

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 *æ* 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 is *m* and the last is *n*, as in the word ‘man’ discussed above. But should we regard the *aɪ* 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 actually 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 *æ* for *e* in the word ‘bed’ we get a different word: ‘bad’. But in the case of two slightly 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 the *æ* 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, æ, ʌ, ɒ, 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' pʌt
'pet' pet	'pot' pɒt
'pat' pæt	'put' pʊt

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

'A' 'a' 'ɑ' 'u'

they would not know that to users of the alphabet three of these characters all represent the same letter, while 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 'ɑ' 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 'ɑ', at the beginning of a sentence. They would also find that names could begin with 'A' but *never* with 'ɑ'; 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 all 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 *tʃ* (as in ‘chip’ *tʃɪp*) as one phoneme, so *tʃ* is a phonemic *symbol* consisting of two *characters* (*t* and *ʃ*).

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 [ä] 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 **allophonic** transcription. As an example of the use of allophonic transcription, in this course phonetic symbols are used occasionally when it is necessary to give an accurate label to an allophone 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 / /. While this convention is useful when giving a few examples, there is so much transcription in this book that I feel it would be an unnecessary distraction to enclose each example in brackets. We will continue to use square brackets for cardinal vowel symbols, but elsewhere all 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 *æ* is unusual, and that the *a* symbol should be used for the vowel in 'cat' instead of *æ*. 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 *æ*, which is usually 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 *ɪ* and that of 'beat' with *i*. Yet another point of view is that quality and quantity are *both* important and should *both* be indicated; this point of view results in a transcription using *ɪ* for 'bit' and *i:*, a symbol different from *ɪ* 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 English 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 *æh*. 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 : 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 Pullum 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 “alphabetic 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 ʃ and ʒ, symbols not usually found outside phonetics, many Americans use š and ž, 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 phonemically, then (in square brackets) phonetically. In your phonetic transcription you should use the following diacritics:

- b, d, g pronounced without voicing are transcribed b̥, d̥, g̥
- p, t, k pronounced with aspiration are transcribed p^h, t^h, k^h

- i:, a:, ɔ:, ɜ:, u: when shortened by a following fortis consonant should be transcribed i', a', ɔ', ɜ', u'
- ɪ, e, æ, ʌ, ɒ, ʊ, ə when shortened by a following fortis consonant should be transcribed ɪ̣, ɛ̣, æ̣, ʌ̣, ɒ̣, ʊ̣, ə̣. Use the same mark for diphthongs, placing the diacritic on the first part of the diphthong.

Example spelling: 'peat'; phonemic: pi:t phonetic: p^hi:t

Words for transcription

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