

## English Vowels

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### TRANSCRIPTION AND PHONETIC DICTIONARIES

The vowels of English can be transcribed in many different ways, partly because accents of English differ greatly in the vowels they use, and partly because there is no one right way of transcribing even a single accent of English. The set of symbols used depends on the reason for making the transcription. If one is aiming to reduce English to the smallest possible set of symbols, then *sheep* and *ship*, *Luke* and *look*, and all the other pairs of vowels that differ in length could be transcribed using one symbol per pair plus a length mark [ : ], as [ʃi:p, ʃɪp], [lu:k, lʌk], and so on. In this way, one could reduce the number of vowel symbols considerably, but at the expense of making the reader remember that the vowel pairs that differed by the use of the length mark also differed in quality. A different approach would be to emphasize all the differences between English vowels. This would require noting that both length and quality differences occur, making [ʃi:p, ʃɪp] the preferable transcription. Using this kind of transcription would hide the fact that vowel quality and vowel length are linked, and there is no need to mark both. In this book, we have chosen to use the transcription that most phonetics instructors prefer and write [ʃɪp, ʃɪp], leaving the reader to infer the difference in length.

Using this simple style of transcription, which was introduced in Chapter 2, carries a small penalty. There are some widely accepted reference books that specify pronunciations in both British and American English, none of which use exactly this style. One is an updated version of the dictionary produced by the English phonetician Daniel Jones, whose acute observations of English dominated British phonetics in the first half of the twentieth century. The current edition, *English Pronouncing Dictionary*, 16th edition (Cambridge: Cambridge University Press, 2003), is familiarly known as “EPD 16.” It still bears Daniel Jones’s name but has been completely revised by the new editors, Peter Roach, James Hartman, and Jane Setter. It now shows both British and American pronunciations. One version is accompanied by a CD so that you can hear both the British and American pronunciations

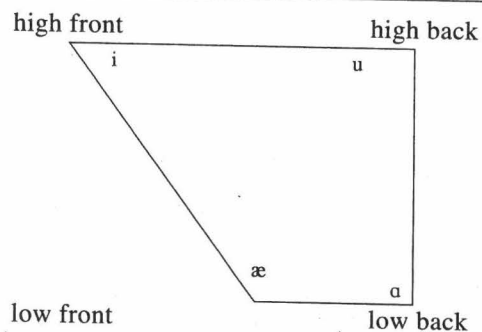
Boston area pronounce words such as *car* and *park* with a vowel between the more usual American vowels in *cam* and *calm*. They do, however, also distinguish the latter two words.

Last, in order to appreciate the notion of a continuum of vowel sounds, glide from [ɑ] as in *father* to [u] as in *who*. In this case, it is difficult to be specific as to the vowels that you will go through on the way, because English accents differ considerably in this respect. But you should be able to hear that the movement from one of these sounds to the other covers a range of vowel qualities that have not been discussed so far in this section.

## THE AUDITORY VOWEL SPACE

When you move from one vowel to another, you are changing the auditory quality of the vowel. You are, of course, doing this by moving your tongue and your lips, but, as we have noted, it is very difficult to say exactly how your tongue is moving. Consequently, because phoneticians cannot be very precise about the positions of the vocal organs in the vowels unless we use x-ray or MRI to monitor the tongue, we often simply use labels for the auditory qualities of the different vowels. The vowel [i] as in *heed* is called *high front*, meaning, roughly, that the tongue is high and in the front of the mouth but, more precisely, that it has the auditory quality we will call *high*, and the auditory quality *front*. Similarly, the vowel [æ] as in *had* has a low tongue position and, more important, an auditory quality that may be called *low front*. The vowel [ɛ] as in *head* sounds somewhere between [i] and [æ], but a little nearer to [æ], so we call it *mid-low front*. (Say the series [i, ɛ, æ] and check for yourself that this is true.) The vowel [ɑ] as in *father* has a tongue position that is low and back in the mouth and auditory qualities that we will call *low back*. Last, the vowel [u] in *who* is a high, fairly back vowel. The four vowels [i, æ, ɑ, u], therefore, give us something like the four corners of a space showing the auditory qualities of vowels, which may be drawn as in Figure 4.1.

Figure 4.1 The vowel space.



None of the vowels has been put in an extreme corner of the space in Figure 4.1. It is possible to make a vowel that sounds more back than the vowel [u] that most people use in *who*. You should be able to find this fully back vowel for yourself. Start by making a long [u], then round and protrude your lips a bit more. Now try to move your tongue back in your mouth, while still keeping it raised toward the soft palate. The result should be a fully back [u]. Another way of making this sound is to whistle the lowest note that you can and then, while retaining the same tongue and lip position, voice this sound. Again, the result will be an [u] sound that is farther back than the vowel in *who*. Try saying [i] as in *heed*, [u] as in *who*, and then this new sound, which we may symbolize with an added underline [u̯]. If you say the series [i, u, u̯], you should be able to hear that [u] is intermediate between [i] and [u̯], but—for most speakers—much nearer [u̯].

Similarly, it is possible to make vowels with a more extreme quality than the usual English vowels [i, æ, ɑ]. If, for example, while saying [æ] as in *had*, you lower your tongue or open your jaw slightly farther, you will produce a vowel that sounds relatively farther from [i] as in *heed*. It will probably also sound a little more like [ɑ] as in *father*.

Given a notion of an auditory vowel space of this kind, we can plot the relative quality of the different vowels. Remember that the labels *high/low* and *front/back* should not be taken as descriptions of tongue positions. They are simply indicators of the way one vowel *sounds* relative to another. The labels describe the relative auditory qualities, not the articulations.

