those twenty in the place of one of the others, we can change the meaning of a word. For example, if we substitute ae for e in the word 'bed' we get a different word: 'bad'. But in the case of two sUghtly different ways of pronouncing what we regard as "the same sound", we usually find that, if we substitute one for the other, a change in the meaning of a word does not result. If we substitute a more open vowel, for example cardinal vowel no. 4 [a] for theae in the word 'bad', the word is still heard as 'bad'.

The principles involved here may be easier to understand if we look at a similar situation related to the letters of the alphabet that we use in writing English. The letter of the alphabet in writing is a unit which corresponds fairly well to the unit of speech we have been talking about earlier in this chapter - the segment. In the alphabet we have five letters that are called vowels: 'a', 'e', 'i', 'o', 'u'. If we choose the right context we can show how substituting one letter for another will change meaning. Thus with a letter 'p' before and a letter 't' after the vowel letter, we get the five words spelt 'pat', 'pet', 'pit', 'pot', 'put', each of which has a different meaning. We can do the same with *sounds.* If we look at the short

vowels I, e, ae, Л, D, u, for example, we can see how substituting one for another in between the plosives p and t gives us six different words as follows (given in spelling on the left):

'pit'	pit	'putt'	pAt
'pet'	pet	'pot'	pot 'put'
'pat'	paet		put

Let us return to the example of letters of the alphabet. If someone who knew nothing about the alphabet saw these four characters:

they would not know that to users of the alphabet three of these characters aU represent the same letter, whfte the fourth is a different letter. They would quickly discover, through noticing differences in meaning, that 'u' is a different letter from the first three. What would our illiterate observer discover about these three? They would eventually come to the conclusion about the written characters 'a' and 'o' that the former occurs most often in printed and typed writing while the latter is more common in handwriting, but that if you substitute one for the other it will not cause a difference in meaning. If our observer then examined a lot of typed and printed material they would eventually conclude that a word that began with 'a' when it occurred in the middle of a sentence would begin with 'A) and *never* with 'a', at the beginning of a sentence. They would also find that names could begin with 'A' but *never* with 'a'; they would conclude that 'A' and 'a' were different ways of writing the same letter and that a context in which one of them could occur was always a context in which the other could not. As will be explained below, we find similar situations in speech sounds.

If you have not thought about such things before, you may find some difficulty in understanding the ideas that you have just read about. The principal difficulty lies in the fact that what is being talked about in our example of letters is at the same time something *abstract* (the alphabet, which you cannot see or touch) and something *real* and *concrete* (marks on paper). The alphabet is something that its users know; they also know that it has twenty-six letters. But when the alphabet is used to write with, these letters appear on the page in a practically infinite number of different shapes and sizes.

Now we will leave the discussion of letters and the alphabet; these have only been introduced in this chapter in order to help explain some important general principles. Let us go back to the sounds of speech and see how these principles can be explained. As was said earlier in this chapter, we can divide speech up into segments, and we can find great variety in the way these segments are made. But just as there is an abstract alphabet as the basis of our writing, so there is an abstract set of units as the basis of our speech. These units are called phonemes, and the complete set of these units is called the phonemic system of the language. The phonemes themselves are abstract, but there are many slightly different ways in which we make the sounds that represent these phonemes, just as there are many ways in which we may make a mark on a piece of paper to represent a particular (abstract) letter of the alphabet.

We find cases where it makes little difference which of two possible ways we choose to pronounce a sound. For example, the b at the beginning of a word such as 'bad' will usually be pronounced with practically no voicing. Sometimes, though, a speaker may produce the b with full voicing, perhaps in speaking very emphatically. If this is done, the sound is still identified as the phoneme b, even though we can hear that it is different in some way. We have in this example two different ways of making b - two different realisations of the phoneme. One can be substituted for the other without changing the meaning.

We also find cases in speech similar to the writing example of capital 'A' and little 'a' (one can only occur where the other cannot). For example, we find that the realisation of t in the word 'tea' is aspirated (as are aU voiceless plosives when they occur before stressed vowels at the beginning of syllables). In the word 'eat', the realisation of t is unaspirated (as are all voiceless plosives when they occur at the end of a syllable and are not followed by a vowel). The aspirated and unaspirated realisations are both recognised as t by English speakers despite their differences. But the aspirated realisation will never be found in the place where the unaspirated realisation is appropriate, and vice versa. When we find this strict separation of places where particular realisations can occur, we say that the realisations are in complementary distribution. One more technical term needs to be introduced: when we talk about different realisations of phonemes, we sometimes call these realisations allophones. In the last example, we were studying the aspirated and unaspirated allophones of the phoneme t. Usually we do not indicate different allophones when we write symbols to represent sounds.

5.2 Symbols and transcription

You have now seen a number of symbols of several different sorts. Basically the symbols are for one of two purposes: either they are symbols for phonemes (phonemic symbols) or they are phonetic symbols (which is what the symbols were first introduced as).

We will look first at phonemic symbols. The most important point to remember is the rather obvious-seeming fact that the number of phonemic symbols must be exactly the same as the number of phonemes we decide exist in the language. It is rather like typing on a keyboard - there is a fixed number of keys that you can press. However, some of our phonemic symbols consist of two characters; for example, we usually treat tj (as in 'chip' tjip) as one phoneme, so tj" is a phonemic *symbol* consisting of two *characters* (t and J).

One of the traditional exercises in pronunciation teaching by phonetic methods is that of phonemic transcription, where every speech sound must be identified as one of the phonemes and written with the appropriate symbol. There are two different kinds of transcription exercise: in one, transcription from dictation, the student must listen to a person, or a recording, and write down what they hear; in the other, transcription from a written text, the student is given a passage written in orthography and must use phonemic symbols to represent how she or he thinks it would be pronounced by

a speaker of a particular accent. In a phonemic transcription, then, only the phonemic symbols may be used; this has the advantage that it is comparatively quick and easy to learn to use it. The disadvantage is that as you continue to learn more about phonetics you become able to hear a lot of sound differences that you were" not aware of before, and students at this stage find it frustrating not to be able to write down more detailed information.

The phonemic system described here for the BBC accent contains forty-four phonemes. We can display the complete set of these phonemes by the usual classificatory methods used by most phoneticians; the vowels and diphthongs can be located in the vowel quadrilateral - as was done in Chapters 2 and 3 - and the consonants can be placed in a chart or table according to place of articulation, manner of articulation and voicing. Human beings can make many more sounds than these, and phoneticians use a much larger set of symbols when they are trying to represent sounds more accurately. The best- known set of symbols is that of the International Phonetic Association's alphabet (the letters IPA are used to refer to the Association and also to its alphabet). The vowel symbols of the cardinal vowel system (plus a few others) are usually included on the chart of this alphabet, which is reproduced at the beginning of the book (p. xii). It is important to note that in addition to the many symbols on the chart there are a lot of diacritics - marks which modify the symbol in some way; for example, the symbol for cardinal vowel no. 4 [a] may be modified by putting two dots above it. This centralisation diacritic then gives us the symbol [a] for a vowel which is nearer to central than [a]. It would not be possible in this course to teach you to use all these symbols and diacritics, but someone who did know them all could write a transcription that was much more accurate in phonetic detail, and contained much more information than a phonemic transcription. Such a transcription would be called a phonetic transcription; a phonetic transcription containing a lot of information about the exact quality of the sounds would be called a narrow phonetic transcription, while one which only included a little more information than a phonemic transcription would be called a broad phonetic transcription. One further type of transcription is one which is basically phonemic, but contains additional symbolic information about allophones of particular symbols: this is often called an aUophonic transcription. As an example of the use of aUophonic transcription, in this course phonetic symbols are used occasionaUy when it is necessary to give an accurate label to an aUophone of some English phoneme, but we do not do any phonetic transcription of continuous speech: that is a rather specialised exercise. A widely-used convention is to enclose symbols within brackets that show whether they are phonemic or phonetic: when symbols are used to represent precise phonetic values, rather than phonemes, they are often enclosed in square brackets [ ], as we have done already with cardinal vowels; in many phonetics books, phonemic symbols are enclosed within slant brackets / /. WhUe this convention is useful when giving a few examples, there is so much transcription in this book that I feel it would be an imnecessary distraction to enclose each example in brackets. We wiU continue to use square brackets for cardinal vowel symbols, but elsewhere aU symbols are printed in blue

type, and the context should make it clear whether the symbols are phonemic or phonetic in function.

It should now be clear that there is a fundamental difference between phonemic symbols and phonetic symbols. Since the phonemic symbols do not have to indicate precise phonetic quality, it is possible to choose among several possible symbols to represent a particular phoneme; this has had the unfortunate result that different books on English pronunciation have used different symbols, causing quite a lot of confusion to students. In this course we are using the symbols now most frequently used in British publishing. It would be too long a task to examine other writers' symbols in detail, but it is worth considering some of the reasons for the differences. One factor is the complication and expense of using special symbols which create problems in typing and printing; it could, for example, be argued that a is a symbol that is found in practically all typefaces whereas ae is unusual, and that the a symbol should be used for the vowel in 'cat' instead of ae. Some writers have concentrated on producing a set of phonemic symbols that need the minimum number of special or non-standard symbols. Others have thought it important that the symbols should be as close as possible to the symbols that a phonetician would choose to give a precise indication of sound quality. To use the same example again, referring to the vowel in 'cat', it could be argued that if the vowel is noticeably closer than cardinal vowel no. 4 [a], it is more suitable to use the symbol ae, which is usuahy used to represent a vowel between open-mid and open. There can be disagreements about the most important characteristics of a sound that a symbol should indicate; one example is the vowels of the words 'bit' and 'beat'. Some writers have claimed that the most important difference between them is that the former is short and the latter long, and transcribed the former with i and the latter with i: (the difference being entirely in the length mark); other writers have said that the length (or quantity) difference is less important than the quality difference, and transcribe the vowel of 'bit' with the symbol i and that of 'beat' with i Yet another point of view is that quahty and quantity are *both* important and should *both* be indicated; this point of view results in a transcription using i for 'bit' and i:, a symbol different from i both in shape of symbol (suggesting quality difference) and in length mark (indicating quantity difference), for 'beat'. This is the approach taken in this course.

5.3 Phonology

Chapters 2-4 were mainly concerned with matters of phonetics - the comparatively straightforward business of describing the sounds that we use in speaking. When we talk about how phonemes function in language, and the relationships among the different phonemes - when, in other words, we study the *abstract* side of the sounds of language, we are studying a related but different subject that we call phonology. Only by studying both the phonetics and the phonology of English is it possible to acquire a full understanding of the use of sounds in Enghsh speech. Let us look briefly at some areas that come within the subject of phonology; these areas of study will be covered in more detail later in the course.

