Figure 1.17 The waveform of the phrase *Tom saw nine wasps.*


```
0          0.5          1.0          1.5 seconds
```
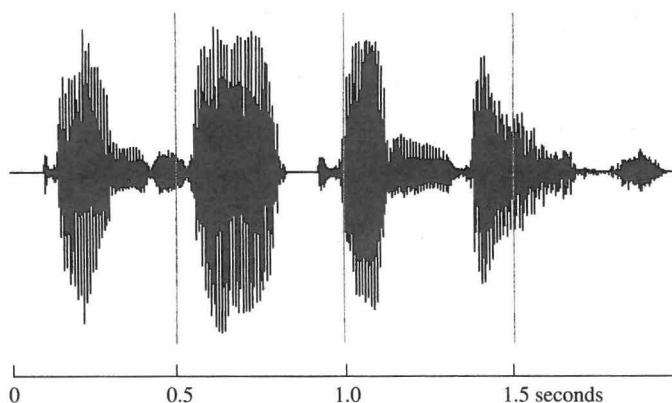
J. In the next chapter, we will start using phonetic transcriptions. The following exercises prepare for this by pointing out the differences between sounds and spelling.

How many distinct sounds are there in each of the following words? Circle the correct number.

1.	laugh	1	2	3	4	5	6	7
2.	begged	1	2	3	4	5	6	7
3.	graphic	1	2	3	4	5	6	7
4.	fish	1	2	3	4	5	6	7
5.	fishes	1	2	3	4	5	6	7
6.	fished	1	2	3	4	5	6	7
7.	batting	1	2	3	4	5	6	7
8.	quick	1	2	3	4	5	6	7
9.	these	1	2	3	4	5	6	7
10.	physics	1	2	3	4	5	6	7
11.	knock	1	2	3	4	5	6	7
12.	axis	1	2	3	4	5	6	7

K. In the following sets of words, the sound of the vowel is the same in every case but one. Circle the word that has a different vowel sound.

1.	pen	said	death	mess	mean
2.	meat	steak	weak	theme	green
3.	sane	paid	eight	lace	mast
4.	ton	toast	both	note	toes
5.	hoot	good	moon	grew	suit
6.	dud	died	mine	eye	guy

Phonology and Phonetic Transcription

Many people think that learning phonetics means simply learning to use phonetic transcription. But there is really much more to the subject than learning to use a set of symbols. A phonetician is a person who can describe speech, who understands the mechanisms of speech production and speech perception, and who knows how languages use these mechanisms. Phonetic transcription is no more than a useful tool that phoneticians use in the description of speech. It is, however, a very important tool.

In this chapter, we will be concerned with the phonetic transcription of careful speech—the style of speech you use to show someone how to pronounce a word. This is called the **citation style** of speech. Transcriptions of citation style are particularly useful in language documentation and lexicography, and also serve as the basic phonetic observations described in phonology. In Chapter 5, we will discuss phonetic transcription of **connected speech**—the style that used in normal conversation. When phoneticians transcribe a citation speech utterance, we are usually concerned with how the sounds convey differences in meaning. For the most part, we describe only the significant articulations rather than the details of the sounds. For example, when saying the English word *tie*, some people pronounce the consonant with the blade of the tongue against the alveolar ridge, others with the tip of the tongue. This kind of difference in articulation does not affect the meaning of the word and is not usually transcribed. We will begin by considering just this simplest form of transcription, sometimes called a *broad transcription*.

In order to understand what we transcribe and what we don't, it is necessary to understand the basic principles of phonology. **Phonology** is the description of the systems and patterns of sounds that occur in a language. It involves studying a language to determine its distinctive sounds, that is, those sounds that convey a difference in meaning. Children have to do this when they are learning to speak. They may not realize at first that, for example, there is a difference between the consonants at the beginnings of words such as *white* and *right*. They later realize that these words begin with two distinct sounds. Eventually, they learn to distinguish all the sounds that can change the meanings of words.

When two sounds can be used to differentiate words, they are said to belong to different **phonemes**. There must be a phonemic difference if two words (such as *white* and *right* or *cat* and *bat*) differ in only a single sound. There are, however, phonetic variations that cannot be used to distinguish words, such as the differences between the consonants at the beginning and end of the word *pop*. For the first of these sounds, the lips must open and there must be a puff of air before the vowel begins. After the final consonant, there may be a puff of air, but it is not necessary. In fact, you could say *pop* and not open your lips for hours, if it happened to be the last word you said before going to sleep. The sound at the end would still be a *p*. Both consonants in this word are voiceless bilabial stops. They are different, but the differences between them cannot be used to change the meaning of a word in English. They both belong to the same phoneme.

We cannot rely on the spelling to tell us whether two sounds are members of different phonemes. For example, the words *phone* and *foam* begin with the same sounds, although they have different spellings. To take a more complex example, the words *key* and *car* begin with what we can regard as the same sound, despite the fact that one is spelled with the letter *k* and the other with *c*. But in this case, the two sounds are not exactly the same. The words *key* and *car* begin with slightly different sounds. If you whisper just the first consonants in these two words, you can probably hear the difference, and you may be able to feel that your tongue touches the roof of the mouth in a different place for each word. This example shows that there may be very subtle differences between members of a phoneme. The sounds at the beginning of *key* and *car* are slightly different, but it is not a difference that changes the meaning of a word in English. They are both members of the same phoneme.

We noted other small changes in sounds that do not affect the meaning in Chapter 1, where we saw that the tongue is farther back in *true* than in *tea*, and the *n* in *tenth* is likely to be dental, whereas the *n* in *ten* is usually alveolar. In some cases, the members of a phoneme are more different from one another. For example, most Americans (and some younger speakers of British English) have a *t* in the middle of *pity* that is very different from the *t* at the end of the word *pit*. The one in *pity* sounds more like a *d*. Consider also the *l* in *play*. You can say just the first two consonants in this word without any voicing, but still hear the *l* (try doing this). When you say the whole word *play*, the *l* is typically voiceless, and very different from the *l* in *lay*. Say the *l* at the beginning of *lay*, and you'll hear that it is definitely voiced.

It follows from these examples that a phoneme is not a single sound, but a name for a group of sounds. There is a group of *t* sounds and a group of *l* sounds that occur in English. It is as if you had in your mind an ideal *t* or *l*, and the ones that are actually produced are variations that differ in small ways that do not affect the meaning. These groups of sounds—the phonemes—are abstract units that form the basis for writing down a language systematically and unambiguously. (Peter Ladefoged's book *Vowels and Consonants* has an extended discussion of the relationship between written language and phonology in which

he speculates that the development of phonemic analysis was partly due to the writing systems used by European linguists.)