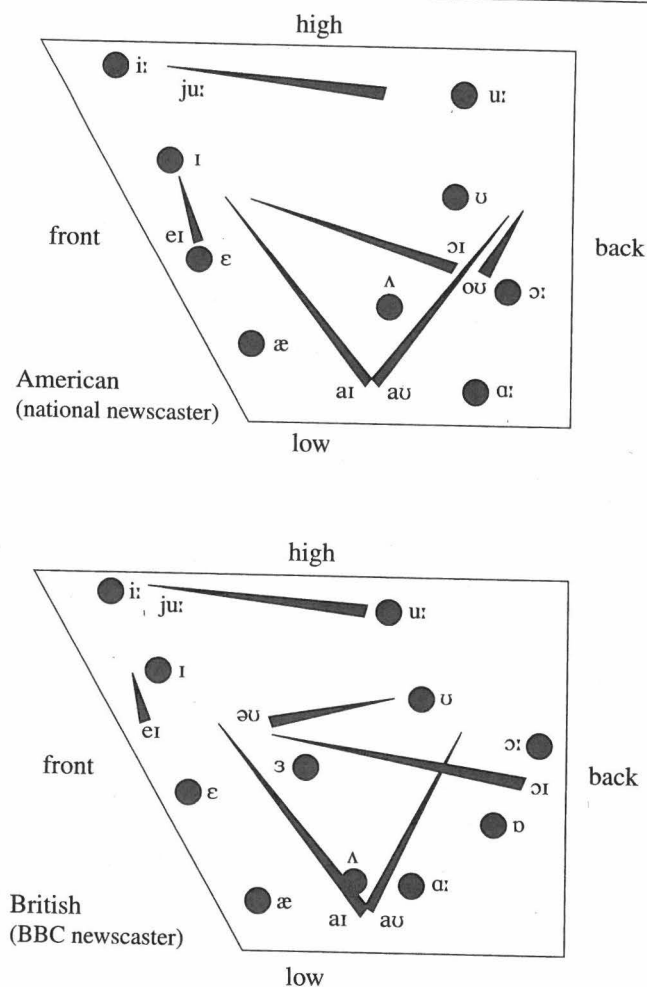
Students of phonetics often ask why we use terms like *high*, *low*, *back*, and *front* if we are simply labeling auditory qualities and not describing tongue positions. The answer is that it is largely a matter of tradition. For many years, phoneticians thought they were describing tongue positions when they used these terms to specify vowel quality. But there is only a rough correspondence between the traditional descriptions in terms of tongue positions and the actual auditory qualities of vowels. If you could take x-ray pictures showing the position of your tongue while you were saying the vowels [i, æ, ɑ, u], you would find that the relative positions were not as indicated in Figure 4.1. But, as we will see in Chapter 8, if you use acoustic phonetic techniques to establish the auditory qualities, you will find that these vowels do have the relationships indicated in this figure.

Indeed, linguists have used terms such as *acute* and *grave* instead of *front* and *back* in the description of vowels. But, for a variety of reasons, these terms did not become widely used. It seems preferable to stick with the old terms *high*, *low*, *front*, and *back*, even though they are being used to describe auditory qualities rather than tongue positions.

## AMERICAN AND BRITISH VOWELS

Most of the vowels of a form of Standard American Newscaster English typical of many Midwestern speakers are shown in the upper part of Figure 4.2. A comparable diagram of the vowels of British English as spoken by BBC newscasters

**Figure 4.2** The relative auditory qualities of some of the vowels of Standard American Newscaster English and British (BBC newscaster) English.



is shown in the lower part of Figure 4.2. In both diagrams, the solid points represent the vowels that we are treating as monophthongs, and the lines represent the movements involved in the diphthongs. The symbols labeling the diphthongs are placed near their origins. There is a good scientific basis for placing the vowels as shown here. The positions of both monophthongs and diphthongs are not just the result of auditory impressions. The data are taken from the acoustic analyses of a number of authorities, a point we will return to in Chapter 8 when we discuss acoustic phonetics. Meanwhile, if you are able to listen to a speaker of

Midwestern American English or BBC English, you should be able to hear that the relative vowel qualities are as indicated. Other varieties of English will differ in some respects, but you should find that in most accents, the majority of the relationships are the same. We will note the cases in which there are substantial differences as we discuss the individual vowels.

Listen first of all to your pronunciation of the vowels [i, ɪ, ε, æ] as in *heed*, *hid*, *head*, *had*. (If you are not a native speaker of English, you can listen to recordings of these words, which are on the CD in Chapter 2.) Do these vowels sound as if they differ by a series of equal steps? Make each vowel about the same length (although in actual words they differ considerably), saying just [i, ɪ, ε, æ]. Now say them in pairs, first [i, ɪ], then [ɪ, ε], then [ε, æ]. In many forms of English, [i] sounds about the same distance from [ɪ] as [ɪ] is from [ε], and as [ε] is from [æ]. Some Eastern American speakers make a distinct diphthong in *heed* so that their [i] is really a glide starting from almost the same vowel as that in *hid*. Other forms of English, for example as spoken in the Midlands and the North of England, make a lower and more back vowel in *had*, making it sound a little more like the [ɑ] in *father*. This may result in the distance between [ε] and [æ] being greater than that between [ε] and [ɪ]. But speakers who have a lower [æ] may also have a slightly lower [ε], thus keeping the distances between the four vowels [i, ɪ, ε, æ] approximately the same.

The remaining front vowel in English is [eɪ] as in *hay*. We will discuss this vowel after we have discussed some of the back vowels. The back vowels vary considerably in different forms of English, but no form of English has them evenly spaced like the front vowels. Say for yourself [ɑ, ɔ, ʊ, u] as in *father, author, good, food*. As before, make each vowel about the same length, and say just [ɑ, ɔ, ʊ, u]. (If, like many Californians, you do not distinguish between the vowels in *father* and *author*, just say the three vowels [ɑ, ʊ, u].) Consider pairs of vowels as you did the front vowels. Estimate the distances between each of these vowels, and compare them with those shown in Figure 4.2.

