INTRODUCTION TO ENGLISH PHONOLOGY

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PREFACE

Linguistics is an important tool to understand the meaning behind the language. Some of its branches are context-related, but the others are not. Phonetics and phonology are the free-context. These two are talking about sound, where this book is focused on.

The purpose of this book is to introduce the phonology to the student. By knowing the process of sound, they could become better speaker of listener. Thus, we are not the native speaker of English, without knowing the tone or the assimilation of some words will make us confuse. That's why phonology and phonetics becomes important on this case.

To help the students find more about the issues covered in this book, each chapter ends with a set of exercise and some link of video that related to the topic. The exercise will enable the students to check their understanding of the main points or important terms introduced in the chapter. Meanwhile, the link of the video will provide an opportunity to figure out about how the patterns are applied in daily life. The students will be able to know more about the use of the pattern in native speaker way of speaking.

This book is made from many references that can be found in the internet. Some of the references are not free, but the students still can find the related references with free e-book. This book is not complete edition to cover the whole phonology material. There is a lot of lack in this book. Therefore, it will be a quite useful input to have feedback about the content of this book.

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CHAPTER I
PHONETICS AND PHONOLOGY

A. The Sound Pattern of Language

Every individual has a physically different vocal tract. Consequently, in physical terms, every individual will pronounce sounds differently. There are, then thousands of physically different ways of saying the simple words of *me*. More over every individual will not pronounce the word *me* in a physically the same manner on every occasion. Obvious differences occur when the individual is shouting, is asking for sixth martini, or is suffering from cold. Given this vast range of potential differences in the actual physical production of a speech sound, we manage to consistently recognize all the versions of words through the study of phonology. Thus, we will find why *me* will have the phonetics form [mi], and not [ni] or [si], or [ma], or [mo] (Maharsi, 2002, p.28)

B. Phonetics and Phonology

There are two sub-disciplines in linguistics which deal with sound, namely phonetics and phonology, ***Phonetics*** provides objective ways of describing and analyzing the range of sounds humans use in their languages. More specifically, articulatory phonetics identifies precisely which speech organs and muscles are involved in producing the different sounds of the world's languages.

It follows that phonetics has strong associations with anatomy, physiology, physics and neurology.

There are three major braches in the study of phonetics, namely acoustic Phonetics, articulatory Phonetics, and auditory Phonetics.

Acoustic Phonetics. This deals with the transmission of speech sounds through the air (sound waves). Different instruments are used to measure the characteristics of these sound waves.

Articulatory Phonetics. Articulatory phonetics is the study of how speech sounds are produced. Sounds are classified according to the place of articulation in terms of the organs of speech used in their production (bilabial, alveolar, palatal), and according to manner of articulation in terms of the how airflow from the lungs is obstructed in their production e.g. stops, fricatives, affricates etc.

Auditory Phonetics. Hearing, or audition, is one of the traditional five senses, and refers to the bility to detect sounds. In human beings hearing is performed traditionally by the ears which also performs function of maintaining balance. A common rule of thumb used to describe human hearing is that human hearing is sensitive in the range of sound wave or frequency of 20 decibel or Hertz to 20 kHz. Auditory phonetics studies how the human hearing organ perceives sound.

We move into the domain of phonology, which is the language-specific selection and organization of sounds to signal meanings. Phonologists are interested in the sound patterns of articular languages.

Our phonological knowledge is not something we can necessarily access and talk about in detail: we often have intuitions about language without knowing where they come from, or exactly how to express them.

As we go along, what we have learned becomes easy, fluent and automatic; we only become dimly aware of what complexity lies behind our actions when we realize we have made a speech error, or see and hear a child struggling to say a word or take a step.

Phonologists, like anatomists and physiologists, aim to help us understand the nature of that underlying complexity, and to describe fully and formally what we know in a particular domain, but don't know we know.

The relationship between phonetics and phonology is a complex one, but we might initially approach phonology as narrowed-down phonetics.

Phonology, on the other hand, involves a reduction to the essential information, to what speakers and hearers think they are saying and hearing. The perspective shifts from more units to fewer, from huge variety to relative invariance, from absolutely concrete to relatively abstract;

Phonetics is universal, while phonology is language-specific. First, phonologists also attempt to distinguish those patterns which are characteristic of a single language and simply reflect its history

Sneeze, for example, has the Old English ancestor *fnesan*,

such as [kn-]: this again was common in Old English, as in *cnã an* 'to know', and survives into Modern English spelling, though it is now simply pronounced [n]; again, [kn-] is also perfectly normal in other languages, including

German, where we find *Knabe* 'boy', *Knie* 'knee'.

On the other hand, if you say the words *intemperate* and *incoherent* to yourself as naturally as you can, and concentrate on the first consonant written *n*, you may observe that this signals two different sounds. In *intemperate*, the front of your tongue moves up behind your top front teeth for the *n*, and stays there for the *t*; but in *incoherent*, you are producing the sound usually indicated by *ing* in English spelling, with our tongue raised much further back in the mouth, since that's where it's going for the following [k] (spelled *c*). Processes of assimilation like this involve two sounds close together in a word becoming closer together in terms of pronunciation, making life easier for the speaker by reducing vocal tract gymnastics. Assimilation is an everyday occurrence in every human language; and it is particularly common for nasal sounds, like the ones spelled *n* here, to assimilate to following consonants.

This is not just an automatic, phonetic matter: in some cases a single speaker will always use one variant, but in others, individuals will use different variants on different occasions. It also has nothing to do with the physical characteristics of the different speakers, or the different environments in which they may find themselves,

Providing an adequate and accurate phonological description is therefore a challenge: on the one hand, a single system for English would be too abstract, and would conceal many meaningful differences between speakers; on the other, a speaker-by-speaker account would be too detailed, and neglect what unifies speakers and allows them to recognize one another as using the same system. In what follows, we will concentrate on a small number of varieties – Southern Standard British English; Scottish Standard English; General American, the most frequently encountered broadcasting variety in the United States; and New Zealand English.

C. The International Phonetic Alphabet

To date, the involvement of analogies from outside languages or examples given is rather general. Provide more detailed examples demands a more specific vocabulary, and a notation system dedicated to the description of sounds. The English spelling system, although it is the system of transcription we are most used to, is both too restrictive and too lenient to do the job.

Without a universal transcription system for phonetics and phonology, writing down the unfamiliar sounds of other languages presents an almost insuperable challenge. Take, for example, a sound which is used only paralinguistically in English (that is, for some purpose outside the language system itself), but which is a perfectly ordinary consonant in other languages, just as [b] in but or [l] in list are in English, namely the 'tut-tut' sound made to signal disapproval. When we see this, we do not think of a whole word, but of a repeated clicking. This description is hopelessly inadequate, however, for anyone else trying to recognise the sound in question, or learn how to make it. Hearing a native speaker use the 'tut-tut' click in a language where it is an ordinary consonant does not help us understand how the sound is made or how it compares with others. Likewise, adopting the usual spelling from that language (assuming it is not one of the many without an orthography) might let us write the 'tut-tut' sound down; but this technique would not produce a universal system for writing sounds of the world's languages, since linguists would tend to use their own spelling systems as far as possible, and opt for representations from the languages they happened to know for other sounds. There would be little consistency, and generalisation of such a system would be difficult.

The situation is worse with 'exotic' sounds which do not happen to coincide even with those used paralinguistically in English: groping towards a description in ordinary English is far too vague to allow accurate reproduction of the sound in question; and indeed, such sounds tended by early commentators to be regarded as unstable or not quite proper. John Leighton Wilson, who published a brief description of the African language Grebo in 1838, had considerable difficulties with sounds which do not have an obvious English spelling, and tended to resolve this by simply not transcribing them at all. Thus, he notes that 'There is a consonant sound intermediate between b and p, which is omitted … with the expectation that it will, in the course of time, gradually conform to one or the other of the two sounds to which it seems allied'. Similarly, he observes 'a few words in the language so completely nasal that they cannot be properly spelled by any combination of letters whatever'.

It is for these reasons that the International Phonetic Alphabet was proposed in 1888; it has been under constant review ever since by the International Phonetic Association, and the latest revision dates from 1996. It is true that a certain amount of learning is required to become familiar with the conventions of the IPA and the characteristics of sounds underlying the notation: but once you know that 'tut-tut' is [ǀ], an alveolar click, it will always be possible to produce the relevant sound accurately; to write it down unambiguously; and to recognise it in other languages.

Although a universal system of description and transcription might be desirable in principle, and even in practice when dealing with unfamiliar languages and sounds, readers of a book both in and on English might question the necessity of learning the IPA. However, precisely the same types of problems encountered above also appear in connection with the phonology of English, and some new ones besides.

First, there is considerable ambiguity in the English spelling system, and it works in both directions: many sounds to one spelling, and many spellings to one sound. The former situation results in 'eye-rhymes', or forms which look as if they ought to have the same pronunciation, but don't. There are various doggerel poems about this sort of ambiguity (often written by non-native speakers who have struggled with the system): one begins by pointing out a set of eye-rhymes – 'I gather you already know, Of plough and cough and through and dough'. Those four words, which we might expect to rhyme on the basis of the spelling, in fact end in four quite different vowels, and cough has a final consonant too. On the other hand, see, sea, people, amoeba and fiend have the same long vowel, but five different spellings.

Despite these multiple ambiguities, attempts are regularly made to indicate pronunciations using the spelling system. None are wholly successful, for a variety of different reasons. The lack of precision involved can be particularly frustrating for phonologists trying to discover characteristics of earlier stages of English. John Hart, a well-known sixteenth-century grammarian, gives many descriptions of the pronunciations of his time, but the lack of a standard transcription system hampers him when it comes to one of the major mysteries of English phonology at this period, namely the sound of the vowel spelled a. Hart mentions this explicitly, and tells us that it is made ‘with wyde opening of the mouthe, as when a man yawneth’: but does that mean a back vowel, the sort now found for Southern British English speakers in father, or a front one, like the father vowel for New Zealanders or Australians? Similarly, Thomas Low Nichols, discussing mid-nineteenth-century American English, notes that ‘It is certain that men open their mouths and broaden their speech as they go West, until on the Mississippi they will tell you “thar are heaps of bar [bear] over thar, whar I was raised”’. Here we have two related difficulties: the nature of the a vowel, and what the orthographic r means, if anything. Most British English speakers (those from Scotland, Northern Ireland and some areas of the West Country excepted) will pronounce [r] only immediately before a vowel: so a London English speaker would naturally read the quote with [r] at the end of the first thar, bar and whar, but not the second thar, where the next word begins with a consonant. However, a Scot would produce [r] in all these words, regardless of the following sound. Which is closer to what Thomas Low Nichols intended? Orthographic r is still problematic today: when Michael Bateman, in a newspaper cookery column, writes that ‘This cook, too, couldn’t pronounce the word. It’s not pah-eller; it’s pie ey-yar’, he is producing a helpful guide for most English English speakers, who will understand that his ‘transcription’ of paella indicates a final vowel, since they would not pronounce [r] in this context in English; but he is quite likely to confuse Scots or Americans, who would pronounce [r] wherever r appears in English spelling, and may therefore get the mistaken idea that paella has a final [r] in Spanish. In short, the fact that there are many different Englishes, and that each quite properly has its own phonological interpretations of the same spelling system (which, remember, is multiply ambiguous in the first place), means we encounter inevitable difficulties in trying to use spelling to give explicit information about sounds.

The same problems arise in a slightly different context when writers try to adapt the spelling system to indicate accent differences:

'Good flight?' asked Jessica at Christchurch Airport. I melodramatically bowed a depressurization-deaf ear towards her … before answering that it had been a little gruelling.

'You are a bit pale. But you'll still be able to get breakfast at the hotel … '

What Jessica actually said was git brikfist it the hitil. The Kiwi accent is a vowel-vice voice, in which the e is squeezed to an i, the a elongated to an ee. A New Zealander, for example, writes with a pin, and signals agreement with the word yis.

(Mark Lawson, The Battle for Room Service:

Journeys to all the safe places, Picador (1994), 22)

Lawson succeeds in showing that a difference exists between New Zealand and English English, and provides a very rough approximation of that difference. However, anyone who has listened to New Zealand speakers will know that their pronunciation of pen is not identical to Southern British English pin, as Lawson's notation would suggest; and readers who have not encountered the variety might arrive at a number of different interpretations of his comments that New Zealand vowels are 'squeezed' or ‘elongated’. The National Centre for English Cultural Tradition in Sheffield has produced a list of local phrases, again dered in a modified version of English spelling: it includes intitot (‘Isn’t it hot?’), eez gooinooam (‘he’s going home’), and lerrus gerrus andzwesht (‘Let’s get our hands washed’). Sometimes the modifications are obvious; the lack of h in intitot suggests that no [h] is pronounced, and the substitution of r for t in lerrus gerrus signals the common northern English weakening of [t] to [r] between vowels. But why double rr? The double vowel letters in gooinooam presumably signal long vowels; but the rr in lerrus certainly does not mean a long consonant. Such lists are amusing when the reader knows the variety in question; but reading the list in a respectable imitation of an unfamiliar accent would be rather a hit and miss affair.

The same goes for dialect literature, even when there is an informally agreed set of emendations to the spelling system, as is perhaps the case for Scottish English. Tom Leonard’s poem ‘Unrelated Incidents’ begins:

this is thi
six a clock
news thi
man said n
thi reason
a talk wia
BBC accent
iz coz yi
widny wahnt
mi ti talk
aboot thi

trooth wia
voice lik
wanna yoo scruff.

Again, many of the alterations are entirely transparent for a reader who is familiar with Scottish English – aboot does sound like a-boot rather than having the diphthong usually found in Southern British English about, and widny rather than wouldn't is both clear and accurate. However, not everything is so obvious.Trooth is written to match aboot, and the two words do have the same vowel in Scots – but the former is pronounced like its English English equivalent, whereas the latter is not; so we might ask, why alter both? Thi is consistently written for the, and there is indeed a slight difference in those final vowels between the two varieties; but if we compare Tom Leonard with Mark Lawson, the impression given is that thi (= the) for a Scot sounds like pin (= pen) for a New Zealander, which is not the case at all.

In some cases of this type, there are attempts to introduce new symbols into the English spelling system to represent accent differences: one particularly common device is to use an apostrophe. This has become a fairly conventional and familiar device; but again, it turns out to be ambiguous. For instance, take the three phrases I feel 'ot, She was waitin', and Give us the bu'er. The first is perhaps the most straightforward: many speakers of non-standard varieties of English consistently drop their [h]s (and we all do, in pronouns under low stress, for instance, as in What did he say?, where [h] will be pronounced only in extraordinarily careful speech). In this case, then, the apostrophe means the standard [h] is omitted. This might, however, lead us to believe that an apostrophe always means something is missing, relative to the standard pronunciation. Informal characterisations might support this hypothesis, since speakers producing forms like waitin' and bu'er are frequently described as 'dropping their gs' and 'dropping their ts' (or 'swallowing their ts') respectively: an article in The Independent of 28 June 2000 reports that '... the entire cast of East Enders ... swallow their ts, ps and ks like true Glasgow speakers when using such words as "sta'ement" and "sea'belt"'. However, the phonetic facts suggest otherwise. Whereas 'ot simply lacks an initial consonant, waitin' does not lack a final one: instead, the final [ŋ] of waiting has been replaced by [n] (recall the discussion of incoherent versus intemperate above). For most speakers, apart from some from the Midlands and north of England, there was no [g] to drop in the first place, simply one nasal in more formal circumstances, which shifts to another nasal in informal conversation. In bu'er, we also find one consonant, this time [t], being replaced by another, the glottal stop; but this time, the replacement is only found in English as an alternative for another sound. It has no independent orthographic representation, and is strongly associated with informal, non-standard and stigmatised usage.

If we are to consider these variants objectively, however, we need a system of notation which will allow us to observe them neutrally, providing transcriptions of each variety in its own terms: seeing the glottal stop as IPA [ʔ], which is a perfectly normal consonant in, say, Arabic, rather than regarding it as an unsymbolisable grunt, or a debased form of another consonant, may allow us to analyse the facts of accent variation without seeing every departure from an idealised standard variety as requiring apology. The linguistic arbitrariness but social grounding of such judgements is apparent from forms like car park – a standard Southern British English pronunciation will have no [r] in either word, and to a Scottish English speaker with both [r]s invariably produced, there is certainly something missing; but I have not seen this represented as ca' pa'k, or heard southerners accused of 'swallowing their [r]s'.

For all these cases, what we need is a consistent, agreed system of transcription, so that we can assess the accent differences we find and compare them with confidence. Of course, no purely phonetic system is going to help with the meaning of items of vocabulary a reader has not met before – an IPA transcription will not tell you what a bampot is, or glaur, or a beagie, if you don't know. But at least you have the comfort of knowing how the natives pronounce it.

At the same time, this is an introductory text on English, and not a handbook of general phonetics, so only those sections of the IPA relevant to English sounds will be considered, beginning with consonants in Chapter 3, and moving on to vowels, where most accent variation in English is concentrated. However, before introducing the IPA in detail, we must also confront a phonological issue. As we have already seen, native speakers of a language cannot always be relied upon to hear every theoretically discernible gradation of sound. In some cases, the IPA supplies alternative symbols in cases where speakers will be quite sure they are hearing the same thing; and this is not a universal limitation of human ears, but rather varies from language to language. To illustrate this, and to resolve the problem that sometimes speakers think they are hearing something quite different from what they objectively are hearing, we must introduce the concept of the phoneme.

D. Morphemes

In phonology, morphemes are how we say words or parts of words. often occur morphemes are pronounced differently, this is depending on the context. here we will introduce this depiction of morpheme variations based on phonological rules. this discussion will begin with some examples from English then switch to examples from other languages.

E. The Pronunciation of Plurals

Almost all words in English have the plural as an example: *book/books, orange/oranges, box/boxes.* But have you ever paid attention to how plural forms are *pronounced*? Listen to a native speaker of English (or yourself if you are one) pronounce the plurals of the following nouns.

A	**B**	**C**	**D**
cab	cap	bus	child
cad	cat	bush	ox
bag	back	buzz	mouse
love	cuff	garage	criterion
lathe	faith	match	sheep
cam		badge	
can			
call			
bar			
spa			
boy			

From the words above, the final sound of the plural noun from Column A is [z] - an alveolar fricative that is voiced. For column B, the plural suffix is [s] —a sound alveolar fricative. And for Column C it is [əz]. if observed in the examples of the morpheme there are regularities in columns A, B, and C which do not exist in D. Plural forms in D - children, cattle, rats, criteria, and sheep - are hodge circumvention of special cases memorized individually when you get English, either original or as a second language. this is because there is no way to predict the plural of these words. how to know the pronunciation of this plural morpheme? The spelling, which adds s or es, is misleading—not a z in sight—yet if you know English, you pronounce it as we indicated. When faced with this type of question, it's useful to make a chart that records the phonological environments in which each variant of the morpheme is known to occur. (The more technical term for a variant of a morpheme is allomorph.)

Allomorph	Environment
[z]	After [kæb], [kæd], [bæg], [lʌv], [leð], [kæm], [kæn], [bæŋ], [kɔl], [bar], [spa], [bɔɪ], e.g., [kæbz], [kædz] . . . [bɔɪz]
[s]	After [kæp], [kæt], [bæk], [kʌf], [feθ], e.g., [kæps], [kæts] . . .[feθs]
[əz]	After [bʌs], [bʊʃ], [bʌz], [gəraʒ], [mæʧ], [bæʤ], e.g., [bʌsəz], [bʊʃəz] . . . [bæʤəz]

The pattern behind the way plurals are pronounced, can be searched through some property of the environment associated with each group of allomorphs. For example, what is it about [kæb] or [lʌv] that determines that the plural morpheme will take the form [z] rather than [s] or [əz]. We look for a minimal pairs in the list of words to guide search. A minimal pair is two words with different meanings that are identical except for one sound segment that occurs in the same place in each word. For example, *cab* [kæb] and *cad* [kæd] are a minimal pair that differ only in their final segments, whereas *cat* [kæt] and *mat* [mæt] are a minimal pair that differ only in their initial segments. Other minimal pairs in our list include *cap/cab*, *bag/ back*, and *bag/badge*. Minimal pairs whose members take different allomorphs for example, consider *cab* [kæb] and *cap* [kæp], which respectively take the allomorphs [z] and [s] to form the plural. Similarly for *bag* [bæg] and *badge* [bæʤ]. Their final segments determine the different plural allomorphs [z] and [əz]. Apparently, the distribution of plural allomorphs in English is conditioned by the final segment of the singular form.

Allomorph	Environment
[z]	After [b], [d], [g], [v], [ð], [m], [n], [ŋ], [l], [r], [a], [ɔɪ]
[s]	After [p], [t], [k], [f], [θ]
[əz]	After [s], [ʃ], [z], [ʒ] , [ʧ], [ʤ]

To understand why the English plural follows this pattern. We always answer questions of this type by inspecting the phonetic properties of the conditioning segments. Such an inspection reveals that the segments that trigger the [əz] plural have in common the property of being sibilants. Of the nonsibilants, the voiceless segments take the [s] plural, and the voiced segments take the [z] plural. Now the rules can be stated in more general terms:

Allomorph	**Environment**
[z]	After voiced nonsibilant segments
[s]	After voiceless nonsibilant segments
[əz]	After sibilant segments

An even more concise way to express these rules is to assume that the basic or underlying form of the plural morpheme is /z/, with the meaning 'plural.' This is the "default" pronunciation. The rules tell us when the default does *not* apply:

a. Insert a [ə] before the plural morpheme /z/ when a regular noun ends in a sibilant, giving [əz].
b. Change the plural morpheme /z/ to a voiceless [s] when preceded by a voiceless sound.

These rules will derive the phonetic forms—that is, the pronunciations—of plurals for all regular nouns. Because the basic form of the plural is /z/, if no rule applies, then the plural morpheme will be realized as [z].

The particular phonological rules that determine the phonetic form of the plural morpheme and other morphemes of the language are morphophonemic rules. Such rules concern the pronunciation of specific morphemes. So the pronunciation of a word like *horse* /hɔrs/ is with a final [s] because there is no morpheme boundary between the /s/ and the voiced /r/ that precedes it.

1. Additional Examples of Allomorphs

The formation of the regular past tense of English verbs parallels the formation of regular plurals. Like plurals, some irregular past tenses conform to no particular rule and must be learned individually, such as *go/went*, *sing/sang*, and *hit/hit*. And also like plurals, there are three *phonetic* past-tense morphemes for regular verbs: [d], [t], and [əd]. Here are several examples in broad phonetic transcription. Study sets A, B, and C and try to see the regularity before reading further.

Set A: *gloat* [glot], *gloated* [glotəd]; *raid* [red], *raided* [redəd]

Set B: *grab* [græb], *grabbed* [græbd]; *hug* [hʌg], *hugged* [hʌgd]; *faze*[fez], *fazed* [fezd]; *plan* [plæn], *planned* [plænd]

Set C: *reap* [rip], *reaped* [ript]; *poke* [pok], *poked* [pokt]; *kiss* [kɪs],*kissed* [kɪst]; *fish* [fɪʃ], *fished* [fɪʃt]; patch [pæʧ], *patched* [pæʧt]

Set A suggests that if the verb ends in a [t] or a [d] (i.e., non-nasal alveolar stops), [əd] is added to form the past tense, similar to the insertion of [əz] to form the plural of nouns that end in sibilants. Set B suggests that if the verb ends n a voiced segment other than [d], you add a voiced [d]. Set C shows us that if the verb ends in a voiceless segment other than [t], you add a voiceless [t].

Just as /z/ was the basic form of the plural morpheme, /d/ is the basic form of the past-tense morpheme, and the rules for past-tense formation of regular verbs are much like the rules for the plural formation of regular nouns. These are also *morphophonemic* rules as they apply specifically to the past-tense morpheme /d/. As with the plural rules, the output of Rule 1, if any, provides the input to Rule 2, and the rules must be applied in order.

1. Insert a [ə] before the past-tense morpheme when a regular verb ends in a non-nasal alveolar stop, giving [əd].
2. Change the past-tense morpheme to a voiceless [t] when a voiceless sound precedes it.

Two further allomorphs in English are the possessive morpheme and the thirdperson singular morpheme, spelled *s* or *es*. These morphemes take on the same phonetic form as the plural morpheme *according to the same rules*! Add [s] to *ship* to get *ship's*; add [z] to *woman* to get *woman's*; and add [əz] to *judge* to get *judge's*. Similarly for the verbs *eat*, *need*, and *rush*, whose third-person singular forms are *eats* with a final [s], *needs* with a final [z], and *rushes* with a final [əz].

That the rules of phonology are based on properties of segments rather than on individual words is one of the factors that make it possible for young children to learn their native language in a relatively short period. The young child doesn't need to learn each plural, each past tense, each possessive form, and each verb ending, on a noun-by-noun or verb-by-verb basis. Once the rule is learned, thousands of word forms are automatically known. And as we will see when we discuss language development in chapter 9, children give clear evidence of learning morphophonemic rules such as the plural rules by applying the rule too broadly and producing forms such as *mouses*, *mans*, and so on, which are ungrammatical in the adult language.

English is not the only language that has morphemes that are pronounced differently in different phonological environments. Many languages have morpheme variation that can be described by rules similar to the ones we have written for English. For example, the negative morpheme in the West African language Akan has three nasal allomorphs: [m] before *p*, [n] before *t*, and [ŋ] before *k*, as the following examples show ([mɪ] means 'I'):

mɪ pɛ	'I like'	mɪ mpɛ	'I don't like'
mɪ tɪ	'I speak'	mɪ ntɪ	'I don't speak'
mɪ kɔ	'I go'	mɪ ŋkɔ	'I don't go'

The rule that describes the distribution of allomorphs is:

Change the place of articulation of the nasal negative morpheme to agree with the place of articulation of a following consonant.

The rule that changes the pronunciation of nasal consonants as just illustrated is called the **homorganic nasal rule**—*homorganic* means 'same place'—because the place of articulation of the nasal is the same as for the following consonant. The homorganic nasal rule is a common rule in the world's languages.

F. Phoneme and Allophone

Phonemes are the basic form of a sound as sensed mentally rather than spoken or heard. Each phoneme – a mental abstraction in itself – is manifested aurally by one or more sounds, called allophones, which are the perceivable sounds corresponding to the phoneme in various environments. For example, the phoneme /p/ is pronounced with the aspiration allophone [ph] in *pit* but without aspiration [p] in *spit*. Phonological rules operate on phonemes to make explicit which allophones are pronounced in which environments (Fromkin, 2014, p.230).

Phoneme is the single abstract unit of sound type which is represented by a single symbol. Thus, phoneme /t/ is described as a sound type. Noted that slash mark / / are used to indicate a *phoneme*, and square brackets [ ] is used to each *phonetics segment*.

The – and + are 'features' used to distinguish each phoneme from the next. Thus, /p/ can be characterized as [-voice, +bilabial, +stop] and /k/ as [-voice, +velar, +stop]. Because /p/ and /k/ share the same phonemic features, they are described as member of *natural class sound*. If a sound does not share the same phonemic features, then, it does not belong to the same "natural class". Another example is the phoneme /v/ which has the features [+voice, +labiodental, +fricative], so it cannot be in the same natural class as /p/ and /k/. The features analysis could lead to suspicion that there may be a good phonological reason why words beginning with /pl-/ and /kl-/ are common in English but /vl-/ are not.

1. The reality of the phoneme

We have already seen that the phoneme system of a speaker's native language, and specifically the difference between pairs of sounds which contrast and pairs which do not, strongly condition her perceptions: the early twentieth century American linguist Sapir concludes that 'What the native speaker hears is not phonetic elements but phonemes'. However, the phoneme is a psychologically real unit in other ways too, since it does not only condition what we hear, but also what we do.

First, alphabetic spelling systems are frequently based on the phonemes of a language: there are various reported cases of linguists teaching variants of the IPA to speakers of languages which lacked orthographies, and providing inventories of symbols which covered all the phones of the language, but where speakers subsequently made use of only one symbol per phoneme. In Old English, both [f] and [v], which were then in complementary distribution, were spelled , whereas in Modern English contrastive /f/ and /v/ typically correspond to (or) versus . Similarly, in Hungarian /k/ and /c/ are consistently distinguished as and . The alphabet has several times been borrowed by speakers of one language from those of another, and has been remodelled in some respects to fit the borrowing phoneme system better. So, the first letter of the Semitic alphabet represents the glottal stop, [ʔ], which is phonemically distinctive in Arabic, for example: but when this alphabet was borrowed by the Greeks, that first letter, Greek alpha, was taken to represent the vowel which begins the word alpha itself. Although Greek speakers would commonly produce an initial glottal stop on a word like alpha (as would English speakers, especially when saying the word emphatically), they would not observe it or want to symbolise it, since [ʔ] is not a phoneme of Greek. We should not, however, as we saw in the last chapter, assume that we can simply read the phoneme system off the spelling system, since there is not always a one-to-one correlation. Hence, English does have two orthographic symbols for /k/, namely and , but these do not systematically signal two separate allophones: the spelling system simply has a redundant extra symbol here. Furthermore, some phonemes are spelled consistently, but not with a single graph, so the phonemic difference between the English nasals /m/, /n/ and /ŋ/ in ram, ran and rang, is signalled orthographically by , and (or in rank).