We often want to record all—and only—the variations between sounds that cause a difference in meaning. Transcriptions of this kind are called *phonemic transcriptions*. Languages that have been written down only comparatively recently (such as Swahili and most of the other languages of Africa) have a fairly phonemic spelling system. There is very little difference between a written version of a Swahili sentence and a phonemic transcription of that sentence. But because English pronunciation has changed over the centuries while the spelling has remained basically the same, phonemic transcriptions of English are different from written texts.

THE TRANSCRIPTION OF CONSONANTS

We can begin searching for phonemes by considering the contrasting consonant sounds in English. A good way is to find sets of words that rhyme. Take, for example, all the words that rhyme with *pie* and have only a single consonant at the beginning. A set of words in which each differs from all the others by only one sound is called a *minimal set*. The second column of Table 2.1 lists a set of this kind. There are obviously many other words that rhyme with *pie*, such as *spy*, *try*, *spry*, but these words begin with sequences of two or more of the sounds already in the minimal set. Some of the words in the list begin with two consonant letters (*thigh*, *thy*, *shy*), but they each begin with a single consonant sound. *Shy*, for example, does not contain a sequence of two consonant sounds in the way that *spy* and *try* do. You can record these words and see the sequences in *spy* and *try* for yourself.

Some consonants do not occur in words rhyming with *pie*. If we allow using the names of the letters as words, then we can find another large set of consonants beginning words rhyming with *pea*. A list of such words is shown in the third column of Table 2.1. (Speakers of British English will have to remember that in American English, the name of the last letter of the alphabet belongs in this set rather than in the set of words rhyming with *bed*.)

Even in this set of words, we are still missing some consonant sounds that contrast with others only in the middles or at the ends of words. The letters *ng* often represent a single consonant sound that does not occur at the beginning of a word. You can hear this sound at the end of the word *rang*, where it contrasts with other nasals in words such as *ram* and *ran*, though the vowel sound in *rang* is a little different in most varieties of English. There is also a contrast between the consonants in the middles of *mission* and *vision*, although there are very few pairs of words that are distinguished by this contrast in English. (One such pair for some speakers involves the name of a chain of islands—*Aleutian* versus *allusion*.) Words illustrating these consonants are given in the fourth column of Table 2.1.

Most of the symbols in Table 2.1 are the same letters we use in spelling these words, but there are a few differences. One difference between spelling and

TABLE 2.1	Symbols for transcribing English consonants. (Alternative symbols that may be found in other books are given in parentheses.) The last column gives the conventional names for the phonetic symbols in the first column.				
p	pie	pea			lowercase *p*
t	tie	tea			lowercase *t*
k	kye	key			lowercase *k*
b	by	bee			lowercase *b*
d	dye	D			lowercase *d*
g	guy				lowercase *g*
m	my	me	ra*m*		lowercase *m*
n	nigh	knee	ra*n*		lowercase *n*
ŋ			ra*ng*		eng (or angma)
f	fie	fee			lowercase *f*
v	vie	V			lowercase *v*
θ	thigh				theta
ð	thy	thee			eth
s	sigh	sea	listen		lowercase *s*
z		Z	mizzen		lowercase *z*
ʃ (š)	shy	she	mission		esh (or long *s*)
ʒ (ž)			vision		long *z* (or yogh)
l	lie	lee			lowercase *l*
w	why	we			lowercase *w*
r	rye				lowercase *r*
j (y)		ye			lowercase *j*
h	high	he			lowercase *h*

Note also the following:

tʃ (tš)	chi(me)	chea(p)
dʒ (dž)	ji(ve)	G

phonetic usage occurs with the letter *c*, which is sometimes used to represent a [k] sound, as in *cup* or *bacon*, and sometimes to represent an [s] sound, as in *cellar* or *receive*. Two *c*'s may even represent a sequence of [k] and [s] sounds in the same word, as in *accent*, *access*. A symbol that sometimes differs from the corresponding letter is [g], which is used for the sound in *guy* and *guess* but never for the sound in *age* or the sound in the name of the letter *g*.

A few other symbols are needed to supplement the regular alphabet. The phonetic symbols we will use are part of the set approved by the International Phonetic Association, a body founded in 1886 by a group of leading phoneticians from France, Germany, Britain, and Denmark. The complete set of IPA symbols is given in the chart on the inside covers of this book. It will be discussed in detail later in this book. Because we often need to talk about the symbols, the names that have been given to them are shown in the last column of Table 2.1.

The velar nasal at the end of *rang* is written with [ŋ], a letter *n* combined with the tail of the letter *g* descending below the line. Some people call this

symbol *eng*; others pronounce it *angma*. The symbol [θ], an upright version of the Greek letter theta, is used for the voiceless dental fricative in words such as *thigh*, *thin*, *thimble*, *ether*, *breath*, *mouth*. The symbol [ð], called *eth*, is derived from an Anglo-Saxon letter. It is used for the corresponding voiced sound in words such as *thy*, *then*, *them*, *breathe*. Both these symbols are ascenders (letters that go up from the line of writing rather than descending below it). The spelling system of the English language does not distinguish between [θ] and [ð]. They are both written with the letters *th* in pairs such as *thigh*, *thy*.

The symbol for the voiceless palato-alveolar (post-alveolar) fricative [ʃ] (long *s*) in *shy*, *sheep*, *rash* is both an ascender and a descender. It is like a long, straightened *s* going both above and below the line of writing. The corresponding voiced symbol [ʒ] is like a long *z* descending below the line. This sound occurs in the middle of words such as *vision*, *measure*, *leisure* and at the beginning of foreign words such as the French *Jean*, *gendarme*, and foreign names such as *Zsa Zsa*.

In earlier editions of this book, the sound at the beginning of the word *rye* was symbolized by [ɹ], an upside-down letter *r*. This is the correct IPA symbol for this sound but as the two major dictionaries of American and British English pronunciation (see "Further Reading") use a regular [r] for this sound, we have done so here.