Study of the phonemic system

It is sometimes helpful to think of the phonemic system as being similar to the set of cards used in a card game, or the set of pieces used in a game of chess. In chess, for example, the exact shape and colour of the pieces are not important to the game as long as they can be reliably distinguished. But the number of pieces, the moves they can make and their relationship to all the other pieces are very important; we would say that if any of these were to be changed, the game would no longer be what we call chess. Similarly, playing cards can be printed in many different styles and sizes, but while changing these things does not affect the game played with them, if we were to remove one card from the pack or add one card to it before the start of a game, nobody would accept that we were playing the game correctly. In a similar way, we have a more or less fixed set of "pieces" (phonemes) with which to play the game of speaking English. There may be many slightly different realisations of the various phonemes, but the most important thing for communication is that we should be able to make use of the full set of phonemes.

Phoneme sequences and syllable structure

In every language we find that there are restrictions on the sequences of phonemes that are used. For example, no English word begins with the consonant sequence zbf and no word ends with the sequence $h In phonology we try to analyse what the restrictions and regularities are in a particular language, and it is usually found helpful to do this by studying the syllables of the language.

Suprasegmental phonology

Many significant sound contrasts are not the result of differences between phonemes. For example, stress is important: when the word 'import' is pronounced with the first syllable sounding stronger than the second, English speakers hear it as a noun, whereas when the second syllable is stronger the word is heard as a verb. Intonation is also important: if the word 'right' is said with the pitch of the voice rising, it is likely to be heard as a question or as an invitation to a speaker to continue, while falling pitch is more likely to be heard as confirmation or agreement. These examples show sound contrasts that extend over several segments (phonemes), and such contrasts are called suprasegmental. We will look at a number of other aspects of suprasegmental phonology later in the course.

Notes on problems and further reading

This chapter is theoretical rather than practical. There is no shortage of material to read on the subject of the phoneme, but much of it is rather difficult and assumes a lot of background knowledge. For basic reading I would suggest Katamba (1989: Chapter 2), Cruttenden (2008: Chapter 5, Section 3) or Giegerich (1992: 29-33). There are many classic works: Jones (1976; first published 1950) is widely regarded as such, although it is often criticised nowadays for being superficial or even naive. Another classic work is Pike's *Phonemics* (1947), subtitled "A Technique for Reducing Languages to Writing":

this is essentially a practical handbook for people who need to analyse the phonemes of unknown languages, and contains many examples and exercises.

The subject of symbols is a large one: there is a good survey in Abercrombie (1967: Chapter 7). The IPA has tried as far as possible to keep to Roman-style symbols, although it is inevitable that these symbols have to be supplemented with diacritics (extra marks that add detail to symbols - to mark the vowel [e] as long, we can add the length diacritic i to give [e:], or to mark it as centralised we can add the centralisation diacritic " to give [ë]). The IPA's present practice on symbolisation is set out in the *Handbook of the International Phonetic Association* (IPA, 1999). There is a lot of information about symbol design and choice in PuUum and Ladusaw (1996). Some phoneticians working at the end of the nineteenth century tried to develop non-alphabetic sets of symbols whose shape would indicate all essential phonetic characteristics; these are described in Abercrombie (1967: Chapter 7).

We have seen that one must choose between, on the one hand, symbols that are very informative but slow to write and, on the other, symbols that are not very precise but are quick and convenient to use. Pike (1943) presents at the end of his book an "analphabetic notation" designed to permit the coding of sounds with great precision on the basis of their articulation; an indication of the complexity of the system is the fact that the full specification of the vowel [o] requires eighty-eight characters. On the opposite side, many American writers have avoided various IPA symbols as being too complex, and have tried to use as far as possible symbols and diacritics which are already in existence for various special alphabetic requirements of European languages and which are available on standard keyboards. For example, where the IPA has J and 3, symbols not usually found outside phonetics, many Americans use § and *i*, the mark above the symbols being widely used for Slavonic languages that do not use the Cyrillic alphabet. The widespread use of computer printers and word processing has revolutionised the use of symbols, and sets of phonetic fonts are widely available via the Internet. We are still some way, however, from having a universally agreed set of IPA symbol codes, and for much computer-based phonetic research it is necessary to make do with conventions which use existing keyboard characters.

Note for teachers

It should be made clear to students that the treatment of the phoneme in this chapter is only an introduction. It is difficult to go into detailed examples since not many symbols have been introduced at this stage, so further consideration of phonological issues is left until later chapters.

Written exercises

The words in the following list should be transcribed first phonemicaUy, then (in square brackets) phonetically. In your phonetic transcription you should use the following diacritics:

- b, d, g pronounced without voicing are transcribed b, d, g
- p, t, κ pronounced with aspiration are transcribed p• **, t'', k''

- **i:, a:, o:, з:, u: when shortened by a following fortis consonant should be transcribed i', o', o', 3', u'**
- I, **e, ae,** Л, **o, u, э when shortened by a following fortis consonant should be transcribed** I, e, ae, Л, D, u, Э. **Use the same mark for diphthongs, placing the diacritic on the first part of the diphthong.**

Example **spelling: 'peat'; phonemic: pi:t phonetic: p4't**

Words for transcription

a) speed **c) book** **e) car** **g) appeared** **i) stalk**
b) partake **d) goat** **f) bad** **h) toast**

6 Fricatives and affricates

6.1 Production of fricatives and affricates

Fricatives are consonants with the characteristic that air escapes through a narrow passage and makes a hissing sound. Most languages have fricatives, the most commonly found being something like a Fricatives are continuant consonants, which means that you can continue making them without interruption as long as you have enough air in your lungs. Plosives, which were described in Chapter 4, are not continuants. You can demonstrate the importance of the narrow passage for the air in the following ways:

i) **Make a long, hissing s sound and gradually lower your tongue so that it is no longer close to the roof of the mouth. The hissing sound will stop as the air passage gets larger.**

ii) Make a long f sound and, while you are producing this sound, use your fingers to pull the lower lip away from the upper teeth. Notice how the hissing sound of the air escaping between teeth and Up suddenly stops.

Affricates are rather complex consonants. They begin as plosives and end as fricatives. A familiar example is the affricate heard at the beginning and end of the word 'church'. It begins with an articulation practically the same as that for t, but instead of a rapid release with plosion and aspiration as we would find in the word 'tip', the tongue moves to the position for the fricative J that we find at the beginning of the word 'ship'. So the plosive is followed immediately by fricative noise. Since phonetically this affricate is composed of t and J we represent it as tj, so that the word 'church' is transcribed as tjoitj.

However, the definition of an affricate must be more restricted than what has been given so far. We would not class aU sequences of plosive plus fricative as affricates; for example, we find in the middle of the word 'breakfast' the plosive κ followed by the fricative £ English speakers would generally not accept that kf forms a consonantal unit in the way that tJ seems to. It is usually said that the plosive and the foUowing fricative must be made with the same articulators - the plosive and fricative must be homorganic. The sounds k, fare not homorganic, but t, dand J, 5 being made with the tongue blade against the alveolar ridge, *are* homorganic. This still leaves the possibUity of quite a large number of affricates since, for example, t, dare homorganic not only with J", shut also with s ^ so

ts,dz would also count as affricates. We could also considertr,dr as affricates for the same reason. However, we normally only counttj,d3 as affricate phonemes of English.

Although tj, d3 can be said to be composed of a plosive and a fricative, it is usual to regard them as being single, independent phonemes of English. In this way, t is one phoneme,/ is another andtj yet another. We would say that the pronunciation of the word 'church'tjaitj is composed of three phonemes,tj,3i andtj. We will look at this question of "two sounds = one phoneme" from the theoretical point of view in Chapter 13.

6.2 The fricatives of English

English has quite a complex system of fricative phonemes. They can be seen in the table below:

	PLACE OF ARTICULATION				
	Labiodental	Dental	Alveolar	Post-alveolar j Glottal	
Fortis ("voiceless")	f	0	s	J	1 ih
Lenis ("voiced")	v	6	z	3	

With the exception of glottal, each place of articulation has a pair of phonemes, one fortis and one lenis. This is similar to what was seen with the plosives. The fortis fncatives are said to be articulated with greater force than the lenis, and their friction noise is louder. The lenis fricatives have very little or no voicing in initial and final positions, but may be voiced when they occur between voiced sounds. The fortis fricatives have the effect of shortening a preceding vowel in the same way as fortis plosives do (see Chapter 4, Section 4). Thus in a pair of words like 'ice' ais and 'eyes' aiz, the ai diphthong in the first word is considerably shorter than ai in the second. Since there is only one fricative with glottal place of articulation, it would be rather misleading to call it fortis or lenis (which is why there is a line on the chart above dividing h from the other fricatives).

O AU6, Exs 1-3

We will now look at the fricatives separately, according to their place of articulation, f, v

(example words: 'fan', 'van'; 'safer', 'saver'; 'half', 'halve')

These are labiodental; the lower lip is in contact with the upper teeth as shown in Fig. 18. The fricative noise is never very strong and is scarcely audible in the case of v.

o,6 (example words: 'thumb', 'thus'; 'ether', 'father'; 'breath', 'breathe')

The dental fricatives are sometimes described as if the tongue were placed between the front teeth, and it is common for teachers to make their students do this when they are trying to teach them to make this sound. In fact, however, the tongue is normally placed

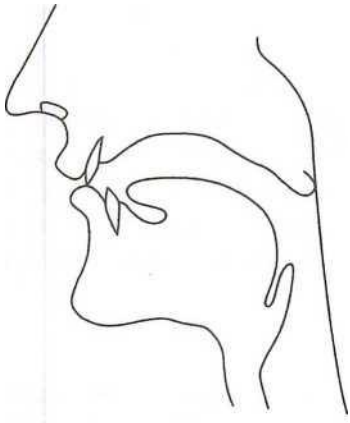


Fig. 18 Labiodental fricative

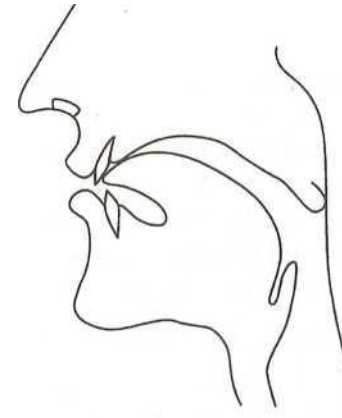


Fig. 19 Dental fricative

behind **the teeth, as shown in Fig. 19, with the tip touching the inner side of the lower front teeth and the blade touching the inner side of the upper teeth. The air escapes through the gaps between the tongue and the teeth. As with *f*, v, the fricative noise is weak.**

s, z (example words: 'sip', 'zip'; 'facing', 'phasing'; 'rice, 'rise')

These are alveolar fricatives, with the same place of articulation as t, d. The air escapes through a narrow passage along the centre of the tongue, and the sound produced is comparatively intense. The tongue position is shown in Fig. 16 in Chapter 4.