More importantly, our native phoneme system tends to get in the way when we try to learn other languages. It is perhaps unsurprising that we should find it difficult at first to produce sounds which do not figure at all in our first language. However, it is just as difficult, and sometimes worse, to learn sounds which are phonemically contrastive in the language we are learning, but allophones of a single phoneme in our native system. For instance, there is no contrast between aspirated [th] and unaspirated [t] in English; we can predict that the former appears only wordinitially. In Chengtu Chinese, however, /t/ contrasts with /th /, as we find minimal pairs like [tou] 'a unit of dry measure for grain' versus [th ou] 'to tremble'; the same is true in Thai, where [tam] 'to pound' contrasts with [th am] 'to do', establishing a phonemic distinction of /t/ and /th /. When a native English speaker tries to learn Chengtu Chinese, or Thai, she will find this distinction extremely awkward to replicate, despite the fact that she herself has always used both these sounds. The problem is that, whereas a totally new and unfamiliar sound simply has to be learned from scratch, an old sound in a new role requires further processes of adjustment: our English speaking Thai learner has to suppress her instinctive and subconscious division of the aspirated and unaspirated sounds, and learn to produce both in the same context. In perceptual terms, it is again easier to hear a completely new sound, which will initially be extremely easy to perceive because of its very unfamiliarity, than to learn to distinguish two sounds which have conceptually been considered as one and the same. Conversely, a Korean speaker, who has [r] and [l] as allophones of a single phoneme, with [r] produced between vowels and [l] everywhere else, will make errors in learning English, finding minimal pairs like lot and rot highly counter-intuitive, and tending to produce [l] at the beginning of both, but [r] medially in both lolly and lorry. A combination of unlearning and learning are needed to get those patterns right.

In Chapter 4, we shall return to phonemes and allophones, and develop more precise ways of stating exactly where each allophone occurs. First, however, we need some more phonetic detail on the consonants of English, and some more technical vocabulary to describe how they are produced.

2. Illustration of Allophones

English contains a general phonological rule that determines the contexts in which vowels are nasalized. In chapter we noted that both oral and nasal vowels occur phonetically in English. The following examples show this:

bean	[bĩn]	bead	[bid]

roam [rõm] robe [rob]

Taking oral vowels as basic—that is, as the phonemes—we have a phonological rule that states:

Vowels are nasalized before a nasal consonant within the same syllable.

This rule expresses your knowledge of English pronunciation: nasalized vowels occur only before nasal consonants and never elsewhere. The effect of this rule is seen in Table 1.1

Table	Nasal and Oral Vowels: Words and Nonwords				
Words			Nonwords		
be [bi]	bead [bid]	bean [bĩn]	*[bĩ]	*[bĩd]	*[bin]
lay [le]	lace [les]	lame [lẽm]	*[lẽ]	*[lẽs]	*[lem]

As the table shows, oral vowels in English occur in final position and before non-nasal consonants; nasalized vowels occur only before nasal consonants. The nonwords (starred) show us that nasalized vowels do not occur finally or before non-nasal consonants, nor do oral vowels occur before nasal consonants.

You may be unaware of this variation in your vowel production, Whether you speak or hear the vowel in bean with or without nasalization does not change the word's meaning. Without nasalization, it might sound a bit strange, as if you had a foreign accent, but bean pronounced [bĩn] and bean pronounced [bin] would convey the same word. Likewise, if you pronounced bead as [bĩd], with a nasalized vowel, someone might suspect you had a cold, or that you spoke nasally, but the word would remain bead. Because nasalization is an inessential difference insofar as what the vowel actually is, we tend to be unaware of it.

Contrast this situation with a change in vowel height. If you intend to say bead but say bed instead, that makes a difference. The [i] in bead and the [ɛ] in bed are sounds from different phonemes. Substitute one for another and you get a different word (or no word). The [i] in bead and the [ĩ] in the nasalized bead do not make a difference in meaning. These two sounds, then, belong to the same phoneme, an abstract high front vowel that we denote between slashes as /i/.

Similarly, English also contains a phonological rule that determines the context

in which voiceless stops—/p/, /t/, and /k/—are aspirated:

Voiceless stops are aspirated when they occur initially in a stressed syllable

You could say spit with an aspirated [ph], as [sphɪt], and it would be understood as spit, but listeners would probably think you were spitting out your words. Because aspiration is an inessential difference insofar as what the consonant actually is, we do not notice it (unless we're linguists or students of linguistics). Thus there is one phoneme /p/—an abstract voiceless bilabial stop—which may be pronounced [ph] or [p] depending on the phonetic context.

As a third illustration of allophones, consider the voiceless alveolar stop /t/ along with the following examples:

Spelling	Phonemic	Phonetic
representation		representation
tick	/tɪk/	[thɪk]
stick	/stɪk/	[stɪk]

blitz	/blɪts/	[blɪts]
bitter	/bɪtər/	[bɪɾər]

In tick we normally find an aspirated [th], whereas in stick and blitz we find an unaspirated [t], and in bitter we find the flap [ɾ]. Swapping these sounds around will not change word meaning. If we pronounce bitter with a [th], it will not change the word; it will simply sound unnatural (to most Americans).

We account for this knowledge of how t is pronounced by positing a phoneme /t/ with three allophones [th], [t], and [ɾ]. We also note phonological rules to the effect that the aspirated voiceless stop [th] occurs initially in a stressed syllable, the unaspirated [t] occurs directly before or after /s/, and the flap [ɾ] occurs between a stressed vowel and an unstressed vowel.

3. How to Find Phonemes

Phonemes are the dark matter of phonology; they are not physical sounds and directly observable. The phonological rules of the language apply to phonemes to determine the pronunciation of words.

The process of substituting one sound for another in a word to see if it makes a difference is a good way to identify the phonemes of a language. Here are twelve words differing only in their vowels:

beat	[bit]	[i]	boot	[but]	[u]
bit	[bɪt]	[ɪ]	but	[bʌt]	[ʌ]
bait	[bet]	[e]	boat	[bot]	[o]
bet	[bɛt]	[ɛ]	bought	[bɔt]	[ɔ]
bat	[bæt]	[æ]	bout	[baʊt]	[aʊ]
bite	[baɪt]	[aɪ]	bot	[bat]	[a]

Any two of these words form a minimal pair: two different words that differ in one sound in the same position. The two sounds that cause the word difference belong to different phonemes. The pair [bid] and [bĩd] are not different words; they are variants of the same word. Therefore, [i] and [ĩ] do not belong to different phonemes. They are two actualizations of the same phoneme.

From the minimal set of [b_t] words we can infer that English has at least twelve vowel phonemes. (We consider diphthongs to function as single vowel sounds.) To that total we can add a phoneme corresponding to [ʊ] resulting from minimal pairs such as book [bʊk] and beak [bik]; and we can add one for [ɔɪ] resulting from minimal pairs such as boy [bɔɪ] and buy [baɪ].

Minimal pair analysis has revealed eleven monophthongal and three diphthongal vowel phonemes, namely, /i/, /ɪ/, /e/, /ɛ/, /æ/, /u/, /ʊ/, /o/, /ɔ/, /a/,/ʌ/, and /aɪ/, /aʊ/, and /ɔɪ/. (This set may differ somewhat in other variants of English.) Importantly, each of these vowel phonemes has (at least) two allophones (i.e., two ways of being pronounced: orally as [i], [ɪ], [e], etc., and nasally as [ĩ], [ɪ̃] , [ẽ], etc.), as determined by the phonological rule of nasalization.

A particular realization (pronunciation) of a phoneme is called a phone. The aggregate of phones that are the realizations of the same phoneme are called the allophones of that phoneme. In English, each vowel phoneme has both an oral and a nasalized allophone. The choice of the allophone is not random or haphazard; it is rule-governed.

To distinguish graphically between a phoneme and its allophones, we use slashes / / to enclose phonemes and continue to use square brackets [ ] for allophones or phones.

For example, [i] and [ĩ] are allophones of the phoneme /i/; [ɪ] and [ɪ̃] are allophones of the phoneme /ɪ/, and so on. Thus we will represent bead and bean phonemically as /bid/ and /bin/. We refer to these as phonemic transcriptions of the two words. The rule for the distribution of oral and nasal vowels in English shows that phonetically these words will be pronounced as [bid] and [bĩn]. The pronunciations are indicated by phonetic transcriptions, and written between square brackets.

4. Complementary Distribution

Minimal pairs illustrate that some speech sounds in a language are contrastive and can be used to make different words such as *big* and *dig*. These contrastive sounds group themselves into the phonemes of that language. Some sounds are non-contrastive and cannot be used to make different words. The sounds [th] and [ɾ] were cited as examples that do not contrast in English, so [raɪthər] and [raɪɾər] are not a minimal pair, but rather alternate ways in which *writer* may be pronounced. Oral and nasal vowels in English are also non-contrastive sounds. What's more, the oral and nasal allophones of each vowel phoneme never occur in the same phonological context, as Table illustrates.

Where oral vowels occur, nasal vowels do not occur, and vice versa. In this sense the phones are said to complement each other or to be in complementary distribution.

Complementary distribution is a fundamental concept of phonology, and interestingly enough, it shows up in everyday life. Here are a couple of examples that draw on the common experience of reading and writing English.

Table 1.2

Table	Distribution oral and nasal vowels in english syllables		
	In Final Position	Before Nasal Consonant	Before Oral Consonant
Oral Vowels	yes	no	yes
Nasal Vowels	no	yes	no

The first example focuses on *printed* letters, each printed letter of English has two main variants: lowercase and uppercase (or capital). If we restrict our attention to words that are not proper names or acronyms (such as Ron or UNICEF), we can formulate a simple rule that does a fair job of determining how letters will be printed:

A letter is printed in uppercase if it is the first letter of a sentence; otherwise, it is printed in lowercase.

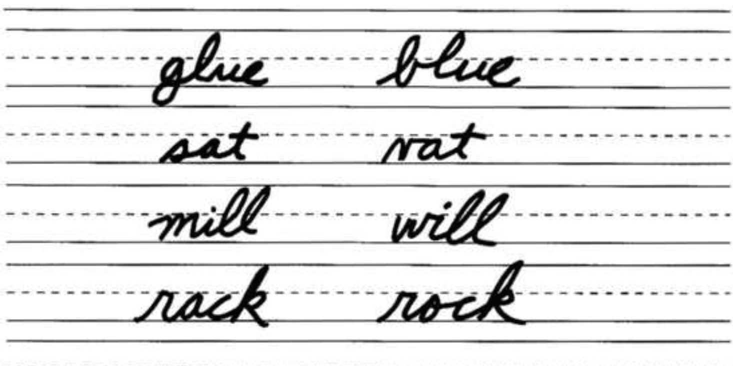
Even ignoring names and acronyms, this rule is only approximately right, but let's go with it anyway. It helps to explain why written sentences such as the following appear so strange:

phonology is the study of the sound patterns of human languageS. pHONOLOGY iS tHE sTUDY oF tHE sOUND pATTERNS oF Human lANGUAGES.

These "sentences" violate the rule in funny ways. Despite that, they are comprehensible, just as the pronunciation of *beast* with a nasal [ĩ] as [bĩd] would sound funny but be understood.

To the extent that the rule is correct, the lowercase and uppercase variants of an English letter *are in complementary distribution*. The uppercase variant occurs in one particular context (namely, at the beginning of the sentence), and the lowercase variant occurs in every other context (or elsewhere). Therefore, just as every English vowel phoneme has an oral and a nasalized allophone that occurs in different spoken contexts, every letter of the English alphabet has two variants, or allographs, that occur in different written contexts. In both cases, the two variants of a single mental representation (phoneme or letter) are in *complementary distribution* because they never appear in the same environment. And, substituting one for the other—a nasal vowel in place of an oral one, or an uppercase letter in place of a lowercase one—may sound or look unusual, but it will not change the meaning of what is spoken or written.

Our next example turns to *cursive* handwriting, which you are likely to have learned in elementary school. Writing in cursive is in one sense more similar to the act of speaking than printing is, because in cursive writing each letter of a word (usually) connects to the following letter—just as adjacent sounds connect during speech. the connections between the letters of a word in cursive writing create different variants of a letter in different environments:



Picture 1.1

Compare how the letter *l* appears after a *g* (as in *glue*) and after a *b* (as in *blue*). In the first case, the *l* begins near the bottom of the line, but in the second case, the *l* begins near the middle of the line (which is indicated by the dashes). In other words, the same letter *l* has two variants. Meaning is unaffected by the position of *l*: wherever the *l* begins, it's still an *l*. Likewise, whether a vowel in English is nasalized or not does not affect meaning, it's still that same vowel. Which variant occurs in a particular word is determined by the immediately preceding letter. The variant that begins near the bottom of the line appears after letters like *g* that end near the bottom of the line. The variant that begins near the middle of the line appears after letters like *b* that end near the middle of the line. The two variants of *l* are therefore in complementary distribution.

This pattern of complementary distribution is not specific to *l* but occurs for other cursive letters in English. By examining the pairs *sat* and *vat*, *mill* and *will*, and *rack* and *rock*, that the complementary distribution of the variants of *a*, *i*, and *c*, respectively. In each case, the immediately preceding letter determines which variant occurs, with the consequence that the variants of a given letter are in complementary distribution.

5. The Need for Similarity

When sounds are in complementary distribution, they do not contrast with each other. The replacement of one sound for the other will not change the meaning of a word, although it might not sound like typical English pronunciation. Given these facts about the patterning of sounds in a language, a phoneme can be seen as underlying a set of phonetically similar sounds that are in complementary distribution. A set may consist of only one member because a particular phoneme is actualized in all contexts by only one sound; it has one allophone.

Complementary distribution alone is insufficient for determining the allophones when there is more than one allophone in the set. The phones must also be *phonetically similar*, that is, share most phonetic features. In English, the velar nasal [ŋ] and the glottal fricative [h] are in complementary distribution; [ŋ] does not occur word-initially and [h] does not occur word-finally. But they share very few phonetic features; [ŋ] is a voiced velar nasal stop; [h] is a voiceless glottal fricative. Therefore, they are not allophones of the same phoneme; [ŋ] and [h] are allophones of different phonemes.

Speakers of a language generally perceive the different allophones of a single phoneme as the same sound or phone. For example, most speakers of English are unaware that the vowels in *bead* and *bean* are different phones because mentally, speakers produce and hear phonemes, not phones.

6. Distinctive Features of Phonemes

Phonetics provides the means to describe the phones (sounds) of language, showing how they are produced and how they vary. *Phonology* tells us how various sounds form patterns to create phonemes and their allophones.

For two phones to contrast meaning there must be some phonetic difference between them. The minimal pairs *seal* [sil] and *zeal* [zil] show that [s] and [z] represent two contrasting phonemes in English. They cannot be allophones of one phoneme because one cannot replace the [s] with the [z] without changing the meaning of the word. Furthermore, they are not in complementary distribution as both occur word initially before the vowel [i]. They are therefore allophones of the two different phonemes /s/

and /z/. From the discussion of phonetics we know that [s] and [z] differ in voicing: [s] is voiceless and [z] is voiced. The phonetic feature of voicing therefore distinguishes the two words. Voicing also distinguishes *feel* and *veal* [f]/[v] and *cap* and *cab* [p]/[b]. When a feature distinguishes one phoneme from another, hence one word from another, it is a **distinctive feature** or, equivalently, a **phonemic feature**.

a. Feature Values

One can think of voicing and voicelessness as the presence or absence of a single feature, *voiced*. This single feature may have two values: plus (+), which signifies its presence, and minus (–), which signifies its absence. For example, [b] is [+voiced] and [p] is [–voiced].

The presence or absence of nasality can similarly be designated as [+nasal] or [–nasal], with [m] being [+nasal] and [b] and [p] being [–nasal]. A [–nasal] sound is an *oral* sound.

We consider the phonetic and phonemic symbols to be *cover symbols* for sets of distinctive features. They are a shorthand method of specifying the phonetic properties of segments. Phones and phonemes are not indissoluble units; they are composed of phonetic features, similar to the way that molecules are composed of atoms. A more explicit description of the phonemes /p/, /b/, and /m/ may thus be given in a feature matrix of the following sort.

P	b	m	
Labial	+	+	+
Voiced	–	+	+
Nasal	–	–	+

Aspiration is not listed as a phonemic feature in the specification of these units for English, because [p] and

[ph] do not represent different phonemes in English. In a *phonetic* transcription, however, the aspiration feature would be specified where it occurs.

A phonetic feature is distinctive when the + value of that feature in certain words contrasts with the – value of that feature in other words. At least one feature value difference must distinguish each phoneme from all the other phonemes in a language.

Because the phonemes /b/, /d/, and /g/ contrast in English by virtue of the place of articulation features—*labial*, *alveolar*, and *velar*—these place features are also distinctive in English. The distinctive features of the voiced stops in English are shown in the following:

	b m d ng ŋ
Voiced	+ + + + + +
Labial	+ + – – – –
Alveolar	– – + + – –
Velar	– – – – + +
Nasal	– + – + – +

Each phoneme in this chart differs from all the other phonemes by at least one distinctive feature.

Vowels, too, have distinctive features. For example, the feature [±back] distinguishes the vowel in *look* [lʊk] ([+back]) from the vowel in *lick* [lɪk] ([−back]) and is therefore distinctive in English. Similarly, [±tense] distinguishes [i] from [ɪ] (*beat* versus *bit*) and is also a distinctive feature of the English vowel system.

b. Nondistinctive Features

As we saw, aspiration is not a distinctive feature of English consonants. It is a **nondistinctive** or **redundant** or

predictable feature (all equivalent terms). Some features may be distinctive for one class of sounds but nondistinctive for another. For example, nasality is a distinctive feature of English consonants but not a distinctive feature for English vowels. There is no way to predict when an /m/ or an /n/ can occur in an English word. You learn this when you learn the words. On the other hand, the nasality feature value of the vowels in *bean*, *mean*, *comb*, and *sing* is predictable because they occur before nasal consonants. Thus the feature nasal is **nondistinctive** *for vowels*.

This is not the case in all languages. As we noted above, nasality on vowels is phonemic in Portuguese. Nasalization is also a distinctive feature for vowels in Akan (spoken in Ghana), as the following examples illustrate:

[ka] 'bite'	[kã] 'speak'
[fi] 'come from'	[fĩ] 'dirty'
[tu] 'pull'	[tũ] 'den'
[nsa] 'hand'	[nsã] 'liquor'
[ʧi] 'hate'	[ʧĩ] 'squeeze'
[pam] 'sew'	[pãm] 'confederate'

Thus, the unpredictability was nasalized in Akan, as in English. There are no national rules in Akan, such as minimal pairs intended in [pam] and [pãm], or in Portuguese, as indicated by pairs of minimum [pão], 'bread,' and [pao], 'stick'. You will change the word if you change oral vocals for nose vocals, or vice versa.

Have the same phonetic segment (cellphone) in two languages is possible but have two different phonemic systems. Phonetically, both oral and nasal vowels are in English, Portuguese and Akan. However, English does not have a vocalized phoneme, but Akan and Portuguese do it. The same phonetic segments function differently in English than the way they function in two other languages. Nasalization of vowels in English is redundant and nondistinctive; nasalization of vocals in Akan and Portuguese is not excessive and distinctive.

The aspiration to stop speaking is another non-distinctive feature in English. The aspirated stops silent [ph], [th], and [kh] and stops unaspirated voices [p], [t], and [k] in a complementary distribution. The presence of this feature is predicted by rules and does not need to be learned by speakers when getting words.

G. Phonemic Patterns May Vary across Languages

We have seen that the same phones may occur in two languages but pattern differently because the phonologies are different. English, Portuguese, and Akan have oral and nasal vowel phones; in English, oral and nasal vowels are allophones of one phoneme, whereas in Portuguese and Akan they represent distinct phonemes.

Aspiration of voiceless stops further illustrates the asymmetry of the phonological systems of different languages. Both aspirated and unaspirated voiceless stops occur in English and Thai, but they function differently in the two languages. Aspiration in English is not a distinctive feature because its presence or absence is predictable. In Thai it is not predictable, as the following examples show:

Voiceless Unaspirated		Voiceless Aspirated	
[paa]	*forest*	[p^haa]	*to split*
[tam]	*to pound*	[t^ham]	*to do*
[kat]	*to bite*	[k^hat]	*to interrupt*

The voiceless unaspirated and the voiceless aspirated stops in Thai occur in minimal pairs; they contrast and are therefore phonemes. In both English and Thai, the phones [p], [t], [k], [ph], [th], and [kh] occur. In English they represent the phonemes /p/, /t/, and /k/; in Thai they represent the phonemes /p/, /t/, /k/, /ph/, /th/, and /kh/. Therefore aspiration is a distinctive feature in Thai; it is a nondistinctive redundant feature in English.

The phonetic facts alone do not reveal what is distinctive or phonemic:

The *phonetic representation* of utterances shows what speakers know about the pronunciation of sounds.

The *phonemic representation* of utterances shows what speakers know about the patterning of sounds.

In English, vowel length and consonant length are nonphonemic. Prolonging a sound in English will not produce a different word. In other languages, long and short vowels that are identical except for length are phonemic. In such languages, length is a nonpredictable distinctive feature. For example, vowel length is phonemic in some dialects of Korean, as shown by the following minimal pairs (recall that the colon-like symbol ː indicates length):

il	“day”	iːl	“work”
seda	“to count”	seːda	“strong”
kul	“oyster”	kuːl	“tunnel”

In Italian the word for ‘grandfather’ is *nonno* /nonːo/, which contrasts withthe word for ‘ninth,’ which is *nono* /nono/, so consonant length is phonemic in Italian. In Luganda, an African language, consonant length is also phonemic: /kula/ with a short /k/ means ‘grow up,’ whereas /kːula/ with a long /kː/ means ‘treasure.’ Thus consonant length is unpredictable in Luganda, just as whether a word begins with a /b/ or a /p/ is unpredictable in English.

In ASL, phonology signs can be broken down into smaller units that are in many ways analogous to the phonemes and distinctive features in spoken languages. They can be decomposed into handshape, movement, and location, as discussed in chapter 5. There are minimal pairs that are distinguished by a change in one or another of these features. For example, the signs meaning 'candy,' 'apple,' and 'jealous' are articulated at the same location on the face and involve the same movement, but contrast minimally in hand configuration. 'Summer,' 'ugly,' and 'dry' are a minimal set contrasting only in place of articulation, and 'tape,' 'chair,' and 'train' contrast only in movement. Thus signs can be decomposed into smaller minimal units that contrast meaning. Some features are non-distinctive. Whether a sign is articulated on the right or left hand does not affect its meaning.

H. Natural Classes of Speech Sounds

We show what speakers know about the predictable aspects of speech through phonological rules. In English, these rules determine the environments in which vowels are nasalized or voiceless stops aspirated. These rules apply to *all* the words in the language, and even apply to made-up words such as *sint*, *peeg*, and *sparg*, which would be /sɪnt/, /pig/, and /sparg/ phonemically and [sĩnt], [phig], and [sparg] phonetically.

The more linguists examine the phonologies of the world's languages, the more they find that similar phonological rules involve the same classes of sounds such as nasals and voiceless stops. For example, many languages besides English have a rule that nasalizes vowels before nasal consonants:

Nasalize a vowel when it precedes a nasal consonant in the same syllable.

The rule will apply to all vowel phonemes when they occur in a context preceding any segment marked [+nasal] in the same syllable, and will add the feature [+nasal] to the feature matrix of the vowel. Our description of vowel nasalization in English needs only this rule. It need not include a list of the individual vowels to which the rule applies or a list of the sounds that result from its application.

Many languages have rules that refer to [+voiced] and [–voiced] sounds. For example, the aspiration rule in English applies to the class of [–voiced] noncontinuant sounds in word-initial position. As in the vowel nasality rule, we do not need to consider individual segments. The rule automatically applies to initial /p/, /t/, /k/, and /ʧ/.

Phonological rules often apply to **natural classes** of sounds. A natural class is a group of sounds described by a small number of distinctive features such as [–voiced], [–continuant], which describe /p/, /t/, /k/, and /ʧ/. Any individual member of a natural class would require more features in its description than the class itself, so /p/ is not only [–voiced], [–continuant], but also [+labial].

The relationships among phonological rules and natural classes illustrate why segments are to be regarded as bundles of features. If segments were not specified as feature matrices, the similarities among /p/, /t/, and /k/ or /m/, /n/, and /ŋ/ would be lost. It would be just as likely for a language to have a rule such as

1. Nasalize vowels before p, i, or z. as to have a rule such as
2. Nasalize vowels before *m*, *n*, or *ŋ*.

Rule 1 has no phonetic explanation, whereas Rule 2 does: the lowering of the velum in anticipation of a following nasal consonant causes the vowel to be nasalized. In Rule 1, the environment is a motley collection of unrelated sounds that cannot be described with a few features. Rule 2 applies to the natural class of nasal consonants, namely sounds that are [+nasal], [+consonantal].

The various classes of sounds discussed in chapter 5 also define natural classes to which the phonological rules of all languages may refer. They also can be specified by + and – feature values. Table illustrates how these feature values combine to define some major classes of phonemes. The presence of +/– indicates that the sound may or may not possess a feature dependingon its context. For example, word-initial nasals are [–syllabic] but some wordfinal nasals can be [+syllabic], as in *wagon* [wægn̩], where the diacritic ̩ below the [n̩] indicates its syllabicity.

Table 1.3

Table	Feature spesification of Major Natural Classes of Sound				
Feature	Obstruents	Nasals	Liquids	Glides	Vowels
Consonantal	+	+	+		-
Sonorant	-	+	+		+
Syllabic	-	+/-	+/-		+
Nasal	-	+	-	-	+/-

Feature Specifications for American English Consonants and Vowels

Here are feature matrices for vowels and consonants in English. By selecting all segments marked the same for one or more features, you can identify natural classes. For example, the natural class of high vowels /i/, /ɪ/, /u/, /ʊ/

is marked [+high] in the vowel feature chart of Table; the natural class of voiced stops /b, m, d, n, g, ŋ, ʤ/ are the ones marked [+voice] [–continuant] in the consonant chart of

Table 1.4

Table	Features of Some American English Vowels										
Features	l	I	e	ɛ	æ	u	ʊ	o	a	ʌ	ə
High	+	+	-	-	-	+	+	-	-	-	-
Low	-	-	-	-	+	-	-	-	+	+	-
Back	-	-	-	-	-	+	+	+	-	-	-
Central	-	-	-	-	-	-	-	-	+	+	+
Round	-	-	-	-	-	+	+	+	-	-	-
Tense	+	-	+	-	-	+	-	+	+	-	-

I. The Rules of Phonology

Throughout this chapter we have emphasized that the relationship between the phonemic representation of a word and its phonetic representation, or how it is pronounced, is rule-governed. Phonological rules are part of a speaker's knowledge of the language.

The phonemic representations are minimally specified because some features or feature values are predictable. For example, in English all nasal consonants are voiced, so we don't need to specify voicing in the phonemic feature matrix for nasals. Similarly, we don't need to specify the feature round for back vowels. If Table 6.6 was strictly phonemic, then instead of a + in the voice row for m, n, and ŋ, the cells would be left blank, as would the cells in the round row of Table 6.5 for u, ʊ, o, and ɔ. Such underspecification reflects the redundancy in the phonology, which is also part of a speaker's knowledge of the sound system. The phonemic representation should include only the nonpredictable, distinctive features of the phonemes in a word. The phonetic representation, derived by applying the phonological rules, includes all of the linguistically relevant phonetic aspects of the sounds. It does not include all of the physical properties of the sounds of an utterance, however, because the physical signal may vary in many ways that have little to do with the phonological system. The absolute pitch of the sound, the rate of speech, or its loudness is not linguistically significant. The phonetic transcription is therefore also an abstraction from the physical signal; it includes the nonvariant phonetic aspects of the utterances, those features that remain relatively constant from speaker to speaker and from one time to another.

Although the specific rules of phonology differ from language to language, the kinds of rules, what they do, and the natural classes they refer to are universal.

1. Feature-Changing Rules

Not a few rules that change features from one value to the other or even add features that are not in phonemic representation. In English, the morpheme / z / plural has the value of the sound changing from plus to minus when following a voiceless sound. Similarly, / n / in the morpheme of the phonemic negative prefix / tempatn / changes in the place of the articulation feature when overtaking bilabial or velar.

Rules in English that voiceless aspirates stop at the beginning of syllables only add nondistinctive features. Generally, aspiration only occurs if the following vowels are emphasized. The / p / in pit and repeat are aspirated [ph], but / p / in inspect or compass is unaspirated [p]. We also note that even with interfering consonants, aspiration occurs so that words such as boxes, clips, and quip ([khrıb], [khlıp], and [khwıp]) all begin with [kh] being sucked. And finally, affricate / ʧ / obeys rules, becomes a phonetic chip [ʧhıp]. We can now state the rules:

> A voiceless noncontinuant has [+aspirated] added to its feature matrix at the beginning of a syllable when followed by a stressed vowel with an optional intervening consonant.

Aspiration is not specified in any phonemic feature matrix of English, as Table above shows. The aspiration rule adds this feature for reasons having to do with the timing of the closure release.

2. Assimilation Rules

A special type of feature change rule is assimilation. We have seen that nasalization of vowels in English is nonfonemic because it can be predicted by rules. The vocal nasal rule is an assimilation rule that makes neighboring segments more similar to adding [+ nasal] features to vocals.

For most of the assimilation rules come from the articulation process. There is a tendency when we speak to improve the ease of articulation. It's easier to lower the velum when the vowel is pronounced before the nose stops rather than waiting for the vocal solution and then requires velum to move suddenly.

We now want to take a closer look at the phonological rules that we have discussed. Previously, we stated the rules for nasal vowels:

Vowels are nasalized before a nasal consonant within the same syllable.

This rule specifies the class of sounds affected by the rule:

Vowels

It states what phonetic change will occur by applying the rule:

Change phonemic oral vowels to phonetic nasal vowels.

And it specifies the context or phonological environment.

Before a nasal consonant within the same syllable.