It is unfortunate that different books on phonetics use different forms of phonetic transcription. This is not because phoneticians cannot agree on which symbols to use, but rather because different styles of transcription are more appropriate in one circumstance than in another. Thus, in this book, where we are concerned with general phonetics, we have used the IPA symbol [j] for the initial sound in *yes*, *yet*, *yeast* because the IPA reserves the symbol [y] for another sound, the vowel in the French word *tu*. Another reason for using [j] is that in many languages (German, Dutch, Norwegian, Swedish, and others) this letter is used in words such as *ja*, which are pronounced with a sound that in the English spelling system would be written with the letter *y*. Books that are concerned only with the phonetics of English often use [y] where this one uses [j]. Some books on phonetics also use [š] and [ž] in place of the IPA symbols [ʃ] and [ʒ], respectively. The first and last sounds in both *church* and *judge* are transcribed with the digraph symbols [tʃ] and [dʒ]. These affricate sounds are phonetically a sequence of a stop followed by a fricative (hence the IPA symbols for them are digraphs), yet they function in English as if they are really a single unit, comparable in some ways to other stop consonants. You can see that a word such as *choose* might be said to begin with [tʃ] if you compare your pronunciation of the phrases *white shoes* and *why choose*. In the first phrase, the [t] is at the end of one word and the [ʃ] at the beginning of the next; but in the second phrase, these two sounds occur together at the beginning of the second word. The difference between the two phrases is one of the timing of the articulations involved. The affricate in *why choose* has a more abrupt fricative onset, and the timing of the stop and fricative is more rigid than is the timing of the sequence in *white shoes*. Also, for some speakers, the final [t] of *white* may be said with simultaneous

:D 2.1

alveolar and glottal stops, while the [t] in the affricate [tʃ] is never said with glottal stop. Other pairs of phrases that demonstrate this point are *heat sheets* versus *he cheats* and *might shop* versus *my chop*. There are no pairs of phrases illustrating the same point for the voiced counterpart [dʒ] found in *jar*, *gentle*, *age*, because no English word begins with [ʒ].

Some other books on phonetics transcribe [tʃ] and [dʒ] (as in *church* and *judge*) with single symbols, such as [č] and [ǰ]. These transcriptions highlight the fact that affricates are single units by using a single letter to transcribe them. We will see that some linguistic segments have two phonetic elements (for example, vowel diphthongs) and it is usually helpful to represent both of the elements in phonetic transcription. When we wish to make perfectly clear that we are writing an affricate and not a consonant cluster, the ligature symbol [⌢] is used to tie symbols together. Thus, the affricate in *why choose* can be written [t͡ʃ] to distinguish it from the cluster [tʃ] in *white shoes*. The glottal stop that begins words that are spelled with an initial vowel (recall the example from Chapter 1 of the difference between *flee east* and *fleeced*) is written phonetically with [ʔ], a symbol based on the question mark. So *flee east* is pronounced [fliʔist], while *fleeced* is [flist]. The status of glottal stop as a consonant phoneme in English is questionable because its distribution is limited. Where other consonants may appear in a variety of positions in words (e.g. note the [k] in *cat*, *scab*, *back*, *active*, *across*, etc.), glottal stop only occurs word initially before vowels in American English. In London Cockney, glottal stop also appears between vowels in words like *butter* and *button* where other dialects have a variant of [t]. In American casual speech, the final [t] in words like *cat* and *bat* can be "glottalized"—replaced by glottal stop, or more usually pronounced with simultaneous glottal stop (e.g., [bæt͡ʔ] and [kæt͡ʔ]).

There is one minor matter still to be considered in the transcription of the consonant contrasts of English. In most forms of both British and American English, *which* does not contrast with *witch*. Accordingly, both *why* and *we* in Table 2.1 are said to begin simply with [w]. But some speakers of English contrast pairs of words such as *which*, *witch*; *why*, *wye*; *whether*, *weather*. These speakers will have to transcribe the first consonants of each of these pairs of words with [hw]. Note that, phonetically, the [h] is transcribed before [w] in that it is the first part of each of these words that is voiceless.

THE TRANSCRIPTION OF VOWELS

The transcription of the contrasting vowels (the vowel phonemes) in English is more difficult than the transcription of consonants for two reasons. First, accents of English differ more in their use of vowels than in their use of consonants. Second, authorities differ in their views of what constitutes an appropriate description of vowels.

Taking the same approach in looking for contrasting vowels as we did for contrasting consonants, we might try to find a minimal set of words that differ

only in the vowel sounds. We could, for example, look for monosyllables that begin with [h] and end with [d] and supplement this minimal set with other lists of monosyllables that contrast only in their vowel sounds. Table 2.2 shows five such sets of words. You should listen to the recordings of these words on the CD while reading the following discussion of the vowels.

We will consider one form of British and one form of American English. The major difference between the two is that speakers of American English pronounce [r] sounds after vowels, as well as before them, whereas in most forms of British English, [r] can occur only before a vowel. American English speakers distinguish between words such as *heart* and *hot* not by making a difference in vowel quality (as in Peter Ladefoged's form of British English), but rather by pronouncing *heart* with an [r] and *hot* with the same vowel but without an [r] following it. In *here*, *hair*, *hire*, these speakers may use vowels similar to those in *he*, *head*, *high* respectively, but in each case with a following [r]. Most speakers of British English distinguish these words by using different **diphthongs**—movements from one vowel to another within a single syllable.

TABLE 2.2	Symbols for transcribing contrasting vowels in English. Column 1 applies to many speakers of American English, Column 2 to most speakers of British English. The last column gives the conventional names for the phonetic symbols in the first column unless otherwise noted.						
1	**2**						
i	i	heed	he	bead	heat	keyed	lowercase *i*
ɪ	ɪ	hid		bid	hit	kid	small capital *I*
eɪ	eɪ	hayed	hay	bayed	hate	Cade	lowercase *e*
ɛ	ɛ	head		bed			epsilon
æ	æ	had		bad	hat	cad	ash
ɑ	ɑ	hard		bard	heart	card	script *a*
ɑ	ɒ	hod		bod	hot	cod	turned script *a*
ɔ	ɔ	hawed	haw	bawd		cawed	open *o*
ʊ	ʊ	hood				could	upsilon
oʊ	əʊ	hoed	hoe	bode		code	lowercase *o*
u	u	who'd	who	booed	hoot	cooed	lowercase *u*
ʌ	ʌ	Hudd		bud	hut	cud	turned *v*
ɝ	ɜ	herd	her	bird	hurt	curd	reversed epsilon
aɪ	aɪ	hide	high	bide	height		lowercase a (+I)
aʊ	aʊ		how	bowed		cowed	(as noted above)
ɔɪ	ɔɪ		(a)hoy	Boyd			(as noted above)
ɪr	ɪə		here	beard			(as noted above)
ɛr	ɛə		hair	bared		cared	(as noted above)
aɪr	aə	hired	hire				(as noted above)
Note also:							
ju	ju	hued	hue	Bude		cued	(as noted above)

CD 2.2

Even within American English, there are variations in the number of contrasting vowels that occur. Many Midwestern speakers and most Far Western speakers do not distinguish between the vowels in pairs of words such as *odd*, *awed* and *cot*, *caught*. Some forms of American English make additional distinctions not shown in Table 2.2. For example, some speakers (mainly from the East Coast) distinguish the auxiliary verb *can* from the noun *can*, the latter being more diphthongal. But we will have to overlook these small differences in this introductory textbook.