We noted that many Midwestern and Californian speakers do not distinguish [ɑ] and [ɔ] as in *cot* and *caught*. They usually have a vowel intermediate in quality between the two points shown on the chart but closer to [ɑ]. On the other hand, most speakers of British English have an additional vowel in this area. They distinguish between the vowels [ɑ, ɒ, ɔ] as in *balm, bomb, bought*. This results in a different number of vowel qualities, as shown in the lower diagram in Figure 4.2. The additional vowel [ɒ] is more back and slightly more rounded than [ɑ].

The vowels [ʊ, u] as in *good, food* also vary considerably. Many speakers have a very unrounded vowel in *good* and a rounded but central vowel in *food*. Look in a mirror and observe your own lip positions in these two vowels.

Both British and American English speakers have a mid-low central vowel [ʌ] as in *bud*. In many forms of British English, this vowel may be a little lower than in American English. In this way, it is distinct from the British English

central vowel [ɜ] in *bird*. The vowel in American English *bird* is not shown in the upper part of Figure 4.2 because it is distinguished from the vowel in *bud* by having *r*-coloring, which we will discuss later.

## DIPHTHONGS

We will now consider the diphthongs shown in Figure 4.2. Each of these sounds involves a change in quality within the one vowel. As a matter of convenience, they can be described as movements from one vowel to another. In English, the first part of the diphthong is usually more prominent than the last. In fact, the last part is often so brief and transitory that it is difficult to determine its exact quality. Furthermore, the diphthongs often do not begin and end with any of the sounds that occur in simple vowels.

For maximum clarity, the difference in the prominence of the two vowel qualities of a diphthong can be indicated by writing the “nonsyllabic” diacritic symbol under the less prominent portion, as in [aɪ̯]. This makes explicit the distinction between a two-syllable vowel sequence (*gnaw it* [naɪ̯t]) and a single-syllable vowel sequence (*night* [naɪ̯t]). It is also common among phoneticians to use another method to mark diphthongs: with the nonsyllabic element printed as a superscript letter (e.g., [a<sup>ɪ</sup>]).

As you can see from Figure 4.2, both of the diphthongs [aɪ̯, aʊ̯], as in *high*, *how*, start from more or less the same low central vowel position, midway between [æ] and [ɑ] and, in BBC English, closer to [ʌ] than to any of the other vowels. (The *Oxford Dictionary of Pronunciation for Current English* transcribes the American [aɪ̯] as [aɪ̯] in British English.) Say the word *eye* very slowly and try to isolate the first part of it. Compare this sound with the vowels [æ, ʌ, ɑ] as in *bad*, *bud*, *father*. Now make a long [ɑ] as in *father*, and then say the word *eye* as if it began with this sound. The result should be something like some forms of New York or London Cockney English pronunciations of *eye*. Try some other pronunciations, starting, for example, with the vowel [æ] as in *bad*. In this case, the result is a somewhat affected pronunciation.

The diphthong [aɪ̯], as in *high*, *buy*, moves toward a high front vowel, but in most forms of English, it does not go much beyond a mid-front vowel. Say a word such as *buy*, making it end with the vowel [e] as in *bed* (as if you were saying [bae]). A diphthong of this kind probably has a smaller change in quality than occurs in your normal pronunciation (unless you are one of the speakers from Texas or elsewhere in the South and Southwest who make such words as *by*, *die* into long monophthongs—[baɪ̯, daɪ̯]). Then say *buy*, deliberately making it end with the vowel [ɪ] as in *bid*. This vowel is usually slightly higher than the ending of this diphthong for many speakers of English. Finally, say *buy* with the vowel [i] as in *heed* at the end. This is a much larger change in quality than normally occurs in this word. But some speakers of Scottish English and Canadian English have a diphthong [aɪ̯] that moves toward a high front vowel, but in most forms of English, it does not go much beyond a mid-front vowel.

The diphthong [aʊ̯] in *how* usually starts with a quality very similar to that at the beginning of *high*. Try to say *owl* as if it started with [æ] as in *had*, and note the difference from your usual pronunciation. Some speakers of the type of English spoken around London and the Thames estuary (often called Estuary English) have a complicated movement in this diphthong, making a sequence of qualities like those of [e] as in *bed*, [ʌ] as in *bud*, and [u] as in *food*. Say [e-ʌ-u] in quick succession. Now say the phrase *how now brown cow* using a diphthong of this type.

The diphthong [eɪ̯] as in *hay* varies considerably in different forms of English. Some American English speakers have a diphthong starting with a vowel very like [e] in *head* (as shown in the upper part of Figure 4.2). Most BBC English speakers and many Midwestern Americans have a smaller diphthong, starting closer to [ɪ] as in *hid*. Estuary English, as described above, has a larger diphthong, so that words such as *mate*, *take* sound somewhat like *might*, *tyke*. Conversely, others (including many Scots) have a higher vowel, a monophthong that can be written [e]. Check your own pronunciation of *hay* and try to decide how it should be represented on a chart as in Figure 4.2.

The diphthong [oʊ̯] as in *hoe* may be regarded as the back counterpart of [eɪ̯]. For many speakers of American English, it is principally a movement in the high–low dimension, but in most forms of British English, the movement is more in the front–back dimension, as you can see in Figure 4.2. Some British English speakers make this vowel start near [e] and end a little higher than [ʊ]. Say each part of this diphthong and compare it with other vowels.

The remaining diphthong moving in the upward direction is [ɔɪ̯] as in *boy*. Again, this diphthong does not end in a very high vowel. It often ends with a vowel similar to that in *bed*. We might well have transcribed *boy* as [bɔe] if we had not been trying to keep the style of transcription used in this book as similar as possible to other widely used transcriptions.