A shorthand notation to write rules, similar to the way scientists and mathematicians use symbols, makes the rule statements more concise. Every physicist knows that E = mc2 means 'Energy equals mass times the square of the velocity of light.' We can use similar notations to state the nasalization rule as:

V → [+nasal] / __ [+nasal] $

Let's look at the rule piece by piece.

V→[+nasal]/ __ [+nasal]$

Vowels	become nasalized in the before nasal within a Environment segments syllable

To the left of the arrow is the class of sounds that is affected. To the right of the arrow is the phonetic change that occurs. The phonological environment follows the slash. The underscore __ is the relative position of the sound to be changed within the environment, in this case before a nasal segment. The dollar sign denotes a syllable boundary and guarantees that the environment does not cross over to the next syllable.

This rule tells us that the vowels in such words as den /dɛn/ will become nasalized to [dɛñ], but deck /dɛk/ will not be affected and is pronounced [dɛk] because /k/ is not a nasal consonant. As well, a word such as den$tal /dɛn$təl/

will be pronounced [dɛñ $təl]: we have showed the syllable boundary explicitly. However, the first vowel in de$note, /di$not/, will not be nasalized, because the nasal segment does not precede the syllable boundary, so the "within a syllable" condition is not met.

Any rule written in formal notation can be stated in words. The use of formal notation is a shorthand way of presenting the information, and also a way of eliminating ambiguity and making sure the intended meaning of the rule is completely clear. Notation also reveals the function of the rule more explicitly than words. It is easy to see in the formal statement of the rule that this is an assimilation rule because the change to [+nasal] occurs before [+nasal] segments. Assimilation rules in languages reflect coarticulation—the spreading of phonetic features either in the anticipation or in the perseveration (the "hanging on") of articulatory processes. The auditory effect is that words sound smoother.

The following example illustrates how the English vowel nasalization rule applies. It also shows the assimilatory nature of the rule, that is, the change to [+nasal] before a [+nasal] segment:

"bob" "boom"

Phonemic representation /b a b/ /b u m/

Nasality: phonemic feature value – O* –– O* + Apply nasal rule NA NA ↓

Nasality: phonetic feature value – – – – + +

Phonetic representation [b a b] [b u m]

There are many assimilation rules in English and other languages. Recall that the voiced /z/ of the English regular plural suffix is changed to [s] after a voiceless sound, and that similarly the voiced /d/ of the English regular pasttense suffix is changed to [t] after a voiceless sound. These are instances of voicing assimilation. In these cases the value of the voicing feature goes from [+voice] to [–voice] because of assimilation to the [–voice] feature of the final consonant of the stem, as in the derivation of cats:

/kæt + z/ → [kæts]

We saw a different kind of assimilation rule in Akan, where we observed that the nasal negative morpheme was expressed as [m] before /p/, [n] before /t/, and [ŋ] before /k/. (This is the homorganic nasal rule.) In this case the place of articulation—bilabial, alveolar, velar—of the nasal assimilates to the place of articulation of the following consonant. The same process occurs in English: the negative morpheme prefix spelled in- or im- agrees in place of articulation with the word to which it is prefixed, so we have impossible [ɪm̃ phasəbəl], intolerant [ɪñ thalərə̃nt], and incongruous [ɪŋ̃ khãngruəs]. In effect, the rule makes two consonants that appear next to each other more similar.

ASL and other signed languages also have assimilation rules. One example

is handshape assimilation, which takes place in compounds such as the sign for 'blood.' This ASL sign is a compound of the signs for 'red' and 'flow.' The handshape for 'red' alone is formed at the chin by a closed hand with the index finger pointed up. In the compound 'blood' this handshape is replaced by that of the following word 'flow,' which is an open handshape (all fingers extended). In other words, the handshape for 'red' has undergone assimilation. The location of the sign (at the chin) remains the same. Examples such as this tell us that while the features of signed languages are different from those of spoken languages, their phonologies are organized according to principles like those of spoken languages.

3. Dissimilation Rules

The rules of assimilation that many languages have make articulation easier. It might seem strange, then, for language learning it also has a feature change called the dissimilation rule, where certain segments become less similar to other segments. Ironically, such rules have the same explanation: sometimes it's easier to articulate different sounds. "The sixth sheep of the sheik is sick" is based on repeated sound similarities. If someone uses a less similar sound, as in "the second sheik for sick sheep," it will be easier to say it. The cartoon makes the same point, with toy boats becoming more difficult to articulate than sailboats, because [ɔɪ] toys are more similar to boats than to the [e] screen.

An example of easing pronunciation through dissimilation is found in some varieties of English, in which there is a fricative dissimilation rule. This rule applies to sequences /fθ/ and /sθ/, changing them to [ft] and [st]. Here the fricative /θ becomes dissimilar to the preceding fricative by becoming a stop. For example, the words fifth and sixth come to be pronounced as if they were spelled fift and sikst.

A classic example of the same kind of dissimilation occurred in Latin, and the results of this process show up in the derivational morpheme /-ar/ in English. In Latin a derivational suffix -alis was added to nouns to form adjectives. When the suffix was added to a noun that contained the liquid /l/, the suffix was changed to -aris; that is, the liquid /l/ was changed to the dissimilar liquid /r/. These words came into English as adjectives ending in

-al or in its dissimilated form -ar, as shown in the following examples:

-al	-ar
anecdot-al	angul-ar
annu-al	annul-ar
ment-al	column-ar
pen-al	perpendicul-ar
spiritu-al	imil-ar
ven-al	vel-ar

All of the -ar adjectives contain /l/, and as columnar illustrates, the /l/ need

not be the consonant directly preceding the dissimilated segment.

Assimilation rules, dissimilation rules, and other kinds of feature-changing

rules are part of Universal Grammar (UG) and are found throughout the world's languages.

4. Segment Insertion and Deletion Rules

Phonological rules may add or delete entire segments. These are different from the feature-changing rules we have seen so far, which affect only parts of segments. The process of inserting a consonant or vowel is called epenthesis.

The rules for forming regular plurals, possessive forms, and third-person singular verb agreement in English all require an epenthesis rule. Here is the first part of that rule that we gave earlier for plural formation:

Insert a [ə] before the plural morpheme /z/ when a regular noun ends in a sibilant, giving [əz].

Letting the symbol Ø stand for 'null,' we can write this morphophonemic epenthesis rule more formally as "null becomes schwa between two sibilants," or like this:

Ø → ə / [+sibilant] [+sibilant]

There is a plausible explanation for insertion of a [ə]. If we merely added a [z] to squeeze to form its plural, we would get [skwizː], which would be hard for English speakers to distinguish from [skwiz] because in English we do not contrast long and short consonants. This and other examples suggest that the morphological patterns in a language are closely related to other generalizations about the phonology of that language.

Segment deletion rules are commonly found in many languages and are far more prevalent than segment insertion rules. One such rule occurs in casual or rapid speech. We often delete the unstressed vowels in words like the following:

Mystery general memory funeral vigorous Barbara

These words in casual speech can sound as if they were written:

mystry genral memry funral vigrous Barbra

The silent g that torments spellers in such words as sign and design is actually the result of a segment deletion rule. Consider the following examples:

A	B	
sign [sãɪn]	signature	[sɪgnətʃər]
design [dəzãɪn]	designation	[dɛzɪgneʃ□n]
paradigm [pʰærədãɪm]	paradigmatic	[pʰærədɪgmærək]

In none of the words in column A is there a phonetic [g], but in each corresponding word in column B a [g] occurs. Our knowledge of English phonology accounts for these phonetic differences. The “[g]—no [g]” alternation is regular and is also seen in pairs like gnostic [nastık] and agnostic [ægnastık], and by the silent g’s in the cartoon:

This rule may be stated as:

Delete a /g/ word-initially before a nasal consonant or before a syllablefinal nasal consonant.

Given this rule, the phonemic representations of the stems in sign/signature, design/designation, malign/malignant, phlegm/phlegmatic, paradigm/paradigmatic, gnostic/agnostic, and so on will include a /g/ that will be deleted by the regular rule if a prefix or suffix is not added. By stating the class of sounds that follow the /g/ (nasal consonants) rather than any specific nasal consonant, the rule deletes the /g/ before both /m/ and /n/.

5. The Function of Phonological Rules

The function of the phonological rules in a grammar is to provide the phonetic information necessary for the pronunciation of utterances. We may illustrate this point in the following way:

input	*Phonemic (Mental Lexicon) Representation of Words* in a Sentence ↓ Phonological rules (P-rules)↓
output	*Phonetic Representation of Words in a Sentence*

The input to the P-rules is the phonemic representation. The P-rules apply to the phonemic strings and produce as output the phonetic representation.

The application of rules in this way is called a derivation. We have given examples of derivations that show how plurals are derived, how phonemically oral vowels become nasalized, and how /t/ and /d/ become flaps in certain environments. A derivation is thus an explicit way of showing both the effects and the function of phonological rules in a grammar.

All the examples of derivations we have so far considered show the application of just one phonological rule, except the plural and past-tense rules, which are actually one rule with two parts. In any event, it is common for more than one rule to apply to a word. For example, the word tempest is phonemically /tɛmpɛst/ (as shown by the pronunciation of tempestuous [thɛm̃ phɛsʧuəs]) but phonetically [thɛm̃ pəst]. Three rules apply to it: the aspiration rule, the vowel nasalization rule, and the schwa rule. We can derive the phonetic form from the phonemic representation as follows:

Table 1.5

Underlying phonemic representation	/	t	□	m	p	□	s	t	/
Aspiration Rule		t^h							
Nazalisation Rule			□						
Schwa Rule						ə			
Surface Phonetic Representation	[	t^h	□	m	p	ə	s	t	]

J. Free variation

Previously discussed exceptions to the criterion of predictability of occurrence: two sounds which are in complementary distribution are normally assigned to a single phoneme, but where this would conflict with phonetic similarity (and with native speakers' intuitions), it is appropriate to set up two distinct phonemes and seek an alternative explanation for the complementarity, in terms of defective distributions. In this section, we turn to an exception to the other main criterion for allophony, invariance of meaning.

When there is no difference in meaning that appears when one voice is replaced by another, we are dealing with two allophones of the same phoneme. An English speaker who produces a dark [ɫ] in initial position may be regarded as having an unfamiliar accent, or some sort of minor speech impediment, but there is little danger that *light* pronounced with initial [ɫ] is going to be mistaken for another word entirely.

However, sometimes there is more than one possible pronunciation in the same word or context; this is known as free variation, and raises two possible theoretical problems. First, we require complementary distribution to assign two sounds to a single phoneme; and yet a speaker of Scottish English, for example, may sometimes produce a tapped allophone of /r/ in very, and on other occasions, an approximant. There are no possible minimal pairs for tapped [ɾ] versus approximant [ɹ], and an allophonic rule can indeed be written, such that the tap appears intervocalically, as in very, and the approximant word-initially and wordfinally. Apparent exceptions are sociolinguistically motivated: perhaps the Scot is talking to an English English speaker, who will typically not use the tap, and is subconsciously accommodating her speech towards that of her interlocutor; perhaps she is trying to sound less like a Scot; perhaps she is in a very formal situation, where more standard pronunciations are favoured. Clearly, such stylistic variation is not free in sociolinguistic terms, though it is known as free variation phonologically because there is no watertight phonological or phonetic context determining the appearance of one allophone rather than the other. The variable appearance of a glottal stop or [t] medially in butter, for instance, would fall into the same category, and the frequency of occurrence of the two variants would be subject to explanation in the same sociolinguistic terms.

The opposite of the first is the second type of free variation, and potentially more problematic. Here, instead of finding two allophones of a single phoneme in the same context, violating complementary distribution, we see two sounds which on other criteria belong to different phonemes, failing to make the meaning difference we expect. Sometimes the difference can be explained in geographical terms: for instance, Southern British English speakers say *tomahto*, and North American speakers typically say *tomayto*, producing the same lexical item with consistently different vowels. Those two vowels, [ɑ] and [eI] respectively, nonetheless contrast for speakers of both accents, although as we shall see in more detail in the next three chapters, they appear in different sets of words: a Southern British English speaker will have relevant minimal pairs in *psalm* and *same*, or *grass* and *grace*, while a General American speaker will contrast *lot* with *late*, or *odd* with *aid*. The two different pronunciations of *tomato* are therefore simply characteristic of speakers from different areas.

In other cases, the same speaker uses different phonemes in the same word on different occasions of utterance. Some speakers consistently pronounce *economic* with the [ɛ] of *elephant*, and others with the [i] of *eat*; but many more produce sometimes one, and sometimes the other. And yet there are plenty of minimal pairs to establish a contrast between /ɛ/ in *pet, hell* or *bed,* and /i/ in *peat, heal* or *bead*, outside that single problematic lexical item.

The same is true for *either* and *neither*, which some speakers produce with [i], others with the [aI] of high, and still others with variation between the two. Again, there is no question that /i/ and /aI/ constitute different phonemes, with minimal pairs including *he* and *high, heed* and *hide,* or *steal* and *stile*. This is theoretically problematic: two sounds which on all other criteria belong to different phonemes are nonetheless found in the same context without making a meaning difference, directly contravening invariance of meaning. However, such examples tend to be few and far between, and involve only single lexical items; and again, the explanation is typically sociolinguistic. These pronunciations often develop in different geographical areas, then one spreads into the territory of the other. One variant may become stigmatised, and the other fashionable; but this stylistic variation can disappear over time, leaving two rather neutral alternatives. In such cases, the resulting variation can be truly free; but as long as the phonemes involved can be identified on the basis of minimal pairs elsewhere, these can simply be regarded as one-off exceptions. They are parallel to cases where a speaker stores two words, from the same historical source but each now appropriate in a different dialect, like the Scot who uses kirk with fellow Scots, but otherwise church; or indeed, to the use of historically unrelated synonyms like *sofa* and *settee.*

K. Neutralisation

In this second type of free variation can also be seen as constituting the tip of a much larger theoretical iceberg. In the [ε]*conomic* – [i]*conomic* cases, two otherwise contrastive sounds are both possible in a single word. The contrast between two phonemes may also be interrupted more atically, in a particular phonological context; in this case, rather than the two phonemes being equally possible alternatives, we find some form intermediate between the two.

One example involves the voiceless and voiced English plosives. These seem to contrast in all possible positions in the word: minimal pairs can be found for /t/ and /d/ initially, as in *till* versus *dill*; medially, in *matter* versus *madder*; finally, as in *lit* versus *lid*; and in consonant clusters, as in *trill, font* versus *drill, fond* – and the same is true for the labial and velar plosives. However, no contrast is possible in an initial cluster, after /s/: *spill, still* and *skill* are perfectly normal English words, but there is no **sbill, *sdill* or **sgill*. This phenomenon is known as neutralisation, because the otherwise robust and regular contrast between two sets of phonemes is neutralised, or suspended, in a particular context – in this case, after /s/.

In fact, matters are slightly more complicated yet. Although the spelling might suggest that the sounds found after /s/ are realisations of the voiceless stops, we have already seen that, in one crucial respect, they do not behave as we would expect voiceless stops to behave at the beginning of a word: that is, they are not aspirated. On the other hand, they do not behave like realisations of /b d / either, since they are not voiced. That is to say, the whatever-it-is that appears after /s/ has something in common with both /p/ and /b/, or /t/ and /d/, or /k/ and / /, being an oral plosive of a particular place of articulation. But in another sense, it is neither one nor the other, since it lacks aspiration, which is the distinctive phonetic characteristic of an initial voiceless stop, and it also lacks voicing, the main signature of an initial voiced one.

There are two further pieces of evidence, one practical and the other theoretical, in support of the in-between status of the sounds following /s/. If a recording is made of *spill, still, skill,* the [s] is erased, and the remaining portion is played to native speakers of English, they find it difficult to tell whether the words are *pill, till, kill,* or *bill, dill, gill.* Furthermore, we might argue that a /t/ is a /t/ because it contrasts with /d/ – phonemes are defined by the other phonemes in the system they belong to. To take an analogy, again from written English, children learning to write often have difficulty in placing the loop for a right at the base of the upstroke, and it sometimes appears a little higher than in adult writing – which is fine, as long as it doesn't migrate so high as to be mistaken for a , where the loop is meant to appear at the top. What matters is maintaining distinctness between the two; and the same is true in speech, where a realisation of /d/, for instance, can be more or less voiced in different circumstances, as long as it does not become confused with realisations of /t/. In a case where the two cannot possibly contrast, as after /s/ in English, /t/ cannot be defined as it normally is, precisely because here alone, it does not contrast with /d/. It follows again that the voiceless, unaspirated sound after /s/ in *still* cannot be a normal allophone of /t/.

Phonologists call the unit found in a position of neutralisation an archiphoneme. The archiphoneme is symbolised by a capital letter, and is composed of all the properties which the neutralised phonemes have in common, but not the properties which typically distinguish them, as shown in.

/T/

+oral

+stop

+alveolar

0 voice

The archiphoneme /T/ is proposed where the normal opposition between /t/ and /d/ is suspended, so neither /t/ nor /d/ is a possibility. /T/ is an intermediate form, sharing the feature values common to /t/ and /d/, but with no value possible for voicing, since there is no contrast of voiced and voiceless in this context. Neutralisation is therefore the defective distribution of a class of phonemes, involving a particular phonological context (rather than a single word, as in the *either/neither* case).

There are many other cases of neutralisation in English, but for the time being, we shall consider only one. In many varieties of English, the normal contrasts between vowels break down before /r/. To take one example, British English speakers will tend to maintain a three-way contrast of *Mary, merry* and *marry*, whereas many speakers of General American suspend the usual contrast of /eɪ/, /ɛ/ and //, as established by minimal triplets like *sail, sell* and *Sal* or *pain, pen* and *pan*, in this environment, making *Mary, merry* and *marry* homophones. Although the vowel found here often sounds like [ɛ], this cannot be regarded as a normal realisation of /ɛ/, since /ɛ/ is a phoneme which contrasts with /eɪ/ and //, and that contrast is not possible here. So, we can set up an archiphoneme /E/ in just those cases before /r/, again signalling that a contrast otherwise found in all environments fails to manifest itself here.

L. Phonology and morphology

The archiphoneme is useful in signalling cases where oppositions are suspended, but has two problems. First, a representation like /mEri/ is three ways ambiguous for a General American speaker, since it could be *Mary, merry* or *marry*: this might in fact be quite appropriate, because the three sound the same at the phonetic level, but it would be helpful to have a way of identifying, somewhere in the phonology, just which is which. Secondly, in some cases that look rather like neutralisation, the archiphoneme cannot really be invoked. For instance, the English regular plural ending on nouns is marked by an spelling, which means more than one thing phonologically: in *cats, caps, chiefs,* where the final sound of the stem is voiceless, the plural suffix is realised as voiceless [s]; in *dogs, heads, pans, hooves, dolls, eyes,* where the final sound of the stem is voiced, the plural suffix is also voiced [z]; and finally, in cases where the stem ends in a sibilant, namely [s z ʃ tʃ d], a vowel is inserted for reasons of ease of articulation, since sequences of two sibilants are not allowed in English, giving *horses, bushes, churches* with [əz] (or [ɪz]). This might, on the face of it, seem to be a purely phonetic matter, involving assimilation of the plural ending to the last segment of the stem; but there is more to it than that. If voicing assimilation were necessary in final clusters, forms like *hence, face, loss* would not be possible words of English, since they involve final sequences of a voiced consonant or vowel, followed by voiceless [s]. What matters, in the plural cases, is what that final sound is doing: the cases where it is a suffix indicating plural behave differently from those in which it is part of the stem.

Similarly, singular and plural noun forms like *leaf – leaves, hoof – hooves, knife – knives* might initially appear to represent a case of neutralisation, where the usual contrast between /f/ and /v/ is suspended before /z/ (recall that this is pronounced voiced). However, whatever is going on here cannot be ascribed straightforwardly to the phonetic context, since there are also cases, as in the example bellow, where either the singular and plural both have voiceless fricatives, or both have voiced ones.

chief – chiefs	roof – roofs
hive – hives	stove – stoves

Neutralisation always involves a regular suspension of contrast in a particular phonetic context. Here, we are dealing with an alternation between two phonemes, /f/ and /v/, in a particular grammatical context. *Leaf* has a final /f/, and *leaves* a medial /v/ – there is no intermediate, archiphonemic form here. The determining factor is neither phonetic nor phonological: it is simply a fact about certain English nouns (including *leaf, hoof, knife, life, wife,* but excluding *chief, roof, hive, stove*) that they have /f/ in some forms, notably the singular, and /v/ in others, notably the plural.

Such alternation between phonemes, depending on grammatical facts, is very common. For instance, before certain suffixes, the shape of the final consonant of a stem may change: hence /k/, /s/ and /ʃ/, otherwise three distinct phonemes as in *kin, sin* and *shin*, occur predictably depending whether the stem *electric* stands alone, or has a following suffix. Similar alternations involve *president* and other words derived from that, as shown in the example bellow. English speakers can perfectly well pronounce [k] before the sound sequence [Iti], as in *kitty*, or [t] before [i], as in *pretty* or *Betty*: the fact that these sounds do not appear in *electricity* or *presidency*, where we find [s] instead, reflects the function of *-ity* and *-y* as suffixes in those cases.

electri[k]	electri[s]ity	electri[ʃ]ian
presiden[t]	presiden[s]y	presiden[ʃ]ial

M. The Phoneme System

The introduction of features reveals phonemes, not as the ultimate, smallest unit of the phonology, but as cover-symbols for a range of properties. However, it also permits a higher-level perspective, exploring natural classes, and the motivation for similar patterns of behaviour in groups of phonemes. These groupings can also be considered at the level of the phoneme system as a whole.

Just as the phoneme, although an abstract unit, seems to have some degree of reality for native speakers and to shape their perceptions, so the phoneme system, at an even higher level of abstraction, also reflects speakers' intuitions and may shape the development of a language.

For one thing, setting out a phoneme system can be extremely helpful to a phonologist in deciding which phonemes to propose for particular groups of allophones, and in checking that her decisions accord with native speakers' intuitions. For instance, some phonologists consider the English velar nasal as a phonemic sequence of /n / and /nk/, as it certainly was historically, even in cases where no [ ] or [k] now appears phonetically: hence, hang would be analysed as /han /, with the alveolar nasal having a velar allophone before velar plosives, and the velar plosive subsequently being deleted after a velar nasal at the ends of syllables. However, native speakers find the three nasals [m], [n] and [ŋ] easy to distinguish, although they may well not easily perceive cases which are more clearly allophones of /n/, such as the labiodental nasal [**ɱ**] in *unfortunate*. Their perception of /ŋ/ as separate from /n/ may be encouraged by the shape of the stop system in general, where voiced and voiceless plosives and a distinctive nasal stop go together at the labial /b p m/ and alveolar /d t n/

places of articulation, with / k ŋ/ providing a parallel set of velars.

Similarly, consider the English affricates, [tʃ] and [d], in *church* and *judge*. These could be phonemicised either as single units (albeit single units with two phases: recall that affricates have a stop phase, followed by a brief fricative phase as the stop is gradually released), or as clusters of consonants. In deciding which option to adopt, phonologists try to establish how the affricates behave. Do they follow the pattern of single phonemes in English, or do they act like clusters? In English, initial clusters of a plosive plus a fricative are extremely rare, and tend to be restricted to words obviously borrowed from other languages, like *psittacosis* or *dvandva* (a Sanskrit term for a type of compound word). However, the affricates occur quite freely both initially and finally (where such clusters are more common), making them seem less like clusters, and more like single units. Phonetically, affricates are also typically shorter than a sequence of stop plus fricative, so that in *why choose*, the fricative component in particular is significantly shorter than in *white shoes*. If the voiceless affricate were aspirated word-initially, or glottally reinforced word-finally, there would be additional good reasons for seeing this as essentially a stop, rather than a sequence.

Phoneme systems often seem to have the shape they do for essentially phonetic reasons. For instance, if there are too many distinctive sounds with similar features, they are likely to be misperceived, and may gradually merge historically: there is a general tendency for languages to have a reasonable margin of safety between sounds, so that words can be kept apart without the sort of effort which is inconsistent with fast, casual speech. Recall the discussion above of distinguishing and in writing, where there is a certain amount of tolerance built into the system concerning the placement of the loop; this would not be maintained if an intermediate symbol,<Ь>, was introduced. Similarly, it is possible to keep the allophones of labial, alveolar and velar stops distinct, because there is a considerable amount of phonetic space between them in terms of articulation; in English, palatal allophones of /k /, or dental allophones of /t d/ do not interfere with the realisations of any other stops. The story would be different if English also had contrastive palatal and dental stops.

As well as being determined by the need for reasonable margins of error, so that processes of assimilation, for instance, can take place without encroaching too greatly on the territory of adjacent phonemes, systems also seem to favour symmetry. Thus, English has pairs of contrastive voiced and voiceless stops at the labial, alveolar and velar places of articulation. If gaps arise in systems of this kind, they are very commonly filled by change in the language or by borrowing: the Old Irish stop system had a /b/ but no /p/, and /p/ was borrowed from Latin. In the case of the English fricatives, when voiced /v ð z/ came to contrast with pre-existing /f θ s/ in Middle English, there was no voiced counterpart for either /ʃ/ or /h/: however, // has subsequently been introduced by simplification of the [zj] cluster and in loans from French, while /h/ is increasingly marginal, appearing only syllable-initially; indeed, in some accents, like Cockney, it is routinely dropped in that position too, and might be said to be absent from the system altogether. Looking at phoneme systems may perhaps help phonologists identify weak spots in the language which are likely targets for later changes, as well as exemplifying some of the general principles native speakers pay attention to when learning and using their language.

N. Minimal Pair and Sets

A minimal pair is two words, which are identical in form except for a contrast in one phoneme, and occur in the same position. Examples of English minimal pairs are: ***fan – van, bet – bat, pat – bat, site – side***. Such pairs have been used to determine non-native speakers' ability to understand the contrast in meaning resulting from the minimal sound contrast.

A minimal set is a group of words which are differentiated each one from other by changing one phoneme (always in the same position). Thus, example of a minimal set based on the vowel phonemes of English is ***feat, fit, fat, fate, fought, foot.*** A minimal set based on consonant phonemes could have ***big, pig, rig, fig, dig, wig*** (Maharsi, 2002, pp.29-30).

Phonetic Symbols and Spelling Correspondences

Table 5.6 shows the sound/spelling correspondences for American English consonants and vowels. (We have not given all possible spellings for every sound; however, these examples should help you relate English orthography to the English sound system.) We have included the symbols for the voiceless aspirated stops to illustrate that what speakers usually consider one sound—for example *p*—may occur phonetically as two sounds: [p], [ph].

Some of these pronunciations may differ from your own. For example, you may (or may not) pronounce the words *cot* and *caught* identically. In the form of English described here, *cot* and *caught* are pronounced differently, so *cot* is one of the examples of the vowel sound [a] as in *car*. *Caught* illustrates the vowel [ɔ] as in *core*.

There will be other differences, too, because English is a worldwide language

and is spoken in many forms in many countries. The English examples

Phonetic Symbol/English Spelling Correspondences

Consonants

Symbol Examples

p spit, tip, Lapp

p^h pit, prick, plaque, appear

b bit, tab, brat, bubble

m mitt, tam, smack, Emmy, comb, Autumn

t stick, pit, kissed, write

t^h tick, intend, pterodactyl, attack

d Dick, cad, drip, loved, ride

n nick, kin, snow, mnemonic, gnome, pneumatic, know

k skin, stick, scat, critique, elk

k^h curl, kin, charisma, critic, mechanic, close

g girl, burg, longer, Pittsburgh

ŋ sing, think, finger

f fat, philosophy, flat, phlogiston, coffee, reef, cough

v vat, dove, gravel

s sip, skip, psychology, pass, pats, democracy, scissors, fasten, deceive, descent

z zip, jazz, razor, pads, kisses, Xerox, design, lazy, scissors, maize

θ thigh, through, wrath, ether, Matthew

ð thy, their, weather, lathe, either

ʃ shoe, mush, mission, nation, fish, glacial, sure ʒ measure, vision, azure, casual, genre, rouge

ʧ match, rich, righteous

$ʧ^h$ choke, Tchaikovsky, discharge

ʤ judge, midget, George, magistrate, residual

l leaf, feel, call, single

r reef, fear, Paris, singer

j you, yes, feud, use

w witch, swim, queen

ʍ which, where, whale (for speakers who pronounce which differently from witch)

h hat, who, whole, rehash

ʔ bottle, button, glottal (for some speakers), (ʔ)uh-(ʔ) oh

ɾ writer, rider, latter, ladder

Vowels

i b**ee**t, b**ea**t, b**e**, rec**ei**ve, k**e**y, bel**ie**ve, am**oe**ba, p**eo**ple, C**ae**sar, Vasel**i**ne, ser**e**ne,

Ral**eigh**

ɪ b**i**t, cons**i**st, **i**njury, b**i**n, w**o**men, b**ui**ld

e g**a**te, b**ai**t, r**ay**, gr**ea**t, **eigh**t, g**au**ge, gr**ey**hound, r**ei**n, f**eig**n

ɛ b**e**t, ser**e**nity, s**ay**s, g**ue**st, d**ea**d, s**ai**d

æ p**a**n, **a**ct, l**au**gh, comr**a**de

u b**oo**t, l**u**te, wh**o**, s**ew**er, thr**ough**, t**o**, t**oo**, t**wo**, m**o**ve, L**ou**, tr**ue**, s**ui**t

ʊ p**u**t, f**oo**t, b**u**tcher, c**ou**ld

ʌ c**u**t, t**ou**gh, am**o**ng, **o**ven, d**oe**s, c**o**ver, fl**oo**d

o c**oa**t, g**o**, b**eau**, gr**ow**, th**ough**, t**oe**, **ow**n, s**ew** ɔ c**augh**t, st**al**k, c**o**re, s**aw**, b**a**ll, **aw**e, **au**to

a c**o**t, f**a**ther, p**al**m, s**e**rgeant, **ho**nor, h**o**spital, mel**o**dic

ə sof**a**, **a**lone, symph**o**ny, s**u**ppose, mel**o**dy, b**i**rd, v**e**rb, th**e**

aɪ b**i**te, s**igh**t, b**y**, b**uy**, d**ie**, d**ye**, **ai**sle, ch**oi**r, g**ui**de, **is**land, h**ei**ght, s**ig**n

aʊ ab**ou**t, br**ow**n, d**oub**t, c**ow**ard, s**au**erkr**au**t

ɔɪ b**oy**, **oi**l, R**eu**ters

used in this book are a compromise among several varieties of American English,

but this should not deter you. Our purpose is to teach phonetics in general,

and to show you how phonetics might describe the speech sounds of any of

the world's languages with the proper symbols and diacritics. We merely use

American English for illustration, and we provide the major phonetic symbols

for American English to show you how such symbols may be used to describe

the phonetics of any of the world's languages.