There are several possible ways of transcribing the contrasting vowels in Table 2.2. The two principal forms that will be used in this book are shown in the first and second columns. The first column is suitable for many forms of American English and the second for many forms of British English. The two columns have been kept as similar as possible; as you will see in Chapter 4, we have tried to make the transcriptions reasonably similar to those of well-known authorities on the phonetics of English.

As in the case of the consonant symbols, the vowel symbols in Table 2.2 are used in accordance with the principles of the IPA. Those symbols that have the same shapes as ordinary letters of the alphabet represent sounds similar to the sounds these letters have in French or Spanish or Italian. Actually, the IPA usage of the vowel letters is that of the great majority of the world's languages when they are written with the Roman alphabet, including such diverse languages as Swahili, Turkish, and Navajo. The present spelling of English reflects the way it sounded many centuries ago when it still had vowel letters with values similar to those of the corresponding letters in all these other languages.

One of the principal problems in transcribing English phonetically is that there are more vowel sounds than there are vowel letters in the alphabet. In a transcription of the English word *sea* as [si], the [i] represents a similar (but not identical) sound to that in the Spanish or Italian *si*. But unlike Spanish and Italian, English differentiates between vowels such as those in *seat*, *sit*, and *heed*, *hid*. The vowels in *seat*, *heed* differ from those in *sit*, *hid* in two ways: They have a slightly different quality and they are longer. Because the vowels in *sit*, *hid* are somewhat like those in *seat*, *heed*, they are represented by the symbol [ɪ], a small capital *I*. In an earlier edition of this book, the difference in length was also shown by adding the symbol [ː], which, as we will see later, can be used when it is necessary to distinguish sounds that differ in length. Adding this symbol to some vowels shows additional phonetic detail, but it goes against the principle of showing just the differences between phonemes and will not be used when making phonemic transcriptions of English in this book.

The vowels in words such as *hay*, *bait*, *they* are transcribed with a sequence of two symbols, [eɪ], indicating that for most speakers of English, these words contain a diphthong. The first element in this diphthong is similar to sounds in Spanish or Italian that use the letter *e*, such as the Spanish word for 'milk,' which is written *leche* and pronounced [letʃe]. The second element in the English words *hay*, *bait*, *they* is [ɪ], the symbol used for transcribing the vowel in *hid*.

Two symbols that are not ordinary letters of the alphabet, [ɛ] and [æ], are used for the vowels in *head* and *had*, respectively. The first is based on the Greek letter epsilon and the second on the letters *a* and *e* joined together. They may be referred to by the names *epsilon* and *ash*.

Most Americans use the same vowel sound in the words *heart* and *hot* and can use one form of the letter *a*. They would transcribe these words as [hɑrt] and [hɑt]. But some East Coast Americans and speakers of British English who do not pronounce [r] sounds after a vowel distinguish between these words by the qualities of the vowels and have to use two different forms of the letter *a*. They would transcribe these words as [hɑt] and [hɒt].

Most speakers of British forms of English, and many American speakers, distinguish between pairs of words such as *cot*, *caught*; *not*, *naught*. The symbol [ɔ], an open letter *o*, may be used in the second of each of these pairs of words and in words such as *bawd*, *bought*, *law*. Many Midwestern and Far Western American speakers do not need to use this symbol in any of these words, as they do not distinguish between the vowels in words such as *cot* and *caught*. They may have different vowels in words in which there is a following [r] sound, such as *horse*, *hoarse*, but if there is no opposition between *cot*, *caught* or *not*, *naught*, there is no need to mark this difference by using the symbol [ɔ]. Doing so would simply be showing extra phonetic detail, straying from the principle of showing just the differences between phonemes.

Another special symbol is used for the vowel in *hood*, *could*, *good*. This symbol, [ʊ], may be thought of as a letter *u* with the ends curled out.

The vowel in *hoe*, *dough*, *code* is a diphthong. For most American English speakers, the first element is very similar to sounds that are written in Spanish or Italian with the letter *o*. Many speakers of English from the southern parts of Britain use a different sound for the first element of the diphthong in these words, which we will symbolize with [ə], an upside-down letter *e* called *schwa*. We will discuss this sound more fully in a later section. The final element of the diphthong in words such as *hoe* and *code* is somewhat similar to the vowel [ʊ] in *hood*.

An upside-down letter *v*, [ʌ], is used for the vowel in words such as *bud*, *hut*. This symbol is sometimes called *wedge*. Another symbol, [ɜ], a reversed form of the Greek letter epsilon, is used for the sound in *pert*, *bird*, *curt* as pronounced by most speakers of British English and those speakers of American English who do not have an [r] in these words. In most forms of American English, the *r* is fully combined with the vowel, and the symbol [ɝ] is used. The little hook [˞] indicates the *r*-coloring of the vowel.

The next three words in Table 2.2 contain diphthongs composed of elements that have been discussed already. The vowel in *hide* [haɪd] begins with a sound between that of the vowel in *cat* [kæt] and that in *hard* [hɑd] or [hɑrd], and moves toward the vowel [ɪ] as in *hid* [hɪd]. The symbol [a] is used for the first part of this diphthong. The vowel in *how* [aʊ] begins with a similar sound but moves toward [ʊ] as in *hood*. The vowel in *boy* [bɔɪ] is a combination of the sound [ɔ] as in *bawd* and [ɪ] as in *hid*.

Most Americans pronounce the remaining words in Table 2.2 with one of the other vowels followed by [r], while most British English speakers have additional diphthongs in these words. In each case, the end of the diphthong is [ə], the same symbol we used for the beginning of the diphthong in *hoe* for most British English speakers. We will discuss this symbol further in the next paragraph. Some (usually old-fashioned) British English speakers also use a diphthong in words like *poor, cure* that can be transcribed as [ʊə]. Some people have a diphthong [aə] in words such as *fire, hire* [faə, haə]. Others pronounce these words as two syllables (like *higher, liar*), transcribing them as [faɪə, haɪə].