ʃ, ʒ (example words: 'ship' (initial ʒ is very rare in English); 'Russia', 'measure'; 'Irish', 'garage')

These fricatives are called post-alveolar, which can be taken to mean that the tongue is in contact with an area slightly further back than that for s, z (see Fig. 20). If you make s, then ʃ, you should be able to feel your tongue move backwards.

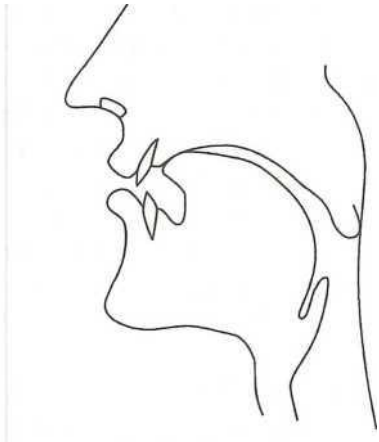


Fig. 20 Post-alveolar fricative

The air escapes through a passage along the centre of the tongue, as in s, z, but the passage is a little wider. Most BBC speakers have rounded lips for/,3, and this is an important difference between these consonants and s, z • The fricative J is a common and widely distributed phoneme, but 3 is not. All the other fricatives described so far (f, v, 6,d,s,z,J) can be found in initial, medial and final positions, as shown in the example words. In the case of3, however, the distribution is much more limited. Very few English words begin with 3 (most of them have come into the language comparatively recently from French) and not many end with this consonant. Only medially, in words such as 'measure'тезэ, 'usual'juisuol is it found at all commonly.

h (example words: 'head', 'ahead', 'playhouse')

The place of articulation of this consonant is glottal. This means that the narrowing that produces the friction noise is between the vocal folds, as described in Chapter 4. If you breathe out silently, then produce h, you are moving your vocal folds from wide apart to close together. However, this is not producing speech. When we produce h in speaking English, many different things happen in different contexts. In the word 'hat', the h is followed by an ae vowel. The tongue, jaw and lip positions for the vowel are aU produced simultaneously with the h consonant, so that the glottal fricative has an ae quality. The same is found for all vowels following h; the consonant always has the quality of the vowel it precedes, so that in theory if you could listen to a recording of h-sounds cut off from the beginnings of different vowels in words like 'hit', 'hat', 'hot', 'hut', etc., you should be able to identify which vowel would have followed the h- One way of stating the above facts is to say that *phonetically* h is a voiceless vowel with the quality of the voiced vowel that follows it.

PhonologicaUy, h is a consonant. It is usually found before vowels. As well as being found in initial position it is found medially in words such as 'ahead' ohed, 'greenhouse' grimhaus, 'boathook'bouthuk. It is noticeable that whenh occurs between voiced sounds (as in the words 'ahead','greenhouse'), it is pronounced with voicing - not the normal voicing of vowels but a weak, slightly fricative sound called breathy voice. It is not necessary for foreign learners to attempt to copy this voicing, although it is important to pronounce h where it should occur in BBC pronunciation. Many English speakers are surprisingly sensitive about this consonant; they tend to judge as sub-standard a pronunciation in which h is missing. In reality, however, practically aU English speakers, however carefully they speak, omit the h in non-initial unstressed pronunciations of the words 'her', 'he', 'him', 'his' and the auxiliary 'have', 'has', 'had', although few are aware that they do this.

There are two rather uncommon sounds that need to be introduced; since they are said to have some association with h, they will be mentioned here. The first is the sound produced by some speakers in words which begin orthographically (i.e. in their spelling form) with 'wh'; most BBC speakers pronounce the initial sound in such words (e.g. 'which', 'why', 'whip', 'whale') as w (which is introduced in Chapter 7), but there are some (particularly when they are speaking clearly or emphatically) who pronounce the sound used by most American and Scottish speakers, a *voiceless* fricative with the same

lip, tongue and jaw position as w. The phonetic symbol for this voiceless fricative is м. We can find pairs of words showing the difference between this sound and the voiced sound w:

'witch' witj	'which' MitJ
'waiT well	'whale' Meil
'Wye' wai	'why' /wai
'wear' weo	'where' мeэ

The obvious conclusion to draw from this is that, since substituting one sound for the other causes a difference in meaning, the two sounds must be two different phonemes. It is therefore rather surprising to find that practically all writers on the subject of the phonemes of English decide that this answer is not correct, and that the sound м in 'which', 'why', etc., is *not* a phoneme of English but is a realisation of a sequence of two phonemes, h and w. We do not need to worry much about this problem in describing the BBC accent. However, it should be noted that in the analysis of the many accents of English that do have a "voiceless w" there is not much more theoretical justification for treating the sound as h plus w than there is for treating p as h plus b. Whether the question of this sound is approached phonetically or phonologically, there is no h sound in the "voiceless w".

A very similar case is the sound found at the beginning of words such as 'huge', 'human', 'hue'. Phonetically this sound is a voiceless palatal fricative (for which the phonetic symbol is 9); there is no glottal fricative at the beginning of'huge', etc. However, it is usual to treat this sound as h plus j (the latter is another consonant that is introduced in Chapter 7 - it is the sound at the beginning of'yes', 'yet'). Again we can see that a phonemic analysis does not necessarily have to be exactly in line with phonetic facts. If we were to say that these two sounds as, 9 were phonemes of English, we would have two extra phonemes that do not occur very frequendy. We will follow the usual practice of transcribing the sound at the beginning of 'huge', etc., as hj just because it is convenient and common practice.

6.3 The affricates of English

O AU6, Exs 4 & 5

It was explained in Section 6.1 that tj, d3 are the only two affricate phonemes in English. As with the plosives and most of the fricatives, we have a fortis/lenis pair, and the voicing characteristics are the same as for thfese other consonants, tj is slightly aspirated in the positions where p, t, к are aspirated, but not strongly enough for it to be necessary for foreign learners to give much attention to it. The place of articulation is the same as for f, 3 - that is, it is post-alveolar. This means that the t component of tJ has a place of articulation rather further back in the mouth than the t plosive usually has. When t| is final in the syllable it has the effect of shortening a preceding vowel, as do other fortis consonants. tJ, d3 often have rounded lips.

6.4 Fortis consonants

All the consonants described so far, with the exception of h, belong to pairs distinguished by the difference between fortis and lenis. Since the remaining consonants to be described are not paired in this way, a few points that stiU have to be made about fortis consonants are included in this chapter.

The first point concerns the shortening of a preceding vowel by a syllable-final fortis consonant. As was said in Chapter 4, the effect is most noticeable in the case of long vowels and diphthongs, although it does also affect short vowels. What happens if something other than a vowel precedes a fortis consonant? This arises in syllables ending with l, m, n, g, followed by a fortis consonant such as p, t, к as in 'belt' belt, 'bump' Блтр, 'bent' bent, 'bank'baegk. The effect on those continuant consonants is the same as on a vowel: they are considerably shortened.

Fortis consonants are usually articulated with open glottis - that is, with the vocal folds separated. This is always the case with fricatives, where airflow is essential for successful production. However, with plosives an alternative possibility is to produce the consonant with completely *dosed* glottis. This type of plosive articulation, known as glottalisation, is found widely in contemporary English pronunciation, though only in specific contexts. The glottal closure occurs immediately before p, t, k, tj. The most widespread glottalisation is that of tj at the end of a stressed syllable (I leave defining what "stressed syllable" means until Chapter 8). If we use the symbol? to represent a glottal closure, the phonetic transcription for various words containing tj can be given as follows;

	With glottalisation	Without glottalisation
'nature'	nei?tj3	neitja
'catching'	kae?tjig	kaetjig
'riches'	n?tjiz	ritjiz

There is similar glottalisation of p, t, к, although this is not so noticeable. It normally happens when the plosive is followed by another consonant or a pause; for example:

	With glottalisation	Without glottalisation
'actor'	aePkta	aekts
'petrol'	pe?tral	petral
'mat'	mae?t	maet
'football'	fu?tbo;l	futboil

Learners usually find these rules difficult to leam, from the practical point of view, and find it simpler to keep to the more conservative pronunciation which does not use glottalisation. However, it is worth pointing out the fact that this occurs - many learners

notice the glottalisation and want to know what it is that they are hearing, and many of them find that they acquire the glottalised pronunciation in talking to native speakers.

Notes on problems and further reading

The dental fricative *Q* is something of a problem: although there are not many English words in which this sound appears, those words are ones which occur very frequently - words like 'the', 'this, 'there', 'that'. This consonant often shows so little friction noise that on purely phonetic grounds it seems incorrect to class it as a fricative. It is more like a weak (lenis) dental plosive. This matter is discussed again in Chapter 14, Section 14.2.

On the phonological side, I have brought in a discussion of the phonemic analysis of two "marginal" fricatives ^ which present a problem (though not a particularly important or fundamental one): I feel that this is worth discussing in that it gives a good idea of the sort of problem that can arise in analysing the phonemic system of a language. The other problem area is the glottalisation described at the end of the chapter. There is now a growing awareness of how frequently this is to be found in contemporary English speech; however, it not easy to formulate rules stating the contexts in which this occurs. There is discussion in Brown (1990: 28—30), in Cruttenden (2008: Section 9.2.8), in Ladefoged (2006: 60-1) and in Wells (1982: Section 3.4.5).

Notes for teachers

Whether learners should be taught to produce glottalisation of p,t,k>tJ must depend on the level of the learner - I have often found advanced learners have been able to pick up this pronunciation, and I find the increase in naturalness in their accent very striking.

Written exercises

Transcribe the following words phonemically:

a) fishes
b) shaver
c) sixth
d) these
e) achieves
f) others
g) measure
h) ahead

Following the style introduced in Exercise 1 for Chapter 4, describe the movements of the articulators in the first word of the above list.

7 Nasals and other consonants

So far we have studied two major groups of consonants - the plosives and fricatives - and also the affricates tj> dsJ this gives a total of seventeen. There remain the nasal consonants - m> n> Г) - and four others - b r> w> j; these four are not easy to fit into groups. АЦ of these seven consonants are continuants and usually have no friction noise, but in other ways they are very different from each other.