O. TIPS MATERIAL VIDEO

https://youtu.be/bfMw8OAGXTg (Tips study)

https://youtu.be/lJPdR7Kbl9k (tips)

P. INDIVIDUAL WORK

1. Which of the following sets of words are minimal pairs? For the ones that are not minimal pairs, why are they not? To answer these questions, you must read the phonetics symbols out loud and determine

whether your mental grammar interprets them as two different words or different pronunciation of the same word.

2.

Table 1.6 Table of minimal pairs exercise

1	[batl]	[baʔl]
2	[bəsɪ]	[bəzɪ]
3	[ɹênîŋ]	[ɹenɪŋ]
4	[bətɹ]	[bərɹ]
5	[pap]	[pʰap]
6	[məŋk]	[mənɵ]

3. Natural classes:

   Identify which natural classes the following sound come from. None of the rows contain an entire set from a natural class. Choose the smallest possible subclass (e.g. for [d b g] "obstruent" is accurate, but not as specific as "voiced stops")

Table 1.7 Table of natural classes exercise

Sounds	Natural class
[m p w]	
[h v ɵ]	
[n l j a]	
[I u e]	
[t l z]	

(Hazen, 2015, p.)

Q. EXERCISE

1. Define what do you mean by A MNIMAL PAIR!
2. What is phonemes?

3. Define what do you mean by ALLOPHONES!
4. Give two examples of ALLOPHONES of English phoneme!
5. Phonetics and phonology are both concerned with speech sounds. In what do they differ?
6. What is the International Phonetic Alphabet?
7. Write the IPA symbol for the first sound in each of the following words:
   a. psychology
   b. knowledge
   c. his
   d. use
   e. physics
   f. honour
   g. caught
   h. though
   i. show
8. Identify three minimal pairs in the following group of words:

   Patpen more heat tape bun fat
   ban tale bell bit meal vote bet
   pit heel
9. What is assimilation?
10. The use of plural –s has three different phonological forms: /s/, /z/ and /iz/. Which do you add to words ship, book, lad, rag, church, bush. What is the phonological rule that determines which –s version is used?
11. Are [l] and [p] allophones of one phoneme or of two

different phonemes?

12. Are [k] and [g] allophones of one phoneme or of two different phonemes?
13. Verbal means of communicating. Consists of articulation, voice, fluency. → Voice.
    a. Right
    b. Wrong
14. Phonology → Any particular occurrence of a sound segment that is used by a speaker in words may be referred to as a ______.
    a. Right
    b. Wrong
15. How speech sounds are made → Minimal Pairs
    a. Right
    b. Wrong

CHAPTER II
CONSONANT

A. Description of consonant

In the production of sounds generally, there are three operative terms which all students of the subject should be firmly knowledgeable about. These are the terms **plosive, fricative and nasal. Practically all natural languages have plosive consonants,** fricative consonants and nasal consonants, in varying numbers and in varying distributional patterns. In the realization of a plosive consonant, four stages described here in sporting terms are notable:

i. Two articulators come together – the articulators may be the lips coming together; the tongue moving up to be in contact with the teeth ridge (alveolar ridge) or the back part of the tongue being in contact with the soft palate. We may refer to this as the preparatory or the "on-your-marks" phase.
ii. The air from the lungs is now held completely in check; the united organs prevent it from escaping. We can call this the 'get-set' phase.
iii. There follows a sudden parting of the organs, a process which allows the imprisoned air to escape.

This is the 'go' or the 'plosion' phase.

iv. What follows immediately in the wake of the plosion may be voicing or voicelessness depending on the action of the vocal lips: vibration or absence of it. We may call this the post-plosion (the "pp" stage).

These four stages are applicable to the articulation of plosive consonants in practically all natural languages. From these four stages we can also appreciate why plosive consonants are sometimes referred to as stop consonants. With respect to English, six consonant sounds /p, b, t, d, k, g/ are often realized following the four stages outlined above. Of these six, /b,d,g/ are generally said to be voiced (even if they are not equally vigorously voided in all word positions), while /p, t, k/ are generally said to be voiceless. It has also generally been claimed that the voiceless plosives are produced with a great exertion of energy and so the consonants are said to be strong or fortis. On the other hand, it is generally claimed that the realization of the voiced plosives /b,d,g/ takes a comparatively less exertion of energy in their realization and so the plosives are said to be weak or lenis. The terms fortis and lenis are however not restricted to English alone. Indeed, any language in which the dichotomy of energy exertion is observable may employ the terms for the description of plosive or any other consonant sounds for that matter.

The next term in our preliminary discussion of consonant is fricative. Fricative consonants are realized when articulating organs get near to each other, leaving a small space between them. Because of the narrowed space, the air that passes through makes some kind of hissing sound. Such consonants are often said to be continuant consonants, and this is because of the fact that the fricative sounds can be continued almost indefinitely so long as the speaker has enough air to continue the pronunciation at any given time.

The last of our operative terms is nasal. Nasal consonants are those which are realized through the nose. For this to happen, the soft palate must be lowered to cover the mouth cavity and this allow the nasal cavity free for the air to pass through. In all natural languages, consonants of this class exist and are explicable in terms of this kind of lowering of the soft palate. This possibility of lowering the soft palate during sound production presupposes that even oral sounds can be nasalized, (for illustration or for any other reasons). The process of nasalized is a very crucial one in sound production because it makes the important difference between two sets of sounds – oral and nasal. Ordinarily, all vowels and all consonants produced without a lowering of the soft palate belong to one class – oral sounds. All other sounds which pass through the nose cavity are nasal sounds. In a majority of the world's languages, all nasals are voiced. So, in a detailed description of a nasal, it is superfluous to say something like. Voiced velar nasal for / /. It is enough to say: velar nasal.

B. Inside the phonetic symbol

IPA symbol is a symbol system that is used in pronunciation of words in any language, which allows us to express a range of sounds that are greater than English spelling system will. However, only see those symbols might suggest that we deal with independent individual units when we consider phonemes and allophones: each is like a locked black box labeled with the IPA symbol.

In fact, each IPA symbol stands for various types of property, and those characteristics explain how certain segments are represented as pronounced; dismantling the black box for each sound does not reveal mixed up, but internal structure, and understanding that structure allows us to make comparisons with other sounds. When we know that [k], for example, is soundless velar, we can begin to see what property that is shared with other sounds that may also be silent, or velar, or plosif; we can also see the difference with which other sounds not voiced, or velar, or plosif. Next, we will see what allophonic properties are different from the same phoneme distribution, which is possible allow them to be considered 'equal' by English speakers: that is, us can find out what features of a particular English phonetic speaker to ignore, and what they realize. Because this might be very different for speakers of other languages, dismantle the science notation in this way too allow cross-linguistic comparisons to be made. In this chapter, we must therefore consider a very basic set of phonetic features that allow us to describe the articulations of English consonants, and to judge their differences and similarities.

C. Classification of Consonant

1. Voiced or Voiceless

A major division among speech sounds which is relevant for all languages is the dichotomy of voiced and voiceless. If you put your fingers on your 'Adam's apple' or 'voicebox' (technically the larynx), and produce a very long [zzzzzzz], you should feel vibration; this shows that [z] is a voiced sound. On the other hand, if you make a very long [sssssss], you will not feel the same sort of activity: [s] is a voiceless sound. This phonetic property distinguishes the words in pairs like the following:

rope/robe	fate/fade	rack/rag	wreath/wreathe
[rop]/[rob]	[fet]/[fed]	[ræk]/[ræg]	[riθ]/[rið]

The first word of each pair ends with a voiceless sound and the second word with a voiced sound. All other aspects of the sounds in each word pair are identical; the position of the lips and tongue is the same. The voiced/voiceless distinction also occurs in the following pairs, where in each case the first word begins with a voiceless sound and the second with a voiced sound:

fine/vine	seal/zeal	choke/joke
[faɪn]/[vaɪn]	[sil/zil]	[ʧok]/[ʤok]
peat/beat	tote/dote	kale/gale
[pit]/[bit]	[tot]/[dot]	[kel]/[gel]

Pulmonic egressive air flows through the trachea, or windpipe, and up into the larynx,

Trachea acts to control the airway to and from the lungs, with the epiglottis above it protecting the lungs by stopping foreign bodies like food from dropping in. Stretched across the larynx from front to back are the vocal folds, or vocal cords. These can be pulled back and drawn apart, in which case they leave a free space, the glottis, through which air can flow: this is the case for voiceless sounds like [s]. For voiced sounds, the vocal folds are drawn together, closing off the glottis; however, the pressure of air flowing from the lungs will cause the folds to part, and their essentially elastic nature will then force them together again. Repetitions of this cycle of opening and closing cause vibration, as for [z].

Voicelessness and voicing are the two main settings of phonation, or states of the glottis: for English at least, the only other relevant case, and again one which is used paralinguistically, is whisper. In whisper phonation, the vocal folds are close together but not closed; the reduced size of the glottis allows air to pass, but with some turbulence which is heard as the characteristic hiss of whisper.

2. Oral or Nasal

For most sounds, air passes from the lungs, up through a long tube composed of the trachea, or windpipe; the larynx; and the pharynx, which opens out into the back of the oral cavity. The air passes the various articulators in the mouth, and exits at the lips; The key to whether air can flow through the nose is the velum, or soft palate, which you can identify by curling the tip of your tongue up and running it back along the roof of your mouth until you feel the hard, bony palate giving way to something squashier. For oral sounds, the velum is raised and pushed against the back wall of the pharynx, cutting off access to the nose. However, for [m], [n] and [ŋ] in *ram*, *ran* and *rang*, the velum is lowered, so that air moving up from the lungs must flow through the nose. If you produce a long [s], you will be able to feel that air is passing only through your mouth; conversely, if you hum a long [m], you will notice that air continues to flow through your nose while your lips are pressed together, with that closure being released only at the end of the [m].

Nasal sounds, like [m] and [n], are produced with air only passing through the nasal cavity for at least part of their production. On the other hand, nasalized sounds, like the vowel in *can*, preceding a nasal consonant, as opposed to the vowel in *cat*, which precedes an oral one, are characterized by airflow through both nose and mouth simultaneously.

3. Manner of Articulation

a. Stops

If the active and passive articulators actually touch, stopping airflow through the oral cavity completely for a brief period, the sound articulated is a stop. If you put your lips together to produce [p] *pea*, and hold them in that position, you will feel the build-up of air which is then released when you move from the stop to the following vowel. Further back in the vocal tract, [t] *tea* and [k] *key* are also stop sounds. More accurately, all these are plosives, the term for oral stops produced on a pulmonic egressive airstream, just as clicks are stops produced on a velaric ingressive airstream, for instance. Plosives may be voiceless, like [p], [t] and [k], or voiced, like their equivalents [b], [d] and [g].

Stops are consonants in which the airstream is completely blocked in the oral cavity for a short period (tens of milliseconds).

- [p], [b], and [m] are bilabial stops, with the airstream stopped at the mouth by the complete closure of the lips.
- [t], [d], and [n] are alveolar stops; the airstream is stopped by the tongue, making a complete closure at the alveolar ridge.
- [k], [g], and [ŋ] are velar stops, with the complete closure at the velum.
- [ʧ] and [ʤ] are palatal affricates with complete stop closures. They will be further classified later.

Since the definition of a stop involves the complete, transient obstruction of the *oral* cavity, it also includes nasal sounds, where airflow continues through the nose. English [m], [n] and [ŋ] are therefore nasal stops, although they are typically referred to simply as nasals, as there are no distinctive English nasals involving other manners of articulation. All these nasals are also voiced.

Finally, some varieties of English also have subtypes of stops known as taps or trills. While a plosive is characterised by a complete obstruction of oral airflow, followed generally by release of that airflow, a tap is a very quick, ballistic movement where the active articulator strikes a glancing blow against the passive one; interruption of the airstream is real, but extremely brief. Many Scots speakers have a tapped allophone [ɾ] of the phoneme /r/ between vowels, as in *arrow*, *very*; many American speakers have a similar tap as a realisation of /t/ in *butter*, *water*. Trills are repeated taps, where the active articulator vibrates against the passive one. Trilled [r] is now rather uncommon for speakers of English, although attempts at imitating Scots often involve furious rolling of [r]s.

b. Fricative

During the production of a fricative, the active and passive articulators are brought close together, but not near enough to totally block the oral cavity. This close approximation of the articulators means the air coming from the lungs has to squeeze through a narrow gap at high speed, creating turbulence, or local audible friction, which is heard as hissing for a voiceless fricative, and buzzing for a voiced one. English [f] ***f**ive* and [s] ***s**ize* are voiceless fricatives, while [v] *fi**v**e* and [z] *si**z**e* are voiced. The subclass of affricates consists of sounds which start as stops and end up as fricatives; but as we shall see in Chapter 5, they behave as single, complex sounds rather than sequences. Stops generally involve quick release of their complete articulatory closure; but if this release is slow, or delayed, the articulators will pass through a stage of close approximation appropriate for a fricative. The two relevant sounds for English are [tʃ], at the beginning and end of *church*, and its voiced equivalent [d], found at the beginning and end of *judge*. If you pronounce these words extremely slowly, you should be able to identify the stop and fricative phases.

Fricatives [f] [v] [θ] [ð] [s] [z] [ʃ] [ʒ] [x] [ɣ] [h]

The first of each the following pairs of fricatives is voiceless; the second voiced.

- [f] and [v] are labiodental fricatives; the friction is created at the lips and teeth, where a narrow passage permits the air to escape.
- [θ] and [ð] are interdental fricatives, represented by th in thin and then. The friction occurs at the opening between the tongue and teeth.
- [s] and [z] are alveolar fricatives, with the friction created at the alveolar ridge.
- [ʃ] and [ʒ] are palatal fricatives, and contrast in such pairs as mission [mɪʃən] and measure [mɛʒər].
- [x] and [ɣ] denote *velar fricatives*. They are produced by raising the back of the tongue toward, but not quite touching, the velum.
- [h] is a glottal fricative. Its relatively weak sound comes from air passing through the open glottis and pharynx.

All fricatives are continuants. Although the airstream is obstructed as it passes through the oral cavity, it is not completely stopped.

c. Approximants

It is relatively easy to recognise a stop or fricative, and to diagnose the articulators involved, since these are either touching or so close that their location can be felt. In approximants, on the other hand, the active and passive articulator never become sufficiently close to create audible friction. Instead, the open approximation of the articulators alters the shape of the oral cavity, and leads to the production of a particular sound quality. There are four approximant consonant phonemes in English: /j/ ***y****es*, /w/ ***w****et*, /r/ ***r****ed* (although as we have seen, /r/ may have a tapped allophone for some speakers) and /l/ ***l****et*. All these approximants are voiced. The first three are central approximants, whereas [l] is a lateral approximant. Although in this chapter we focus on the sounds of English, the IPA has symbols and classifications for all the sounds of the world's languages.

d. Affricates [ʧ] [ʤ]

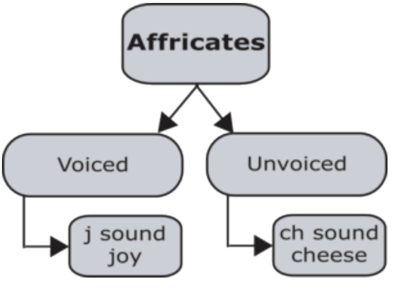


Diagram 2.1

These sounds are produced by a stop closure followed immediately by a gradual release of the closure that produces an effect characteristic of a fricative. The palatal sounds that begin and end the words *church* and *judge* are voiceless and voiced affricates, respectively. Affricates are not continuants because of the initial stop closure.

e. Liquids [l] [r]

In the production of the sounds [l] and [r], there is some obstruction of the airstream in the mouth, but not enough to cause any real constriction or friction. These sounds are f. F.

- / l / / ɫ / lateral liquids

A lateral liquid is a sound in which the flow of air out of the body is redirected around the tongue and toward the sides of the mouth before exiting through the lips. English has two lateral liquids. the alveolar lateral approximate /l/ in which the tongue is brought near (approximate) the alveolar ridge, forcing the air around the tongue toward the sides (lateral) of the mouth before being allowed to exit. /l/ occurs in syllable-initial position for example like, melon, and hello. The syllable-final sound /ɫ/ is referred to as a velarized alveolar lateral approximate, meaning that in addition to the tip of the tongue being brought near the alveolar ridge, the back of the tongue is raised toward the velum as well. /ɫ/ occurs in syllable-final position for example full, little, and belfry. As with nasals, the order of articulation is reversed between syllable-initial and syllable-final laterals.

- / ɹ / / ɻ / / r / non-lateral liquids

A non–lateral liquid is a sound in which the flow of air out of the body is altered by the shape of the tongue, usually flowing over the tongue resonating near the roof of the mouth (but not toward the sides of the mouth) before exiting through the lips. English has three non-lateral liquids, with most dialects having two (rhotic), some having a third (trill), and some having only one (R-dropping). In syllable-initial / ɹ / as in rabbit, run, and borrow, referred to as a retroflex approximate, the tongue is brought forward the curled backward toward the roof of the mouth (retroflexion). It comes near (approximate) the roof of the mouth but does not touch it. The sound is released by lowering the jaw and drawing the tongue back to neutral position. This is the most common r-sound in English. Common in most dialects, syllable-final / ɻ / is similar to the syllable initial form. Depending on the accent of the speaker, this sound may be either an alveolar approximate or a retroflex approximate (some speakers place the tongue closer to the alveolar ridge, others put it in the same position as syllable-initial / ɹ /. The primary difference between syllable-initial and syllable-final forms is that the syllable-final sound begins and ends with the tongue and jaw in the approximate position. This differs from syllable-initial position which ends with the jaw lowering and the tongue returning resting position. Compare movement within the mouth between / ɹ / in red and Robert, and / ɻ / in car, better, and urgent. Finally, some dialects possess a third non-lateral approximate /r/ known as a trill (and in lesser form a flap). These sounds are often referred to as rolled-r. In producing this sound the tongue is quickly and lightly (and in longer trills, repeatedly) brought into contact with the alveolar ridge. Otherwise the /r/ is produced in the same manner as syllable-initial / ɹ / or syllable-final / ɻ / depending on position. The sound /r/ is a primary characteristic of many Scottish accents and is also found in certain Spanish loanwords in North American English including burrito and perro.

f. Glides [j] [w]

The sounds [j] and [w], the initial sounds of *you* [ju] and *we* [wi], are produced with little obstruction of the airstream. They are always followed directly by a vowel and do not occur at the ends of words (don't be fooled by spelling; words ending in *y* or *w* like *say* and *saw* end in a vowel sound). After articulating [j] or [w], the tongue glides quickly into place for pronouncing the next vowel, hence the term **glide**.

The glide [j] is a palatal sound; the blade of the tongue (the front part minus the tip) is raised toward the hard palate in a position almost identical to that in producing the vowel sound [i] in the word *beat* [bit]. The glide [w] is produced by both rounding the lips and simultaneously raising the back of the tongue toward the velum. It is thus a **labio-velar** glide. Where speakers of English have different pronunciations for the words *which* and *witch*, the labiovelar glide in the first word is voiceless, symbolized as [ʍ] (an upside-down *w*). The position of the tongue and the lips for [w] is similar to that for producing the vowel sound [u] in *suit* [sut].

g. Trills and flaps

The *r*-sound of many languages may be different from the English [r]. A trilled *r* is produced by rapid vibrations of an articulator. An alveolar **trill**, as in the Spanish word for 'dog,' *pe**rr**o*, is produced by vibrating the tongue tip against the alveolar ridge. Its IPA symbol is [r], strictly speaking, though we have co-opted [r] for the English *r*. Many French speakers articulate the initial sound of *rouge* as a uvular trill, produced by vibrating the uvula. Its IPA symbol is [ʀ].

Another *r*-sound is called a **flap** and is produced by a flick of the tongue against the alveolar ridge. It sounds like a very fast *d*. It occurs in Spanish in words like *pe**r**o* meaning 'but.' It may also occur in British English in words such as *very*. Its IPA symbol is [ɾ]. Most American speakers produce a flap instead of a [t] or [d] in words like *writer* and *rider*, which then sound identical and are spelled phonetically as [raɪɾər].

h. Clicks

These “exotic” sounds are made by moving air in the mouth between various articulators. The sound of disapproval often spelled *tsk* is an alveolar **click** that occurs in several languages of southern Africa such as Zulu. A lateral click, which is like the sound one makes to encourage a horse, occurs in Xhosa. In fact, the *X* in *Xhosa* stands for that particular speech sound.

i. T Sound

The articulator of T are the tip of tongue and the alveolar ridge.

There are three kind of T sound :

1. True T :

   When T at the beginning of a word, ex : In the TR cluster (train, try)

   T it can be CH in the words to, today, tomorrow, tomato

2. Flap T :

   When T between 2 vowels or diphtong (beautyful, city)

   When T after an R before a vowels or diphtong (party, dirty)

3. Stop T :

   When T is followed by a consonant sound (definetly, bluently)

   When the T is the last sound (fact, best)

j. Tap. .Tap. .Tap

Tap is a regular pronounciation of /t, n, d/ in word latter, ladder, tanner. The articulator is the tip of the tongue contact the dental or alveolar, roof and floor of mouth then up and down.

k. Sibilance

Sibilance is a literary device where strongly stressed consonants are created deliberately by producing air from vocal tracts through the use of lips and tongue. Such consonants produce hissing sounds.

There are 6 sound of sibilance.

a. /s/ – "suit" and "bus" – air is forced through tongue and alveolar ridge (alveolar)
b. /z/ – "zit" and "jazz" – air is forced through tongue and alveolar ridge (alveolar)
c. /ʃ/ – "shot" and "brash" – air is forced through the tongue and point just beyond alveolar ridge (postalveolar)
d. /ʒ/ – "vision" and "measure" – air is forced through the tongue and point just beyond alveolar ridge (post-alveolar)
e. /tʃ/ – "chick" and "match" – air is blocked with tongue just beyond the alveolar ridge (post-alveolar), then released as a fricative.
f. /dʒ/ – "jam" and "badge" – air is blocked with tongue just beyond the alveolar ridge (post-alveolar),

l. Lateral

The key feature of laterals is that the airflow passes to the sides (of the tongue, usually) when pronouncing them.

Ex : **L**ake , Be**ll**

m. Nasal

The Definition of Nasal :

Nasal is the sounds produced with articulated are completely obstructing the mouth passage. But, allowing the air to pass out through the nose.

The basic characteristics of a nasal consonant is that the air escapes through the nose. For this to happen, the soft palate must be lowered; in the case off all the other consonants and vowel, the soft palate is raised and air cannot pass through the nose. In nasal consonants, however, the air does not pass through the mouth; it is prevented by a complete closure in the mouth at some point. (*English Phonetics and Phonology – Peter Roach)*

> Nasal is the sounds occur when a complete closure is made somewhere in the mouth, then the soft palate is lowered, and air escapes through the nasal cavity.

The Types of Nasal :

a. Bilabial : Total closure is made by both lips. For a bilabial sound, the active articulator is the bottom lip, and the passive articulator is the top lip.

   For example :

/p/	*pie*	voiceless bilabial plosive
/b/	*by*	voiced bilabial plosive
/m/	*my*	voiced bilabial nasal

   The other example "m" = man, come, time, family, more, maybe, make, game, much, many, etc.

b. Alveolar : Alveolar sound are produced by the tip of the tongue moving up towards the palate of the rough part.

   For example :

   /t/ *tie* voiceless alveolar plosive

/d/	*die*	voiced alveolar plosive
/n/	*nigh*	voiced alveolar nasal
/s/	*sip*	voiceless alveolar fricative
/z/	*zip*	voiced alveolar fricative
/r/	*rip*	voiced alveolar central approximant
/l/	*lip*	voiced alveolar lateral approximant

The other example "n" = now, funny, sun, friend, sound, nice, know, ant, change, end, etc.

c. Velar : The back part of the tongue to touched against the soft palate, the back part roof of the mouth. For velar sounds, the active articulator is the back of the tongue and the passive articulator is the velum, or soft palate.

For example :

/k/	*cot*	voiceless velar plosive
/g/	*got*	voiced velar plosive
/ŋ/	*rang*	voiced velar nasal
/x/	*locb*	voiceless velar fricative

The other example "ŋ" = sing, song, morning, everything, wing, single, angle, ring, anger, thing, etc.

4. The Airflow

Speech is audible because the movements of articulators (to be discussed in subsequent sections) cause the air to vibrate, forming sound waves which travel to the hearer's ears, and set up vibrations in her inner ear, which are then translated into sounds again by the brain. Since sound waves need air, it follows that articulatory vibrations will only make sound waves if there is a moving body of air available. Airstreams can be set in motion, or initiated, in three ways; however, only one is used in English, and indeed is found in every language of the world.

Essentially, speaking is modified breathing: it makes use of the resources involved in normal respiration, but in a more controlled way. When we are simply breathing quietly, the phases of breathing in and out last approximately the same time, and expiration is not under our physical control; it simply occurs as an automatic consequence of having breathed in. However, when we are speaking, the phase of breathing out is significantly longer, depending on the length of the utterance we want to produce. A network of muscles, like the intercostal muscles between our ribs, come into play to make breathing out smoother, more gradual and more controlled during speech, providing a regular flow of air which can then be modified by the articulators in various ways.

All the sounds of English, both consonants and vowels, are produced on this pulmonic egressive airstream, where the initiator is the lungs and the rest of the respiratory system, and the direction of airflow is outwards: this is overwhelmingly the most common airstream mechanism in every language of the world. It can generally be taken for granted that the sounds under discussion below are pulmonic egressive, but you should remember to give that information in a complete description: so the labial nasal [m] (which, as we shall see, is produced using the lips – hence labial, and with airflow through the nose – hence nasal), is strictly a pulmonic egressive labial nasal.

It is possible to produce speech using a pulmonic ingressive airstream. No language seems to use this airstream regularly for particular sounds, although it has been reported in various cultures as a means of voice disguise: if you try to breathe in and speak at the same time, you will find that the pitch of your voice raises significantly.

There are two other airstreams which may be involved in speech, although even in languages where these are used, they will characterise only a few sounds, interpolated in a stream of pulmonic egressive speech. The first is the glottalic airstream mechanism, initiated by a movement of the larynx, which is where you can feel your 'Adam's apple' protruding slightly about half-way up your throat. The larynx can move up or down, and the glottalic airstream can therefore be either ingressive or egressive, producing sounds known as implosives and ejectives respectively; none of these occur in English. Finally, the 'tut-tut' click sound [] is produced on a velaric airstream, which operates only ingressively. When you make [] you can feel that the back of your tongue is pressed against the roof of your mouth, stopping air from moving any further back; a little air is then drawn into the mouth further forward, and the closure with the tongue is released to make a click. Neither the glottalic nor the velaric airstreams provide airflow with the volume or controllability of the pulmonic system.

5. Place of Articulation

As we have seen, the location of the active and passive articulators determines the place of articulation for a consonant. In English, consonants are produced at eight places of articulation. Since we have now covered all the other articulatory parameters required to describe consonants, introducing and defining these places will allow us to build up a complete consonant phoneme system for English. In the tables below, the phoneme or allophone in question is initial in the example word, unless another part of that word is bold-face.

a. Bilabial

For a bilabial sound, the active articulator is the bottom lip, and the passive articulator is the top lip.

/p/ *pie* voiceless bilabial plosive

/b/ *by* voiced bilabial plosive

/m/ *my* voiced bilabial nasal

There is at least one further English phoneme which to an extent fits under this heading: this is the approximant /w/ in *wet*. In producing [w], the lips are certainly approximated, though not enough to cause friction or obstruct the airflow; but you should be able to feel that the back of your tongue is also bunched up. This additional articulation takes place at the velum, so that [w] is not simply a labial sound, but a labial-velar one. In some accents of English, notably those spoken in Scotland and New Zealand, this /w/ contrasts with / ʍ /, the voiceless labial-velar fricative, which tends to occur in words spelled <wh->. If you have the same pronunciation for *witch* and *which*, or *Wales* and *whales*, then you have only /w/; if these are consistently different for you, then these minimal pairs establish a contrast of /w/ and /ʍ/.

/w/ *witch* voiced labial-velar approximant

/ʍ/ *which* voiceless labial-velar fricative

b. Labio-Dental

For labio-dental sounds, the active articulator is again the bottom lip, but this time it moves up to the top front teeth. Note that these sounds are labio-dental, while /w/ and // are labial-velar, because in the first case, articulation takes place only at a single location, while in the second, there are two separate, simultaneous articulations.