The last diphthong, [ju̯] as in *cue*, differs from all the other diphthongs in that the more prominent part occurs at the end. Because it is the only vowel of this kind, many books on English phonetics do not even consider it a diphthong; they treat it as a sequence of a consonant followed by a vowel. We have considered it to be a diphthong because of the way it patterns in English. Historically, it is a vowel, just like the other vowels we have been considering. Furthermore, if it is not a vowel, then we have to say that there is a whole series of consonant clusters in English that can occur before only one vowel. The sounds at the beginning of *pew*, *beauty*, *cue*, *spew*, *skew* and (for most speakers of British English) *tune*, *due*, *sue*, *Zeus*, *new*, *lieu*, *stew* occur only before /u/. (Note that in British English, *do* and *due* are pronounced differently, the one being [du] and the other [dju].) There are no English words beginning with /pje/ or /kjæ/, or any combination of stop plus [j] before any other vowel. In stating the distributional properties of English sounds, it seems much simpler to recognize [ju̯] as a diphthong than to treat it as a sequence of a consonant followed by a vowel.



## RHOTIC VOWELS

The only common stressed vowel of American English not shown in Figure 4.2 is [ɜ̞] as in *sir*, *herd*, *fur*. This vowel does not fit on the chart because it cannot be described simply in terms of the features high–low, front–back, and rounded–unrounded. The vowel [ɜ̞] can be said to be **r-colored**. It involves an additional feature called **rhotacization**. Just like high–low and front–back, the feature rhotacization describes an auditory property, the *r*-coloring, of a vowel. When we describe the height of a vowel, we are saying something about how it sounds rather than something about the tongue gesture necessary to produce it. Similarly, when we describe a sound as a *rhotacized vowel*, we are saying something about how it sounds. In most forms of American English, there are both stressed and unstressed rhotacized vowels. The transcription for the phrase *my sister's bird* in most forms of American English would be [maɪ 'sɪstərs 'bɜ̞d].

Rhotacized vowels are often called *retroflex vowels*, but there are at least two distinct ways in which the *r*-coloring can be produced (see Figure 4.3). Some speakers have the tip of the tongue raised, as in a retroflex consonant. The speaker shown in the top panel of Figure 4.3 has this type of tongue configuration in [ɜ̞]. Others (such as the speaker in the bottom panel) keep the tip down and produce a high bunched tongue position. These two gestures produce a very similar auditory effect. X-ray studies of speech have shown that in both these ways of producing a rhotacized quality, there is usually a constriction in the pharynx caused by retraction of the part of the tongue near the epiglottis.

The most noticeable difference among accents of English is in whether they have *r*-colored vowels. In many forms of American English, rhotacization occurs when vowels are followed by [r], as in *beard*, *bared*, *bard*, *board*, *poor*, *tire*, *hour*. Accents that permit some form of [r] after a vowel are said to be **rhotic**. The rhotacization of the vowel is often not so evident at the beginning of the vowel, and something of the quality of the individual vowel remains. But in *sir*, *herd*, *fur* the whole vowel is rhotacized (which is why LPD 2 [ɜ̞] is preferable to EPD 16 [ɜr]). Insofar as the quality of this vowel can be described in terms of the features high–low and front–back, it appears to be a mid-central vowel such as [ɜ] with added rhotacization.

Rhotic accents are the norm in most parts of North America. They were prevalent throughout Britain in Shakespeare's time, and still occur in the West Country, Scotland, and other regions distant from London. Shortly after it became fashionable in the Southeast of England to drop the post-vocalic /r/, this habit spread to areas of the United States in New England and parts of the South. These regions are now non-rhotic to various degrees. Try to find a speaker of English with an accent that is the opposite of yours—rhotic or non-rhotic, as the case may be. Listen to their vowels in words such as *mirror*, *fairer*, *surer*, *poorer*, *purser* and compare them with your own.

Standard BBC English is not rhotic and has diphthongs (not shown in Figure 4.2) going from a vowel near the outside of the vowel space toward the

Figure 4.3 Magnetic resonance imaging (MRI) scans of two American English speakers producing [ɜ̞] (data from Zhou, Espy-Wilson, Tiede, & Boyce, 2007).



central vowel [ə]. In words such as *here* and *there*, these are transcribed [ɪə] and [eə]. Some speakers have a long [ɛ] instead of [ɛə], particularly before [r] as in *fairy* and *bearing*. Some people have a centering diphthong [ʊə] in words such as *poor*, but this is probably being replaced by [ɔ] in most non-rhotic accents of British English. We also noticed in Chapter 2 that some speakers have a centering diphthong (though we did not call it that at the time) in *hire*, *fire*, which are [haə, faə].

As a conclusion to this section, we will consider the ways in which the vowels of different accents (or, indeed, of different languages) can differ. Each accent

(or language) contrasts a certain number of vowels. The first difference between two accents may be in the number of vowels they contrast. Californian English, for example, differs from many Midwestern accents of English in having lost the contrast between [ɑ] and [ɔ], as in *cot* versus *caught*, so there is one fewer vowel in the Californian system. Similarly, most British English accents have systemic differences from most American English accents in that they have additional vowels, distinguishing *cart*, *cot*, *court* by vowels that we can represent by /ɑ, ɒ, ɔ/. Another way in which accents can differ is in the vowels that occur in certain words. Both BBC English and American Newscaster English have vowels that can be symbolized by /æ/ and /ɑ/ as in *fat* and *father*, but BBC English has /ɑ/ in *glass* and *last*, while American English has /æ/. An even more pointed comparison of this kind of difference is that between some Standard Northern accents of British English and BBC English. Both these accents have the same number of vowel contrasts (the same vowel systems), but they use /æ/ and /ɑ/ in different words, Standard Northern having /æ/ in *castle*, *glass*, and much the same words as those for which this vowel is used in American English. This kind of difference between accents is known as a difference in *distribution* (of vowel qualities) as opposed to a difference in *system* (the number of distinct vowels). Finally, some differences between accents are simply a matter of vowel quality. Two accents can have exactly the same vowel systems and the same vowel distributions, but the vowels can differ in quality. Thus, Texans and Midwestern Americans have similar vowel systems and distributions but use different ways of distinguishing the vowels in words such as *pie* and the word for 'father,' *pa*. Texans are likely to have a long monophthong in each of these words, making them best symbolized as [pa:] and [pɑ:], whereas Midwestern Americans are more likely to say [paɪ] and [pɑɪ]. Or, to take a British English example, an old-fashioned Cockney English and a modern Estuary English accent may have the same vowel distinctions (the same systems) and use them in the same words (the same distributions), but use different vowel qualities. Cockney will have vowels best represented as [aɪ] and [ɑɪ] in *mate* and *might*; Estuary English pronounces these words more like [meɪt] and [maɪt].

