This chapter explains how linguists represent the flow of speech, and outlines the main symbols used for the sounds of English. It also discusses ways of describing stress and rhythm.

05 sound patterns

There was a young man of Dunlaoghaire,
Who propounded an interesting theoghaire,
That the language of Erse
Has a shortage of verse
As the spelling makes poets so weoghaire.

J.B. Searle

Linguistics is concerned primarily with the spoken word. So a priority task for anyone describing sounds is to decide how to represent the flow of speech. Clearly, the conventional written forms are most unsatisfactory, since they often provide little guide to pronunciation. The limerick quoted above suggests that Erse (Irish Gaelic) contains spelling eccentricities, and some of the idiosyncrasies of English written forms are illustrated by Bernard Shaw's somewhat exaggerated claim that *ghoti* could spell 'fish', with *gh* as in 'rough', *o* as in 'women', and *ti* as in 'station'! As de Saussure pointed out, 'Written forms obscure our view of language. They are not so much a garment as a disguise.'

Linguists, then, when they are concerned with sounds, abandon conventional spelling for the purpose of representing spoken utterances, and use one of the many specially devised systems of notation in which one symbol represents one sound. Perhaps the best known of these is the International Phonetic Alphabet (IPA). A number of IPA symbols are borrowed from the conventional written alphabet:

[b] as in '*b*ird'
[d] as in '*d*og'

(Symbols representing sounds are put into square brackets).

Other symbols are variations of alphabet letters:

[ɒ] as in 'hot' is an upside down *a*.
[ŋ] as in 'ba*ng*' is a combination of *n* and *g*.
[ɪ] as in 'h*i*t' is a small-size capital I.

Sometimes obsolete letters are used:

[ʃ] as in di*sh*.

Other symbols are from the Greek alphabet:

[θ] as in *th*in,

and a few symbols are inventions:

[ɬ] Welsh *ll* as in *Ll*anelli.

Sometimes supplementary marks (known as 'diacritics') are added to the symbols. For example, two dots indicate length:

[uː] (long *u*) as in boot.

By such means, the IPA has built up a store of symbols which can, in theory, represent any sound in any language.

This book uses IPA symbols whenever a phonetic transcription is essential. However, as explained in Chapter 1, a knowledge of phonetics is considered to be prerequisite for linguistics, rather than an essential part of linguistics itself. Further information is therefore contained in an appendix (p. 244–52) rather than in this chapter. Furthermore, since phonetic symbols make a text more difficult to read, this book (in common with most other linguistic textbooks) uses the conventional written letters wherever possible, even though it is the spoken form which is being discussed.

Sorting out the basic sounds

Let us assume that a linguist is working on a hitherto unknown, unwritten language. The first step is to find a suitable informant – a reliable native speaker from whom to gather samples of speech. The early sessions will concentrate on the accurate transcription of sounds, dealing at first with single words. The linguist will do this by asking the informant to name everyday objects such as *nose*, *mouth*, *house*, *tree*, *sun*, and will then transcribe each of these words in as much detail as possible. At first even sneezes and hiccups should be recorded in case they are relevant. In Zulu, for example, there are sounds known as 'clicks' which an English speaker might well overlook, since they are totally unlike any English speech sounds. The nearest equivalents are the clicking *gee-up* sounds which people make to horses, and the *tut-tut* click of disapproval.

As time goes by, and as the sounds of the language under investigation become familiar, the linguist will transcribe more and more accurately. Simultaneously, it will slowly become apparent that the variety of strange sounds is not infinite. Instead, the informant is ringing the changes on a relatively small number of basic sounds or **phonemes**, each of which may have several variant forms.

The number of phonemes varies from language to language. The average is around thirty-five. English has forty-four, according

to Gimson's well-known analysis of one widely spoken variety of British English (see Further Reading, p. 233), though different accents and different methods of analysis can result in a slightly lower number. Hawaiian, it has been claimed, has only thirteen, and one of the languages of the northern Caucasus is reported to have eighty-nine. But these extremes are unusual, and the information may be unreliable.

A **phoneme** is the smallest segment of sound which can distinguish two words. Take the words *pit* and *bit*. These differ only in their initial sound, *pit* begins with /p/ and *bit* begins with /b/. This is the smallest amount by which these two words could differ and still remain distinct forms. Any smaller subdivision would be impossible, because English does not subdivide /p/ or /b/. Similarly, take the words *pet* and *pit*. These differ only in the vowel. Once again, this is the smallest amount by which these two words could differ. There is no English sound halfway between /e/ and /ɪ/. Therefore /p/, /b/, /e/, /ɪ/ are all phonemes of English. (Symbols for phonemes are normally put into slanted brackets.) Pairs of words such as *pit* and *bit*, *pit* and *pet* which differ by only one phoneme are known as **minimal pairs**, and one way to identify the phonemes of any language is to look for minimal pairs.