/f/ *fat* voiceless labio-dental fricative

/v/ *vat* voiced labio-dental fricative

c. Dental

In most English sounds, and most speech sounds in general, the active articulator is part of the tongue; to avoid confusion, places of articulation where the tongue is involved are therefore generally called after the passive articulator. For the two dental fricatives, it follows that the passive articulator is the top front teeth; the active articulator is the tip of the tongue. The tongue itself is conventionally divided into the tip (the very front); the blade (just behind the blade, and lying opposite the alveolar ridge); the front (just behind the blade, and lying opposite the hard palate); the back (behind the front, and lying opposite the velum); and the root (right at the base, lying opposite the wall of the pharynx). [θ] *thigh* voiceless dental fricative [ð] *thy* voiced dental fricative

d. Alveolar

Alveolar sounds are produced by the tip or blade of the tongue moving up towards the alveolar ridge, the bony protrusion you can feel if you curl your tongue back just behind your top front teeth.

/t/ *tie* voiceless alveolar plosive
/d/ *die* voiced alveolar plosive
/n/ *nigh* voiced alveolar nasal
/s/ *sip* voiceless alveolar fricative
/z/ *zip* voiced alveolar fricative
/r/ *rip* voiced alveolar central approximant
/l/ *lip* voiced alveolar lateral approximant

The symbol /r/ is used for the phoneme here and throughout the book, primarily because it is typographically convenient; but different realisations of /r/ are found throughout the English-speaking world, and as we have seen, [r] itself, the voiced alveolar trill, is rather rare. The tapped realisation, [ɾ], is also alveolar; but another even more common pronunciation is not. This is the voiced retroflex approximant, [ɹ], which is produced with the tip of the tongue curled back slightly behind the alveolar ridge; this is the most common realisation of /r/ for speakers of Southern Standard British English and General American.

e. Post-alveolar

If you move your tongue tip back behind the alveolar ridge, you will feel the hard palate, which then, moving further back again, becomes the soft palate, or velum. Post-alveolar sounds are produced with the blade of the tongue as the active articulator, and the adjoining parts of the alveolar ridge and the hard palate as the passive one. They include two fricatives, and the affricates introduced in the last section.

/ʃ/ *ship* voiceless postalveolar fricative
/ʒ/ *bei**g**e* voiced postalveolar fricative
/tʃ/ *chunk* voiceless postalveolar affricate
/dʒ/ *junk* voiced postalveolar affricate

f. Palatal

Palatals are produced by the front of the tongue, which moves up towards the hard palate. We have so far encountered two palatal sounds: the approximant /j/ in *yes*, and the voiceless palatal stop [c] in *kitchen*. Recall, however, that [c] is the allophone of /k/ found before certain vowels; velar [k] appears elsewhere. There is a similar pattern for /g/, which has as allophones velar [g] in *garden* and palatal [ɟ] *give*. Since we are constructing a phoneme system here, these allophones are not included in the list.

/j/ *yes* voiced palatal approximant

g. Velar

For velar sounds, the active articulator is the back of the tongue, and the passive articulator is the velum, or soft palate. The labial-velar approximant and fricative /w/ and /ʍ/ are not included here, as they were discussed above with the bilabials; however, it should be remembered that these doubly-articulated sounds strictly belong under both headings. Similarly, although the 'dark l' realisation, [ɫ], is also velar, it does not appear in the list below as it is an allophone of /l/. There is a further accent difference involving velar sounds: in some varieties of English, notably Scottish ones, there is a voiceless velar fricative, /x/: this is the sound at the end of Scots *loch*, which speakers of other accents typically replace with a [k].

/k/ *cot* voiceless velar plosive
/g/ *got* voiced velar plosive
/ŋ/ *ra**ng*** voiced velar nasal
/x/ *lo**ch*** voiceless velar fricative

h. Glottal

Glottal sounds are in the minority in articulatory terms, since they do not involve the tongue: instead, the articulators are the vocal folds, which constitute a place of articulation as well as having a crucial role in voicing. English has two glottal sounds. The first is allophonic, namely the glottal stop, [ʔ], which appears as an intervocalic realisation of /t/ in many accents, as in *butter*. The glottal stop is technically voiceless, though in fact it could hardly be anything else, since when the vocal folds are pressed together to completely obstruct the airstream, as must be the case for a stop sound, air cannot simultaneously be passing through to cause vibration. The second, the voiceless glottal fricative [h], is a phoneme in its own right. /h/ *high* voiceless glottal fricative.

D. Phonetic Symbols for American English Consonants

We are now capable of distinguishing all of the consonant sounds of English via the properties of voicing, nasality, and place and manner of articulation. For example, [f] is a voiceless, (oral), labiodental fricative; [n] is a (voiced), nasal, alveolar stop. The parenthesized features are usually not mentioned because they are redundant; all sounds are oral unless nasal is specifically mentioned, and all nasals are voiced in English.

Table 5.4 lists the consonants by their phonetic features. The rows stand for manner of articulation and the columns for place of articulation. The entries are sufficient to distinguish all words in English from one another. For example, using [p] for both aspirated and unaspirated voiceless bilabial stops and [b] for the voiced bilabial stop suffices to differentiate the words pit, spit, and bit. If a narrower phonetic transcription of these words is desired, the symbol [ph] can be used to indicate aspiration, giving us [phıt], [spıt], [bıt]. By "narrow transcription" we mean one that indicates all the phonetic details of a sound, even those that do not affect the words.

Examples of words in which these sounds occur are given in

Table 2.1

Table	Some phonetic symbol for American English Consonant						
	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (Oral) Voiceless Voiced	Pb			td		Kg	?
Nasal (Voiced)	m			n		ŋ	
Fricative Voiceless Voiced		F v	θ ð	S Z	ʃ ʒ		h
Glide Voiceless Voiced	ʍ w				j	ʍ w	
Liquid (Voiced) (central) (lateral)					r l		

Table 2.2

Table	Examples of Consonant in English Word						
	Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar	Glottal
Stop (Oral) Voiceless Voiced	**P**ie **b**uy			**t**ie **d**ie		**K**ite **g**uy	(?)-oh
Nasal (Voiced)	**m**e			**n**ap		lo**ng**	
Fricative Voiceless Voiced		**F**ine vine	**Th**igh **th**y	**S**ue **Z**oo	**Sh**oe Measure		**h**igh
Glide Voiceless Voiced	**Wh**ich **w**ipe				you	**Wh**ich **w**ipe	
Liquid (Voiced) (central) (lateral)					**r**ye **l**ye		

E. Variation between accents

1. The importance of accent

Every speaker of English has a particular system of his or her own, known by linguists as that individual's idiolect. However, considering language only at the idiolectal level might produce extremely thorough and detailed descriptions, but would give rather little insight into why individuals speak in the way they do. To understand this, we must identify higher-level groupings, and investigate geographical and social accents. That is to say, individuals adopt a particular mode of speech (or more accurately, move along a continuum of modes of speech) depending on who they want to identify with, who they are talking to, and what impression they want to make. Not all these 'decisions' are conscious, of course. Small children learn to speak as their immediate family members do; but quite soon, the peer group at school (even nursery) becomes at least equally important; and later, older children, then television presenters, actors or sporting heroes may become role models, leading to modifications in accent. Consequently, age-related differences appear in all varieties; some will be transient, as a particular TV show falls out of fashion and the words or pronunciations borrowed from it disappear; others will become entrenched in young people's language, and may persist into adulthood, becoming entirely standard forms for the next generation.

This flexibility, and the associated facts of variation and gradual change, mean that phonologists face a Catch-22 situation. On the one hand, describing idiolects will give seriously limited information, since it will not reveal the groups an individual belongs to, or the dynamics of those groups. On the other hand, we must take care that the groups are not described at too abstract a level. Any description of 'an accent' is necessarily an idealisation, since no two speakers will use precisely the same system in precisely the same way: our physical idiosyncracies, different backgrounds, and different preferences and aspirations will see to that. Nonetheless, two speakers of, say, Scottish Standard English, or New Zealand English, will have a common core of features, which allows them to be grouped together by speakers of the same accent, by speakers of other accents, and by phonologists. Not everyone is equally adept at making these identifications, of course. Speakers of other varieties may succeed in placing accents only within a very wide geographical boundary: thus, a speaker of GA may have difficulty in distinguishing a Scottish from an Irish speaker, while conversely, a Scot may confuse Americans and Canadians. Within groups, however, much more subtle distinctions are perceived and have geographical or social meaning: hence, one speaker of SSE may identify another as coming from Glasgow rather than Edinburgh, and perhaps even from a particular area of the city; and may well base assumptions to do with social class and level of education on those linguistic factors.

Accent is clearly extremely important, as one of the major tools we use in drawing inferences about our fellow humans, and in projecting particular images of ourselves. Phonologists should, then, be able to do as speakers do, in identifying and classifying accents, but with a more technical rather than emotional classification of the differences and similarities between them. An accent, in phonological terms, is an idealised system which speakers of that variety share. Although slight differences in its use may be apparent, both across and within individuals, its speakers will still share more in common with one another, and with that idealised accent system, than with speakers of any other idealised accent system. Standard accents should also be described in just the same way as non-standard ones, as they provide just the same sort of social and geographical information about their users: that is, although it is quite common for speakers of a standard accent, such as SSBE in the south of England, to claim that they have no accent, other speakers (and phonologists) know different.

A more detailed appreciation of the cues speakers attend to in different accents, and the social judgements they make on that basis, is a matter for sociolinguistics and dialectology rather than phonology. The main contribution a phonologist can make is to produce a classification of types of differences between accents, which can then be used in distinguishing any set of systems; and that is the goal of this chapter. In the next sections, then, we shall introduce a three-way classification of accent differences, and illustrate these using examples involving both consonants and vowels. First, the systems of two accents may contain different numbers of phonemes, so different phonemic oppositions can be established for them: these are systemic differences. Second, the same phonemes may have different allophones: these are realisational differences. Finally, there are distributional differences, whereby the same lexical item may have different phonemes in two different varieties; or alternatively, the same phoneme may have a phonological restriction on its distribution in one variety but not another.

2. Systemic differences

The first and most obvious difference between accents is the systemic type, where a phoneme opposition is present in one variety, but absent in another. Consonantal examples in English are relatively rare. As we have already seen, some varieties of English, notably SSE, Scots and NZE, have a contrast between /w/ and //, as evidenced by minimal pairs like Wales and whales, or witch and which. Similarly, SSE and Scots have the voiceless velar fricative /x/, which contrasts with /k/ for instance in loch versus lock, but which is absent from other accents. NZE speakers will therefore tend to have one more phoneme, and Scots and SSE speakers two more, than the norm for accents of English.

Conversely, some accents have fewer consonant phonemes than most accents of English. For instance, in Cockney and various other inner-city English accents, [h]-dropping is so common, and so unrestricted in terms of formality of speech, that we might regard /h/ as having disappeared from the system altogether. This is also true for some varieties of Jamaican English. In many parts of the West Indies, notably the Bahamas and Bermuda, there is no contrast between /v/ and /w/, with either [w] or a voiced bilabial fricative [β] being used for both, meaning that /v/ is absent from the phonemic and phonetic systems. The same contrast is typically missing in Indian English, but the opposition is resolved in a rather different direction, with the labio-dental approximant [“] very frequently being used for the initial sound of wine and vine, or west and vest. Again, there is only a single phoneme in this case in Indian English.

The number of accent differences involving vowels, and the extent of variation in that domain, is very significantly greater than in the case of consonants for systemic, realisational and distributional differences. This probably reflects the fact that the vowel systems of all English varieties are relatively large, so that a considerable number of vowels occupy a rather restricted articulatory and perceptual space; in consequence, whenever and wherever one vowel changes, it is highly likely to start to encroach on the territory of some adjacent vowel. It follows that a development beginning as a fairly minor change in the pronunciation of a single vowel will readily have a knock-on effect on other vowels in the system, so that accent differences in this area rapidly snowball. In addition, as we saw in earlier chapters, the phonetics of vowels is a very fluid area, with each dimension of vowel classification forming a continuum, so that small shifts in pronunciation are extremely common, and variation between accents, especially when speakers of those accents are not in day-to-day communication with each other, develops easily.

Systemic differences in the case of vowel phonemes can be read easily from lists of Standard Lexical Sets and the systems plotted from these on vowel quadrilaterals. If for the moment we stick to the four reference accents introduced in the last chapter, namely SSBE, GA, SSE and NZE, we can see that SSBE has the largest number of oppositions, with the others each lacking a certain number of these.

Comparing GA to SSBE, we find that GA lacks /ɒ/, so that lot words are produced with /ɑː/, as are *palm* words, while *cloth* has the /ɔː/ of *thought*. In this respect, SSBE is 'old-fashioned': it maintains the ancestral state shared by the two accents. However, in GA realisations of the earlier /ɒ/ have changed their quality and merged, or become identical with the realisations of either /ɑː/ or /ɔː/. GA also lacks the centring diphthongs of SSBE, so that *near, square, cure* share the vowels of *fleece, face, goose* respectively, but since GA is rhotic, the former lexical sets also have a realisation of /r/, while the latter do not. In this case, however, the historical innovation has been in SSBE. At the time of the initial settlement of British immigrants in North America, most varieties of English were rhotic, as GA still is; but the ancestor of SSBE has subsequently become non-rhotic. The loss of /r/ before a consonant or a pause in SSBE has had various repercussions on the vowel system, most notably the development of the centring diphthongs.

In systemic terms, NZE lacks only one of the oppositions found in SSBE, namely that between /I/ and /ə/; in NZE, both *kit* and *letter* words have schwa. There are more differences in symbols between the SSBE and NZE lexical set lists; but these typically reflect realisational, and sometimes distributional, rather than systemic differences, as we shall see in the next two sections. That is to say, I have chosen to represent the vowel of NZE *trap* as /ɛ/ and *dress* as /e/, *fleece* as /Ii/ and *face* as /ɛI/, to highlight the typical realisational differences between the two accents. However, in phonemic terms, the *trap* and *dress* vowel, and the *fleece* and *face* vowel, still contrast in NZE just as they do in SSBE. That is, the pairs of vowel phonemes in are equivalent: they are symbolised differently because they are very generally pronounced differently (and we could equally well have chosen the same phonemic symbols in each case, to emphasise this parity, at the cost of a slightly more abstract system for NZE), but the members of the pairs are doing the same job in the different accents.

SSBE	NZE	
ɛ	e	dress
æ	ɛ	trap
i:	Ii	fleece

eI	ɛI	face

When we turn to SSE, however, we find a considerably reduced system relative to SSBE. As we might expect, given that SSE is rhotic, it lacks the centring diphthongs, so that near, square, cure share the vowels of fleece, face, goose, though the former will have a final [ɹ] following the vowel. SSE also typically lacks the /ɛ/ vowel of nurse, with [r] appearing here instead; so the *nurse* and *strut* sets share the same vowel. Leaving aside vowels before /r/, however, there are three main oppositions in SSBE which are not part of the SSE system, as shown in the example bellow.

SSBE	SSE	
a	a	trap
ɑ:	a	palm
ɒ	ɒ	lot
ɔ:	ɒ	thought
ʊ	u	foot
u:	u	goose

Each of these three contrasting pairs of vowel phonemes in SSBE corresponds to a single phoneme in SSE. While *Sam – psalm, cot – caught, and pull – pool* are minimal pairs in SSBE, establishing the oppositions between /a/ and /ɑ:/, /ɒ/ and /ɔ:/, and /ʊ/ and /u:/ respectively, for SSE speakers the members of each pair will be homophonous. There is no vowel quality difference; and the Scottish Vowel Length Rule, which makes vowel length predictable for SSE and Scots, means there is no contrastive vowel quantity either. There is some variation in SSE in this respect: speakers who have more contact with SSBE, or who identify in some way with English English, may have some or all of these oppositions in their speech. If an SSE speaker has only one of these contrasts, it is highly likely to be /a/ – /ɑ/; if /ʊ/ and /u/ are contrasted, we can predict that the /ɒ/ – /ɔ/ and /a/ – /ɑ/ pairs also form part of the system.

Of course, such systemic differences are not restricted to the reference accents surveyed above. For instance, within British English, many accents of the north of England and north Midlands fail to contrast /ʊ/ and /ʌ/, so that *put* and *putt, or book* and *buck* all have /ʊ/. In some parts of the western United States, speakers typically lack the /ɑ:/ – /ɔ:/ opposition found in GA, and will therefore have /ɑ:/ in both *cot* and *caught*. Other varieties of English have an even more extreme reduction of the vowel system relative to SSBE. These are typically accents which began life as second language varieties of English: that is, they were at least initially learned by native speakers of languages other than English, although they may subsequently have become official language varieties in particular territories, and be spoken natively by more recent generations. Inevitably, these varieties have been influenced by the native languages of their speakers, showing that language contact can also be a powerful motivating force in accent variation.

One case involves Singapore English. Singapore became a British colony in 1819, and English was introduced to a population of native speakers of Chinese, Malay, Tamil and a number of other languages. Increasingly today, children attend English-medium schools, and use English at home, so that Singapore English is becoming established as a native variety. Its structure, however, shows significant influence from other languages, notably Malay and Hokkien, the Chinese 'dialect' with the largest number of speakers in Singapore. As with many accents, there is a continuum of variation in Singapore English, so that non-native speakers are likely to have pronunciations more distant from, say, SSBE: thus, while a native Singapore English speaker will say [maɪl] 'mile', a second-language speaker who is much more influenced by his native language may say [mʊ]. Increasingly, younger speakers of Singapore English are also looking to American rather than British English as a reference variety, so that further change in the system is likely. The system presented as Singapore English (SgE) is characteristic of native or near-native speakers. Note that SgE has no contrastive differences of vowel length, and that /ɯ/ is the IPA symbol for a high back unrounded vowel.

SSBE	SgE	Set number	Keyword
I	i	1	kit
ɛ	ɛ	2	dress
a	ɛ	3	trap
ɑ	ɔ	4	lot
Λ	Λ	5	strut
ʊ	u	6	foot
ɑ:	ɛ	7	bath
ɒ	ɔ	8	cloth
ɜ:	ɯ	9	nurse
i:	i	10	fleece
eI	e	11	face
ɑ:	Λ	12	palm
ɔ:	ɔ	13	thought
oʊ	o	14	goat
u:	u	15	goose
aI	ai	16	price
ɔI	ɔi	17	choice

aʊ	au	18	mouth
Iə	iə	19	near
ɛə	ɛ	20	square
ɑ:	Λ	21	start
ɔ:	ɔ	22	north
ɔ:	o	23	force
ʊə	uə	24	cure
I	i	25	happy
ə	ə	26	letter
ə	ə	27	comma

As shows above, many of the vowel oppositions found in SSBE are absent from SgE; and in the great majority of cases, the main reason for the changes in SgE is the structure of other languages spoken in Singapore. (The same contact influences account for realisational differences between SgE and other Englishes, which we consider in the next section.) Looking at the various phoneme mergers in SgE in more detail, we find the patterns in example bellow.

Lexical sets	*Merged SgE vowel*	*Malay*	*Hokkien*
dress, trap, bath	ɛ	e	e
Kit, fleece	i	I	i
Lot, thought	ɔ		ɔ
Foot, goose	u	ʊ, u	u
Strut, palm, start	ʌ	no low back vowels	

In all these cases, lexical sets which have distinct vowels in SSBE (and often in other accents too) share a single vowel in SgE; and furthermore, this vowel tends to correspond to the vowel found in either Hokkien, or Malay, or both. Thus, instead of /ɛ/ versus /a/, SgE has only /ɛ/;

both Hokkien and Malay have only a higher vowel in this area, namely /e/ (and realisationally, SgE /ɛ/ raises to [e] before plosives and affricates, as in head, neck, neutralising the opposition between /e/, the monophthong found in face words, and /ɛ/ in trap, dress in this context, so that *bread – braid, red – raid, bed – bade* are homophones). The merger of the *kit, fleece* sets follows the pattern for Malay and Hokkien, and the same is true of strut/palm/start; neither Malay nor Hokkien has any low back vowels, and the SgE vowel for all these sets is higher and more central; in SgE this merger means that cart and cut, or charm and chum, are homophonous. In the cases of lot/thought, and foot/goose, SgE follows the Hokkien pattern; Malay has neither /ɒ/ nor /ɔ/, but both /ʊ/ and /u/. Whichever local language has exerted most influence in any particular instance, it is clear that native language systems have acted as a filter or template for non-native learners of Singapore English, creating the vowel system found today.

3. Realisational differences

In the second type of accent difference, part of the system of phonemes may be the same for two or more accents, but the realisations of that phoneme or set of phonemes will vary. For instance, in SSBE, SSE and GA, /l/ has two main allophones, being clear, or alveolar [l] before a stressed vowel, as in light, clear, but dark, velarised [ɫ] after a stressed vowel, as in dull, hill. This distribution of allophones is not the only possibility in English, however. In some accents, /l/ is always realised as clear; this is true, for instance, of Tyneside English (or ‘Geordie’), Welsh English, and some South African varieties. On the other hand, in Australia and New Zealand, /l/ is consistently pronounced dark; and indeed, realisations may be pharyngeal rather than velar, or in other words, pronounced with a restriction even further back in the vocal tract. In London English, there is a further allophone of /l/, namely a vocalised (or vowel-like) realisation finally or before a consonant: in sell, tall, people, help, /l/ is typically realised as a high or high mid back vowel like [ʊ] or [o]. For younger speakers, vocalisation is also taking hold in medial position, in words like million; and the process is also spreading beyond London, as part of the shift towards so-called 'Estuary English', a mixture of SSBE and London English which is arguably becoming a new standard for young people, especially in urban centres in the south of England.

The other English liquid consonant, /r/, also provides plenty of scope for realisational differences. /r/ is typically an alveolar or slightly retroflex approximant for SSBE and GA, but at least in medial position, is frequently realised as an alveolar tap in SSE (the tap is also a common realisation in South African English). In some parts of the north of England, notably in Northumberland and County Durham, a voiced uvular fricative [ʁ] is quite commonly found, although this may be receding gradually.

In other areas of northern England, this time notably Yorkshire, Tyneside and Liverpool, [ɹ] appears as an allophone of /t/, typically between vowels and across a word-boundary, as in not on [nɒɹɒn], lot of laughs [lɒɹə …],get a job [ɛɹə …]. In Merseyside, voiceless stops are very generally realised as fricatives or affricates in word-final position, so that cake, luck, bike will be [keIx], [lʊx], [baIx]: whereas in Scots and SSE the appearance of [x] in loch constitutes a systemic difference, as there are minimal pairs establishing an opposition of /x/ and /k/, in Liverpool the velar fricative is clearly an allophone of /k/, so that the accent difference between, say, SSBE and Merseyside English in this respect is realisational, but not systemic.

Turning to vowels, one particularly salient example involves the *face* and *goat* vowels, which in SSBE, NZE and Australian English are pronounced consistently as diphthongs. In GA, the *face* vowel is diphthongal, while the *goat* vowel may be a monophthong; and in SSE and SgE, both are monophthongal, with the predominant allophones being high-mid [e] and [o] in both accents. The *nurse* vowel in SSBE is mid cental [ɜ:]; the same phoneme in NZE is very generally rounded, while in SgE it is typically raised to high-mid back unrounded [%], or high back unrounded [ɯ] (as we might expect, Hokkien has [%], Malay has both [%] and [ɯ], but both lack [ɜ]).

Sometimes, although these realisational differences have no direct impact on the phoneme system, they do lead to neutralisations of otherwise consistent contrasts. For instance, we saw in the last section that SgE speakers raise /ɛ/ to [e] before plosives and affricates; the monophthongal pronunciation of /e/ as [e] in *face* words, and the lack of any systematic vowel-length distinction in SgE means that the contrast of /ɛ/ and /e/ is suspended in this context, leading to identical pronunciations of bread and braid, or wreck and rake. It is also possible for realisational differences in vowels to lead to allophonic differences in consonants. For instance, right at the beginning of this book, we identified an allophonic difference between velar [k] and palatal [c], with the latter appearing adjacent to a front vowel. In SSBE, SSE and GA, this will mean that velar realisations will be produced in cupboard and car, palatals in kitchen and keys. However, the distribution differs in other varieties of English, depending on their typical realisations of the *fleece* and *kit* vowels. In NZE, *fleece* has a high front diphthong, so that keys will still have [c]; but no fronting will take place in kitchen, since the *kit* set in NZE has central [ə]. On the other hand, in Australian English, *kit* has a rather high, front [i] vowel so that kitchen will certainly attract a palatal [c]; but in some varieties at least, the diphthong in keys is central [ə⍰], which will therefore favour a velar allophone of /k/.

4. Distributional differences

Distributional differences fall into two subclasses. First, there are differences in lexical incidence: certain individual lexical items will simply have one vowel phoneme in some accents, and another in others. For example, British English speakers are quick to comment on American English /aʊ/ in *route*, or /ɛ/ in *lever*; Americans find British English /ru:t/ and /li:və(ɹ)/ equally odd. Some Northern English English speakers have /u:/ rather than /ʊ/ in *look* and other <OO> words; and it is fairly well-known in Britain that words containing /ɑ:/ vary in English English, with *grass, dance, bath,* for instance, having /a/ for many northern speakers, but /ɑ:/ in the south, though both varieties have /ɑ:/ in *palm*. Similarly, in SSE, *weasel* has /w/, and *whelk* /ʍ/; but in Borders Scots, where these phonemes also contrast, and where indeed most of the same minimal pairs (like *Wales* and *whales, witch* and *which*) work equally well, the lexical distribution in these two words is reversed, with /ʍ/ in *weasel* and /w/ in *whelk.*

On the other hand, a difference in the distribution of two phonemes may depend on the phonological context rather than having to be learned as an idiosyncracy of individual lexical items. For instance, in GA there is a very productive restriction on the consonant /j/ when it occurs before /u:/. Whereas in most British English [j] surfaces in *muse, use, fuse, view, duke, tube, new, assume*, in GA it appears only in the first four examples, and not in the cases where the /u:/ vowel is preceded by an alveolar consonant. There is also, as we have seen, a very clear division between rhotic accents of English, where /r/ can occur in all possible positions in the word (so [ɹ], or the appropriate realisation for the accent in question, will surface in *red, bread, very, beer, beard, beer* is), and nonrhotic ones, where /r/ is permissible only between vowels (and will be pronounced in *red, bread, very, beer* is, but not the other cases).

Again, vowels follow the same patterns. For instance, in many varieties of English, schwa is only available in unstressed positions, in *about, father, letter*; in NZE, however, its range is wider, since it appears also in stressed syllables, in the *kit* lexical set. Similarly, in some varieties words like *happy* have a tense /i/ vowel in the second, unstressed syllable; this is true for Tyneside English, SSE, GA and NZE. In SSBE, however, only lax vowels are permitted in unstressed syllables, so that /I/ appears in *happy* instead. Not all these distributional restrictions have to do with stress; some are the result of other developments in the consonant or vowel systems. For instance, the presence of the centring diphthongs before historical /r/ in SSBE (and other non-rhotic accents) means that non-low monophthongs cannot appear in this context. On the other hand, in rhotic accents like SSE and GA, there are no centring diphthongs, and the non-low monophthongs consequently have a broader range, with the same vowel appearing in *fleece* and *near, face* and *square, goose* and *cure*.

In defining how accents differ, then, we must consider all three types of variation: systemic, realisational, and distributional. Although some of these (notably the systemic type) may seem more important to a phonologist, since they involve differences in the phoneme system, we must remember that one of the phonologist's tasks is to determine what speakers of a language know, and how their knowledge is structured. It follows that we must be able to deal with the lower-level realisational and distributional differences too, since these are often precisely the points native speakers notice in assessing differences between their own accent and another variety of English. In any case, all of these types of variation will work together in distinguishing the phonological systems of different accents, and as we have seen, variation at one level very frequently has further implications for other areas of the phonology.

F. FURTHER MATERIAL VIDEO

https://youtu.be/EceQMTlHDc0 (consonant)

https://youtu.be/49R49e-04xU (consonant)

https://youtu.be/dfoRdKuPF9l (consonant)

https://youtu.be/mDsRSWp1sFo (consonant)

https://youtu.be/lOfEQjlKH64 (consonant)

https://youtu.be/ULOEVa7U8ZQ (consonant)

https://youtu.be/tGBCbXNQ8k0 (consonant)

G. EXERCISE

1. What criteria are used to describe consonants?
2. How many consonants does English have?
3. (a) Which of the following words begin with a voiceless fricative?

   Hang dogs cut ship chip foot zip sit

(b) Which of the following words begin with a voiced sound?

Nap jug knock lot pet jump fin

(c) Which of the following words ends with a stop sound?

Nap hang jug nudge bet lamb lots

(d) Which of the following words ends with an alveolar sound?

Pot sad boss lamb lamp size
hen call

(e) Which of the following words contain an approximant consonant?

Wash hall map sing sigh red
yellow

4. (a) What do the initial consonant of these words have in common?

   Wash let right yet wish rough

   (b) What do the final consonant of these words have in common?

   Hop hot pass wish rough lock
   scratch

   (c) What do the initial consonant of these words have in common?

   Fish ship zip sigh house view

5. How do the consonant at the end of the words in List A differ from those at the end of the word in List B?

   List A List B

(a)	Ham	Top
	Sin	Lock
	Sing	Rot

If you say [sıŋg], ignore the final [g] for this exercise

(b)	Place	Lake
	Lose	Beg
	Half	Dot
(c)	Dogs	Rough
	Hall	Cats
	Film	Catch
	Cold	Help

6. Transcribe the words below. Then write as full a description as you can of all the consonant in each word, in your accent. For instance, in *doze* [d] is a pulmonic egressive central voiced alveolar stop; [z] is a pulmonic egressive central voiced alveolar fricative. Remember to pay attention to the sounds, and not to the spelling.