Try to compare your own accent of English with another accent and say which of the vowel differences are best described as differences in the system of vowels, which are differences of distribution, and which involve just differences in vowel quality. Often all three of these factors—systemic differences, distributional differences, and vowel quality differences—distinguish one accent from another. Nevertheless, considering the three factors provides a useful way of looking at differences between accents.

## UNSTRESSED SYLLABLES

In all forms of English, the symbol [ə], not shown in Figure 2.2, may be used to specify a range of mid-central vowel qualities. As we saw in Chapter 2, this vowel occurs in grammatical function words, such as *to*, *the*, *at* [tə, ðə, ət].

It also occurs at the end of the words *sofa*, *China* ['soʊfə, 'tʃaɪnə], and, for most British speakers, *better*, *farmer* ['betə, 'fɑmə]. In American English, the vowel at the end of words with the *-er* spelling is usually [ə], a very similar quality, but with added *r*-coloring. As the vowel chart in Figure 4.2 represents a kind of auditory space, vowels near the outside of the chart are more distinct from one another than vowels in the middle, and differences in vowel quality become progressively reduced among vowels nearer the center. The symbol [ə] may be used to designate many vowels that have a central, **reduced vowel** quality.

We will be considering the nature of stress in English in the next chapter, but we can note here that vowels in unstressed syllables do not necessarily have a completely reduced quality. All the English vowels can occur in unstressed syllables in their full, unreduced forms. Many of them can occur in three forms, as shown in Table 4.1. In this table, the vowel to be considered is in the first column. The words in the second column illustrate the full forms of the vowels. The third column gives an example of the same unreduced vowel in an unstressed syllable. The fourth column illustrates the same underlying vowel as a reduced vowel. For many people, the reduced vowels in this last column are all very similar. Some accents have slightly different qualities in some of these words, but all are still within the range of a mid-central vowel that can be symbolized by [ə]. Others have [ɪ] in some of these words, such as *recitation*, or a high-central vowel, which may be symbolized by [i]—a symbol that is sometimes called 'barred i.' Yet others, particularly speakers of various forms of American English, do not reduce the vowels in the fourth column appreciably, keeping them with much the same vowel quality as in the third column. The transcription of vowels with one symbol or another sometimes disguises the fact that the vowel in question might have an intermediate quality, neither that of the unstressed vowel nor that of a vowel fully reduced to [ə]. Say all the words in Table 4.1 yourself and find out which vowels you have.

There are some widely applicable rules of English relating the pronunciation of the words in the second column to that of the words in the fourth column.

TABLE 4.1 Examples of vowels in stressed and unstressed syllables and in reduced syllables. The boldface type shows the vowel under consideration.

Vowels	Stressed Syllable	Unstressed Syllable	Reduced Syllable
i	appreciate	creation	deprecate
ɪ	implicit	simplistic	implication
ɔ	cause	causality	
ʊ	hoodwink	neighborhood	
ʌ	confront	umbrella	confrontation
ɜ, ɝ	confirm	verbose	confirmation
aɪ	recite	citation	recitation
ɔɪ	exploit	exploitation	
ju	compute	computation	circular

Consequently, we are able to say that the same underlying vowels occur in the words in the second and fourth columns. If we were making a high-level phonological transcription, we could transcribe the vowels in the different columns with the same symbols and allow the rules to make it clear that different allophones occurred. Thus, we could transcribe *emphatic* as /emfætɪk/ and *emphasis* as /emfæsis/, as long as we also have a rule that assigns the stress and makes /æ/ into [ə] in the second word.

The rules accounting for the allophones are very general in the sense that they account for thousands of similar alternations among English words. But they are also very complicated. They have to account for the blanks in the fourth column, which show that some vowels can be completely reduced but others cannot. There is, for example, a completely reduced vowel in *explanation*, *demonstration*, *recitation*, but not, for most people, in the very similar words *exploitation*, *computation*. As you can also see from an examination of Table 4.1, some vowels, such as [ɔ, ʊ, u, aʊ, ɔɪ], do not fit into this scheme of alternations in the same way as the other vowels. Because the rules are so complicated, we will not use transcriptions showing the underlying forms of English in this elementary textbook. Instead, we will continue to use [ə] or [ɪ] in reduced syllables.

Most British and some American English speakers have a vowel more like [ɪ] in suffixes such as *-ed*, *-(e)s* at the ends of words with alveolar consonants such as *hunted*, *houses* ['hʌntɪd, 'haʊzɪz]. For these speakers, both vowels in *pitted* ['pɪtɪd] have much the same quality. A reduced vowel more like [ʊ] may occur in the suffix *-ful* as in *dreadful* ['dredfʊl], but for many people, this is just a syllabic [l], ['dredfɫ].

## TENSE AND LAX VOWELS

The vowels of English can be divided into what may be called **tense** and **lax** sets. These terms are really just labels used to designate two groups of vowels that behave differently in English words. There are phonetic differences between the two groups, but they are not simply a matter of muscular tenseness versus laxness. To some extent, the differences between the two sets are due to developments in the history of the English language that are still represented in the spelling. The tense vowels occur in the words with a final, so-called silent *e* in the spelling, e.g., *mate*, *mete*, *kite*, *cute*. The lax vowels occur in the corresponding words without a silent *e*: *mat*, *met*, *kit*, *cut*. In addition, the vowel in *good*, which, for reasons connected with the history of English, has no silent *e* partner, is also a member of the lax set. This spelling-based distinction is, however, only a rough indication of the difference between the two sets. It is better exemplified by the data in Table 4.2.