The phonemes of English

Let us now list the phonemes of one widely spoken variety of British English. This is the accent sometimes known as 'Received Pronunciation' (RP). It is only one of the many accents found in Great Britain, but is perhaps the most widespread. As noted above, there are forty-four phonemes, according to one common analysis. They can be divided into two types: consonants and vowels. The latter can be subdivided into relatively pure or unchanging vowels, as in b*i*t, b*e*t, b*a*t, b*u*t, and diphthongs or gliding vowels, in which the voice glides from one vowel to another, as in bo*a*t, b*uy*, b*ay*.

Consonants

/p/ as in *p*ill
/b/ as in *b*ill
/t/ as in *t*in
/d/ as in *d*in
/k/ as in *c*ot
/g/ as in *g*ot
/m/ as in *m*eat
/n/ as in *n*eat
/ŋ/ as in si*ng*
/l/ as in *l*ake
/r/ as in *r*ake
/f/ as in *f*ast
/v/ as in *v*ast
/θ/ as in *th*in
/ð/ as in *th*en
/s/ as in *s*ink
/z/ as in *z*inc
/ʃ/ as in *sh*ip
/ʒ/ as in bei*g*e
/h/ as in *h*at
/tʃ/ as in *ch*in
/dʒ/ as in *g*in
/w/ as in *w*et
/j/ as in *y*et

Vowels

/æ/ as in p*a*t
/ɑː/ as in p*ar*t
/e/ as in p*e*t
/ɪ/ as in p*i*t
/iː/ as in p*ea*t
/ɒ/ as in p*o*t
/ɔː/ as in p*or*t
/ʊ/ as in p*u*t
/uː/ as in b*oo*t
/ʌ/ as in b*u*t
/ɜː/ as in b*ir*d
/ə/ as in *a*go
/eɪ/ as in b*ay*
/aɪ/ as in b*uy*
/ɔɪ/ as in b*oy*
/aʊ/ as in b*ou*t
/əʊ/ as in b*oa*t
/ɪə/ as in b*ee*r
/eə/ as in b*ar*e
/ʊə/ as in d*oe*r, d*our*

Allophones

Anyone working on an unwritten language must not only make a list of the phonemes of that language. They must also discover their variant forms or allophones. In fact, an essential part of the phoneme identification process consists of finding out which variant sounds 'belong' to each phoneme.

The amount of variation differs from phoneme to phoneme. For example, the very slight alterations in the pronunciation of English /s/ are mostly imperceptible and unimportant, whereas the variants of English /l/ are noticeable even to the untrained ear.

Sometimes the variation is random: no two sounds can ever be exactly the same, no matter how hard a speaker tries to replicate one. These slight differences normally pass unnoticed. When sounds vary randomly in this way, they are said to be in **free variation**.

At other times, the variation is predictable. The way a phoneme is pronounced can be conditioned by the sounds round it, or by its position in the word. Take the English phoneme /p/. When it occurs at the beginning of a word, it is pronounced with aspiration (a puff of breath). After /s/, this puff of breath disappears. This can be tested by holding a sheet of paper in front of the mouth and saying the words *spot, spill, pot, pill*. In

the case of *spot* and *spill*, the paper remains motionless. But when *pot* and *pill* are pronounced, the accompanying puff of breath makes the paper billow out. In short, the aspirated variant [p^h] and the unaspirated one [p] are both allophones of the phoneme /p/, and each occurs in a different and predictable set of environments. In linguistic terminology, they are in **complementary distribution**, since one set of environments complements the other.

A neat and currently fashionable way to express this is to take one variant as more basic than the other(s), and to state the circumstances under which any change in the basic form occurs. If we regard [p] as basic, we can then say that [p] changes into [p^h] at the beginning of a word. This can be stated briefly as follows:

$p \rightarrow p^h$ /# ——. That is:

$p \rightarrow p^h$	/	# ——
p changes into p^h	in the following circumstances	after a word boundary (#) (i.e. at the beginning of a word)

figure 5.1

Or, to take another example, consider the English phoneme /l/. This has one form at the beginning of a word, and another form at the end. In a word such as *lip*, the first consonant is a 'clear' *l*, pronounced by placing the tip of the tongue just behind the teeth and keeping the back of the tongue fairly low. In *pill*, the tongue tip is in the same place, but the back of the tongue is raised, resulting in a 'dark' *l*. So the 'clear' variant [l] and the 'dark' variant [ɫ] are both allophones of the phoneme /l/. If we regard [l] as basic, we can say that [l] changes to [ɫ] at the end of a word:

$l \rightarrow ɫ$ / —— #. That is:

l → ɫ	/	—— #
l changes into ɫ	in the following circumstances	when it occurs before a word boundary (#) (i.e. at the end of a word)

figure 5.2

(The distribution of these allophones is in fact more complex than the above paragraph suggests. For further information, see the books recommended on p. 233–5.)