   Psalm, jester, which, climb, heavy, splint, loch, bought, squelch

7. English speakers produce both voiced and voiceless glides. Are these distinct phonemes?

1. dry [draı]	but	try [tṛaı]
2. reap [rip]	but	creap [kṛip]
3. wash [wɑʃ]	but	squash [skẉɑʃ]
4. you [yu]	but	cue [kỵu]
5. glass [glæs]	but	class [kḷæs]

8. Using the IPA symbols, provide 1 example for each type of consonants :

plosives

fricatives

affricates

approximants

9. Mark the two words that contain a silent consonant.

   Brother, listen, writer, cinema, music, house, know, says, book.

10. Read the following groups of words, and transcribe them. Then, select which wordhas a different sound.

    look good blood foot

    dead mean bread head

    fruit suit juice built

    sons girls dreams books

    pen red ten bee

11. Transcribe the following sentences, and circle all bilabial and fricative sounds.

    A couple of brushes

    I wish I could see a real witch

    She is at the store

    Peter likes drinking Pepsi

12. To pronounce /f/ and /v/, the active articulator and passive articulator are the upper teeth and the lower lip respectively. These two consonants are described as labio-dental. On the contrary, the tongue tip and the upper teeth serve as the active articulator and the passive articulator when you pronounce the letter "th" in "think" and "father". What is the place of articulation for these two consonants?

13. There are four post-alveolar consonants. If you

pronounce the words “shy” and “seizure”, you will notice that your tongue tip touches your alveolar ridge. Which are the two other consonants (as pronounced in the first syllables of the following words) that fit into this category?

a. Yellow; judge
b. Church; judge
c. Church; lorry
d. Yellow; lorry

14. As suggested by its name, the palatal consonants are pronounced by using the tongue body as its active articulator while the hard palate (the bony part on your mouth you can touch with your tongue) serves as the passive articulator. For example, the letter “y” in the word “yellow” is categorized as a palatal consonant. What is its phonetic symbol?

a. /j/
b. /w/
c. /q/
d. /t/

15. Consonant sounds can also be classified according to their manner of articulation. Airflow escape along the sides of the tongue when a lateral consonant is pronounced. Which of the following is a lateral consonant?

a. /j/ (as in the sound of the letter “y” in the word “yacht”)
b. /k/ (as in the sound of the letter “c” in the word “car”)
c. /g/ (as in the sound of the letter “g” in the word

"go")

d. /l/ (as in the sound of the letter "l" in the word "letter")

CHAPTER III
VOWELS

A. Description of vowels

To describe vowel sounds, we consider the way in which the tongue influences the shape through which airflow must pass. Because these sounds are not so easily defined in terms of place and manner of articulation, we use labels which serve to indicate how the vowel sounds in relation to each other. The chart below shows the labels of most common vowel sounds of English.

Table 3.1 Table of Vowel Sound of English

	Front	Central	Back
High	i ɪ	ɨ	υ ʊ
Mid	e ɛ	ə	o ɔ
Low	æ	a	ɑ

To become familiar with the distinction within the set of vowel sound some examples of familiar word are presented. The following list goes from *the high front vowels* through *the low back vowels* and ends with three *diphthongs.*

Table 3.2 Table of Vowels

[i]	See, eat, key	[ʊ]	Put, could, foot
[ɪ]	Hit, myth	[o]	No, know, though
[e]	Tail, great, weight	[ɔ]	Raw, fall, caught
[ɛ]	Pet, said, dead	[ɑ]	Cot, father, body
[æ]	Sat, laugh	[ay]	My, buy, eye
[ə]	Th<u>e</u>, <u>a</u>bove	[aw]	Cow, loud
[ʌ]	Puff, blood, tough	[ɔy]	Boy, void
[u]	Move, two, glue		

Diphthongs are combination of vowel sound. They begin with a vowel sound and ends with a glide. When pronouncing diphthongs, we move from vocalic position to another. Try to pronounce the consonant and diphthongs in the following transcription and you should recognize a traditional speech training exercise:

[haw, naw, brawn, kaw]

(Maharsi, 2002:26)

All vowels are produced in a very limited 'vowel space' in the centre of the oral tract, roughly between palatal and velar in consonantal terms; and the place of articulation will also be much more difficult to scertain from self-observation, since the tongue never moves close enough to the roof of the mouth in vowel production to make its position easy to feel.

The quality of a vowel depends on the shape of the vocal tract as the air passes through. Different parts of the tongue may be high or low in the mouth; the lips may be spread or pursed; the velum may be raised or lowered. Vowel sounds carry pitch and loudness; you can sing vowels or shout vowels. They may be longer or shorter in duration. Vowels can stand alone—they can be produced without consonants before or after them. You can say the vowels of beat [bit], bit [bɪt], and boot [but], for example, without the initial [b] or the final [t], but you cannot say a [b] or a [t] alone without at least a little bit of vowel sound.

B. Classification of Vowels

To describe vowels adequately and accurately, we then need to consider three different parameters, all of which can be seen as modifications of the place or manner of articulation continua for consonants: as we shall see, these are height, frontness and rounding. Additionally, vowels may be long or short (long ones are marked with a following below), and monophthongs or diphthongs.

1. The Front-back Dimension

Front vowels are produced with the front of the tongue raised towards the hard palate (although not raised enough, remember, to obstruct the airflow and cause local friction; vowels are approximants) These could, in principle, equally be described as palatal the rule palatalising velar /k / before front vowels in *kitchen*, *key*, *give*, *geese* looked rather perplexing as the relationship between palatal and front was not obvious. However, calling front owels palatal would be misleading, since frontness covers a larger area than [palatal], as we shall see below; and it contrasts with completely different alternatives, namely central and back, rather than labial, alveolar, dental, velar and so on.

Front vowels	SSBE	GA
kit	I	I
dress	ε	ε
trap	a	æ
fleece	i:	i:
face	eI	eI

Conversely, back vowels have the back of the tongue raised, towards the soft palate or velum. The vowels in (2) are back.

Back vowels	SSBE	GA
lot	ɒ	ɑ:
foot	ʊ	ʊ
palm	ɑ:	ɑ:
thought	ɔ:	ɔ:
goat	oʊ	o
goose	u:	u:

There is also a class of vowels between front and back: these are known as central vowels, and involve a raising of the body of the tongue towards the area where the hard and soft palate join. The most common of these in English, [ə], is known as schwa, and only appears in unstressed syllables.

C*entral vowels*	SSBE	GA
about	ə	ə
nurse	ɜ:	ɜr
strut	ʌ	ʌ

2. The high-low Dimension

High vowels have the tongue raised most towards the roof of the mouth; if the raising was significantly greater, then friction would be produced, making a fricative consonant, not a vowel.

High vowels	SSBE	GA
kit	I	I
fleece	i:	i:
foot	ʊ	ʊ
goose	u:	u:

Low vowels are those where the tongue is not raised at all, but rather lowered from its resting position: when you produce a low vowel, you will be able to feel your mouth opening and your jaw dropping, even if it is not very easy to figure out quite what your tongue is doing.

Low vowels	SSBE	GA
trap	a	æ
lot		ɑ:
palm	ɑ:	ɑ:

Again, there is a further class intermediate between high and low, namely the mid vowels. These can if necessary be further subclassified as high mid (like the *face* and *goat* vowels) or low mid (like the *dress*, *thought*, *strut* vowels) depending on whether they are nearer the high end of the scale, or nearer the low end.

Mid vowels	SSBE	GA
face	eI	eI
goat	oʊ	o:
dress	ɛ	ɛ
lot	ɒ	
thought	ɔ:	ɔ:
abou	ə	ə
nurse	ɜ	ɜr
strut	ʌ	ʌ

3. Lip Position

In the high back [u] vowel of *goose*, there is tongue rising in the region of the soft palate; but in addition, the lips are rounded. Vowels in any of the previous categories may be either rounded, where the lips are protruded forwards, or unrounded, where the lips may be either in a neutral position, or sometimes slightly spread (as for a high front vowel, like [i] *fleece*). The high front [i] in *fleece* isnunrounded, with the lips in the shape of a smile, and you can feel it or see it in a mirror. However, it is overwhelmingly more common crosslinguistically for back vowels to be rounded than for front ones, and for high vowels to be rounded than low ones; this is borne out in English.

- **Rounded** vowel is the shape of the lips that form a circular opening.

  [ɔ:], [Ŋ], [u:], [ʊ],

  Example

  a. Rounded /u:/ you /ju:/
  b. Rounded / Ɔ:/ all / Ɔ:/
  c. Rounded /Ŋ/ got/gŊt/

- **Unrounded** vowels

  When the lips are drawn together so that opening between them is more or less round.

  [i:], [e], [ɛ], [I],

  Example :

  a. Unrounded /I/: him /hIm/
  b. Unrounded /e/:anyone/ enIwΛn/
  c. Unrounded /i:/ see/ si: /

4. Length

Using these three dimensions of frontness, height and rounding, we can now define the vowel in *fleece* as high, front and unrounded; that in *goose* as high, back and rounded; and the unstressed vowel of *about*, schwa, as mid, central and unrounded. However, our elementary descriptions would class the *kit* vowel as high, front and unrounded, and the *foot* vowel as high, back and rounded; these labels make them indistinguishable from the clearly different vowels of *fleece* and *goose* respectively. SSBE and GA speakers very readily perceive the *fleece* and *kit* vowels, and the *goose* and *foot* vowels, as different; and there are plenty of minimal pairs to support a phoneme distinction, as in *peat – pit*, *leap – lip*, *Luke – look*, *fool – full*. This distinction is usually made in terms of vowel length:

Long vowels	SSBE	GA
fleece	i:	i:
goose	u:	u:
goat		o:
thought	ɔ:	ɔ:
palm	ɑ:	ɑ:
lot		ɑ:
nurse	3:	3r

Short vowels	SSBE	GA
kit	ɪ	ɪ
dress	ɛ	ɛ
trap	a	æ
lot	ɒ	
foot	ʊ	ʊ
about	ə	ə
strut	ʌ	ʌ

This is not to say, however, that the *only* difference between [i:] and [ɪ], or [u] and [ʊ], is one of length: the quantity difference goes along with a difference in quality. [i:] is higher and fronter than [ɪ]; [u:] is higher and backer than [ʊ]; and similarly, [ɑ] in *palm* is lower and backer than the corresponding short [a] in *trap*. In general, long vowels in English are more peripheral, or articulated in a more extreme and definite way, than their short counterparts. Some phonologists use a feature [±tense] rather than length to express this difference, with the long, more peripheral vowels being [+tense], and the short, more centralised ones being [– tense], or lax.

5. Diphthong and Monophthong

Table 3.3

Diphthong	Monophthong	
/ɪə/	/ɪ/	/iː/
/eə/	/Λ/	/ɑː/
/ʊə/	/e/	/ɜː/
/eɪ/	/ə/	/uː/
/aɪ/	/æ/	/ɔː/
/ɔɪ/	/ʊ/	
/əʊ/	/ɒ/	
/aʊ/		

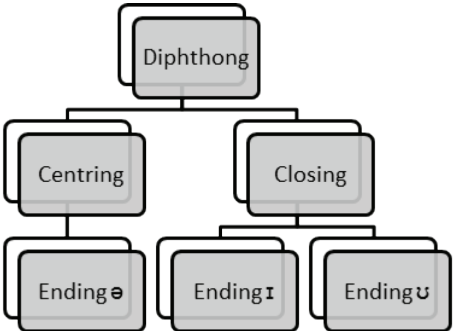
a. Diphthong

Dipthong is sounds which consist of a movement or glide from one vowel to another. A vowel which remains constant and does not glide is called a pure vowel, and one of the most common pronunciation mistakes that result in a learner of English having a “foreign” accent is the production of pure vowels where diphthong should be pronounce.

In terms of length, diphthongs are like the long vowels described above. Perhaps the most important thing to remember about all the diphthong is that first part is much longer and stronger then the second part.

The total number of diphthongs is eight. The easiest way to remember the is in terms of three groups divided as in this diagram.

Diagram 3.1



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

Table 3.4

/ɪə/	• This diphthong moves from one vowel position to another in one syllable • Mouth is closed a little, start saying the /ɪ/ and move to say the sound /ə/ • Lips spread and move tongue up a little when saying it	Ear, here. Tear, clear near, engineer
/eə/	• This diphthong starts with /e/ but more open than the short vowel /e/ and moves to /ə/ • Lips remain open	Area, rare, librarian. Their, where, chair
/ʊə/	• The front of the back of the tongue moves from the position of the /ʊ/ sound to the /ə/ sound • Mouth goes from being almost closed with slightly rounded lips like we are going to kiss someone	Poor, spoor, tour, sewer, hour

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

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

Table 3.5

/eɪ/	• Lips spread in a relaxed position • Tongue moves up to high position	Wait, eight, strange, stay,baby, neighbour
/aɪ/	• The back of tongue lowers and front of tongue up • Jaw moves from an open to a more closed position • The lips are unrounded • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Eye, like, side, quite, silent, while
/ɔɪ/	• The tongue moves from a low back position to a high front position • From lips rounded, make lips wide • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Boy, voice, foil, point, enjoy, destroy, coin

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

Table 3.6

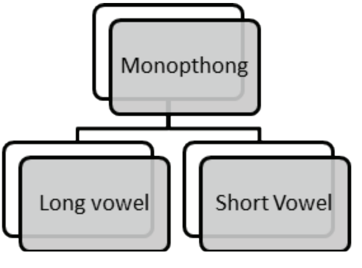
/əʊ/	• The tongue is set lower that **/ʊ/** at the back, with a small pressure • Jaw is slightly lowered • Lips are round shape and forward • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Home, ago, loan, old, shoulder, widow

/aʊ/	• The tongue moves from a low back position to a mid-high front position • Jaw is raised during sound production • From an unrounded shape, lips move to a round shape • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Cl<u>ou</u>d, fl<u>ow</u>er, t<u>ow</u>er, l<u>ou</u>d, ar<u>ou</u>nd, <u>now</u>

b. Monophthong

A is a pure vowel sound, one whose articulation at both beginning and end is relatively fixed, and which does not glide up or down towards a new position of articulation. The monophthongs can be contrasted with diphthongs, where the vowel quality changes within the same syllable, and hiatus, where two vowels are next to each other in different syllables. A vowel sound whose quality does not change over the duration of the vowel is called a pure vowel

Diagram 3.2



Long vowel, these are the vowels which tend to be longer than the short vowel ini similar context. It is necessary to say in "in similar context" because, as we shall see later, the length of all English vowel sounds varies very much according to context (such as the type of sound that follows them) and the presence or absence of stress. To remind you that these vowels tend to be long, the symbols consist of one vowel symbol plus a length-mark made of two dots ː.

Table 3.7

/iː/	• Tongue pushes forward and moves up in the mouth while the sides touch tooth ridge and the tip of the tongue is set behind the lower teeth • Jaw is raise • Lips are unrounded and may be pulled back • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Free, agree, sheep, believe, meal, complete
/ɑː/	• The tongue is set at a back and low position • Jaw is lowered more than the rest of the back vowels • Lips are unrounded and wide open • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Bar, hard, guard, draught, smart
/ɜː/	• The tongue tip of tongue curls up and is near top of mouth • Jaw moves down a little • Lips are rounded • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Burn, word, search, her, world, bird
/uː/	• The tongue is raised to a high back position, against the teeth at the back of the mouth while the back of the tongue is out forward to create an air passage • Jaw is raised • Lips are rounded and put forward • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	True, you, move, whose, two, chew

/ɔː/	• The tongue is set at the back in a low-mid position • Jaw moves down a little • The lips are rounded, but less than /u/ or /o/ • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Sport, short, wall, launch, law, fall

English has a large number of vowel sounds; the first ones to be examined are short vowels. The symbols for these short vowels are: ɪ, e, æ, ʌ, ɒ, ʊ. Short vowels are only relative short; as we shall see later, vowels can have quite different lengths in different contexts.

Table 3.8

/ɪ/	• The tongue is put forward and lower in the mouth than the sound /iː/ , while the sides touch the teeth and the tip is behind the lower teeth • Jaw moves lower a little than /iː/ • The lips are unrounded • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity • Do not spread lips into a smile	Him, miss, honest, sit, kit, return, bit, remind
/ʌ/	• Tongue is in the middle of mouth • Jaw moves down a little bit • The lips are unrounded • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Honey, done, flood, must, sunny, touch

/e/	• The tongue is put forward, near the tooth ridge, the sides of tongue touch the teeth and the tip of the tongue is behind the lower teeth • Jaw is up • The lips are unrounded and may be pulled back • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Anyone, them, breath, hell, met, head, eleven
/ə/	• Tongue is up a little and curls near the top of mouth • Jaw moves down a little • The vocal fold separate and vibrate • The velum is raised blocking off the nasal cavity	Open, answer, balance, mother, woman, banana
/æ/	• The tongue is put a little bit forward and low in the mouth with the tip of tongue is behind the lower teeth • Jaw moves down • The lips are unrounded and can be pulled back • The vocal folds separate and vibrate • The velum is raised blocking off nasal cavity • Have similar sound with /æ/	Man Black Challenge Narrow Thanks
/ʊ/	• The back of tongue is raised up to a high position and touches the teeth at the back of the mouth • Jaw moves up a little • The lips are usually rounded and forward • The vocal folds separate and vibrate • The velum is raised blocking off the nasal	Cook Foot Book Took Wool
/ɒ/	• The tongue is set at a low back position in the mouth. • Jaw moves down • The lips are unrounded and wide open • The vocal folds separate and vibrate • The velum is raised blocking off the nasal cavity	Shot, body, dog, stop, block, box

C. Nasalization Vowel

English speakers need to have a following nasal consonant to create a nasalized vowel. Vowels, like consonants, can be produced with a raised velum that prevents the air from escaping through the nose, or with a lowered velum that permits air to pass through the nasal passage. When the nasal passage is blocked, oralvowels result; when the nasal passage is open, nasal (or nasalized) vowels result. In English, nasal vowels occur for the most part before nasal consonants in the same syllable, and oral vowels occur in all other places. The words bean, bone, bingo, boom, bam, and bang are examples of words that contain nasalized vowels. To show the nasalization of a vowel in a narrow phonetic transcription, an extra mark called a diacritic—the symbol ~ (tilde) in this case—is placed over the vowel, In the examples of [bin] ~ [bıd] and [ɹʌŋ] ~ [ɹəg], the environment for nasalization is clear. As with other kinds of assimilation, a phonological environment triggers the nasalization, called a conditioning environment.

D. The same but different

As we have learned, to classify and describe consonants, most features that function properly are completely unsuitable for vocals. while vowels vary in dimensions (such as tongue height) which are irrelevant for consonants. However, when we turn to the criteria for establishing phonemes, and the exceptions to these reviewed in previous material, it turns out that vowels and consonants behave very similarly indeed. The sections below therefore fulfil a dual role of providing more information about vowels, while allowing some revision of notions like complementary distribution, allophonic rules, free variation, neutralisation and phonetic similarity, which were first introduced mainly in connection with consonants.

E. Establishing vowel contrasts

1. Minimal pairs

Minimal pairs and the commutation test are the main tools available to the phonologist in ascertaining phonemic contrast among both consonants and vowels. A minimal pair list for SSBE vowels appears in (1).

(1) Vowel minimal pairs

bit /I/

bet /ɛ/

bat /æ/

but /ʌ/

beat /iː/

bait /eɪ/

Bart /ɑː/

boat /oʊ/

bought /ɔː/

boot /uː/

bite /aɪ/

bout /aʊ/

sherbet /ə/

Bert /ɜː/

The list above provides evidence for almost all phonemically contrastive vowels of SSBE, with a very small number of exceptions. Since schwa only appears in unstressed syllables, where most of the other vowels cannot appear, we must make do with near-minimal comparisons in this case, contrasting the second, unstressed syllable of sherbet with the various stressed syllables in (1). The short vowels /ʊ/ and /ɒ/, and the centring diphthongs, which were listed as SSBE vowels, do not appear in the selected context /b-t/; but the additional data in (2) shows that /ʊ/ and /ɒ/ on the one hand, and the three centring diphthongs on the other, contrast both with one another and with representative members of the list in (1). Phonemic contrast is a transitive relationship, meaning that if phoneme a contrasts with phoneme b, and phoneme b contrasts with phoneme c, then phonemes a and c also contrast: this means that if a contrast can be established between one of the 'left-out' vowels and any vowel in (1), then that vowel can be taken as contrasting with all the vowels in (1).

(2)	pit/ɪ/	put/ʊ/	pot/ɒ/	peat /iː/	etc.
	leer/ɪə/	lair/ɛə/		lure/ʊə/	lore /ɔː/

Sets of minimal pairs like this may work very well for one accent, but not for another. Some disparities of this sort were discussed in earlier chapters; for instance, minimal pairs like *lock* /k/ versus *loch* /x/, or *witch* /w/ versus *which* // will be relevant for many Scottish speakers in establishing the voiceless velar and labial-velar fricative phonemes, but both members of the pairs will have /k/ and /w/ respectively in many other accents of English. Although this was a rather minor issue for consonants, it is much more important in discussing vowel phoneme systems.

2. Standard Lexical Sets

The oppositions established for SSBE in (1) and (2) cannot, then, be transferred automatically to other accents. For instance, General American has no centring diphthong phonemes; *leer, lair* and *lure* have the /iː/, /eɪ/ and /uː/ vowels of *beat, bait* and *boot*, followed in each case by /r/. GA also lacks the /ɒ/ vowel of SSBE pot; but we cannot assume that all the words with /ɒ/ in SSBE have a single, different phoneme in GA. On the contrary, some words, like lot, pot, sock, possible have GA /ɑ/ (as also in palm, father, Bart, far in both accents); but others, including cloth, cough, cross, long have GA /ɔ/ (as also in thought, sauce, north, war in both accents).

It follows that lists of minimal pairs are suitable when our goal is the establishment of a phoneme system for a single accent; but they may not be the best option when different accents are being compared. An alternative is to use a system introduced by John Wells (see Recommendations for reading), involving 'standard lexical sets', as shown in (3). The key word for each standard lexical set appears conventionally in capital letters, and is shorthand for a whole list of other words sharing the same vowel, although the precise vowel they do share may vary from accent to accent.

(3) Standard Lexical Sets

SSBE	GA	Set number	Keyword
ɪ ɪ	1	KIT	
ɛ ɛ	2	DRESS	
a	æ	3	TRAP
ɒ	ɑ:	4	LOT
ʌʌ	5	STRUT	
ʊ ʊ	6	FOOT	
ɑ:	æ	7	BATH
ɒ ɔ:	8	CLOTH	

ɜː	ɜ	9	NURSE
iː iː	10	FLEECE	
eɪ	eɪ	11	FACE
ɑː	ɑː	12	PALM
ɔː	ɔː	13	THOUGHT
oʊ	oː	14	GOAT
uː	uː	15	GOOSE
aɪ	aɪ	16	PRICE
ɔɪ	ɔɪ	17	CHOICE
aʊ	aʊ	18	MOUTH
ɪə	ir	19	NEAR
ɛə	eɪr	20	SQUARE
ɑː	ɑr	21	START
ɔː	ɔr	22	NORTH
ɔː	or	23	FORCE
ʊə	ur	24	CURE
ɪ i		25	HAPPY
ə	ər	26	LETTER
ə	ə	27	COMMA

These lexical sets allow comparison between accents to be made much more straightforwardly: we can now ask which vowel speakers of a particular accent have in the KIT set, or whether they have the same vowel in NORTH and FORCE (as SSBE does) or two different vowels (as GA does). We could add that many speakers of Northern English will have /ʊ/ in STRUT as well as FOOT, and /a/ in BATH as well as TRAP, pinpointing two of the differences most commonly noted between north and south. The point of the standard lexical sets is not to show that oppositions exist in all these contexts: in fact, there may be no accent of English which contrasts twenty-seven phonemically different vowels in the twentyseven lexical sets (or even twenty-four, for the stressed vowels). Instead, the aim is to allow differences between accents (and sometimes between speakers of the same accent, perhaps in different generations) to be pinpointed and discussed.

More detail on accent variation will be given in the next chapter. For the moment, to illustrate the usefulness of the standard lexical sets, the vowels of two further accents are given in (4). Standard Scottish English (or SSE) is the Scottish equivalent of SSBE: a relatively unlocalised, socially prestigious accent. Many middle-class Scots have SSE as a native variety; many others use it in formal situations, and it is widely heard in the media, in education and in the Scottish Parliament. It is to be contrasted with Scots, sometimes called 'broad Scots', a divergent range of non-standard Scottish dialects which differ from English Standard English not only in phonetics and phonology, but also in vocabulary and grammar. The final example is New Zealand English, a relatively recent variety which shares some characteristics with the other extraterritorial Englishes spoken in Australia and South Africa, but also has some distinctive characteristics of its own, notably the fact that schwa appears in stressed position, in the KIT lexical set.

(4)

SSE	NZE	Set number	Keyword
ɪ ə		1	KIT
ɛ e		2	DRESS
a	ɛ	3	TRAP
ɒ	ɒ	4	LOT

ʌ ʌ		5	STRUT
Uʊ		6	FOOT
a	aː	7	BATH
ɒ ɒ		8	CLOTH
ʌr	ɜː	9	NURSE
i ɪi		10	FLEECE
e ɛɪ		11	FACE
a aː		12	PALM
ɒ	ɔː	13	THOUGHT
o əu		14	GOAT
u	iuː	15	GOOSE
ʌɪ	aɪ	16	PRICE
ɔɪ	ɔɪ	17	CHOICE
ʌʊ	aʊ	18	MOUTH
ir	iə	19	NEAR
er	eə	20	SQUARE
ar	aː	21	START
ɒr	ɔː	22	NORTH
or	ɔː	23	FORCE
ur	uə	24	CURE
i i		25	HAPPY
ər	ə	26	LETTER
ʌ ə		27	COMMA

A number of differences between these accents, and between each of them and SSBE or GA, can be read off these lists. For instance, SSE does not contrast the TRAP and PALM vowels, so that *Sam* and *psalm*, which are minimal pairs for all the other varieties considered so far, are homophonous for Scottish speakers, both having short low front /a/. In NZE, *Sam* and *psalm* do form a minimal pair, but not with low short front /a/ or /æ/ versus low long back /ɑ:/: instead, in NZE we find mid short front /ɛ/ as opposed to low long back front /a:/. Both the TRAP and DRESS vowels in NZE are higher than those of SSBE or GA, while the long vowels of FLEECE, FACE, GOAT and GOOSE are very characteristically diphthongs.

Recall, however, that phonemes are abstract units, and thus could potentially be symbolised using any IPA, or indeed any other character. The symbols chosen for particular phonemes in the lists above are not the only possibilities; they reflect a choice made by a particular phonologist. I have elected to use a symbol for each phoneme, in each accent, which corresponds to one of the main allophones of that phoneme: that is, in many cases speakers of the accent in question will actually pronounce the symbol given in the list, with its normal IPA value. Thus, NZE speakers will often say [ɛ] in trap, and [e] in *dress*, and will typically have a diphthongal pronounciation of *fleece, goose, goat* and *face*. However, for some phonologists the symbols used in (4) would not be the most obvious choices. This highlights a decision phonologist must make in establishing a phoneme system. On the one hand, we may wish our phonemes to be fairly concrete, reflecting quite closely what speakers actually do in at least some of their everyday pronunciations; this is the choice made here. It follows that there will be significant symbol differences between the vowel systems of different accents. On the other hand, some phonologists feel it is more important to reflect the fact that English is a single language, and believe that speakers must have common mental representations to allow them to understand one another, even if they speak rather different accents. In that case, common phoneme symbols might be chosen. For instance, instead of using /ɪi/ for FLEECE in NZE, we would select /iː/, stressing that this is the same phoneme as in SSBE or GA, although there would then have to be an allophonic rule to say that this phoneme is very typically diphthongised for most New Zealanders.

The second solution has the advantage that it stresses the common features speakers of English might share, at least in terms of mental representations, although they may sound very different in actual conversation. It therefore maintains a strong difference between abstract phonology, and concrete phonetics: the /a/ phoneme in TRAP would be low [a] for SSBE, but low mid [ɛ] for NZE, while the /ɛ/ phoneme of DRESS would be high mid [e] for NZE, and low mid [ɛ] in all the other accents we have examined, meaning that phonemes potentially have very different realisations, and the same realisation can belong to different phonemes in different accents. At this point, we do not know enough about how speakers store and process their language mentally to prove which is the most appropriate solution; but it is worth asking how speakers would learn a very abstract system, which does not reflect the phonetic qualities they hear around them during language acquisition. If a New Zealander pronounces the FLEECE vowel as a diphthong, and hears NZE or Australian English (which also tends to have a diphthong here) much more often than British or American accents, why would such a speaker assume this vowel phoneme should be stored as anything other than a diphthong? And why should the 'right' value for the phoneme corresponds to what is pronounced in British or American English, rather than in New Zealand or Australia? The decision between representations which are close to phonetic reality, but with considerable accent variation and potentially rather messy systems, or rather abstract phonemes, with streamlined and economical systems unifying the speakers of different varieties, must be confronted whenever we move away from surface phonetics and into phonology. In this book, I shall continue to use phoneme symbols which correspond to major allophones of those phonemes in the accent concerned; but other, more abstract alternatives can be found in the recommended further reading

3. Vowel features and allophonic rules

Once phonemic contrasts have been established for the accent in question, and the appropriate representation for each phoneme has been selected, the realisations of those phonemes must be determined and rules written to describe allophonic variation. Again, features and rule notation can be used to formalise these statements. We saw in Chapter 4 that vowels are [+syllabic, –consonantal, +sonorant, +voice, –nasal]. To distinguish English vowels appropriately, we also require the features [±high], [±mid] for the dimension of tongue height; [±front], [±back] for place of articulation; and [±round]. These give the illustrative matrix in (5).