The difference between the two sets can be discussed in terms of the different kinds of syllables in which they can occur. Table 4.2 shows some of the restrictions for one form of American English. The first column of words illustrates a set of **closed syllables**—those that have a consonant at the end. All of the vowels

TABLE 4.2 The distribution of tense and lax vowels in stressed syllables in American English.

Tense Vowels	Lax Vowels	Most Closed Syllables	Open Syllables	Syllables Closed By [r]	Syllables Closed By [ŋ]	Syllables Closed By [ʃ]
i	ɪ	beat	bee	beer		(leash)
eɪ	ɛ	bit	bay		sing	wish
oʊ	ʊ	bait		bare	length	fresh
u	ʊ	bet	low	(boar)		push
əʊ/ʌ		boat		tour	hung	crush
buɪ		good	boo	burr		
ɔɪ		boot	buy	fire		
ju		but	boy	(coir)		
		bite	cue	pure		
		void				
		cute				

can occur in these circumstances. The next column shows that in **open syllables**—those without a consonant at the end—only a restricted set of vowels can occur.

None of the vowels [ɪ, ɛ, æ, ʊ, ʌ] as in *bid*, *bed*, *bad*, *good*, *bud* can appear in stressed open syllables. This is the set of vowels that may be called **lax vowels**, as opposed to the tense vowels in the other words. To characterize the differences between tense and lax vowels, we can consider some of them in pairs, each pair consisting of a tense vowel and the lax vowel that is nearest to it in quality. Three pairs of this kind are [i, ɪ] as in *beat*, *bit*; [eɪ, ɛ] as in *bait*, *bet*; and [u, ʊ] as in *boot*, *foot*. In each of these pairs, the lax vowel is shorter, lower, and slightly more centralized than the corresponding tense vowel. There are no vowels that are very similar in quality to the remaining two lax vowels in most forms of American English, [æ] as in *hat*, *cam* and [ʌ] as in *hut*, *come*. But both of these low lax vowels are shorter than the low tense vowel [ɑ] as in *spa*. Speakers of most forms of British English have an additional lax vowel. They have the tense vowel [ɑ] as in *calm*, *car*, *card* in both open and closed syllables, and they also have a lax vowel [ɒ] as in *cod*, *common*, *con* [kɒd, 'kɒmən, kɒn], which occurs only in closed syllables.

The fifth column in Table 4.2 shows the vowels that can occur in syllables closed by /r/ in American English. In a syllable closed by /r/, there is no contrast in quality between a tense vowel and the lax vowel nearest to it. Consequently, as often happens in contexts in which there is no opposition between two sounds, the actual sound produced is somewhere between the two. (We have already observed another example of this tendency. We saw that after /s/ at the beginning of a word, there is no contrast between /p/ and /b/, or /t/ and /d/, or /k/ and /g/. Consequently, the stops that occur in words such as *spy*, *sty*, *sky* are between the corresponding voiced and voiceless stops; they are unaspirated, but they are never voiced.)



The words *boar* and *coir* are in parentheses in this column because for many people, [ou] and [ɔɪ] do not occur before /r/. The word *coir* [kɔɪr], perhaps the only word in English pronounced with [ɔɪr], is not in many people's vocabularies, and many people make no difference between *bore* and *boar*. But some speakers do contrast [ɔ] and [ou] in these two words, or in other pairs such as *horse* and *hoarse*.

The next column shows the vowels that occur before [ŋ]. In these circumstances, again, there is no possible contrast between tense and lax vowels. But, generally speaking, it is the lax vowels that occur. However, many younger Americans pronounce *sing* with a vowel closer to that in *scene* rather than that in *sin*. And in some accents, *length* is regularly pronounced with virtually the same vowel as that in *bait* rather than that in *bet*; in others, it is pronounced with the vowel in *bit*. The pronunciation of *long* varies. It is [lɒŋ] or [lɔŋ] in most forms of American English and [lɒŋ] in most forms of British English. Several other changes are true of vowels before all nasals in many forms of American English. For example, [æ] may be considerably raised in *ban*, *lamb* as compared with *bad*, *lab*. In many accents, *pin*, *pen* and *gym*, *gem* are not distinguished.

The last column shows that there are similar restrictions in the vowels that can occur before [ʃ]. By far, the majority of words ending in /ʃ/ have lax vowels for most speakers, although some accents (e.g., that used in parts of Appalachia) have [i] in *fish* (making it like *fiche*) and [u] in *push* and *bush*. In Peter Ladefoged's speech, the only words containing the tense vowel /i/ before /ʃ/ are *leash*, *fiche*, *quiche*. Some speakers have tense vowels in a few new or unusual words such as *creche*, *gauche*, which may be [kreɪʃ, gouʃ]. The pronunciation of *wash* varies in much the same way as that of *long*. Both [wəʃ] and [wɔʃ] occur in American English.

## RULES FOR ENGLISH VOWEL ALLOPHONES

As we did in the previous chapter in discussing consonant allophones, we can conclude this chapter by considering a set of formal statements that apply to vowels. The first concerns vowel length:

- (1) Other things being equal, a given vowel is longest in an open syllable, next longest in a syllable closed by a voiced consonant, and shortest in a syllable closed by a voiceless consonant.

If you compare words such as *sea*, *seed*, *seat* or *sigh*, *side*, *site*, you will hear that the vowel is longest in the first word in each set, next longest in the second, and shortest in the last. You can see an example of part of this statement in Figure 3.3, which showed the waveforms of the words *mat* and *mad*. Because some vowels (particularly the tense vowels) are inherently longer than others (the lax vowels), we have to restrict statement (1) to a vowel of a given quality. Although it is in a syllable closed by a voiced consonant, the lax vowel in *bid* is often shorter than the tense vowel in *beat*, which is a syllable closed by a voiceless consonant. We also have to note "other things being equal" because, as we will see in the next statement, there are other things that affect vowel length.