Sound combinations

In addition to identifying and analyzing the phonemes of a language, a linguist must also work out ways in which the phonemes may be combined. Every language has certain permitted sequences of sounds, and others which are not allowed.

In English, for example, a word which begins with three consonant-type phonemes always obeys three strict rules:

1 The first phoneme must be /s/.
2 The second phoneme must be /p/ or /t/ or /k/.
3 The third phoneme must be /l/ or /r/ or /w/ or /j/.

The result is that all words beginning with three consonants are words such as *spring*, *string*, *squeal*, *splendid* or *stew*. We never find words such as **bdling*, **sgteal* or **wbtendid*.

Shared properties of phonemes

In the discussion so far, phonemes have been regarded as separate, independent units, each one having its own allophones (Figure 5.3).

figure 5.3

It would, however, be a mistake to regard the phonemes of English as being totally separate from one another, just as it would be a mistake to regard the members of a human family as being totally different. Even though each individual in a family is a distinct person in their own right, family members are nevertheless likely to have certain genes in common with their brothers and sisters. Similarly, many phonemes share common features.

Take the English phonemes, /p/, /t/, /b/, /d/, /m/, /n/. First these all share the property of being **consonants**. Second, /b/, /d/, /m/, /n/ are all **voiced** – that is, they are pronounced with vibration of the vocal cords. If you put a hand on your Adam's apple and say the words *bet*, *debt*, *met*, *net*, you can feel this happening. You can also feel the vibration stopping when you get to the /t/ at the end. Third, /p/, /b/, /m/, are pronounced with the lips, and so share the property of being **labials** (from the Latin word for 'lip'). Fourth, when /m/ and /n/ are spoken, air is expelled through the nose. They are therefore both **nasals** (from the Latin word for 'nose'). And so on. The list of shared properties could continue for some time. However, linguists differ quite considerably as to which features they consider important. 'Labial', for example, is sometimes omitted, and a combination of other features used in its place.

We can draw up a chart which shows the properties possessed by each phoneme (Figure 5.4). A 'plus' sign indicates the presence of a certain property, and a 'minus' sign signifies its absence:

	/p/	/t/	/b/	/d/	/m/	/n/
Consonantal	+	+	+	+	+	+
Voiced	–	–	+	+	+	+
Labial	+	–	+	–	+	–
Nasal	–	–	–	–	+	+

figure 5.4

The more usual linguistic term for 'property' or 'component' of a phoneme is the word **feature**. So we might describe the phoneme /n/ by saying that it has the features **consonantal, voiced, nasal**. Compared with /m/, the phoneme /n/ lacks the feature **labial**. Otherwise, the two are the same. It is therefore the presence or absence of the feature labial which separates /m/ from /n/. Any feature which distinguishes one phoneme from another is called a **distinctive feature**. Since languages will, in general, have a different range of phonemes, the set of distinctive features will also tend to differ from language to language. In some cases, however, different languages are found to have the same features, but in different combinations.

This type of feature analysis makes the rules of any language much simpler to express. Suppose you had a language which dropped the phonemes /m/, /n/ and /ŋ/ at the end of a word under certain circumstances. It is simpler and clearer to write a rule which states that nasals are dropped at the end of a word than it is to name each phoneme separately. A group of sounds which share important features in common, such as the group of nasals, are known as a **natural class** of sounds.

Non-segmental phonemes

English phonemes are chunks or segments of sound, such as /b/ or /t/ or /e/. These are known as **segmental** phonemes. However, a number of languages have not only segmental phonemes, but non-segmental phonemes also.

In North Mandarin Chinese, for example, there are numerous words which are distinguished by differences in the rise and fall of tone, as in the following minimal pairs (Figure 5.5):

ma	———	(level tone)	mother
ma	⟋	(rising tone)	hemp
ma	⟋⟍	(dipping tone)	horse
ma	⟍	(falling tone)	scold

figure 5.5

Tone languages have one advantageous by-product: the tones and rhythms of speech can be imitated by instruments other than the human voice. This is the basis of African talking drums (or more accurately, talking gongs), in which the drum beats reproduce the tones and rhythms of the language. However, because the drums are unable to reproduce the segmental phonemes, their messages work in a slightly different way from normal language. A single message may take several minutes to convey, even though it would have taken only a few seconds to give the information verbally. This is because whole phrases are utilized where ordinary language uses single words. Such a procedure is necessary in order to avoid confusion. For example, among the Lokele of the Upper Congo, the word for dog is *ngwa*, a single syllable spoken with a low tone. But because there are dozens of other single syllable words spoken with a low tone, the drum equivalent for 'dog' uses a whole phrase, meaning literally 'giant dog, little one that barks kpei kpei'. The 'tune' of this phrase is unlike that of any other drum phrase, and serves to distinguish the meaning 'dog' in the message.