The words in Table 2.2 are all monosyllables except for *ahoy*. Consequently, none of them contains both stressed and unstressed vowels. By far, the most common unstressed vowel is [ə], the one we noted at the end of some of the diphthongs in British English. It is often called by its German name, *schwa*. It occurs at the ends of words such as *sofa, soda* [ˈsoʊfə, ˈsoʊdə], in the middles of words such as *emphasis, demonstrate* [ˈɛmfəsɪs, ˈdɛmənstreɪt], and at the beginnings of words such as *around, arise* [əˈraʊnd, əˈraɪz]. (In all these words, the symbol [ˈ] is a stress mark that has been placed before the syllable carrying the main stress. Stress should always be marked in words of more than one syllable.)

In British English, [ə] is usually the sole component of the *-er* part of words such as *brother, brotherhood, simpler* [ˈbrʌðə, ˈbrʌðəhʊd, ˈsɪmplə]. In forms of American English with *r*-colored vowels, these words are usually [ˈbrʌðɚ, ˈbrʌðɚhʊd, ˈsɪmplɚ]. As with the symbol [ɝ], the small hook on [ɚ] symbolizes the *r*-coloring. Both [ə] and [ɚ] are very common vowels, [ə] occurring very frequently in unstressed monosyllables such as the grammatical function words *the, a, to, and, but*. In connected speech, these words are usually [ðə, ə, tə, ənd, bət].

Some of the other vowels also occur in unstressed syllables, but because of differences in accents of English, it is a little more difficult to say which vowel occurs in which word. For example, nearly all speakers of English differentiate between the last vowels in *Sophie, sofa* or *pity, patter*. But some accents have the vowel [i] as in *heed* at the end of *Sophie, pity*. Others have [ɪ] as in *hid*. Similarly, most accents make the vowel in the second syllable of *taxis* different from that in *Texas*. Some have [i] and some have [ɪ] in *taxis*. Nearly everybody pronounces *Texas* as [ˈtɛksəs]. (Note that in English, the letter *x* often represents the sounds [ks].) Compare your pronunciation of these words with the recordings on the CD and decide which unstressed vowels you use.

○
:D 2.3

This is an appropriate moment to start doing some transcription exercises. There are a large number of them at the end of this chapter. To ensure that you have grasped the basic principles, you should try the first four sets of exercises.

CONSONANT AND VOWEL CHARTS

So far, we have been using the consonant and vowel symbols mainly as ways of representing the contrasts that occur among words in English. But they can also be thought of in a completely different way. We may regard them as shorthand

descriptions of the articulations involved. Thus, [p] is an abbreviation for *voiceless bilabial stop* and [1] is equivalent to *voiced alveolar lateral approximant*. The consonant symbols can then be arranged in the form of a chart as in Figure 2.1. The places of articulation are shown across the top of the chart, starting from the most forward articulation (bilabial) and going toward those sounds made in the back of the mouth (velar) and in the throat (glottal). The manners of articulation are shown on the vertical axis of the chart. By convention, the voiced–voiceless distinction is shown by putting the voiceless symbols to the left of the voiced symbols.

The symbol [w] is shown in two places in the consonant chart in Figure 2.1. This is because it is articulated with both a narrowing of the lip aperture, which makes it bilabial, and a raising of the back of the tongue toward the soft palate, which makes it velar. The affricate symbols [tʃ] and [dʒ] are not listed separately in the table even though they are contrastive sounds in English. Note that if we were to include them in the table, we would have the problem of deciding whether to put them in the palato-alveolar column (the place of the fricative element) or in the alveolar column (the place of the stop element). The international phonetic alphabet avoids the inaccuracy that is inevitable when the stop element and fricative element of the affricate have different place of articulation by listing only stop and fricative symbols in the consonant chart.

Figure 2.1   A phonetic chart of the English consonants we have dealt with so far. Whenever there are two symbols within a single cell, the one on the left represents a voiceless sound. All other symbols represent voiced sounds. Note also the consonant [h], which is not on this chart, and the affricates [tʃ, dʒ], which are sequences of symbols on the chart.

Manner of articulation		Place of articulation							
		bilabial	labio-dental	dental	alveolar	palato-alveolar	palatal	velar	glottal
nasal (stop)		m			n			ŋ	
stop		p b			t d			k g	ʔ
fricative			f v	θ ð	s z	ʃ ʒ			h
(central) approximant		(w)			r		j	w	
lateral (approximant)					l				

Figure 2.2   A vowel chart showing the relative vowel qualities represented by some of the symbols used in transcribing English. The symbols [e, a, o] occur as the first elements of diphthongs.
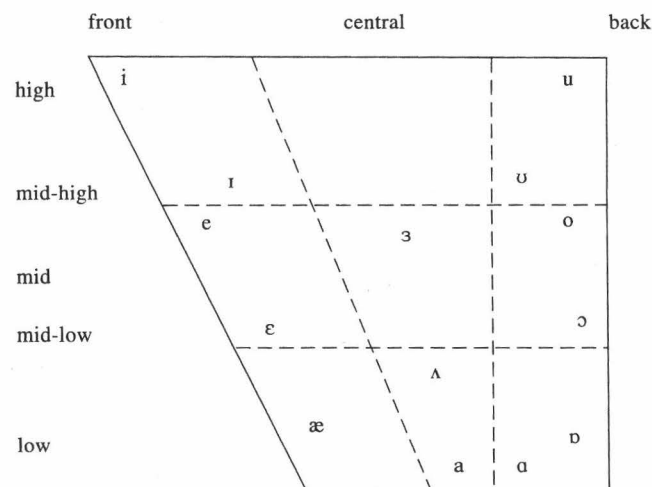
The symbols we have been using for the contrasting vowels may also be regarded as shorthand descriptions for different vowel qualities. There are problems in this respect in that we have been using these symbols somewhat loosely, allowing them to have different values for different accents. But the general values can be indicated by a vowel chart as in Figure 2.2. The symbols have been placed within a quadrilateral, which shows the range of possible vowel qualities. Thus, [i] is used for a high front vowel, [u] for a high back one, [ɪ] for a mid-high front vowel, [e] for a raised mid-front vowel, [ɛ] for a mid-low, and so on.

The simple vowel chart in Figure 2.2 shows only two of the dimensions of vowel quality, and if they are taken to be descriptions of what the tongue is doing, these dimensions are not represented very accurately (as we will see in later chapters). Furthermore, Figure 2.2 does not show anything about the variations in the degree of lip rounding in the different vowels, nor does it indicate anything about vowel length. It does not show, for example, that in most circumstances, [i] and [u] are longer than [ɪ] and [ʊ].