Even when we are considering the same vowel in syllables with the same consonants, there may be a difference in vowel length. Stressed syllables are longer than the corresponding unstressed syllables. Compare words such as *below* and *billow*. You will find that the vowel [ou] in the stressed syllable in the first word is longer than the same vowel in the second word, where it occurs in an unstressed syllable. We therefore have the following formal statement:

- (2) Other things being equal, vowels are longer in stressed syllables.

We still have to hedge this statement with the phrase "other things being equal," as there are other causes of variation in vowel length. Another kind of length variation is exemplified by sets of words such as *speed*, *speedy*, *speedily*. Here, the vowel in the stressed syllable gets progressively shorter as extra syllables are added to the same word. The reasons for this phenomenon will be dealt with in the next chapter. Here, we will simply state:

- (3) Other things being equal, vowels are longest in monosyllabic words, next longest in words with two syllables, and shortest in words with more than two syllables.

We should also add a statement about unstressed vowels, which may become voiceless in words such as *potato*, *catastrophe*. For some people, this happens only if the following syllable begins with a voiceless stop, but for many, it also happens in a normal conversational style in words such as *permission*, *tomato*, *compare*. In terms of the gestures involved, this is simply a case of the voiceless gesture for the glottis associated with the initial voiceless stops overlapping with the voicing gesture normally associated with the vowels. One wording of an appropriate statement would be:

- (4) A reduced vowel may be voiceless when after a voiceless stop (and before a voiceless stop).

The parenthesized phrase can be omitted for many people.

- (5) Vowels are nasalized in syllables closed by a nasal consonant.

The degree of nasalization in a vowel varies extensively. Many people will have the velum lowered throughout a syllable beginning and ending with a nasal, such as *man*, making the vowel fully nasalized.

Finally, we must note the allophones produced when vowels occur in syllables closed by /l/. Compare your pronunciation of /i/ in *heed* and *heel*, of /eɪ/ in *paid* and *pail*, and [æ] in *pad* and *pal*. In each case, you should be able to hear a noticeably different vowel quality before the velarized [ɫ]. All the front vowels become considerably retracted in these circumstances. It is almost as if they became diphthongs with an unrounded form of [ʊ] as the last element. In a narrow transcription, we could transcribe this element so that *peel*, *pail*, *pal* would be [p<sup>h</sup>iʊɫ, p<sup>h</sup>eʊɫ, p<sup>h</sup>æʊɫ]. Note that we omitted the usual second element of the diphthong [eɪ] in order to show that in these circumstances, the vowel moved from a mid-front to a mid-central (rather than to a high front) quality.



Back vowels, as in *haul*, *pull*, *pool*, are usually less affected by the final [ɪ] because they already have a tongue position similar to that of [ɪ]. But there is often a great difference in quality in the vowels in *hoe* and *hole*. As we have seen, many speakers of British English have a fairly front vowel as the first element in the diphthong [əʊ]. This vowel becomes considerably retracted before /t/ at the end of the syllable. You can observe the change by comparing words such as *holy*, where there is no syllable final [ɪ], and *wholly*, where the first syllable is closed by [ɪ].

The change of vowel quality before [ɪ] is yet another example of overlapping gestures. The exact form of the statement for specifying vowel allophones before [ɪ] will vary from speaker to speaker. But, so that we can include a statement in our set summarizing some of the main allophones of vowels in English, we may say:

(6) Vowels are retracted before syllable final [ɪ].

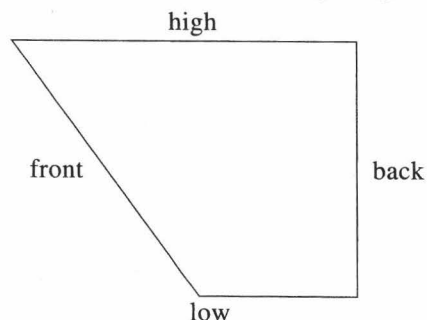
Some speakers have a similar rule that applies to vowels before /r/, as in *hear*, *there*, which might be [hiʔr, ðeʔr]. Note again how /l, r/ act in similar ways, as we found in the preceding chapter when discussing consonants.

Again, it is important to understand that these statements specify roughly only some of the major aspects of the pronunciation of English. They do not state everything about English vowels that is rule-governed, nor are they formulated with complete accuracy. There are problems, for example, in saying exactly what is meant by *word* or *syllable*, and it is possible to find both exceptions to these statements and additional generalizations that can be made.

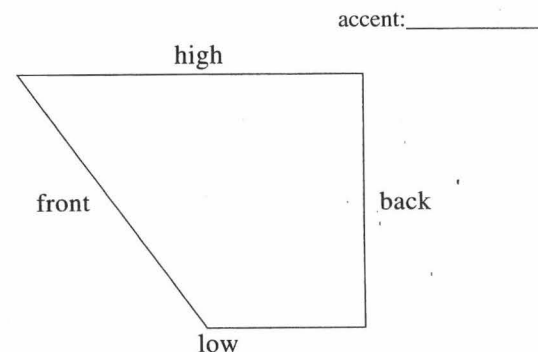
## EXERCISES

(Printable versions of all the exercises are available on the CD.)

- A. Put your own vowels in this chart, using a set of words such as that given in Table 2.2. Listen to each vowel carefully and try to judge how it sounds relative to the other vowels. You will probably find it best to say each vowel as the middle vowel of a three-member series, with the vowels in the words above and below forming the first and last vowels in the series. In the case of the diphthongs, you should do this with both the beginning and the ending points.



- B. Try to find a speaker with an accent different from your own (or perhaps a foreigner who speaks English with an accent) and repeat Exercise A, using this blank chart.



- C. List words illustrating the occurrence of vowels in monosyllables closed by /p/. Do not include names or words of recent foreign origin. You will find that some vowels cannot occur in these circumstances.

i  
ɪ  
eɪ  
e  
æ  
ɑ  
ɔ  
ou  
ʊ  
uɑ  
aɪ  
aʊ  
ɔɪ

- D. Considering only the vowels that *cannot* occur in monosyllables closed by /p/ as in Exercise C, give words, if possible, illustrating their occurrence in syllables closed by the following consonants.

b	l
m	s
f	z
t	k
n	g

- E. Which vowel occurs before the smallest number of consonants? Also, which class of consonants occurs after the largest number of vowels? (Define the class in terms of the place of articulation at which these consonants are made.)