7.1 Nasals

The basic characteristic of a nasal consonant is that the air escapes through the nose. For this to happen, the soft palate must be lowered; in the case of all the other consonants and vowels of English, the soft palate is raised and air cannot pass through the nose. In nasal consonants, however, air does not pass through the mouth; it is prevented by a complete closure in the mouth at some point. If you produce a long sequence dndndndndn without moving your tongue from the position for alveolar closure, you will feel your soft palate moving up and down. The three types of closure are: bilabial (lips), alveolar (tongue blade against alveolar ridge) and velar (back of tongue against the palate). This set of places produces three nasal consonants - m> п> q - which correspond to the three places of articulation for the pairs of plosives p Ь t d> к g-

The consonants m, n are simple and straightforward with distributions quite similar to those of the plosives. There is in fact little to describe. However, g is a different matter. It is a sound that gives considerable problems to foreign learners, and one that is so unusual in its phonological aspect that some people argue that it is not one of the phonemes of English at all. The place of articulation of g is the same as that of k> gf it is a useful exercise to practise making a continuous g sound. If you do this, it is very important not to produce a к or g at the end - pronounce the g like m or n-

OAU7,EXS 1 &2

We will now look at some ways in which the distribution of g is unusual.

i) **In initial position we find m, n occurring freely, but g never occurs in this position. With the possible exception of 3, this makes g the only English consonant that does not occur initially.**
ii) **Medially, g occurs quite frequently, but there is in the BBC accent a rather complex and quite interesting rule concerning the question of when g may**

be pronounced without a following plosive. When we find the letters 'nk' in the middle of a word in its orthographic form, a ĸ will always be pronounced; however, some words with orthographic 'ng' in the middle will have a pronunciation containing gg and others will have g without g. For example, in BBC pronunciation we find the following:

A	B
'finger'figga	'singer'sigo
'anger'aeggo	'hanger'haega

In the words of column A the g is followed by g, while the words of column B have no g. What is the difference between A and B? The important difference is in the way the words are constructed - their morphology. The words of column B can be divided into two grammatical pieces: 'sing' + '-er', 'hang' + '-er'. These pieces are called morphemes, and we say that column B words are morphologically different from column A words, since these *cannot be* divided into two morphemes. 'Finger' and 'anger' consist of just one morpheme each.

We can summarise the position so far by saying that (within a word containing the letters 'ng' in the spelling) g occurs without a following g if it occurs at the end of a morpheme; if it occurs in the middle of a morpheme it has a following g.

Let us now look at the ends of words *ending* orthographically with 'ng'. We find that these always end with g; this g is never followed by a g. Thus we find that the words 'sing' and 'hang' are pronounced as sig and haeg; to give a few more examples, 'song' is sog, 'bang' is baeg and 'long' is log. We do not need a separate explanation for this: the rule given above, that no g is pronounced after g at the end of a morpheme, works in these cases too, since the end of a word must also be the end of a morpheme. (If this point seems difficult, think of the comparable case of sentences and words: a sound or letter that comes at the end of a sentence must necessarily also come at the end of a word, so that the final ĸ of the sentence 'This is a book' is also the final ĸ of the word 'book'.)

Unfortunately, rules often have exceptions. The main exception to the above morpheme-based rule concerns the comparative and superlative suffixes '-er' and '-est'. According to the rule given above, the adjective 'long' will be pronounced log, which is correct. It would also predict correctly that if we add another morpheme to 'long', such as the suffix '-ish', the pronunciation of g would again be without a following g. However, it would additionally predict that the comparative and superlative forms 'longer' and 'longest' would be pronounced with no g following the g, while in fact the correct pronunciation of the words is:

'longer' Inggo 'longest' loggost

As a result of this, the rule must be modified: it must state that comparative and superlative forms of adjectives are to be treated as single-morpheme words for the purposes of

this rule. It is important to remember that English speakers in general (apart from those trained in phonetics) are quite ignorant of this rule, and yet if a foreigner uses the wrong pronunciation (i.e. pronounces gg where g should occur, or g where gg should be used), they notice that a mispronunciation has occurred.

iii) A third way in which the distribution of g is unusual is the small number of vowels it is found to follow. It rarely occurs after a diphthong or long vowel, so only the short vowels i, e, ae, л, o, и, э are regularly found preceding this consonant.

The velar nasal consonant g is, in summary, phonetically simple (it is no more difficult to produce than m or n) but phonologically complex (it is, as we have seen, not easy to describe the contexts in which it occurs).

7.2 The consonant 1

OAU7,EX3

The 1 phoneme (as in 'long' log, 'hill' hil) is a lateral approximant. This is a consonant in which the passage of air through the mouth does not go in the usual way along the centre of the tongue; instead, there is complete closure between the centre of the tongue and the part of the roof of the mouth where contact is to be made (the alveolar ridge in the case of 1). Because of this complete closure along the centre, the only way for the auto escape is along the sides of the tongue. The lateral approximant is therefore somewhat different from other approximants, in which there is usually much less contact between the articulators. If you make a long 1 sound you may be able to feel that the sides of your tongue are puhed in and down while the centre is raised, but it is not easy to become consciously aware of this; what is more revealing (if you can do it) is to produce a long sequence of alternations between d and 1 without any intervening vowel. If you produce dldldldldl without moving the middle of the tongue, you wih be able to feel the movement of the sides of the tongue that is necessary for the production of a lateral. It is also possible to see this movement in a mirror if you open your lips wide as you produce it. Finally, it is also helpful to see if you can feel the movement of air past the sides of the tongue; this is not really possible in a voiced sound (the obstruction caused by the vibrating vocal folds reduces the airflow), but if you try to make a very loud whispered 1, you should be able to feel the air rushing along the sides of your tongue.

We find 1 initially, medially and finally, and its distribution is therefore not particularly limited. In BBC pronunciation, the consonant has one unusual characteristic: the realisation of I found before vowels sounds quite different from that found in other contexts. For example, the realisation of 1 in the word 'lea' li: is quite different from that in 'eel' irl.The sound in 'eel' is what we call a "dark 1"; it has a quality rather similar to an [u] vowel, with the back of the tongue raised. The phonetic symbol for this sound is 1. The sound in 'lea' is what is called a "clear 1"; it resembles an [i] vowel, with the front of the tongue raised (we do not normally use a special phonetic symbol.

different from 1, to indicate this sound). The "dark 1" is also found when it precedes a consonant, as in 'eels' i:lz. We can therefore predict which realisation of 1 (clear or dark) will occur in a particular context: clear 1 wih never occur before consonants or before a pause, but only before vowels; dark 1 never occurs before vowels. We can say, using terminology introduced in Chapter 5, that clear 1 and dark 1 are allophones of the phoneme 1 in complementary distribution. Most English speakers do not consciously know about the difference between clear and dark 1, yet they are quick to detect the difference when they hear English speakers with different accents, or when they hear foreign learners who have not learned the correct pronunciation. You might be able to observe that most American and lowland Scottish speakers use a "dark 1" in all positions, and don't have a "clear 1" in their pronunciation, while most Welsh and Irish speakers have "clear 1" in all positions.

Another aUophone of 1 is found when it follows p, κ at the beginning of a stressed syllable. The 1 is then devoiced (i.e. produced without the voicing found in most realisations of this phoneme) and pronounced as a fricative. The situation is (as explained in Chapter 4) similar to the aspiration found when a vowel follows p, t, κ in a stressed syllable: the first part of the vowel is devoiced.

7.3 The consonant r

OAU7,EX4

This consonant is important in that considerable differences in its articulation and its distribution are found in different accents of English. As far as the articulation of the sound is concerned, there is really only one pronunciation that can be recommended to the foreign learner, and that is what is called a post-alveolar approximant. An **approximant,** as a type of consonant, is rather difficult to describe; informally, we can say that it is an articulation in which the articulators approach each other but do not get sufficiently close to each other to produce a "complete" consonant such as a plosive, nasal or fricative. The difficulty with this explanation is that articulators are always in *some* positional relationship with each other, and any vowel articulation could also be classed as an approximant - but the term "approximant" is usually used only for consonants.

The important thing about the articulation of r is that the tip of the tongue approaches the alveolar area in approximately the way it would for at or d, but never actually makes contact with any part of the roof of the mouth. You should be able to make a long r sound and feel that no part of the tongue is in contact with the roof of the mouth at any time. This is, of course, very different from the "r-sounds" of many other languages where some kind of tongue-palate contact is made. The tongue is in fact usually sUghtly curled backwards with the tip raised; consonants with this tongue shape are usually called **retroflex.** If you pronounce an alternating sequence of d and r (drdrdrdrdr) while looking in a mirror you should be able to see more of the underside of the tongue in the r than in the d, where the tongue tip is not raised and the tongue is

the mouth than that for alveolar consonants such as t, d, which is why this approximant is called "post-alveolar". A rather different r sound is found at the beginning of a syllable if it is preceded by p, t, k; it is then voiceless and fricative. This pronunciation is found in words such as 'press', 'tress', 'cress'.

One final characteristic of the articulation of r is that it is usual for the lips to be shghtly rounded; learners should do this but should be careful not to exaggerate it. If the lip-rounding is too strong the consonant will sound too much like w, which is the sound that most English children produce until they have learned to pronounce r in the adult way.

The distributional peculiarity of r in the BBC accent is very easy to state: this phoneme only occurs before vowels. No one has any difficulty in remembering this rule, but foreign learners (most of whom, quite reasonably, expect that if there is a letter 'r' in the spelling then r should be pronounced) find it difficult to apply the rule to their own pronunciation. There is no problem with words like the following:

i) 'red' red 'arrive' oraiv 'hearing' hiarii)

In these words r is followed by a vowel. But in the following words there is no r in the pronunciation:

ii) 'car' ka: 'ever' eva 'here' hia
iii) 'hard' hard 'verse' V3:s 'cares' keaz

Many accents of English do pronounce r in words like those of (ii) and (iii) (e.g. most American, Scots and West of England accents). Those accents which have rin final position (before a pause) and before a consonant are called rhotic accents, while accents in which r only occurs before vowels (such as BBC) are called non-rhotic.

7.4 The consonants j and w

O AU7, Ex 5

These are the consonants found at the beginning of words such as 'yet' and 'wet'. They are known as approximants (introduced in Section 7.3 above). The most important thing to remember about these phonemes is that they are phonetically like vowels but phonologically like consonants (in earlier works on phonology they were known as "semivowels"). From the phonetic point of view the articulation of j is practically the same as that of a front close vowel such as [i], but is very short. In the same way w is closely similar to [u]. If you make the initial sound of'yet' or 'wet' very long, you will be able to hear this. But despite this vowel-Uke character, we use them like consonants. For example, they only occur before vowel phonemes; this is a typically consonantal distribution. We can show that a word beginning with w or j is treated as beginning with a consonant in the following way: the indefinite article is 'a' before a consonant (as in 'a cat', 'a dog'), and 'an' before a vowel (as in 'an apple', 'an orange'). If a word beginning with w or j is preceded by the indefinite article, it is the 'a' form that is found (as in 'a way', 'a year'). Another example is that of the definite article. Here the rule is that 'the' is pronounced as дэ before

consonants (as in 'the dog' дэ dog, 'the cat' дэ kaet) and as 6i before vowels (as in 'the apple' di aepl, 'the orange' di nnnds). This evidence illustrates why it is said that j, w are phonologicaUy consonants. However, it is important to remember that to pronounce them as fricatives (as many foreign learners do), or as affricates, is a mispronunciation. Only in special contexts do we hear friction noise in j or w; this is when they are preceded by p, t, к at the beginning of a syllable, as in these words:

'pure' pjuo	(no English	words begin with pw)
'tune' tjuin	'twin twin	
'queue' kju:	'quit' kwit	

When p, t, к come at the beginning of a syllable and are followed by a vowel, they are aspirated, as was explained in Chapter 4. This means that the beginning of a vowel is voiceless in this context. However, when p, t, к are followed not by a vowel but by one of 1, r, j, w, these voiced continuant consonants undergo a similar process, as has been mentioned earlier in this chapter: they lose their voicing and become fricative. So words like 'play' plei, 'tray' trei, 'quick' kwik, 'cue' kju: contain devoiced and fricative 1, r, w, j whereas 'lay', 'ray', 'wick', 'you' contain voiced 1, r, w, j. Consequently, if for example 'tray' were to be pronounced without devoicing of the r (i.e. with fully voiced r) English speakers would be likely to hear the word 'dray'.