(5)	[high]	[mid]	[front]	[back]	[round]
[i]	+	–	+	–	–
[e]	+	+	+	–	–
[ɛ]	–	+	+	–	–
[a]	–	–	+	–	–
[u]	+	–	–	+	+
[o]	+	+	–	+	+
[ɔ]	–	+	–	+	+

[ɑ]	–	–	–	+	–
[ə]	–	+	–	–	–

These features can distinguish four contrastive degrees of vowel height, and three degrees of frontness, which allows all varieties of English to be described. However, /iː/ and /ɪ/, and /uː/ and /ʊ/, will be identical in this matrix. In SSBE and GA, the former in each pair is typically long, and the latter short; and long vowels are also articulated more extremely, or more peripherally than corresponding short ones: the long high front vowel is higher and fronter than the short high front vowel, while the long high back vowel is higher and backer than its short counterpart. The question is whether we regard this as primarily a quality or a quantity difference. If we take quality as primary, we can regard /i/, /u/, /ɑ/, /ɔ/ as [+tense], or more peripheral, and simply write a redundancy rule to say that all tense vowels are phonetically long. On the other hand, we could do the opposite, and take length as the important factor, so these vowels are long /iː/, /uː/, /ɑː/ and /ɔː/, and redundantly also more peripheral.

For most accents of English, we could choose either solution, although most phonologists would select either length or tenseness as relevant at the phoneme level, with the other simply following automatically, to minimise redundancy in the system. However, in SSE and Scots dialects, it matters which we choose. This is because vowels in Scottish accents (and some related Northern Irish accents) are unique among varieties of English in one respect: we can predict where vowels are phonetically long, and where they are phonetically short. Vowels become long before /r v ð z / and at the end of a word, but they are short everywhere else, as shown in (6). (6) The Scottish Vowel

Length Rule

/i/	[i]	beat	wreath leaf	bean	
	[i:]	beer	wreathe	leave	agree
/o/	[o]	boat	close (Adj)	foal	ode
	[o:]	bow	close (V)	four	owe

/ɪ/, /ɛ/ and /ʌ/, which are short and lax in other accents, do not lengthen in any circumstances. In SSE and Scots, then, we can define the two classes of phonemic vowels as lax (the three which never lengthen) and tense (the others, which are sometimes long and sometimes short, in predictably different environments). It is possible to predict length from [±tense], but not the other way around. The allophonic rule involved will then state that tense vowels lengthen before /r/, before a voiced fricative, or before a word boundary (that is, in word-final position), to account for the data in (6). Other allophonic rules are more general. For instance, in all varieties of English, vowels become nasalised immediately before nasal consonants; the velum lowers in anticipation of the forthcoming nasal, and allows air to flow through the nasal as well as the oral cavity during the production of the vowel. If you produce cat and can, then regardless of whether your vowel is front or back, there will be a slight difference in quality due to nasalisation in the second case; you may hear this as a slight lowering of the pitch. This rule is shown in (7); note that the symbol V here means ‘any vowel’.

(7) V → [+nasal] / ___ [+nasal]

Just as for consonants, then, some allophonic rules specifying the realisations of vowel phonemes are found very generally in English (and may in fact, as in the case of the nasalisation process in (7), reflect universal phonetic tendencies); others, like the Scottish Vowel Length Rule, are peculiar to certain accents.

4. Phonetic similarity and defective distribution

As we learned in the consonant chapter, phonetic similarity can help us decide which vowel allophones to assign to which phonemes, and defective distributions hinder our decision-making. For instance, schwa in accents other than NZE is confined to unstressed positions, and therefore does not strictly speaking contrast with most other vowels. Its defective distribution means it could be regarded as the unstressed allophone of almost any other vowel phoneme. So, schwa appears in the unstressed syllables of about, father, fathom, sherbet, pompous; but which vowel phoneme is involved in each case? Since speakers do not tend to produce vowels other than schwa in any of these forms, even when speaking rather carefully, it is difficult to say. We could say that there is wholesale neutralisation of vowel phonemes in unstressed syllables; alternatively, because speakers of English can hear the difference between schwa and other vowels quite reliably, and seem to regard schwa as a distinct vowel, the best solution might be to accept that schwa is a phoneme of English in its own right, albeit with a defective distribution.

Again as with consonants, defective distributions often result from language change. For instance, spelling evidence from Old English indicates that a much wider range of vowels was probably found in unstressed syllables at that period; these have gradually merged into schwa during the history of English. Similarly, the centring diphthongs of SSBE are generally found where there is an in the spelling, and where other accents, like SSE and GA, have combinations of a vowel found elsewhere in the system, plus [ɹ]. Historically, all varieties of English followed the SSE/GA pattern; but accents like SSBE lost [ɹ] in certain contexts, with a related change in the realisation of vowels producing the centring diphthongs.

As for phonetic similarity, it will again help to resolve situations where one allophone could potentially belong to more than one phoneme, although phonologists (and native speakers) apply this criterion so automatically as to scarcely justify making it an explicit step in phonemic analysis. In the case of vowel nasalisation before nasals, for instance, there is a situation of complementary distribution between ALL nasalised allophones on the one hand, since these can appear only adjacent to a nasal consonant, and ALL oral allophones on the other. It is theoretically possible that [u:] and [ĩ:], or [ɛ] and [ũ], might be assigned to the same phoneme, if we took only complementary distribution into account. However, since the members of these vowel pairs differ from one another with respect to more features than simply [nasal], notably in terms of frontness; and since there are alternative pairings available, namely [i:] and [ĩ:], or [ʊ] and [ũ], where nasalisation is the only difference at issue, these minimally different, more phonetically similar pairings will be used in establishing which two realisations belong to each phoneme.

5. Free variation, neutralisation and morphophonemics

Some examples involving free variation between vowel phonemes were reviewed in other Chapter: for instance, economic can be pronounced, for the same speaker, with the DRESS vowel on some occasions and the FLEECE vowel on others, and although this conflicts with the requirement that different phonemes should not be substitutable without causing a change in meaning to be conveyed, such a marginal case involving only a single lexical item should not in fact compromise the distinction between /ɛ/ and /iː/, given the significant number of minimal pairs establishing their contrast. Free variation also occurs between allophones of a single phoneme. This again correlates with sociolinguistic rather than linguistic conditioning. For instance, in NZE some speakers produce /ɜː/, the NURSE vowel, with lip-rounding, more significantly so in informal circumstances. Similarly, New Yorkers may produce the FLEECE and GOOSE vowels as monophthongs in formal situations, but prefer diphthongs in casual speech; and the quality of the diphthongs varies too, with [ɪi], [ʊu] being more common for middle-class speakers, but more central first elements, and hence a greater distance between the two parts of the diphthongs, for working-class speakers. Some cases of free variation reflect language change in progress: so, in SSBE older speakers may still produce centring diphthongs in CURE and SQUARE words, while younger ones almost invariably smoothe these diphthongs out and produce monopthongal [ɔː], [ɛː]. Younger speakers might use the pronunciations more typical of the older generation when they are talking to older relatives, or in formal circumstances.

Cases of neutralisation tend not to be subject to sociolinguistic influence in this way, but rather reflect a tendency for certain otherwise contrastive sets or pairs of vowels to fall together with a single realisation in a particular phonological context. In the last chapter, we saw that the DRESS, TRAP and SQUARE vowels are neutralised for many GA speakers before /r/, so that merry, marry and Mary become homophonous: in this context, rather than the usual /ɛ/, /æ/, /eɪ/ opposition, we might propose archiphonemic /E/, realised as [ɛ]. Neutralisations of this sort are extremely common for English vowels. To take just two further examples, speakers from the southern states of the USA have a neutralisation of the KIT and DRESS vowels before /n/, so that pin and pen are homophonous; and for many speakers of SSE and Scots, the opposition between the KIT and STRUT vowels is suspended before /r/, so that fir and fur are both pronounced with [ʌ]. However, whereas suspension of contrast takes place in a particular phonological context, and will affect all lexical items with that context, in other cases we are dealing with an interaction of morphology and phonology; here, we cannot invoke neutralisation. For instance, the discussion of the Scottish Vowel Length Rule above does not quite tell the full story, since we also find alternations of long and short vowels in the cases in (8).

(8) *Short*	*Long*
greed	agreed
brood	brewed
bonus	slowness
typing	tie-pin

From the Scottish Vowel Length Rule examples considered earlier, we concluded that vowel length is not contrastive in SSE and Scots, since it was possible to predict that long vowels appear before certain consonants or at the end of a word, while short ones appear elsewhere. However, the data in (8) appear, on purely phonological grounds, to constitute minimal pairs for short and long vowels. In fact, what seems to matter is the structure of the words concerned. The vowels in the 'Long' column of (8) are in a sense word-final; they precede the inflectional ending [d] marking past tense; or the suffix -ness; or appear at the end of the first element of a compound, which is a word in its own right, as in tie. This is not true for the 'Short' column, where the words are not separable in this way. The Scottish Vowel Length Rule must therefore be rewritten to take account of the morphological structure of words: it operates before /r/ and voiced fricatives, at the end of a word, and also at the end of a morpheme, or meaningful unit within the word; in the cases in (8), the affected vowel is at the end of a stem.

In other cases, different vowel phonemes alternate with one another before particular suffixes, as we found in consonant Chapter where the final [k] of electric became [s] or [ʃ] before certain suffixes, as in electricity and electrician. One of the best-known cases in English, and one which affects all varieties, involves pairs of words like those in (9).

(9) divine – divinity line – linear /aɪ/ – /ɪ/

serene – serenity supreme – supremacy /iː/ – /ɛ/

sane – sanity explain – explanatory /eɪ/ – /æ/

These Vowel Shift alternations (so-called because the patterns reflect the operation of a sound change called the Great Vowel Shift several hundred years ago) involve pairs of phonemes which very clearly contrast in English – the members of the PRICE and KIT, FLEECE and DRESS, and FACE and TRAP pairs of standard lexical sets. Minimal pairs are common for all of these (take type and tip, peat and pet, lake and lack, for instance). However, the presence of each member of these pairs can be predicted in certain contexts only; and native speakers tend to regard the pairs involved, such as divine and divinity, as related forms of the same word. This is not neutralisation, because the context involved is not specifically phonetic or phonological: it is morphological. That is, what matters is not the length of the word, or the segment following the vowel in question, but the presence or absence of one of a particular set of suffixes. In underived forms (that is, those with no suffix at all) we find the tense or long vowel, here /aɪ/, /iː/ or /eɪ/; but in derived forms, with a suffix like -ity, -ar, -acy, -ation, a corresponding lax or short vowel /ɪ/, /ɛ/ or /æ/ appears instead. This alternation is a property of the lexical item concerned; vowel changes typically appear when certain suffixes are added, but there are exceptions like obese, with /iː/ in the underived stem, and the same vowel (rather than the /ɛ/ we might predict) in obesity, regardless of the presence of the suffix -ity. Opting out in this way does not seem to be a possibility in cases of neutralisation, but is quite common in cases of morphophonemics, or the interaction between phonology and morphology. To put it another way, not all alternations involving morphology are completely productive. Some are: this means that every single relevant word of English obeys the regularity involved (so, all those nouns which form their plural using a -s suffix will have this pronounced as [s] after a voiceless final sound in the stem, [z] after a voiced one, and [ɪz] after a sibilant; not only this, but any new nouns which are borrowed into English from other languages, or just made up, will also follow this pattern). Others are fairly regular, but not entirely so: this goes for the Vowel Shift cases above. And yet others are not regular at all, but are simply properties of individual lexical items which children or secondlanguage learners have to learn as such. The fact that teach has the past tense taught is an idiosyncrasy of modern English which has to be mastered; but although knowing this relationship will help a learner of English to use teach and taught appropriately, it will not help when it comes to learning other verbs, because preach does not have the past tense *praught, and caught does not have the present tense *ceach. Knowing where we should draw the line between extremely regular cases which clearly involve exceptionless rules or generalisations, fairly regular ones which may be stated as rules with exceptions, and one-off (or severaloff) cases where there is no rule at all but a good deal of rote-learning, is one of the major challenges of morphophonology. The only comfort is that native speakers, at least during acquisition and sometimes later too, find it just as much of a challenge, as amply demonstrated by overgeneralisations like past-tense swang from swing (on the pattern of swim – swam) or past-tense [trɛt] from treat (on the pattern of meet – met).

F. Vowels vs Consonants

In the other chapter there are some examples involving vowels: for instance, we found that there is free variation for some speakers between [i] and [ɛ] in economic, but that these two vowels nonetheless contrast, as shown by minimal pairs like pet – peat, or hell – heal. We also saw that the usual contrast of /eɪ/, /ɛ/ and /æ/ is neutralised before /r/ for many General American speakers, who pronounce *Mary, merry* and *marry* homophonously. It follows that the central ideas of phonemic contrast, with minimal pairs determining the members of the phoneme system, and rules showing allophonic variation in different contexts, apply equally to vowels and to consonants; free variation, phonetic similarity and neutralisation affect both classes of sounds too. A more detailed demonstration of these issues for vowels, and the establishment of vowel phoneme systems for different varieties of English, will be the focus on vowels and accents chapter.

However, when we turn to the physical description of actual vowel sounds, it is not possible simply to reuse the parameters and features already introduced for consonants. Of course, vowels and consonants are all speech sounds; and in English at least, they are all produced using the same pulmonic egressive airstream. In almost all other respects, however, the features which allow us to classify and understand consonants are less than helpful in distinguishing between vowels.

In consonants Chapter , six articulatory parameters were introduced: knowing the value for each of these allowed us to describe English consonants unambiguously, and would extend to further consonants found in other languages. To describe a consonant in articulatory terms, we needed to know the airstream mechanism involved; the state of the glottis, determining whether the sound is voiced or voiceless; the position of the velum, which either allows or stops airflow through the nose, making the consonant nasal or oral; the manner of articulation, namely stop, affricate, fricative or approximant; whether airflow is central or lateral; and finally, the place of articulation, and consequently the identity and position of the active and passive articulators.

Unfortunately, almost none of these helps us in classifying vowels. All vowels, universally, are produced on a pulmonic egressive airstream, with central airflow: there is no contrast between central and lateral vowels. It is possible, but rare, for vowels to be voiceless or nasal; in English, however, all vowel phonemes are voiced and oral, and voiceless and nasal allophones appear only in very specific circumstances, as we shall see later. Vowels are all continuants: that is, airflow through the oral tract is not significantly obstructed during their production, so they are all approximants on the consonant manner classification: there are no stop, fricative or affricate vowels. Finally, although we shall distinguish between vowels in terms of place of articulation, the range of options is much more restricted than for consonants, where places from labial to glottal are distinguished in English alone. All vowels are produced in a very limited 'vowel space' in the centre of the oral tract, roughly between palatal and velar in consonantal terms; and the place of articulation will also be much more difficult to ascertain from self-observation, since the tongue never moves close enough to the roof of the mouth in vowel production to make its position easy to feel.

It follows that an adequate vowel classification requires new features and descriptive parameters which are better designed to capture the ways in which vowels do vary. This kind of situation, where two classes of objects or concepts share some essential unity, but need different descriptors, is not unique to vowels and consonants. For instance, plants and animals are both categories of living things; they both populate the world widely, and are mutually necessary in terms of their complementary roles in gas exchange, for instance. They both require the same basic nutrients, operate according to the same chemical principles, and have common structures, including identical cell types. However, there is just as little point in classifying plants according to whether or not they are mammals, or have feathers, or are carnivores or herbivores, as there is in categorising animals as being evergreen or dropping their leaves, bearing cones or flowers, or producing fruit or not. At that lower classificatory level, it is simply necessary to recognise the divergence of the two categories by using different distinguishing features. Equally, vowels and consonants are both speech sounds, and are both necessary for language, since they play complementary roles in structuring syllables and words. Both are formed by modifications of a moving airstream, carried out by the actions of the vocal folds and articulatory organs. However, below this very general, common level, consonants and vowels operate as different sets, and to allow us to produce as precise and insightful a classification of each set as possible, they must be described in different terms.

G. FURTHER MATERIAL VIDEO

https://youtu.be/JBugPH9wje0 (vowel)
https://youtu.be/J_iKCN5ApYk (vowel)
https://youtu.be/6DxDa7Tc38c (vowel)

H. EXERCISES

1. (a) Which of the following words contains a rounded vowel?

   Put, seek, hook, grew, grey, hoe, hold

   (b) Which of the following words contains a front vowel?

   See, seat, met, tap, throw, tape, through

   (c) Which of the following words contains a high vowel?

   See seat steak throw list lost through

   (d) Which of the following words contains a central vowel?

   About, put, luck, hit, purse, father, kept

   (e) Which of the following words contains a high back vowel?

   Put, love, hit, heat, luck, look, food

(a) What do the vowels in these words have in common?

Bet, hair, rose, post, love, purse, mate

(b) What do the vowels in these words have in common?

See, leap, weird, pit, fiend, miss, crypt

(c) What do the vowels in these words have in common?

Height, boy, try, noise, loud, crowd, fine

(d) What do the vowels in these words have in common?

Flea, rude, piece, flu, stew, leave, sees

2. Make vowel quadrilateral diagrams for all the diphthongs of SSBE, showing the position of the first and second elements and drawing lines and arrows connecting them.
3. Give as detailed a description as you can of the vowels in the following words: father, leaving, hear, thoroughly, fast, haste, lookalike, sausage, ooze
4. Explain the articulatory difference between consonants and vowels
5. What are the criteria used to describe vowels?
6. Using the IPA symbols, place the English vowels in the following diagram, which is an abstract

   version of the oral cavity:

   front central back

   high

   mid

low

7. How many vocals does English have?
8. Put a check √ next to the word that have front vowels, and circle the vowel phoneme.
   - ____talk
   - ____dollar
   - ____wonder
   - ____keep
   - ____dream
   - ____October
   - ____already
   - ____before
9. English speakers produce both long and short vowels. Are these distinct phonemes?

no [no:]	but	nope [nop] ??[no:p]
node [no:d]	but	note [not]
slab [slæ:b]	but	slap [slæp]
fuzz [fΛ:z]	but	fuss [fΛs]
teethe [ti:ð]	but	teeth [tiθ]
use [ju:z] (v)	but	use [jus] (n)
leave [li:v]	but	leaf [lif]

CHAPTER IV
SYLLABLE

A. Definition of Syllable

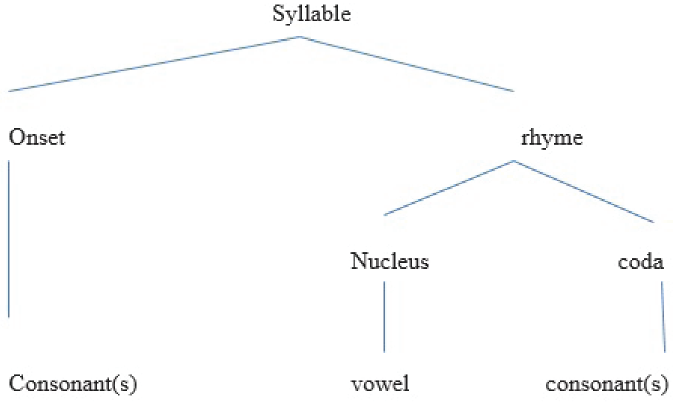
A syllable is a phonological unit composed of one or more phonemes. Every syllable has a nucleus, which is usually a vowel (but can be a syllabic liquid or nasal) and a syllable must contain a vowel (or vowel-like) sound. The most common type of syllable in language also has a consonant (C) before the vowel (V) and is typically represented as CV. Technically, the basic elements of the syllable are the **onset** (one or more consonant) and the rhyme. The rhyme (sometimes written as 'rime') consist a vowel, which is treated as **nucleus,** plus any following consonant (s), described as the **coda.** In rhyming words, the nucleus and the coda of the final syllable of both words are identical, as in the following jingle:

Jack and Jill
Went up the hill
To fetch a pail of water.
Jack fell down
And broke his crown
And Jill came tumbling after.

For this reason, the nucleus + coda constitute the subsyllabic unit called arime (note the spelling).

Syllable like *me, to* and *no* have an onset and a nucleus, but no coda. They are known as 'open' syllable. When a coda is present, as in the syllable *up, cup, at* or *hat,* they are called 'closed' syllables. The basic structure of the kind of syllable found in English word like *green* (CCVC), *eggs* (VCC), *and* (VCC), *ham* (CVC), *I* (V), *do* (CV), *not* (CVC), *like* (CVC), *them* (CVC), *sam* (CVC), is shown in the accompanying diagram:

Diagram 4.1 Syllable tree

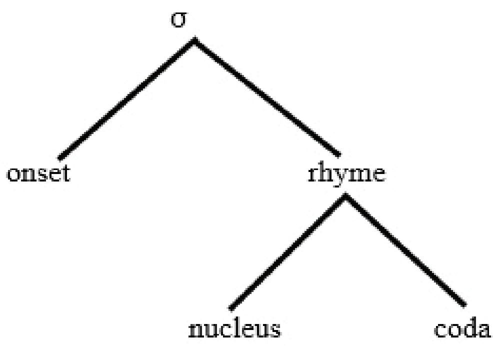


(Yule, 2006:47)

B. Constituents of the syllable

The universal syllable template accepted by most phonologists is given in (1). Note that small sigma (σ) is shorthand for 'syllable'; capital sigma (Σ), as we shall see later, is used to symbolise the foot.

(1)



The only compulsory part of the syllable, and hence its head, or most important, defining unit, is the nucleus. This will generally contain a vowel (and recall that vowels are [+syllabic]): indeed, the syllable I, or the first syllable of about, consist only of a nucleus. If no vowel is available, certain consonants can become nuclear, and play the part of a vowel. In English, this is true of /l/, /m/, /n/, and /r/ in rhotic accents: that is, the sonorant consonants, in natural class terms. Each of the words *bottle, bottom, button, butter* has two syllables, and in each case, the second syllable consists only of nuclear, or syllabic [l], [m], [n] and [ɹ].

Both the onset and the coda are optional constituents, and each, if filled, will contain one or more consonants. In English, *be* has an onset but no coda; *eat* has a coda but no onset; and *bea*t has both. Recognising the difference between the nucleus, which is primarily the domain of vowels, and the onset and coda, where we find consonants, also casts some light on the relationship between the high vowels /i u/ and the glides /j w/. Phonetically, it is very hard to detect any systematic difference between [i] and [j], or [u] and [w] respectively; however, we can now say that

[i] and [u] are [+syllabic], while the glides are [–syllabic], so that in ye, [j] is in the onset and [iː] in the nucleus, and similarly in woo, [w] is an onset consonant and [uː] a nuclear vowel. Clearly, [j] and [iː] are extremely similar phonetically; furthermore, since distinguishing syllable peaks, or nuclei, from margins allows us to predict where each will occur, they are in complementary distribution (and the same is true of [w] and [uː]). This makes [j] and [iː], and [w] and [uː], allophones of a single phoneme, with their distribution determined by position in the syllable.

1. The grammar of syllables: patterns of acceptability

Patterns of permissibility vary in terms of filling these constituents of the syllable. In some languages, like Arabic, every syllable must have an onset; if a word without an onset in one syllable is borrowed from another language, for instance, a glottal stop [ʔ] will be inserted to meet that requirement. Conversely, in Hawaiian, no codas are allowed, so that coda consonants in loanwords will be deleted, or have an extra, following vowel introduced, so the consonant becomes an onset and therefore legal. However, there do not seem to be any languages which either insist on codas, or rule out onsets. The universal, basic syllable type is therefore CV: all known languages allow this, whether they have other, more complex syllable types in addition, or not.

a. Phonotactic constraints

Even languages like English, which allow both onsets and codas, have restrictions on the permissible contents of those slots: these restrictions are known as phonotactic constraints. In particular, English allows clusters of two or three consonants in both onsets and codas; some languages have more complex cluster types, others only CC, and perhaps in the onset only.

Some restrictions on the composition of clusters reflect structural idiosyncracies of English; these include the examples in (2).

(2) In a CCC onset, C1 must be /s/.

/ŋ/ does not appear in onsets.

/v ð z / do not form part of onset clusters.

/t d θ/ plus /l/ do not form permissible onset clusters.

/h/ does not appear in codas.

Coda clusters of nasal plus oral stop are only acceptable if the two stops share the same place of articulation.

/lg/ is not a permissible coda cluster.

b. The Sonority Sequencing Generalisation

However, some other restrictions on possible clusters are not specific to English, but rather reflect universal prohibitions or requirements. The most notable phonological principle which comes into play here is known as the Sonority Sequencing Generalisation, and governs the shape of both onsets and codas. Sonority is related to the difference between sonorants (sounds which are typically voiced, like approximants, nasal stops and vowels) and obstruents (oral stops and fricatives, which may be either voiced or voiceless). Sonorants are more sonorous; that is, their acoustic properties give them greater carrying power. If you stood at the front of a large room and said one sound as clearly as you could, a listener at the back would be much more likely to be able to identify a highly sonorous sound like [ɑ] than a sound at the other end of the sonority range, such as [t].

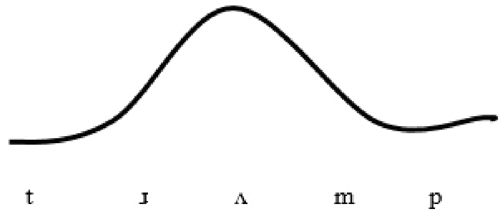
Our knowledge of acoustic phonetics and other aspects of sound behaviour can be combined to produce a sonority scale like the one given in (3). Here, the most sonorous sounds appear at the top, and the least sonorous at the bottom. Some English examples are given for each category.

(3) Low vowels	[ɑ] …
High vowels	[i u] …
Glides	[j w]
Liquids	[l ɹ]
Nasals	[m n ŋ]
Voiced fricatives	[v z] …
Voiceless fricatives	[f s] …
Voiced plosives	[b d]
Voiceless plosives	[p t k]

Natural classes of sounds which function together in phonological processes are often composed of single or adjacent levels on the sonority hierarchy. For instance, English liquids and nasals can be syllabic, and these are the closest consonants to the vowel series (with the exception of the glides; and as we have seen already, we might say that [j w] do have syllabic counterparts, namely the high vowels).

The general rule expressed by the Sonority Sequencing Generalisation is that syllables should show the sonority curve in (4).

(4)



Picture 4.1

The nucleus constitutes the sonority peak of the syllable, with sonority decreasing gradually towards the margins. In syllables like *trump, prance, plant,* the outermost consonants, at the beginning of the onset and the end of the coda, are at the bottom end of the sonority scale, while less marginal consonants, adjacent to the vowel, are also closer to the vowel in their sonority value. Lack of adherence to the Sonority Sequencing Generalisation therefore rules out onsets like *[lp], *[jm], *[ɹ], although onsets with the same segments in the opposite order are found in *play, muse, grey*. Similarly, universal sonority restrictions mean English lacks *[pm], *[kl], *[mr] codas, although again clusters with the opposite order, which do show descending sonority, are attested in *lamp, silk, harm* (the last in rhotic accents only).

Like many rules, the Sonority Sequencing Generalisation has an exception, and this involves the behaviour of /s/. The onset clusters in *spray, skew* have the sonority profile in (5).

(5)

s p ɹ e ɪ

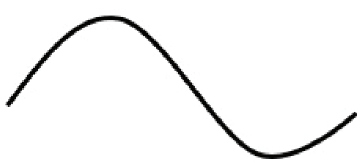
s k j u:

Picture 4.2

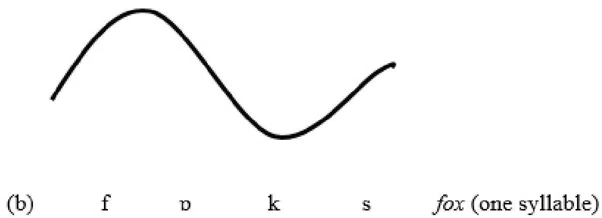
Picture 4.2

That is, the marginal consonant [s] has a higher sonority value than the adjacent voiceless plosive: yet there is no question of drawing a syllable boundary here and recognising two syllables within the same word, as [s] is not one of the English consonants which can become nuclear, or syllabic. The same problem arises in codas. We would normally use a sonority pattern like the one in (6a) to tell us that a syllable division should be made, giving two syllables in little, but one in lilt. However, codas with both orders of clusters involving [s] are possible, as in apse and asp, or axe and ask; and the same sonority pattern in (6b) must be analysed, contrary to the Sonority Sequencing Generalisation, as corresponding to a single syllable.

(6)



(a) l ɪ t ɪ *little* (two syllables)



Picture 4.3

These exceptions are at least not random: cross-linguistically, violations of the Sonority Sequencing Generalisation always seem to involve coronal consonants (those produced using the tongue tip or blade, and typically alveolars), and especially /s/. Such consonants seem to behave exceptionally in a number of ways, and have to be excluded from various phonological generalisations, though it is not yet quite clear why.

2. Justifying the constituents

a. Syllable-based processes

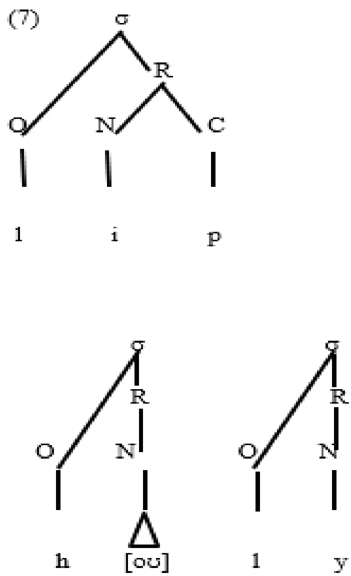
Recognising the syllable as a phonological unit, and moreover a unit with the internal structure hypothesised in (1), allows us to write improved versions of some phonological rules introduced in previous chapters. Sometimes, what determines or conditions a phonological process or change is simply the nature of an adjacent segment: for example, we have seen that the nasal of the prefix in- assimilates to a following consonant, and that sounds frequently become voiced between other voiced segments. However, in other cases it is the position of a sound within the syllable that dictates its phonetic shape. In turn, improvements in our statement of phonological rules may help justify or validate the constituents we have proposed for the syllable.