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- F. Look at Table 4.1. Find additional examples illustrating the relationship between the words in the second and fourth columns. Transcribe each pair of words as shown below for the vowel /i/.

Vowel	Stressed Syllable	Reduced Syllable
i	secrete [sə'krit]	secretive ['sikrətiv]
ɪ		
eɪ		
ɛ		
æ		
ɑ or ɒ		
ou		
aɪ		

- G. Make up and transcribe a sentence containing at least eight different vowels.

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- H. Give a number of examples for each of statements (1) through (6) by making a transcription of some additional words that fit the rules. Your examples should not include any words that have been transcribed in this book so far. Remember to mark the stress on words of more than one syllable.

- (1) three examples (one for each syllable type)

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- (2) two pairs of examples (each showing words differing principally in stress)

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- (3) two sets of examples (each containing a one-syllable, a two-syllable, and a three-syllable word, with the first stressed syllable remaining constant)

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- (4) four examples

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- (5) four examples (use different vowels and different nasals)

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- (6) two sets of examples, each containing a contrasting pair of words

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- I. Transcribe the following sentences as recorded by the British and American speakers on the CD.

- (1) I've called several times, but never found you there.
- (2) Someone, somewhere, wants a letter from you.
- (3) We were away a year ago.
- (4) We all heard a yellow lion roar.
- (5) What did you say before that?
- (6) Never kill a snake with your bare hands.
- (7) It's easy to tell the depth of a well.
- (8) I enjoy the simple life.

As instructors vary in the kinds of transcription exercises they wish to assign, additional exercises will not be given at the end of this and subsequent chapters. Instead, more exercises may be found at the end of Chapter 11, in the appendix "Additional Material for Transcription," and on the CD in a special section called "Additional Resources."

## PERFORMANCE EXERCISES

- A. Learn to produce only the first part of the vowel [eɪ] as in *hay*. Try saying this sound in place of your normal diphthong in words such as *they came late*. Similarly, learn to produce a mid-high back vowel [o], and say it in words that you have been transcribing with the diphthong [ou], such as *Don't go home*.
- B. Incorporate [e] and [o] in nonsense words for production and perception exercises. These words might also now include the voiceless sounds [ɸ], [ɸ̊], [ɸ̊̊], [ɸ̊̊̊]. Remember to practice saying the words by yourself so that you can say them fluently to your partner. Start with easy words such as:

ma'ŋɑ  
'ɸeme  
'ŋɑle  
'moʔi  
'lele

Then go on to more difficult words like:

he'mane

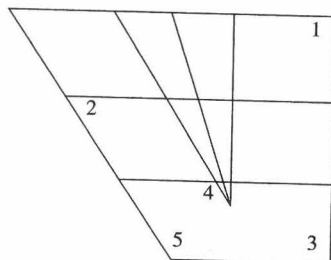
'hambmbel

'spo?etn?ɔɪ

'wɒθfo'resfi

'tleprɪdʒi'kuʒ

- C. Again working with a partner, write the numbers 1 through 5 somewhere on a vowel chart as, for example, shown here.



Now say vowels corresponding to these numbered positions in nonsense monosyllables, saying, for example, something like [dub]. Your partner should try to plot these vowels on a blank chart. When you have pronounced five words, compare notes and then discuss the reasons for any discrepancies between the two charts. Then reverse roles and repeat the exercise.

- D. Repeat Exercise C with as many different partners as you can. It is difficult to make perceptual judgments of the differences among vowels, but you should be able to find a rough consensus.
- E. In addition to nonsense words of the kind given in Exercise B, continue practicing with words to increase your auditory memory span. Say each word only two or three times. Remember that you should be spending at least one hour a week on production and perception exercises.

θe'mife'dime

'serapo'sapofi'pos

mo'preteplete'ki

ŋa'koto'takpoto

la'kimiti'none?e

## 5 English Words and Sentences

### WORDS IN CONNECTED SPEECH

In previous chapters, we considered lists of words that illustrated the contrasts between consonants and the contrasts between vowels. This is a good way of starting to look at the gestures that make up the words of English (or, indeed, of any language, as we will see later). But speech is not really composed of a series of distinct gestures, and, anyway, we don't usually speak using isolated words. As we saw in Chapter 1, when looking at the short movie clip of *on top of his deck*, all the actions run together, making it very hard to see separate gestures. It's useful to look at short, specially constructed phrases so as to be able to see the main aspects of individual vowels and consonants, as we did using x-ray clips in Chapters 2 and 3. But now we must look at how pronunciations of individual words compare with what happens in more normal, connected speech.

The form of a word that occurs when you say it by itself is called the **citation form**. At least one syllable is fully stressed and there is no reduction of the vowel quality. But in connected speech, many changes may take place. Consider, for example, the spectrogram in Figure 5.1. This is our first spectrogram of speech, so you shouldn't expect to get much out of it at first, but even with only a little explanation of how to "read" a spectrogram, you should be able to tell that the word *opposite* was said in two different ways in this utterance. The speaker was being interviewed, and the topic of life choices came up. He was talking about choosing between a life of crime or a life in a religious discipline, and he said, "or I was going to go in the opposite direction, and I went in the opposite direction." Before reading on, listen to this utterance on the CD. Can you hear any differences in the word *opposite* between the first time he says it and the second? They both seem to be perfectly acceptable (American) pronunciations of the word, but the spectrogram shows some differences. The second *opposite* is phonetically **reduced**. There are arrows under the portions of the spectrogram that correspond to vowel sounds. The first *opposite* has three arrows corresponding to the three vowels that we expect in the citation form of the word, while in the second production we can only identify two vowel segments.