The consonant and vowel charts enable us to understand the remark made in Chapter 1, when we said that the sounds of English involve about twenty-five different gestures of the tongue and lips. The consonant chart has twenty-three different symbols, but only eleven basic gestures of the tongue and lips are needed to make these different sounds. The sounds [p, b, m] are all made with the same lip gesture, and [t, d, n] and [k, g, ŋ] with the same tongue gestures. (There are slight differences in timing when these gestures are used for making the different sounds, but we will neglect them here.) Four more gestures are required for the sounds in the fricative row, three more for the (central) approximants, and another one for the lateral approximant, making eleven in all. The vowel chart has fourteen symbols, each of which may be considered to require a separate gesture. But, as we have seen, accents of English vary in the number of vowels that they distinguish, which is why we said that English requires *about* twenty-five different gestures of the tongue and lips.

All these sounds will also require gestures of the other three main components of the speech mechanism—the airstream process, the phonation process, and the oro-nasal process. The airstream process involves pushing air out of the lungs for all the sounds of English. The phonation process is responsible for the gestures of the vocal folds that distinguish voiced and voiceless sounds, and the oro-nasal process will be active in raising and lowering the velum so as to distinguish nasal and oral sounds.

PHONOLOGY

At the beginning of this chapter, we discussed another reason why it is only approximately true that in our transcriptions of English, the symbols have the values shown in Figures 2.1 and 2.2. In the style of transcription we have been using so far, we have used symbols that show just the contrasting sounds of English, the phonemes. From this point on, we will use slash lines / / to mark off symbols when we are explicitly using them to represent phonemes.

As we have noted, some of the phoneme symbols may represent different sounds when they occur in different contexts. For example, the symbol /t/ may represent a wide variety of sounds. In *tap* /tæp/, it represents a voiceless alveolar stop. But the /t/ in *eighth* /eɪtθ/ may be made on the teeth, because of the influence of the following voiceless dental fricative /θ/. This /t/ is more accurately called a voiceless dental stop, and we will later use a special symbol for transcribing it. In most forms of both British and American English, the /t/ in *bitten* is accompanied by a glottal stop, and we will also be using a special symbol for this sound. As we saw, for most Americans and for many younger British English speakers, the /t/ in *catty* /'kæti/ symbolizes a voiced, not a voiceless, sound. All these different sounds are part of the /t/ phoneme. Each of them occurs in a specific place: /t/ before /θ/ is a dental stop, /t/ before a word final /n/ is a glottal stop, and /t/ after a vowel and before an unstressed vowel is a voiced stop. None of these variations is different enough to change the meaning of a word in English. Note also that all of these variations occur in citation speech and are not simply the result of failing to "hit the target" when speaking quickly.

Similarly, other symbols represent different sounds in different contexts. The symbols /l/ and /r/ normally stand for voiced approximants. But in words such as *ply* /plaɪ/ and *try* /traɪ/, the influence of the preceding stops makes them voiceless. Vowel sounds also vary. The /i/ in *heed* /hid/ is usually very different from the /i/ in *heel* /hil/, and much longer than the /i/ in *heat*.

Many of the variations we have been discussing can be described in terms of simple statements about regular sound patterns. Statements of this kind may be considered rules that apply to English words. In most forms of American English, for example, /t/ becomes voiced not only in *catty*, but on all occasions when it occurs immediately after a vowel and before an unstressed vowel (for example, in *pity, matter, utter, divinity*, etc.). In English of nearly all kinds, it is also a rule that whenever /t/ occurs before a dental fricative, it is pronounced as a dental stop. We can show that this is a different kind of /t/ by adding a small mark [̪] under it, making it [t̪]. (As this symbol is not representing a phoneme, it is placed between [ ].) The same is true of /d/, as in *width* [wɪd̪ð]; /n/, as in *tenth* [tɛn̪θ]; and /l/, as in *wealth* [wɛl̪θ]. In all these cases, the mark [̪] may be added under the symbol to indicate that it represents a dental articulation. All these transcriptions are placed between square brackets, as they are phonetic transcriptions rather than phonemic transcriptions.

Small marks that can be added to a symbol to modify its value are known as **diacritics**. They provide a useful way of increasing the phonetic precision of a transcription. Another diacritic, [̥], a small circle beneath a symbol, can be used to indicate that the symbol represents a voiceless sound. Earlier, we noted that the /l/ in *play* is voiceless. Accordingly, we can transcribe this word as [pl̥eɪ]. Similarly, *ply* and *try* can be written [pl̥aɪ] and [tr̥aɪ].

When we describe the sound patterns that occur in English, we want to be able to say that in some sense there are always the same underlying sounds that are changed because of the contexts in which they occur. The phonology of a language is the set of rules or constraints that describe the relation between the underlying sounds, the abstract units called *phonemes* described at the beginning of this chapter, and the phonetic forms that can be observed. When we transcribe a word in a way that shows none of the details of the pronunciation that are predictable by phonological rules, we are making a phonemic transcription.

The variants of the phonemes that occur in detailed phonetic transcriptions are known as **allophones**. They can be described as a result of applying the phonological rules to the underlying phonemes. We have now discussed some of the rules for different allophones of the phoneme /t/. For example, we know that in most varieties of American English, /t/ has a voiced allophone when it occurs between a stressed vowel and an unstressed vowel. We have also illustrated rules that make /r/ and /l/ voiceless when they occur after /p, t, k/. (These rules need more refinement before they can be considered to be generally applicable.)

In addition to applying rules that describe particular allophones of the phonemes in a transcription, there is another way we can show more phonetic detail. We can use more specialized phonetic symbols. For example, we noted that the vowel /i/ is longer than the vowel /ɪ/, as in *sheep* versus *ship*. This difference in length is always there as long as the two vowels are in the same phonetic context (between the same sounds and with the same degree of stress, etc.). We could transcribe this difference in length by adding a length mark to the longer of the

two sounds. The IPA provides the symbol [ː] to show that the preceding symbol represents a longer sound. Accordingly, we could transcribe the two sounds as /iː/ and /ɪ/. We would still be representing only the underlying phonemes in this particular accent of English, but doing so with greater phonetic precision.