This completes our examination of the consonant phonemes of Enghsh. It is useful to place them on a consonant chart, and this is done in Table 1. On this chart, the different places of articulation are arranged from left to right and the manners of articulation are arranged from top to bottom. When there is a pair of phonemes with the same place and manner of articulation but differing in whether they are fortis or lenis (voiceless or voiced), the symbol for the fortis consonant is placed to the left of the symbol for the lenis consonant.

Notes on problems and further reading

The notes for this chapter are devoted to giving further detail on a particularly difficult theoretical problem. The argument that rj is an allophone of n, not a phoneme in its own right, is so widely accepted by contemporary phonological theorists that few seem to feel it worthwhile to explain it ftolly. Since the velar nasal is introduced in this chapter, I have chosen to attempt this here. However, it is a rather complex theoretical matter, and you may prefer to leave consideration of it until after the discussion of problems of phonemic analysis in Chapter 13.

There are brief discussions of the phonemic status of g in Chomsky and Hahe (1968: 85) and Ladefoged (2006); for a fuller treatment, see Wells (1982: 60-4) and Giegerich (1992: 297-301). Everyone agrees that English has at least two contrasting nasal phonemes, m and a However, there is disagreement about whether there is a third nasal phoneme g. In favour of accepting g as a phoneme is the fact that traditional phoneme theory more or less demands its acceptance despite the usual preference for making phoneme inventories as small as possible. Consider minimal pairs (pairs of words in which a difference in

Table 1 Chart of English consonant phonemes

MANNER OF ARTICULATION		PLACE OF ARTICULATION						
		Bilabial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive		p b			t d			к g	
Fricative			f V	0 6	s z	J 3	tj		
Affricate						d3			
Nasal		m			n				
Lateral approximant					1				
Approximant		w							

meaning depends on the difference of just one phoneme) like these: 'sin sin - 'sing' sirj 'sinner' smo—'singer' siqo.

There are three main arguments against accepting D as a phoneme:

i) In some English accents it can easily be shown that D is an allophone of Д which suggests that something similar might be true of BBC pronunciation too.

ii) If t) is a phoneme, its distribution is very different from that of mand n, being restricted to syllable-final position (phonologically), and to morpheme-final position (morphologically) unless it is followed by к or S

iii) English speakers with no phonetic training are said to feel that D is not a 'single sound' like d Sapir (1925) said that "no native speaker of English could be made to feel in his bones" that g formed part of a series with ШЦ n This is, of course, very hard to establish, although that does not mean that Sapir was wrong.

We need to look at point (i) in more detail and go on to see how this leads to the argument against having B as a phoneme. Please note that I am not trying to argue that this proposal must be correct; my aim is just to explain the argument. The whole question may seem of little or no practical consequence, but we ought to be interested in any phonological problem if it appears that conventional phoneme theory is not able to deal satisfactorily with it.

In some EngUsh accents, particularly those of the Midlands, rj is only found with к or g following. For example:

'sink' sigk 'singer' siggo
'sing' sirjg 'singing' siggigg

This was my own pronunciation as a boy, living in the West Midlands, but I now usually have the BBC pronunciation sigk, sig, sig^ sigii). In the case of an accent like this, it can be shown that within the morpheme the only nasal that occurs before k, g is Q. Neither m nor n can occur in this environment. Thus within the morpheme D is in complementary distribution with m, д Since ШЦ n are already established as distinct English phonemes in other contexts (masp, naep, etc.), it is clear that for such non-BBC accents в must be an allophone of one of the other nasal consonant phonemes. We choose n because when a morpheme-final n is followed by a morpheme-initial k, g it is usual for that n to change to ft however, a morpheme-final m followed by a morpheme-initial k, g usually doesn't change to ft Thus:

'raincoat' reiBkout ***but*** 'tramcar' traemkai

So in an analysis which contains no B phoneme, we would transcribe 'raincoat' phonemically as reinkout and 'sing', 'singer', 'singing' as sing, sings^ singing The phonetic realisation of the n phoneme as a velar nasal will be accounted for by a general rule that we will call Rule 1:

Rule J: n is realised as B when it occurs in an environment in which it precedes either kor g

Let us now look at BBC pronunciation. As explained in Section 7.1 above, the crucial difference between 'singer' sigo and 'finger' figga is that 'finger' is a single, indivisible morpheme whereas 'singer' is composed of two morphemes 'sing' and '-er'. When g occurs without a following κ or g it is always immediately before a morpheme boundary. Consequently, the sound g and the sequence gg are in complementary distribution. But within the morpheme there is no contrast between the sequence gg and the sequence ng, which makes it possible to say that g is also in complementary distribution with the sequence ng.

After establishing these "background facts", we can go on to state the argument as follows:

i) English has only m, n as nasal phonemes.
ii) The sound g is an allophone of the phoneme n.
iii) The words 'finger', 'sing', 'singer', 'singing' should be represented phonemically as fmgo, sing, singo, singing.
iv) Rule 1 (above) applies to all these phonemic representations to give these phonetic forms: figgo, sigg, siggo, siggigg
v) A further rule (Rule 2) must now be introduced:

Rule 2: **g is deleted when it occurs after g and before a morpheme boundary.**

It should.be clear that Rule 2 will not apply to 'finger' because the g is not immediately followed by a morpheme boundary. However, the rule does apply to all the others, hence the final phonetic forms: figgo, sig, sigo, sigig.

vi) Finally, it is necessary to remember the exception we have seen in the case of comparatives and superlatives.

The argument against treating g as a phoneme may not appeal to you very much. The important point, however, is that if one is prepared to use the kind of complexity and abstractness illustrated above, one can produce quite far-reaching changes in the phonemic analysis of a language.

The other consonants - 1, r, w, j - do not, I think, need further explanation, except to mention that the question of whether j, w are consonants or vowels is examined on distributional grounds in O'Connor and Trim (1953).

Written exercises

List all the consonant phonemes of the BBC accent, grouped according to manner of articulation.

Transcribe the following words phonemically:

a) sofa c) steering
b) verse d) breadcrumb

e) square g) bought
f) anger h) nineteen

When the vocal tract is in its resting position for normal breathing, the soft palate is usually lowered. Describe what movements are carried out by the soft palate in the pronunciation of the following words: a) banner b) mid c) angle

8 The syllable

The syllable is a very important unit. Most people seem to believe that, even if they cannot define what a syllable is, they can count how many syllables there are in a given word or sentence. If they are asked to do this they often tap their finger as they count, which illustrates the syllable's importance in the rhythm of speech. As a matter of fact, if one tries the experiment of asking English speakers to count the syllables in, say, a recorded sentence, there is often a considerable amount of disagreement.

8.1 The nature of the syllable

When we looked at the nature of vowels and consonants in Chapter 1 it was shown that one could decide whether a particular sound was a vowel or a consonant on phonetic grounds (in relation to how much they obstructed the airflow) or on phonological grounds (vowels and consonants having different distributions). We find a similar situation with the syllable, in that it may be defined both phonetically and phonologically. Phonetically (i.e. in relation to the way we produce them and the way they sound), syllables are usually described as consisting of a centre which has little or no obstruction to airflow and which sounds comparatively loud; before and after this centre (i.e. at the beginning and end of the syllable), there will be greater obstruction to airflow and/or less loud sound. We will now look at some examples:

i) **What we will call a minimum syllable is a single vowel in isolation (e.g. the words 'are' aɹ 'or' o:, 'err' ɜ:). These are preceded and followed by silence. Isolated sounds such as m, which we sometimes produce to indicate agreement, or J, to ask for silence, must also be regarded as syllables.**

ii) **Some syUables have an onset - that is, instead of silence, they have one or more consonants preceding the centre of the syllable:**
'bar' bo: 'key' kii 'more' mo:

iii) **Syllables may have no onset but have a coda - that is, they end with one or more consonants:**
'am' aem 'ought' o:t 'ease' i;z

iv) **Some syllables have both onset and coda:**
'ran' raen 'sat' sst 'fill' fil

This is one way of looking at syllables. Looking at them from the phonological point of view is quite different. What this involves is looking at the possible combinations of English phonemes; the study of the possible phoneme combinations of a language is called phonotactics. It is simplest to start by looking at what can occur in initial position - in other words, what can occur at the beginning of the first word when we begin to speak after a pause. We find that the word can begin with a vowel, or with one, two or three consonants. No word begins with more than three consonants. In the same way, we can look at how a word ends when it is the last word spoken before a pause; it can end with a vowel, or with one, two, three or (in a small number of cases) four consonants. No current word ends with more than four consonants.

8.2 The structure of the English syllable

Let us now look in more detail at syllable onsets. If the first syllable of the word in question begins with a vowel (any vowel may occur, though и is rare) we say that this initial syllable has a zero onset. If the syllable begins with one consonant, that initial consonant may be any consonant phoneme except ® 3 is rare.

We now look at syllables beginning with two consonants. When we have two or more consonants together we call them a consonant cluster. Initial two-consonant clusters are of two sorts in English. One sort is composed of s followed by one of a small set of consonants; examples of such clusters are found in words such as 'sting' stig, 'swa/ swe^ 'smoke' smouk, The sin these clusters is called the pre-initial consonant and the other consonant (L w, min the above examples) the initial consonant. These clusters are shown in Table 2.