Metrical phonology

Although English does not have tones, it possesses important non-segmental features – characteristics which exist alongside the phonemes. In particular, each word and group of words has

its own rhythm, an interplay of stressed and unstressed syllables. This branch of phonology is relatively new, and is known as **metrical phonology.**

In the words in Figure 5.6, the most stressed syllables have the most stars, and the least stressed, the smallest number of stars (some people leave the least stressed syllable unstarred, which would lower the number of stars all along):

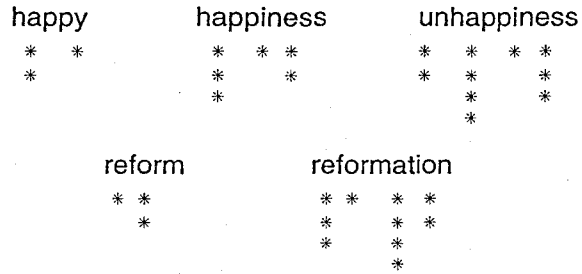

figure 5.6

The actual quantity of stress given to a syllable does not matter very much. The important point is the relative amount given to each. In *happiness*, for example, it is essential to give the greatest amount of stress to *hap-*, and the least to *-pi-*.

But this rhythm is not merely a sequence of different stress levels. It appears to have an internal structure, which can be represented on a 'tree diagram' – so called because its branches resemble an upside-down tree. This shows the overall structure of the rhythm better than a grid of stars. It shows how strong and weak syllables alternate, and indicates that each syllable can be regarded as a sub-portion of a larger unit, sometimes called a **foot.** The words in Figure 5.7 have been split into a strong portion (S) and a weak portion (W), which in some cases is further subdivided.

The word rhythms outlined above are not static, in that they may change as words come into contact with one another. The words *central* and *heating* each sound rather similar when pronounced alone. But when spoken together as the phrase *central heating*, the rhythm alters, so that the strongest stress goes onto *heating* (Figure 5.8).

Recent phonology pays attention not only to the interplay between words, but also to the interaction between sound segments and rhythm. For example, as in poetry, long vowels

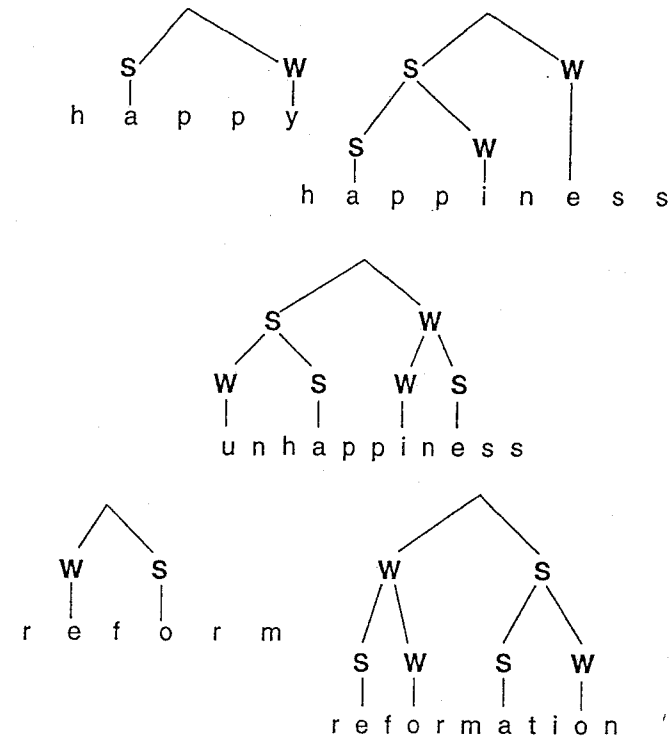

figure 5.7

tend to coincide with strong syllables, and so do short vowels followed by two consonants. In the long run, phonologists hope to work out a universal framework for handling the rhythmic structure of any language.

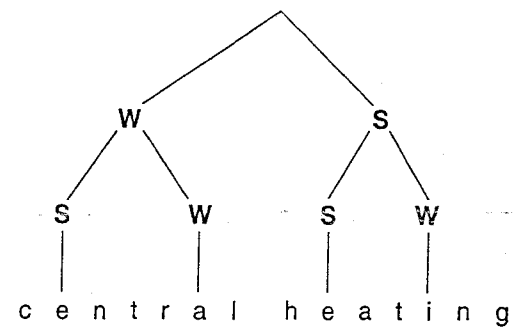

figure 5.8