Another example of using more precise phonetic symbols to show more phonetic detail has to do with the transcription of English /r/. We mentioned that in previous editions of this book, we used the upside-down *r* [ɹ] to write the *r* sound of English. This was done because the IPA symbol [r] indicates a trilled *r* and not the approximant *r* of English. One principle of the International Phonetic Alphabet is to use the most common form of the letter for the most common phonetic property associated with that letter. Because trilled *r* is more common in languages of the world than is approximant *r*, the IPA uses the unusual symbol [ɹ] for the unusual *r* sound found in English. So, you can use [ɹ] to give a more precise transcription of the English /r/.

Students sometimes also make the mistake of thinking that allophones are written with diacritics while phonemes are written with simple phonetic symbols. Consider, though, the pronunciation of the word *letter*. For most speakers of American English, there is no [t] sound in this word. Instead, the medial consonant sounds like a very short [d]. It is different enough from [d] (compare *seedy* and *see Dee*) that the IPA has a unique symbol for the **tap** allophone of /t/ and /d/. The alveolar tap sound in *letter* is written with the symbol [ɾ], a letter derived from the letter *r*. Note, therefore, that transcription of allophones may use simple phonetic symbols as well as symbols with diacritic marks.

The term **broad transcription** is often used to designate a transcription that uses the simplest possible set of symbols. Conversely, a **narrow transcription** is one that shows more phonetic detail, either by using more specific symbols or by representing some allophonic differences. A broad transcription of *please* and *trip* would be /pliz/ and /trɪp/. A narrow (but still phonemic) transcription could be /pliːz/ and /trɪp/. This transcription would be phonemic as long as we always used /iː/ wherever we would otherwise have had /i/. In this way, we would not be showing any allophones of the phonemes. A narrow allophonic transcription would be [pl̥iːz] and [tr̥ɪp], in which [l̥] and [r̥] are allophones of /l/ and /r/.

Every transcription should be considered as having two aspects, one of which is often not explicit. There is the phonetic text itself and, at least implicitly, there is a set of conventions for interpreting the text. These conventions are usually of two kinds. First, there are the conventions that ascribe general phonetic values to the symbols. It was these conventions we had in mind when we said earlier that a symbol could be regarded as an approximate specification of the articulations involved. If we want to remind people of the implicit statements accompanying a transcription, we can make them explicit. We could, for instance, say that, other things being equal, /i/ is longer than /ɪ/, perhaps stating at the beginning of the transcription /i/ = /iː/. We could also make explicit the rules that specify the allophones that occur in different circumstances, a topic we will return to in Chapter 4.

On a few occasions, a transcription cannot be said to imply the existence of rules accounting for allophones. This is at least theoretically possible in the case of a narrow transcription so detailed that it shows *all* the rule-governed alternations among the sounds. A transcription that shows the allophones in this way is called a completely **systematic phonetic transcription**. In practice, it is difficult to make a transcription so narrow that it shows every detail of the sounds involved.

On some occasions, a transcription may not imply the existence of rules accounting for allophones because, in the circumstances when the transcription was made, nothing was known about the rules. When writing down an unknown language or when transcribing the speech of a child or a patient not seen previously, one does not know what rules will apply. In these circumstances, the symbols indicate only the phonetic value of the sounds. This kind of transcription is called an **impressionistic transcription**.

We hope this brief survey of different kinds of transcription makes plain that there is no such thing as *the* IPA transcription of a particular utterance. Sometimes, one wants to make a detailed phonetic transcription; at other times, it is more convenient to make a phonemic transcription. Sometimes, one wants to point out a particular phonetic feature, such as vowel length; at other times, the vowels are not of concern and details of the consonants are more important. IPA transcriptions take many forms.

EXERCISES

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

A. Find the errors in the transcriptions of the consonant sounds in the following words. In each word, there is one error, indicating an impossible pronunciation of that word for a native speaker of English of any variety. Make a correct transcription in the space provided after the word.

1. strength	[strɛngθ]	should be	[	]
2. crime	[craɪm]		[	]
3. wishing	[wɪshɪŋ]		[	]
4. wives	[waɪvs]		[	]
5. these	[θiz]		[	]
6. hijacking	[haɪjækɪŋ]		[	]
7. chipping	[tʃɪppɪŋ]		[	]
8. yelling	[ˈyɛlɪŋ]		[	]
9. sixteen	[ˈsɪxtin]		[	]
10. thesis	[ˈðisɪs]		[	]

B. Now try another ten words in which the errors are all in the vowels. Again, there is only one possible error, but because of differences in varieties of English, there are sometimes alternative possible corrections.

11. man-made	[ˈmanmeɪd]	should be	[	]
12. football	[ˈfʊtbol]		[	]
13. tea chest	[ˈtitʃest]		[	]
14. tomcat	[ˈtomkæt]		[	]
15. tiptoe	[ˈtiptoʊ]		[	]
16. avoid	[æˈvɔɪd]		[	]
17. remain	[rəˈman]		[	]
18. bedroom	[ˈbɛdrɔm]		[	]
19. umbrella	[umˈbrɛlə]		[	]
20. manage	[ˈmænædʒ]		[	]

C. Make a correct transcription of the following words. There is still only one error per word, but it may be among the vowels, the consonants, or the stress marks.

21. magnify	[ˈmægnifaɪ]	should be	[	]
22. traffic	[ˈtræfɪc]		[	]
23. simplistic	[ˈsɪmplɪstɪk]		[	]
24. irrigate	[ˈɪrɪgeɪt]		[	]
25. improvement	[ɪmˈprʊvmənt]		[	]
26. demonstrate	[ˈdəmɑnstreɪt]		[	]
27. human being	[humən ˈbiɪŋ]		[	]
28. appreciate	[əˈpreʃieɪt]		[	]
29. joyful	[ˈdʒɔyfʊl]		[	]
30. wondrous	[ˈwondrəs]		[	]

D. Transcribe the following words or phrases as they are pronounced by either the British or the American speaker on the CD. Be careful to put in stress marks at the proper places. Use a phonemic transcription, and note which speaker you are transcribing.

31. languages
32. impossibility
33. boisterous
34. youngster
35. another
36. diabolical
37. nearly over
38. red riding hood

39. inexcusable
40. chocolate pudding

E. Which of the two transcriptions below is the narrower?
(For this exercise both transcriptions have been put between square brackets.)

Betty cried as she left in the plane.

(a) [ˈbɛti ˈkraɪd əz ʃi ˈlɛft ɪn ðə ˈpleɪn]

(b) [ˈbɛɾi ˈkr̥aɪd əz ʃiː ˈlɛft ɪn̩ ðə ˈpl̩eɪn]

State rules for converting the transcription in (a) above into that in (b). Make your rules as general as possible, so that they cover not only this pair of transcriptions but also other similar sentences (for example, [t] → [ɾ] when it occurs after a vowel and before an unstressed vowel).