The other sort begins with one of a set of about fifteen consonants, followed by one of the set 1, r, w, j as in, for example, 'play' ple^ 'try' tra^ 'quick' kwik, 'few' f jut We call the first consonant of these clusters the initial consonant and the second the post-initial. There are some restrictions on which consonants can occur together. This can best be shown in table form, as in Table 3. When we look at three-consonant clusters we can recognise a clear relationship between them and the two sorts of two-consonant cluster described above; examples of three-consonant initial clusters are: 'split' split, 'stream' striim 'square' skwea The s is the pre-initial consonant, the в t, к that follow s in the three example words are the initial consonant and the 1 r, w are post-initial. In fact, the number of possible initial three-consonant clusters is quite small and they can be set out in full (words given in spelling form): Q

^

		POST-INITIAL			
		1	r	w	j
splus initial	P	'splay'	'spray'	-	'spew'
	t	-	'string'	-	'stew'
	к	'sclerosis'	'screen'	'squeak'	'skewer'

Table 2 *Two-consonant clusters with pre-initial* s

Pre-initial s followed by:																		
											INITIAL							
p	t	k	b	d	g	f	θ	s	ʃ	h	v	ð	z	ʒ	m	n	ŋ	
spɪn	stɪk	skɪn	–	–	–	sfɪə	–	–	–	–	–	–	–	–	smel	snəʊ	–	

Note: Two-consonant clusters of s plus l, w, j are also possible (e.g. slɪp, swɪŋ, sjuː), and even perhaps sr in 'syringe' srɪndʒ for many speakers. These clusters can be analysed *either* as pre-initial s plus initial l, w, j, r *or* initial s plus post-initial l, w, j, r. There is no clear answer to the question of which analysis is better; here they are treated in the latter way, and appear in Table 3.

Table 3 *Two-consonant clusters with post-initial* l, r, w, j

		p	t	k	b	d	g	f	θ	s	ʃ	h	v	ð	z	ʒ	m	n	ŋ	l	r	w	j
POST-INITIAL	l	pleɪ	–	kleɪ	blæk	–	gluː	flaɪ	–	slɪp	–	–	–	–	–	–	–	–	–	–	–	–	–
	r	preɪ	treɪ	kraɪ	brɪŋ	drɪp	grɪn	fraɪ	θrəʊ	ʔ[1]	ʃruː	–	–	–	–	–	–	–	–	–	–	–	–
	w	–	twɪn	kwɪk	–	dwel	ʔ[2]	–	θwɔːt	swɪm	ʔ[3]	–	–	–	–	–	–	–	–	–	–	–	–
	j	pjɔː	tjuːn	kjuː	bjuːti	djuː	ʔ[4]	fjuː	ʔ[5]	sjuː	–	hjuːdʒ	vjuː	–	–	–	mjuːz	njuːz	–	ljuːd	–	–	–

Notes in doubtful cases:

1 Some people pronounce the word 'syringe' as srɪndʒ; there are no other cases of sr unless one counts foreign names (e.g. Sri Lanka).

2 Many Welsh names (including some well known outside Wales) – such as girls' names like Gwen and place names like the county of Gwent – have initial gw and English speakers seem to find them perfectly easy to pronounce.

3 Two cases make ʃw seem familiar: the vowel name 'schwa', and the name of the soft drinks brand Schweppes. This is, however, a very infrequent cluster for English.

4 The only possible occurrence of gj would be in the archaic (heraldic) word 'gules', which is in very few people's vocabulary.

5 θj occurs in the archaic word 'thew' only.

O AU8, Exs 3 & 4

We now have a similar task to do in studying final consonant clusters. Here we find the possibility of up to four consonants at the end of a word. If there is no final consonant we say that there is a zero coda. When there is one consonant only, this is called the final consonant. Any consonant may be a final consonant except h, w, j. The consonant r is a special case: it doesn't occur as a final consonant in BBC pronunciation, but there are many rhotic accents of English (see Section 7.3) in which syllables may end with this consonant. There are two sorts of two-consonant final cluster, one being a final consonant preceded by a pre-final consonant and the other a final consonant followed by a post-final consonant. The pre-final consonants form a small set: m, n, rj, l, s. We can see these in 'bump' bʌmp, 'bent' bent, 'bank' baerjk, 'belt' belt, 'ask' aisk. The post-final consonants also form a small set: s, z, t, d, 0; example words are: 'bets' bets, 'beds' bedz, 'backed' baekt, 'bagged' baegd, 'eighth' eit0. These post-final consonants can often be identified as separate morphemes (although not always - 'axe' aeks, for example, is a single morpheme and its final s has no separate meaning). A point of pronunciation can be pointed out here: the release of the first plosive of a plosive-plus-plosive cluster such as the g (of gd) in baegd or the k (of kt) in baekt is usually without plosion and is therefore practically inaudible.

O AU8, Ex 5

There are two types of final three-consonant cluster; the first is pre-final plus final plus post-final, as set out in the following table:

		Pre-final	Final	Post-final
'helped'	he	l	P	t
'banks'	bar	D	k	s
'bonds'	bo	n	d	z
'twelfth'	twe	l	f	0

The second type shows how more than one post-final consonant can occur in a final cluster: final plus post-final 1 plus post-final 2. Post-final 2 is again one of s, z, t, d, 0.

		Pre-final	Final	Post-final 1	Post-final 2
'fifths'	fi		f	0	s
'next'	ne		k	s	t
'lapsed'	lae		P	s	t

Most four-consonant clusters can be analysed as consisting of a final consonant preceded by a pre-final and followed by post-final 1 and post-final 2, as shown below:

		Pre-final	Final	Post-final 1	Post-final 2
'twelfths'	twe	l	f	0	
'prompts'	pro	m	P	t	

A small number of cases seem to require a different analysis, as consisting of a final consonant with no pre-final but three post-final consonants:

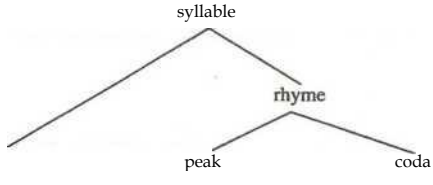
		Pre-final	Final	Post-finah	Post-final 2	Post-finals
'sixths'	SI	-	к	s	9	s
'texts'	te	-	к	s	t	s

To sum up, we may describe the English syllable as having the following maximum phonological structure:

pre initial	initial	post initial	VOWEL	pre final	final	post-final	postfinal	post final
ONSET				CODA				

In the above structure there must be a vowel in the centre of the syllable. There is, however, a special case, that of syllabic consonants (which are introduced in Chapter 9); we do not, for example, analyse the word 'students' stjuidnts as consisting of one syllable with the three-consonant cluster stj for its onset and a four-consonant final cluster dnts- To fit in with what English speakers feel, we say that the word contains two syllables, with the second syllable ending with the cluster nts; in other words, we treat the word as though there was a vowel between d and n, although a vowel only occurs here in very slow, careful pronunciation. This phonological problem will be discussed in Chapter 13.

Much present-day work in phonology makes use of a rather more refined analysis of the syllable in which the vowel and the coda (if there is one) are known as the rhyme; if you think of rhyming English verse you will see that the rhyming works by matching just that part of the last syllable of a line. The rhyme is divided into the peak (normally the vowel) and the coda (but note that this is optional: the rhyme may have no coda, as in a word like 'me'). As we have seen, the syllable may also have an onset, but this is not obligatory. The structure is thus the following



8.3 Syllable division

There are still problems with the description of the syllable: an imanswered question is how we decide on the division between syllables when we find a connected sequence of them as we usually do in normal speech. It often happens that one or more consonants

from the end of one word combine with one or more at the beginning of the following word, resulting in a consonant sequence that could not occur in a single syllable. For example, 'walked through'wo:kt oru: gives us the consonant sequencektor.

We will begin by looking at two words that are simple examples of the problem of dividing adjoining syllables. Most English speakers feel that the word 'morning' mo:nig consists of two syllables, but we need a way of deciding whether the division into syllables should be mo: andnirj, ormoin andiq . A more difficult case is the word 'extra'ekstro. One problem is that by some definitions the s in the middle, between к and t, could be counted as a syllable, which most English speakers would reject. They feel that the word has two syllables. However, the more controversial issue relates to where the two syllables are to be divided; the possibilities are (using the symbol . to signify a syllable boundary):

i) e.kstro
ii) ek.stro
iii) eks.tro
iv) ekst.ro
v) ekstr.o

How can we decide on the division? No single rule will tell us what to do without bringing up problems.

One of the most widely accepted guidelines is what is known as the maximal onsets principle. This principle states that where two syllables are to be divided, any consonants between them should be attached to the right-hand syllable, not the left, as far as possible. In our first example above, 'morning' would thus be divided asmo: .ɪɪɪг). If we just followed this rule, we would have to divide'extra'as (i)e.kstro, but we know that an English syllable cannot begin with kstr. Our rule must therefore state that consonants are assigned to the right-hand syllable as far as possible *within the restrictions governing syllable onsets and codas.* This means that we must reject (i) e.kstro because of its impossible onset, and (v) ekstr.ɜ because of its impossible coda. We then have to choose between (ii), (iii) and (iv). The maximal onsets rule makes us choose (ii). There are, though, many problems still remaining. How should we divide words like 'better'beta? The maximal onsets principle tells us to put thet on the right-hand syllable, giving be. ta, but that means that the first syllable is analysed as be. However, we never find isolated syllables ending with one of the vowelsi,e,ae,A,D,u, so this division is not possible. The maximal onsets principle must therefore also be modified to allow a consonant to be assigned to the left syllable if that prevents one of the vowels i, e, ae, л, o, и from occurring at the end of a syllable. We can then analyse the word as bet. a, which seems more satisfactory. There are words like 'carry' kaeri which still give us problems: if we divide the word askae.ri, we get a syllable-final ae, but if we divide it askaer.i we have a syllable-final r, and both of these are non-occurring in BBC pronunciation. We have to decide on the lesser of two evils here, and the preferable solution is to divide the word askaer.i on the grounds that in the many rhotic accents of English (see Section 7.3) this division would be the natural one to make.

One further possible solution should be mentioned: when one consonant stands between vowels and it is difficult to assign the consonant to one syllable or the other - as in 'better' and 'carry' - we could say that the consonant belongs to *both* syllables. The term used by phonologists for a consonant in this situation is ambisyllabic.

Notes on problems and further reading

The study of syllable structure is a subject of considerable interest to phonologists. If you want to read further in this area, I would recommend Giegerich (1992: Chapter 6), Katamba (1989: Chapter 9), Hogg and McCuUy (1987: Chapter 2) and Goldsmith (1990: Chapter 3). In the discussion of the word 'extra' ekstro it was mentioned that the s in the middle might be classed as a syllable. This could happen if one followed the sonority theory of syllables: sonority corresponds to loudness, and some sounds have greater sonority than others. Vowels have the greatest sonority, and these are usually the centre of a syllable. Consonants have a lower level of sonority, and usually form the beginnings and ends of syllables. But s has greater sonority than к or t, and this could lead to the conclusion that s is the centre of a syllable in the middle of the word 'extra', which goes against English speakers' feelings. There is a thorough discussion, and a possible solution, in Giegerich (1992: Sections 6.2-6.4). Some writers believe that it is possible to describe the combinations of phonemes with little reference to the syllable as an independent unit in theoretical phonology; see, for example, Harris (1994: Section 2.3). Cruttenden (2008: Section 10.10) and Kreidler (2004: Chapters 5 and 6) describe the phonotactics of English in more detail.

A paper that had a lot of influence on more recent work is Fudge (1969). This paper brought up two ideas first discussed by earlier writers: the first is that sp, st, sk could be treated as individual phonemes, removing the pre-initial position from the syllable onset altogether and removing s from the pre-final set of consonants; the second is that since post-initial j only occurs before u, u;, иэ (which in his analysis all begin with the same vowel), one could postulate a diphthong ju and remove j from post-initial position. These are interesting proposals, but there is not enough space here to examine the arguments in ftfll.

There are many different ways of deciding how to divide syllables. To see two different approaches, see the Introductions to the *Longman Pronunciation Dictionary* (Wells, 2008) and the *Cambridge English Pronouncing Dictionary* (Jones, eds. Roach *et aL*, 2006).

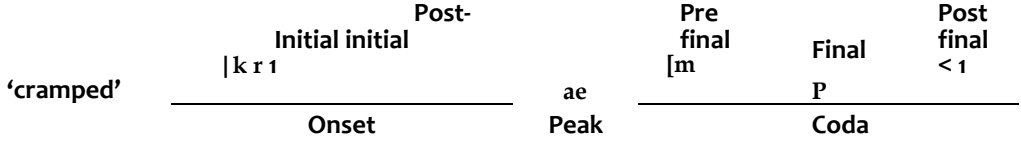
Notes for teachers

Analysing syllable structure, as we have been doing in this chapter, can be very useful to foreign learners of English, since English has a more complex syllable structure than most languages. There are many more limitations on possible combinations of vowels and consonants than we have covered here, but an understanding of the basic structures described will help learners to become aware of the types of consonant cluster that present

them with pronunciation problems. In the same way, teachers can use this knowledge to construct suitable exercises. Most learners find *some* English clusters difficult, but few find *all* of them difficult. For reading in this area, see Celce-Murcia *et al.* (1996; 80-9); Dalton and Seidlhofer (1994: 34-8); Hewings (2004: 1.4, 2.10-2.12).

Written exercise

Using the analysis of the word 'cramped' given below as a model, analyse the structure of the following one-syllable English words:



a) squealed
b) eighths
c) splash
d) texts

9 Strong and weak syllables

9.1 strong and weak

One of the most noticeable features of English pronunciation is that some of its syllables are strong while many others are weak; this is also true of many other languages, but it is necessary to study how these weak syllables are pronounced and where they occur in English. The distribution of strong and weak syllables is a subject that will be met in several later chapters. For example, we will look later at stress, which is very important in deciding whether a syllable is strong or weak. Elision is a closely related subject, and in considering intonation the difference between strong and weak syllables is also important. Finally, words with "strong forms" and "weak forms" are clearly a related matter. In this chapter we look at the general nature of weak syllables.

What do we mean by "strong" and "weak"? To begin with, we can look at how we use these terms to refer to phonetic characteristics of syllables. When we compare weak syllables with strong syllables, we find the vowel in a weak syllable tends to be shorter, of lower intensity (loudness) and different in quality. For example, in the word 'data' delta the second syllable, which is weak, is shorter than the first, is less loud and has a vowel that cannot occur in strong syllables. In a word like 'bottle' bot} the weak second syllable contains no vowel at all, but consists entirely of the consonant }. We call this a syllabic consonant.

There are other ways of characterising strong and weak syllables. We could describe them partly in terms of stress (by saying, for example, that strong syllables are stressed and weak syllables unstressed) but, until we describe what "stress" *means*, such a description would not be very useful. The most important thing to note at present is that any strong syllable wiU have as its peak one of the vowel phonemes (or possibly a triphthong) listed in Chapters 2 and 3, but not ə, i, u (the last two are explained in Section 9.3 below). If the vowel is one of i, e, ae, л, o, и, then the strong syllable will always have a coda as well. Weak syllables, on the other hand, as they are defined here, can only have one of a very small number of possible peaks. At the end of a word, we may have a weak syllable ending with a vowel (i.e. with no coda):

i) **the vowel ə ("schwa");**
ii) **a close front unrounded vowel in the general area of ii, i, symbolised i;**
iii) **a close back rounded vowel in the general area of u:, u, symbolised u.**

Examples would be;

i) 'better' beta
ii) 'happy' haepi
iii) 'thank you' oaer)к ju

We also find weak syllables in word-final position with a coda if the vowel is э. For example;

i) 'open' эирэп
ii) 'sharpen' Joipan

Inside a word, we can find the above vowels acting as peaks without codas in weak syllables; for example, look at the second syllable in each of these words;

i) 'photograph' fautagraif
ii) 'radio' reidiou
iii) 'influence' influons

In addition, the vowel i can act as a peak without a coda if the following syllable begins with a consonant;

iv) 'architect' aikitekt

In the rest of this chapter we will look at the different types of weak syllable in more detail.

9.2 The Э vowel ("schwa")

OAU9,EX 1

The most frequently occurring vowel in English is э, which is always associated with weak syllables. In quality it is mid (i.e. halfway between close and open) and central (i.e. halfway between front and back). It is generally described as lax - that is, not articulated with much energy. Of course, the quality of this vowel is not always the same, but the variation is not important.

Not all weak syllables contain э, though many do. Learners of English need to learn where э is appropriate and where it is not. To do this we often have to use information that traditional phonemic theory would not accept as relevant - we must consider spelling. The question to ask is; if the speaker were to pronounce a particular weak syllable as if it were strong instead, which vowel would it be most likely to have, according to the usual rules of English spelling? Knowing this will not teU us which syllables in a word or utterance should be weak - that is something we look at in later chapters — but it will give us a rough guide to the correct pronunciation of weak syllables. Let us look at some examples;

i) Spelt with 'a'; strong pronunciation would have ae
'attend' atend 'character' kaerakta
'barracks' basraks

ii) Spelt with 'ar'; strong pronunciation would have Q*
'particular' patikjola 'molar" moula
'monarchy' mnnoki

iii) Adjectival endings spelt 'ate'; strong pronunciation would have
'intimate' mtimot 'accurate' aekjsrot
'desolate' desolot (although there are exceptions to this: 'private' is usually praivit)

iv) Spelt with 'o'; strong pronunciation would have or эи
'tomorrow' tamnrau 'potato' pateitsu
'carrot' kasrot

v) Spelt with 'or'; strong pronunciation would have з:
'forget' faget 'ambassador" aembaesodo
'opportunity' opotjumoti

vi) Spelt with 'e'; strong pronunciation would have e
'settlement' setjmont 'violet' vaislot
'postmen' paustman

vii) Spelt with 'er'; strong pronunciation would have з:
'perhaps' pahaeps 'stronger" strogga
'superman' suipamaen

viii) Spelt with 'u'; strong pronunciation would have л
'automn' a:tam 'support' sapoit
'hahbut' haelibat

ix) Spelt with 'ough' (there are many prommciations for the letter-sequence 'ough')
'xhorougK **оЛГЭ 'borough' Ьлгэ**

x) Spelt with 'ou'; strong pronunciation might have au
'gracious' greijas 'callous' kaelas

9.3 Close front and close back vowels

Two other vowels are commonly fovmd in weak syllables, one close front (in the general region of i) and the other close back rounded (in the general region of u). In strong syllables it is comparatively easy to distinguish h from i or u: from Ц but in weak syllables the difference is not so clear. For example, although it is easy enough to decide which vowel one hears in 'beat' or 'bit', it is much less easy to decide which vowel one hears in the second syllable of words such as 'easy' or 'busy'. There are accents of English (e.g. Welsh accents) in which the second syllable sounds most like the iJ in the first syllable of 'easy', and others (e.g. Yorkshire accents) in which it sounds more like the I in the first syllable of 'busy'. In present-day BBC pronunciation, however, the matter is not so clear. There is uncertainty, too, about the corresponding close back rounded vowels. If we look at the words 'good to eat' and 'food to eat', we must ask if the word 'to' is pronounced with the «vowel phoneme of'good' or the phoneme of'food'. Again, which vowel comes in 'to' in 'I want to'?

One common feature is that the vowels in question are more like ii or u: when they precede another vowel, less so when they precede a consonant or pause. You should notice one further thing: with the exception of one or two very artificial examples, there is really no possibility in these contexts of a phonemic contrast between i: and \ or between u: and u. Effectively, then, the two distinctions, which undoubtedly exist within strong syllables, are neutralised in weak syllables of BBC pronunciation. How should we transcribe the words 'easy' and 'busy'? We will use the close front unrounded case as an example, since it is more straightforward. The possibilities, using our phoneme symbols, are the following:

	easy	'busy'
i)	iizii	bizi:
ii)	i:zi	bizi

Few speakers with a BBC accent seem to feel satisfied with any of these transcriptions. There is a possible solution to this problem, but it goes against standard phoneme theory. We can symbolise this weak vowel as i— that is, using the symbol for the vowel in 'beat' but without the length mark. Thus:

i:zi bizi

The i vowel is neither the i: of'beat' nor the i of'bit', and is not in contrast with them. We can set up a corresponding vowel u that is neither the u: of'shoe' nor the и of'book' but a weak vowel that shares the characteristics of both. If we use i, u in our transcription as well as ii, I, u:, Ц it is no longer a true phonemic transcription in the traditional sense. However, this need not be too serious an objection, and the fact that native speakers seem to think that this transcription fits better with their feelings about the language is a good argument in its favour.

O AU9, Ex 2

Let us now look at where these vowels are found, beginning with close front unrounded ones. We find i occurring:

- **i) In word-final position in words spelt with final or 'ey' after one or more consonant letters (e.g. 'happy' haepi 'valley' vael^ and in morpheme-final position when such words have suffixes beginning with vowels (e.g. 'happier' haepic^ 'easiest' iiziost, 'hurrying' hAiiii)).**
- **ii) In a prefix such as those spelt 're', 'pre', 'de' if it precedes a vowel and is unstressed (e.g. in'react' riaeki,'create' krieit,'deodorant' dioudoront).**
- **iii) In the suffixes spelt 'iate', 'ious' when they have two syllables (e.g. in 'appreciate' opriijieit, 'hilarious' hileorios).**
- **iv) In the following words when unstressed: 'he', 'she', 'we', me', 'be' and the word 'the' when it precedes a vowel.**

In most other cases of syllables containing a short close front unrounded vowel we can assign the vowel to the i phoneme, as in the first syllable of 'resist' rizis^ 'inane' тещ

'enough' inAf, the middle syllable of 'incident' msidont, 'orchestra' oikistro, 'artichoke' Qititjouk, and the final syllable of'swimming' swimio, 'liquid' likwid, 'optic' nptik. It can be seen that this vowel is most often represented in spelling by the letters 'i' and 'e'.

Weak syllables with close back rounded vowels are not so commonly found. We find u most frequentiy in the words 'you', 'to', 'into', 'do', when they are unstressed and are not immediately preceding a consonant, and 'through', 'who' in all positions when they are unstressed. This vowel is also found before another vowel within a word, as in 'evacuation' ivaekjueijn, 'influenza' influenza.