F. Pirahã, a language spoken by about 300 hunter-gatherers living in the Amazonian rain forest, has only three vowels—**i, a, o**—and eight consonants—**p, t, k, ʔ, b, g, s, h**. (ʔ, the glottal stop, does not have any lip or tongue action.) How many different gestures of the tongue and lips do the speakers of this language have to make? Note which are vocalic (vowel) gestures and which are consonantal gestures.

G. Hawaiian, now undergoing a revival although spoken natively by only a few hundred people, has the following vowels and consonants: **i, e, a, o, u, p, k, ʔ, m, n, w, l, h**. How many different gestures of the tongue and lips do the speakers of this language have to make? Note which are vocalic gestures and which are consonantal gestures.

H. Transcribe the following phrases as they are pronounced by either the British English or the American English speaker on the CD. Say whether the British or American English speaker is being transcribed.

1. We can see three real trees.
2. He still lives in the big city.
3. The waiter gave the lady stale cakes.
4. They sell ten red pens for a penny.
5. His pal packed his bag with jackets.
6. Father calmly parked the car in the yard.
7. The doll at the top costs lots.
8. He was always calling for more laws.
9. Don't stroll slowly on a lonely road.
10. The good-looking cook pulled sugar.
11. Sue threw the soup into the pool.
12. He loved a dull muddy-colored rug.

13. The girl with curls has furs and pearls.
14. I like miles of bright lights.
15. He howled out loud as the cow drowned.
16. The boy was annoyed by boiled oysters.

I. Transcribe the following phrases as they are pronounced by either the British English or the American English speaker on the CD. Make both (*a*) a broad transcription and (*b*) a narrower transcription. Say whether the British or American English speaker is being transcribed.

Please come home.
(a)
(b)
He is going by train.
(a)
(b)
The tenth American.
(a)
(b)
His knowledge of the truth.
(a)
(b)
I prefer sugar and cream.
(a)
(b)
Sarah took pity on the young children.
(a)
(b)

J. Read the following passages in phonetic transcription. The first, which represents a form of British English of the kind spoken by Peter Ladefoged, is a broad transcription. The second, which represents an American pronunciation typical of a Midwestern or Far Western speaker, is slightly narrower, showing a few allophones. By this time, you should be able to read transcriptions of different forms of English, although you may have difficulty pronouncing each word exactly as it is represented. Nevertheless, read each passage several times and try to pronounce it as indicated. Take care to put the stresses on the correct syllables, and say the unstressed syllables with the vowels as shown. Now listen to these passages on the CD, and comment on any problems with the transcriptions.

British English

ıt ız 'pɒsəbl tə træn'skraıb fə'netıklı

'enı 'ʌtrəns, ın 'enı 'læŋgwıdʒ,

ın 'sevrəl 'dıfrənt 'weız

'ɔl əv ðem 'juzıŋ ði 'ælfəbət ənd kən'venʃnz

əv ði 'aı 'pi 'eı.

ðə 'seım 'θıŋ ız 'pɒsəbl

wıð 'məʊst 'ʌðə ıntə'næʃənl fə'netık 'ælfəbəts.

ə træn'skrıpʃn wıtʃ ız 'meıd baı 'juzıŋ 'letəz əv ðə 'sımplıst 'pɒsəbl 'ʃeıps,

ənd ın ðə 'sımplıst 'pɒsəbl 'nʌmbə,

ız 'kɔld ə 'sımpl fəʊ'nımık træn'skrıpʃn.

American English

ıf ðə 'nʌmbə əv 'dıfrənt 'leɾəz ız 'mɔr ðen̩ ðə 'mınəməm

əz dəfaınd ə'bʌv

ðə træn'skrıpʃn wıl 'nɑt bi ə fə'nımık,

bəɾ ən ælə'fɑnık wʌn.

'sʌm əv ðə 'foʊnımz, 'ðæɾ ız tə 'seı,

wıl bı reprə'zentəd baı 'mɔr ðen 'wʌn 'dıfrənt 'sımbl.

ın 'ʌðə 'wɝdz 'sʌm ælə'foʊnz əv 'sʌm 'foʊnımz

wıl bı 'sıŋgld 'aʊt fə 'reprəzen'teıʃn ın ðə træn'skrıpʃn,

'hens ðə 'tɝm 'ælə'fɑnık.

(Both the above passages are adapted from David Abercrombie, *English Phonetic Texts* [Salem, N.H.: Faber & Faber, 1964].)

PERFORMANCE EXERCISES

It is extremely important to develop practical phonetic skills as you learn the theoretical concepts. One way to do this is to learn to pronounce nonsense words. You should also transcribe nonsense words that are dictated to you. By using nonsense words, you are forced to listen to the sounds that are being spoken. All the following words are on the CD.

A. Learn to say simple nonsense words. A good way is to start with a single vowel, and then add consonants and vowels one by one at the beginning. In this way, you are always reading toward familiar material, rather than having new difficulties ahead of you. Make up sets of words such as:

ɑ

zɑ

ı'zɑ

tr'zɑ

'ætr'zɑ

'mætr'zɑ

ʌ'mætr'zɑ

tʌ'mætr'zɑ

B. Read the following words and listen to them as they appear on the CD. Ask a partner to click on the words on the CD in a different order. Enter the order in which the words are played.

pi'suz

pi'sus

pi'zus

pi'zuz

pi'zuʒ

C. Repeat Exercise B with the following sets of words:

tɑ'θɛð	'kipik	'læmæm	'mʌlʌl
tɑ'θɛθ	'kipik	'læmæn	'mʌrʌl
tɑ'ðɛθ	'kipık	'lænæm	'mʌwʌl
tɑ'ðɛð	'kipık	'lænæn	'nʌlʌl
tɑ'feð	'kipıt	'lænæŋ	'nʌrʌl

D. There is a set of nonsense words on the CD numbered D 1–5. Play them one at a time and try to transcribe them.

1. _____
2. _____
3. _____
4. _____
5. _____

E. After you have done Exercise D, look at the following nonsense words, which are the answers to Exercise D. Now make up a set of similar words, and say these to a partner. Your words can differ from the sample set in as many sounds as you like. But we suggest that you should not make them much longer at first. You will also find it advisable to write down your words and practice saying them for some time by yourself so that you can pronounce them fluently when you say them to your partner.

'skɑnzil

'braıgbluzd

'dʒıŋsmæŋ

flɔıʃ'θraıðz

pjut'peıtʃ