9.4 Syllabic consonants

In the above sections we have looked at vowels in weak syllables. We must also consider syllables in which no vowel is found. In this case, a consonant, either 1, r or a nasal, stands as the peak of the syllable instead of the vowel, and we count these as weak syllables like the vowel examples given earlier in this chapter. It is usual to indicate that a consonant is syllabic by means of a small vertical mark ( ) beneath the symbol, for example 'cattle' kaetj.

Syllabic l **O AU9, Ex 3**

Syllabic 1 is perhaps the most noticeable example of the English syllabic consonants, although it would be wrong to expect to find it in all accents. It occurs after another consonant, and the way it is produced depends to some extent on the nature of that consonant. If the preceding consonant is alveolar, as in 'bottle' botl, 'muddle' mAdj, 'tunnel' tAnl, the articulatory movement from the preceding consonant to the syllabic 1 is quite simple. The sides of the tongue, which are raised for the preceding consonant, are lowered to allow air to escape over them (this is called lateral release). The tip and blade of the tongue do not move until the articulatory contact for the 1 is released. The 1 is a "dark Г' (as explained in Chapter 7). In some accents - particularly London ones, and "Estuary English" - we often find a close back roimded vowel instead (e.g. 'bottle' botu). Where do we find syllabic 1 in the BBC accent? It is useful to look at the spelling as a guide. The most obvious case is where we have a word ending with one or more consonant letters followed by 'le' (or, in the case of noun plurals or third person singular verb forms, 'les'). Examples are:

i) with alveolar consonant preceding
'cattle' kaet} 'bottle' bot}
'wresde' resl 'muddle' mAdl
ii) with non-alveolar consonant preceding
'couple' kAp} 'trouble' trAb}
'struggle' strAgJ 'knuckle' ПАк!

Such words usually lose their final letter 'e' when a suffix beginning with a vowel is attached, but the 1 usually remains syllabic. Thus:

'bottle' - 'bottling'	bntl- botlir) тлсЦ-
'muddle' - 'muddling'	mAdhg strAg|-
'struggle' - 'struggling'	strAglii)

Similar words not derived in this way do not have the syllabic 1 - it has been pointed out that the two words 'coddling' (derived from the verb 'coddle') and 'codling' (meaning "small cod", derived by adding the diminutive suffix '-ling' to 'cod') show a contrast between syllabic and non-syllabic I 'coddling' kodlig and 'codling' kodlir). In the case of words such as 'bottle', 'muddle' 'struggle', which are quite common, it would be a mispronunciation to insert a vowel between the 1 and the preceding consonant in the accent described here. There are many accents of English which may do this, so that, for example, 'cattle' is pronounced kaetol but this is rarely the case in BBC pronunciation.

We also find syllabic 1 in words spelt, at the end, with one or more consonant letters followed by 'al' or 'el', for example:

'panel' pzenl	'petal' petl
'kernel' kainl	'pedal' pedj
'parcel' paisl	'papal' peipl
'Babel' beibl	'ducal' djuikl

In some less common or more technical words, it is not obligatory to pronounce syllabic land the sequence almay be used instead, although it is less likely: 'missal' mis}or misal 'acquittal' okwitlor okwitol

Syllabic n OAU9,Ex4

Of the syllabic nasals, the most frequently foimd and the most important is i]t When should it be pronounced? A general rule could be made that weak syllables which are phonologicaUy composed of a plosive or fricative consonant plus an are uncommon except in initial position in the words. So we can find words like 'tonight' tonait, 'canary' кэпеэгь 'fanatic' fanzetik, 'sonata' sanaito with a before a but medially and finally - as in words like 'threaten', 'threatening' - we find much more commonly a syllabic it Gretn, Gretnig. To pronounce a vowel before the nasal consonant would sovmd strange (or at best over-carefiil) in the BBC accent.

Syllabic n is most common after alveolar plosives and fricatives; in the case of t d, s, z followed by n the plosive is nasally released by lowering the soft palate, so that in the word 'eaten' i:tn for example, the tongue does not move in the tii sequence but the soft palate is lowered at the end of t so that compressed air escapes through the nose. We do not usually find naffer 1, tf, dj so that for example 'sullen' must be pronounced 8A1ЭП> 'Christian' as knstjan (though this word may be pronounced with t followed by i or j) and 'pigeon' as pidsoa

Syllabic n after non-alveolar consonants is not so widespread. In words where the syllable following a velar consonant is spelt 'an' or 'on' (e.g. 'toboggan', 'wagon') it is rarely heard, the more usual pronunciation being tobngoa waegon- After bilabial consonants, in

words like 'happen', 'happening', 'ribbon' we can consider it equally acceptable to pronounce them with syllabic n (htepn, haepnig, nbn) or with on (haepon, haeponiq, пЬэп). In a similar way, after velar consonants in words like 'thicken', 'waken', syllabic n is possible but on is also acceptable.

After f, v> syllabic n is more common than on (except, as with the other cases described, in word-initial syllables). Thus 'seven', 'heaven', 'often' are more usually sevn, hevn.Dfij than Sevan>hevan, ofЭП.

In all the examples given so far the syllabic n has been following another consonant; sometimes it is possible for another consonant to precede that consonant, but in this case a syllabic consonant is less likely to occur. If n is preceded by 1 and a plosive, as in 'Wilton', the pronunciation wiltij is possible, but wiltan is also found regularly. If s precedes, as in 'Boston', a final syllabic nasal is less frequent, while clusters formed by nasal + plosive + syllabic nasal are very unusual: thus 'Minton', 'lantern', 'London', 'abandon' will normally have Э in the last syllable and be pronounced mmton, laentan, Undan, abaendan. Other nasals also discourage a following plosive plus syllabic nasal, so that for example 'Camden' is normally pronoimced kaemdan-

Syllabic m,r)

We will not spend much time on the syllabic pronunciation of these consonants. Both can occur as syllabic, but only as a result of processes such as assimilation and elision that are introduced later. We find them sometimes in words like 'happen', which can be pronounced haepm<. though haepn and haepan are equally acceptable, and 'uppermost', which could be pronounced as Apipaust, though Apamaust would be more usual. Examples of possible syllabic velar nasals would be 'thicken' 0iki) (where 0ikan and 0ikn are also possible), and 'broken key' braukr) ki:, where the nasal consonant occurs between velar consonants (n or эп could be substituted for g).

Syllabic r

In many accents of the type called "rhotic" (introduced in Chapter 7), such as most American accents, syllabic r is very common. The word 'particular', for example, would probably be pronounced prt ik j эк in careful speech by most Americans, while BBC speakers would pronounce this word potikjolo- Syllabic r is less common in BBC pronunciation: it is found in weak syllables such as the second syllable of 'preference' prefpns- In most cases where it occurs there are acceptable alternative pronunciations without the syllabic consonant.

There are a few pairs of words (minimal pairs) m which a difference in meaning appears to depend on whether a particular r is syllabic or not, for example:

'hungry' hAijgri 'Hungary' hATjgji

But we find no case of syllabic r where it would not be possible to substitute either non-syllabic r or gr; in the example above, 'Hungary' could equally well be pronounced hAggori-

Combinations of syllabic consonants

It is not unusual to find two syllabic consonants together. Examples are: 'national' nae 'literal' litr}, 'visionary' vi3ijri. 'veteran' vetm- It is important to remember that it is often not possible to say with certainty whether a speaker has pronounced a syllabic consonant, a non-syllabic consonant or a non-syllabic consonant plus 3. For example, the word 'veteran' given above could be pronounced in other ways than vetm- A BBC speaker might instead say vetroni vetorn or vetaron- The transcription makes it look as if the difference between these words is clear; it is not. In examining colloquial English it is often more or less a matter of arbitrary choice how one transcribes such a word. Transcription has the unfortunate tendency to make things seem simpler and more clear-cut than they really are.

Notes on problems and further reading

9.1 I have at this point tried to bring in some preliminary notions of stress and prominence without giving a full explanation. By this stage in the course it is important to be getting familiar with the difference between stressed and unstressed syllables, and the nature of the "schwa" vowel. However, the subject of stress is such a large one that I have felt it best to leave its main treatment until later. On the subject of schwa, see Ashby (2005: p. 29); Cruttenden (2008: Section 8.9.12).

9.2 The introduction of i and u is a relatively recent idea, but it is now widely accepted as a convention in influential dictionaries such as the *Longman Pronunciation Dictionary* (Wells, 2008), the *Cambridge English Pronouncing Dictionary* (Jones, eds. Roach *et al,* 2006) and the *O^rford Dictionary of Pronunciation* (Upton *et al,* 2001). Since I mention native speakers' feelings in this connection, and since I am elsewhere rather sceptical about appeals to native speakers' feelings, I had better explain that in this case my evidence comes from the native speakers of English I have taught in practical classes on transcription over many years. A substantial number of these students have either been speakers with BBC pronunciation or had accents only slightly different from it, and their usual reaction to being told to use i for the vowel at the end of'easy', 'busy' has been one of puzzlement and frustration; like them, I cannot equate this vowel with the vowel of 'bit'. I am, however, reluctant to use i;, which suggests a stronger vowel than should be pronounced (like the final vowel in 'evacuee', 'Tennessee'). I must emphasise that the vowels i, u are not to be included in the set of English phonemes but are simply additional symbols to make the writing and reading of transcription easier. The Introduction to the *Cambridge English Pronouncing Dictionary* (Jones, eds. Roach *et al,* 2006) discusses some of the issues involved in syllabic consonants and weak syllables; see section 2.10 and p. 492.

Notes for teachers

Introduction of the "schwa" vowel has been deliberately delayed until this chapter, since I wanted it to be presented in the context of weak syllables in general. Since students

should by now be comparatively well informed about basic segmental phonetics, it is very important that their production and recognition of this vowel should be good before moving on to the following chapters.

This chapter is in a sense a crucial point in the course. Although the segmental material of the preceding chapters is important as a foundation, the strong/weak syllable distinction and the overall prosodic characteristics of words and sentences are essential to intelligibility. Most of the remaining chapters of the course are concerned with such matters.

Written exercise

The following sentences have been partially transcribed, but the vowels have been left blank. Fill in the vowels, taking care to identify which vowels are weak; put no vowel at all if you think a syllabic consonant is appropriate, but put a syllabic mark beneath the syllabic consonant

1 **A particular problem of the boat was a leak**
p t kj ɪ pr bl mv ɞ b t wz ɪ ɹ
2 **Opening the bottle presented no difficulty**
png ɞ b t l p r z n t d n d f k l t
3 **There is no alternative to the government's proposal d**
rzn I t n t v t d g v nm nt spr p zl
4 **We ought to make a collection to cover the expenses w**
t t m k k l k j n t k v d ksp ns z
5 **Finally they arrived at a harbour at the edge of the mountains**
f n l d r v d t h b r t d d s v d m n t n z

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