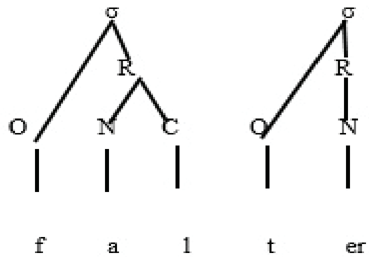
First, the notion of the syllable in general, and the onset constituent in particular, helps us to state the environment for aspiration of voiceless stops more accurately. Our current, rather informal version predicts aspiration in absolute word-initial position; as we already know, /p t k/ surface as aspirated in *pill, till, kill*, but not when preceded by /s/ in *spill, still, skill*. However, this is not the whole story, since we can also observe aspiration in *repair, return, record*, though not in respond, disturb, discard. In these examples, the voiceless stops are medial, not initial in the word: but in *repair, return, record*, they are the sole constituents of the onset for syllable two, and therefore initial in that syllable. As for *respond, disturb, discard*, here also /p t k/ łare part of the onset, but this time preceded by /s/; and since a preceding /s/ inhibits aspiration in onsets word-initially, we should not be surprised that the same pattern is found in onsets wordmedially. In short, aspiration of voiceless stops takes place, not at the beginning of the word, but at the beginning of the onset.

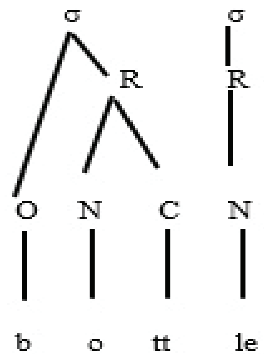
Similar support can be found for the second major constituent of the syllable, namely the rhyme. As we have seen already, many varieties of English have two main allophones of /l/, clear or alveolar [l] and dark, velarised [ɫ], in complementary distribution. However, stating the nature of this complementarity is not entirely straightforward. In earlier chapters, the rule for velarisation of /l/ was informally stated as taking place after the vowel in a word, giving the correct results for *clear* versus *hill*, for instance. This works well enough when we are only dealing with word-initial versus word-final clusters, but it leaves a grey area in wordmedial position, where we find dark [ɫ] in *falter, hilltop*, but clear [l] in *holy, hilly*. Again, this is resolvable if we state the rule in terms of the syllable: clear [l] appears in onset position, and dark [ɫ] in the coda. In fact, this process does not only provide evidence for the contrast between onset and coda position, but for the superordinate rhyme constituent, which consists of the nucleus plus the optional coda. In cases of consonant syllabification, where /l/ (or another sonorant consonant) comes to play the role of a vowel and therefore occupies the nuclear position, as in *bottle, little*, we find the dark allophone. /l/-velarisation, then, takes place in syllable rhymes, as shown in (7).

Diagram 4.2

(7)







b. Onset Maximalism

Of course, this rule (and similarly the earlier reformulation of aspiration in syllable terms) will only work appropriately if we are drawing the boundaries between syllables, and therefore determining what consonants are in the coda of an earlier syllable, and which in the onset of a later one, in the right way. We have already noted that the Sonority Sequencing Generalisation provides one guide to drawing syllable boundaries; leaving aside the exceptional case of /s/ in clusters, we find that legal syllables exhibit a sonority profile which ascends from the lefthand margin of the onset, up to a sonority peak in the nucleus, and subsequently descends to the right-hand margin of the coda, as shown in (4) above. However, there is another, equally important principle governing syllable division, namely Onset Maximalism (also known as Initial Maximalism), which is set out in (8).

(8) *Onset Maximalism*

> Where there is a choice, always assign as many consonants as possible to the onset, and as few as possible to the coda. However, remember that every word must also consist of a sequence of wellformed syllables.

Onset Maximalism tells us that, in a word like *leader*, the medial /d/ must belong to the second syllable, where it can be located in the onset, rather than the first, where it would have to be assigned to the less favoured coda. This is a permissible analysis, because both [liː] and [də(ɹ)] are well-formed syllables of English: think of *lea*, or *Lee*, and the first syllable of *dirty*, or *Derwent*. The same goes for a word like oyster, where both parts of the medial /st/ cluster belong to the onset of the second syllable, while the initial diphthong forms a syllable on its own. There are many monosyllabic words with initial /st/, like *stop, start, stitch, stoop*; and if /st/ make a well-formed onset word-initially, then they can combine to make a well-formed onset word-medially, too.

We can use the same sort of argument to account for the alternation between dark [ɫ] in *hill*, but clear [l] in *hilly*. Since *hill* has only a single syllable, and moreover has a vowel occupying the nuclear slot, the /l/ must necessarily be in the coda, and is therefore dark. However, in *hilly*, there are two syllables, and Onset Maximalism means /l/ must be in the onset of the second, where it automatically surfaces as clear. This kind of alternation, where the form that surfaces depends on its position in the syllable, is quite common in English and other languages. For instance, in non-rhotic accents of English, /r/ has two realisations, namely [ɹ] in onsets, and zero in codas: it surfaces in *red, bread, very*, but not in *car, park*. Again, as with the alternation between clear and dark variants of /l/, we find that the addition of suffixes can change the situation: so for instance, *star* has no final consonant for non-rhotic speakers, but there is a medial [ɹ] in *starry*, where the /r/ constitutes the onset of the second syllable. It also follows that syllable boundaries will not always coincide with morpheme boundaries, or boundaries between meaningful units: in *starry*, the two morphemes are star, the stem, and -y, the suffix, but the syllables are divided as *sta.rry* (note that a dot signals a syllable boundary). As we shall see in more detail in the next chapter, similar alternations arise across word boundaries in connected speech: thus, although car has no final [ɹ], and the same is true of *car keys*, where the second word begins with a consonant, in *car engine* the second word begins with a vowel, and the /r/ can be allocated to the onset of that syllable, where it duly surfaces as [ɹ]. As far as native speakers' knowledge goes, there are two ways of analysing this. We could assume that speakers store car mentally as /kɑr/, and delete the /r/ before a consonant or pause. Alternatively, the entry in the mental lexicon or dictionary might be /kɑ/, with [ɹ] being inserted before vowels. Choices of this kind, and their implications, are vitally important for phonologists; but pursuing the issue here is beyond the scope of this book.

However, in a word like *falter*, we cannot straightforwardly assign the medial /lt/ to the second syllable. The Sonority Sequencing Generalisation would allow the syllable boundary to follow /lt/ (compare *fault*, a well-formed monosyllabic word), but Onset Maximalism forces the /t/ at least into the onset of the next syllable. The syllable boundary cannot, however, precede the /l/ because /lt/ is not a possible word-initial cluster in English, and it consequently cannot be a word-internal, syllableinitial cluster either. On the other hand, in bottle our immediate reaction might be to proposed *bo.ttle*, which fits both the Sonority Sequencing Generalisation and Onset Maximalism. However, we then face a problem with the first syllable, which would on this analysis consist only of /bɒ/, a single short vowel cannot make up the rhyme of a stressed syllable. The first syllable clearly needs a coda; but *bott.le* is not quite right either, since native speakers, asked to check syllable boundaries by saying each syllable in the word twice, typically say *bot-bot-tle-tle*. The same is true of other words with the same problematic structure, like *syllable* in fact, which comes out as *syl-syl-lala-ble-ble*; it may not be coincidental that these are written with double medial consonants. The usual solution here is to analyse the /t/ of *bottle* as ambisyllabic: that is, as belonging simultaneously in both the coda of the first syllable, and the onset of the second. This does not conflict with either the Sonority Sequencing Generalisation or Onset Maximalism, but also accords with native speakers' intuitions and the stress patterns of English.

c. Literary applications of syllable constituents

Recognising the onset and rhyme does not only allow us to write more accurate versions of our phonological rules, and to understand nations between sounds which arise when we add an affix or combine words into longer strings, thus creating different syllabifications. These two constituents are also integral parts of two rather different literary traditions. In alliterative poetry, the important constituent is the onset, which must be identical in several words in a single line (and often, the more the better). An example from the Scots poetic tradition appears in (9); this is a short excerpt from the late fifteenth or early sixteenth century 'Flyting of Dunbar and Kennedie'. A flyting is essentially a long string of insults, here hurled by each of the poets named in the title at the other, in turn. The use of alliteration, which is clear even from the two lines given, extends throughout the fairly lengthy poem.

(9) Conspiratour, cursit cocatrice, hell caa (caa = crow)

Turk, trumpour, traitour, tyran intemperate …

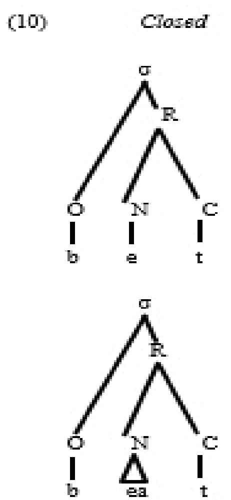
It is clear that almost all of the words in the first line begin with <c> /k/, and those in the second with <t> /t/; and in some cases, here *cocatrice, intemperate*, the alliterating sound may appear in word-internal onset positions too. More obviously, or at least more familiarly, the rhyme of the syllable determines poetic rhyme: for a perfect rhyme, the nucleus and coda (if any) must be exactly the same, though whether there is an onset or not, or what it is, does not matter. That is, *meet* rhymes with *eat*, and with *beat*, and with s*weet*; but it does not rhyme with *might* or *mate*, where the nucleus is different; or with *bee*, where there is no coda; or with *leek* or *beast*, where there is a coda, but not one consisting of the single consonant /t/.

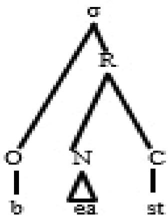
d. Syllable weight

There is one further aspect of syllable structure which provides evidence for the syllable-internal structure set out above. Here again, as in the case of poetic rhyme, the nucleus and coda seem to work together, but the onset does not contribute at all.

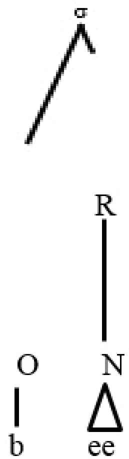
In fact, there are two further subdivisions of syllable type, and both depend on the structure of the rhyme. First, syllables may be closed or open: a closed syllable has a coda, while in an open syllable, the rhyme consists of a nucleus alone, as shown in (10). It does not matter, for these calculations, whether the nucleus and coda are simple, containing a single element, or branching, containing more than one: a branching nucleus would have a long vowel or diphthong, while a branching coda would contain a consonant cluster.

Diagram 4.3





Open



There is a second, related distinction between light and heavy syllables. A light syllable contains only a short vowel in the rhyme, with no coda, as in the first syllable of *potato, report, about*. Although the first two cases have onsets, and the third does not, all these initial syllables are still light, because onsets are entirely irrelevant to the calculation of syllable weight. If a syllable has a complex rhyme, then it is heavy; and complexity can be achieved in two different ways. First, a heavy syllable may have a short vowel, but one or more coda consonants, as in *bet,* *best*. Second, it may have a branching nucleus, consisting of a long vowel or diphthong; such a syllable will be heavy whether it also has a filled coda, as in *beast, bite*, or not, as in *bee, by*.

As we shall see in detail in the next chapter, syllable weight is a major factor in determining the position of stress in a word: essentially, no stressed syllable in English may be light. This means that no lexical word, or full word of English can consist only of a short vowel alone, with or without an onset, since such words, including nouns, verbs and adjectives, must be able to bear stress: thus, we have *be, say*, *loss*, but not *[bɪ], *[sɛ], *[lɒ]. On the other hand, function words like the indefinite article a, or the pronunciation [tə] for the preposition to, which are part of the grammatical structure of sentences and are characteristically unstressed, can be light. In cases where these do attract stress, they have special pronunciations [eɪ] and [tu:], where the vowel is long, the nucleus branches, and the syllable is therefore heavy.

There is one set of cases where a conflict arises between syllable weight on the one hand, and the guidelines for the placement of syllable boundaries on the other: we have already encountered this in the discussion of *bottle* above. In most cases, these two aspects of syllable structure work together. For instance, *potato, report, about* each have a consonant which could form either the coda of the first syllable, or the onset of the second. Onset Maximalism would force the second analysis, placing the first [t] of *potato*, the [p] of *report*, and the [b] of *about* in onset position; this is supported by the evidence of aspiration in the first two cases. The first syllable of each word is therefore light; and since all three syllables are unstressed, this is unproblematic. Similarly, in words like *penny, follow, camera, apple*, Onset Maximalism would argue for the syllabifications *pe.nny, fo.llow, ca.me.ra,* and *a.pple.* However, in these cases the initial syllable is stressed, in direct contradiction of the pervasive English rule which states that no stressed syllable may be light. In these cases, rather than overruling Onset Maximalism completely, we can regard the problematic medial consonant as ambisyllabic, or belonging simultaneously in the coda of the first syllable and the onset of the second. It therefore contributes to the weight of the initial, stressed syllable; but its phonetic realisation will typically reflect the fact that it is also in the onset of the second syllable. Consequently, as we saw earlier, the /l/ in *hilly, follow appears* as clear, as befits an onset consonant, while /r/ in *carry* is realised as [ɹ], its usual value in onset position, rather than being unpronounced, its usual fate in codas.

C. Word Stress

1. The phonetic characteristics of stress

Native speakers of English are intuitively aware that certain syllables in each word, and one syllable in particular, will be more phonetically prominent than others. In *father*, the first syllable seems stronger than the second; in *about*, it is the other way around; and in s*yllable*, the first syllable stands out from the rest. These more prominent syllables are stressed; and stress is a culminative property, signalled by a number of subsidiary phonetic factors, which work together to pick out a stressed syllable from the unstressed ones which surround it. There are three important factors which combine to signal stress. First, the vowels of stressed syllables are produced with higher fundamental frequency; that is, the vocal folds vibrate more quickly, and this is heard as higher pitch. Secondly, the duration of stressed syllables is greater, and they are perceived as longer. Thirdly, stressed syllables are produced with greater intensity, and are thus heard as louder than adjacent unstressed syllables. In addition, stress has effects on vowel quality, in that vowels often reduce to schwa under low stress. To take our earlier examples of *father, about, and syllable*, the stressed syllables have the full vowels [ɑ], [aʊ] and [ɪ] respectively, but the unstressed ones typically have schwa; we do not say [sɪlæbɛl], for instance, but [sɪləbəl] (or [sɪləbl).

The interaction of these phonetic factors produces an effect which is clearly audible, but crucially relative: that is, we cannot distinguish a stressed from an unstressed syllable if each is spoken in isolation, but only by comparing the syllables of a word, or a longer string, to see which are picked out as more prominent. Indeed, within the word, there can be more than one level of stress. Some words have only stressed versus unstressed syllables, as in *father, about* and *syllable*. However, in *entertainment*, the first and the third syllables bear some degree of stress. Both have full vowels [ɛ] and [eɪ], as opposed to the unstressed second and fourth syllables with schwa; but the third syllable is more stressed than the first. Phonologists distinguish primary stress (the main stress in the word, on the third syllable of *entertainment*) from secondary stress (a lesser degree of stress elsewhere, here initially). Special IPA diacritic marks are placed at the beginning of the relevant syllable to show primary and secondary stress, as in *entertainment* [ɛntə’te⍰nmənt], *about* [ə’baʊt], and *father* [fɑːðə]. The difference between secondary stress and no stress is clear in a pair like *raider* [‘ɹeɪdə(ɹ)], where the second syllable is unstressed and has schwa, versus *radar* [‘ɹeɪdɑ(ɹ)], where both syllables have full vowels and some degree of stress, although in both words the first syllable is more stressed than the second.

2. Predicting stress placement

The languages of the world fall into two broad classes in terms of stress position. In fixed-stress languages, primary stress always (or virtually always) falls on one particular syllable; thus, in Scots Gaelic, main stress is consistently initial, except in some English loanwords, such as *buntata* 'potato', where stress stays on the syllable it occupies in the source language (here, the second). Similarly, stress in Swahili consistently falls on the penultimate syllable of the word. On the other hand, languages may have free stress, like Russian; here, words which differ semantically may be identical in terms of phonological segments, and differ only in the position of stress, as in Russian *muka* 'torment' versus *mu ka* 'flour'.

This division into fixed and free-stress languages is relevant to phonologists because it has a bearing on how children learning the language, and adults using it, are hypothesised to deal with stress. In a fixed-stress language, we can assume that children will learn relatively quickly and easily that stress placement is predictable, and will formulate a rule to that effect; if they encounter exceptions to the rule, they may overgeneralise the regular pattern, and have to unlearn it in just those cases, so that a child acquiring Scots Gaelic may well produce *buntata* temporarily for English-influenced *bun'tata*. This is precisely like the situation with other regular linguistic processes, like the regular morphological plural rule adding -s to nouns, which children typically overgeneralise to give *oxes, mouses, tooths* at an early stage, before learning the appropriate form of these irregular nouns individually. In free-stress languages, on the other hand, part of language acquisition involves learning that the position of stress is not predictable, but instead has to be memorised as part of the configuration of each individual word, along with the particular combination of vowels and consonants that make it up. There are no stress rules: instead, speakers are assumed to have a mental representation of each word with stress marked on it.

English does not fall fully within either class: it is neither a wholly fixed-stress, nor a wholly free-stress language. This is in large part a result of its peculiar history. English inherited from Germanic a system with fixed stress falling on the first syllable of the stem; but it has subsequently been strongly influenced by Latin, French and other Romance languages, because of the sheer number of words it has borrowed. It has therefore ended up with a mixture of the Germanic and Romance stress systems. On the one hand, there are pairs of words which contrast only by virtue of the position of stress, such as con vert, pro duce (verb) vs. convert, produce (noun). This initially makes English look like a free stress language, like Russian, but turns out to reflect the fact that such stress rules as English has vary depending on the lexical class of the word they are applying to. On the other hand, there are some general rules, as in (2), which do allow stress placement to be predicted in many English words.

(2) a. Noun rule: stress the penultimate syllable if heavy. If the penultimate syllable is light, stress the antepenult. a. ro.ma a. gen.da di.sci.pline

b. Verb rule: stress the final syllable if heavy. If the final syllable is light, stress the penultimate syllable.

o. 'bey u.'surp a.'tone 'ta.lly 'hu.rry

These stress rules depend crucially on the weight of the syllable: recall from the last chapter that a syllable will be heavy if it has a branching rhyme, composed of either a long vowel or diphthong, with or without a coda, or a short vowel with a coda. A syllable with a short vowel and no coda will be light. As (2a) shows, English nouns typically have stress on the penultimate syllable, so long as that syllable is heavy, which it is in *aroma* (with a long [o:] vowel or a diphthong [oʊ] depending on your accent), and in *agenda*, where the relevant vowel is short [ɛ], but followed by a consonant, [n]; this must be in the coda of syllable two rather than the onset of syllable three, since there are no *[nd] initial clusters in English. However, in *discipline* the penultimate syllable is light [sɪ]; the following [pl] consonants can both be in the onset of the third syllable, since there are initial clusters of this type in *play, plant, plastic* and so on. Since [sɪ] has only a short vowel and no coda consonants, it fails to attract stress by the Noun Rule, and the stress instead falls on the previous, initial syllable.

A similar pattern can be found for verbs, but with stress falling consistently one syllable further to the right. That is, the Verb Rule preferentially stresses final syllables, so long as these are heavy. So, *obey* (with a final long vowel or diphthong), has final stress, as do *usurp* (having a final syllable [ɜ:p] for SSBE, with a long vowel and a coda consonant, and [ʌɹp] for SSE, for instance, with a short vowel and two coda consonants), and *atone* (with a long vowel or diphthong plus a consonant in the coda). However, both *tally* and *hurry* have final light syllables, in each case consisting only of a short vowel in the rhyme. It follows that these cannot attract stress, which again falls in these cases one syllable further left.

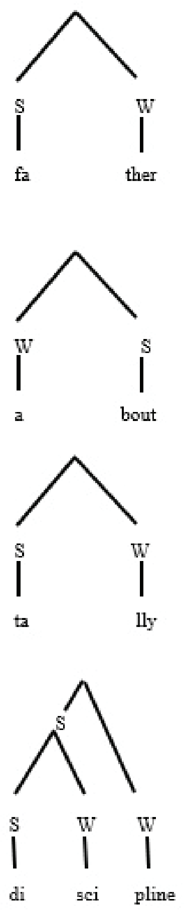
These stress rules are effective in accounting for stress placement in many English nouns and verbs, and for native speakers' actions in determining stress placement on borrowed words, which are very frequently altered to conform to the English patterns. However, there are still many exceptions. A noun like *spaghetti*, for instance, ought by the Noun Rule to have antepenultimate stress, giving *spaghetti*, since the penultimate syllable [�ε] is light; but in fact stress falls on the penultimate syllable, following the original, Italian pattern – in English, the <tt> is of course pronounced as a single [t], not as two [t]s or a long [t]. Although the Noun Rule stresses penultimate or antepenultimate syllables, nouns like *machine, police, report, balloon* in fact have final stress. There are also cases where the stress could, in principle, appear anywhere: in *catamaran*, for instance, the stress pattern is actually *'catamaran*, with primary stress on the first syllable and secondary stress on the final one, again in contradiction of the Noun Rule, which would predict *ca'tamaran* (as in *De'cameron*), with antepenultimate stress as the penult is light. There is equally no good reason why we should not find c*ata'maran* (as in *Alde'baran*); while another logical possibility, catama ran, has a pattern more commonly found in phrases, such as *flash in the'pan*, or *Desperate* '*Dan*. It seems that the Noun Rule and Verb Rule are misnomers; these are not really rules, though they do identify discernible tendencies.

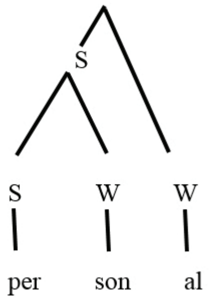
Leaving aside the question of predictability, we can certainly describe the position of stress on particular words accurately and clearly using tree diagrams. In these diagrams, which form part of a theory called Metrical

Phonology, each syllable is labelled either S or W: and because stress, as we saw above, is not an absolute but a relative property of syllables, these labels do not mean 'Strong' and 'Weak', but 'Stronger than an adjacent W' and 'Weaker than an adjacent S', respectively. Some illustrative trees are shown in (3).

Diagram 4.4

(3)



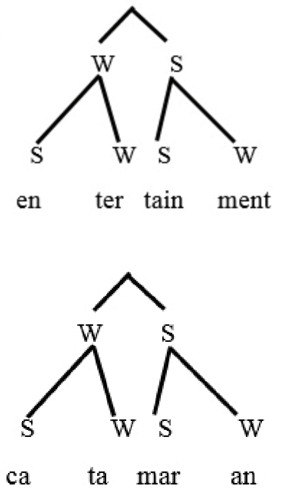


Trees of this sort allow us to compare different words at a glance and tell whether their prominence patterns, and thus the position of stress, are the same or not; from (3), we can see that *father* and *tally* share the same stress pattern, though *about* has the relative prominence of its two syllables reversed. This is particularly important for longer words with more syllables, where prominence patterns are naturally more complex; so, (3) also shows that *discipline* and *personal* have the same stress patterns. Note that, even in longer words, metrical trees can only branch in a binary way: that is, each higher S or W node can only branch into two lower-level constituents, never more. This is straightforward enough for disyllabic words like *father, about* and *tally*; but in *discipline, personal*, tree construction involves two steps. Initially, the first two nodes are put together; then the higher-level S node these form is in turn combined with the leftover W syllable, to form another binary unit. This kind of pattern can be repeated in even longer words.

In cases involving both primary and secondary stresses, these trees are particularly helpful: (4) clearly shows the different patterns for *entertainment* and *catamaran*. In particular, the trees allow us easily to identify the main stress of each word, which will always be on the syllable dominated by nodes marked S all the way up the tree.

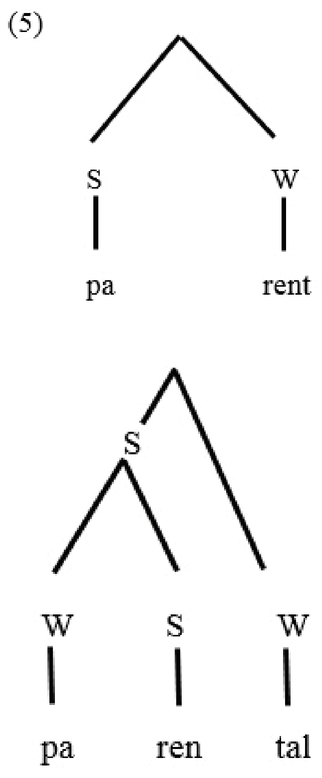
Diagram 4.5

(4)



Finally, metrical trees are useful in displaying the stress patterns of related words. In English, as in many other languages, stress interacts with the morphology, so that the addition of particular suffixes causes stress to shift. Most suffixes are stress-neutral, and do not affect stress placement at all: for instance, if we add *-ise* to ‘*atom*, the result is ‘*atomise*; similarly, adding *-ly* to ‘*happy* or ‘*grumpy* produces ‘*happily*, ‘*grumpily*, with stress remaining on the first syllable. However, there are two other classes of suffixes which do influence stress placement. The first are stress-attracting suffixes, which themselves take the main stress in a morphologically complex word: for example, adding *-ette* to ‘*kitchen*, or *-ese* to ‘*mother*, produces *kitchen’ ette*, *mother’ese*. Other suffixes, notably *-ic, -ity* and adjective-forming *-al*, do not become stressed themselves, but cause the stress on the stem to which they attach to retract one syllable to the right, so that *atom*, *e lectric* and *parent* become *a ‘tomic*, *elec’tricity* and *pa’rental*. The varying stress patterns of related words like *parent* and *parental* can very straightforwardly be compared using tree diagrams, as in (5).

Diagram 4.6



There is one final category of word with its own characteristic stress pattern. In English compounds, which are composed morphologically of two independent words but signal a single concept, stress is characteristically on the first element, distinguishing the compounds *'greenhouse* and *'blackbird* from the phrases a *green'house*, a *black'bird*. Semantically too, the difference is obvious: there can be brown blackbirds (female blackbirds are brown), or blue greenhouses, but *The green 'house is blue* is semantically ill-formed. In phrases, the adjectives *black* and *green* are directly descriptive of the noun, and have to be interpreted that way; on the other hand, the meaning of compounds are not determined compositionally, by simply adding together the meanings of the component parts, so that *greenhouse* signals a particular concept, with no particular specification of colour. Stress is clearly crucial in marking this difference between compounds and phrases; in noting it, however, we are already moving beyond the word, and into the domain of even larger phonological units.

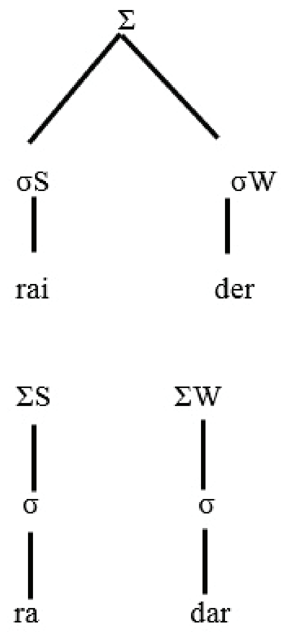
D. The foot

So far we have been assuming that syllables group into words, with some words being composed of only a single syllable. Strictly, however, the word is not a phonological unit, but a morphological and syntactic one; and as we shall see in the next section, phonological processes are no great respecters of word boundaries, operating between words just as well as within them. The next biggest *phonological* unit above the syllable is the foot.

The normally accepted definition is that each phonological foot starts with a stressed syllable (though we shall encounter an apparent exception below), and continues up to, but not including, the next stressed syllable. This means that *cat in a hat* consists of two feet, the first containing *cat in a,* and the second, *hat.* Although *cat flap* consists of only two words (or indeed one, if we agree this is a compound), as opposed to four in *cat in a hat,* it also consists of two feet, this time one for each syllable, since both *cat* and *flap* bear some degree of stress. Indeed, because English is a stress-timed language, allowing approximately the same amount of time to produce each foot (as opposed to syllable-timed languages, like French, which devote about the same amount of time to each syllable regardless of stress), *cat in a hat* and *cat flap* will have much the same phonetic duration. The same goes for *the cat sat on the mat*, with rather few unstressed syllables between the stressed ones, and *as snug as a bug in a rug*, with a regular pattern of two unstressed syllables to each stress. This isochrony of feet, whereby feet last for much the same time regardless of the number of syllables in them, is responsible for the characteristic rhythm of English.

Like syllables, feet can also be contrasted as stronger and weaker. Sometimes, there will be more than one foot to the word; for instance, as we saw earlier, a word like ‘*raider*, with primary stress on the first syllable and no stress on the second, can be opposed to ‘*ra dar*, with primary versus secondary stress. It is not possible to capture this distinction using only syllable-based trees, since both *raider and radar* have a stronger first syllable and a weaker second syllable. However, these two W nodes are to be interpreted in two different ways, namely as indicating no stress in *raider*, but secondary stress in *radar*. To clarify the difference, we must recognise the foot. *Raider* then has a single foot, while *radar* has two, the first S and the second W. Recall that small sigma (σ) indicates a syllable, and capital sigma (Σ), a foot.

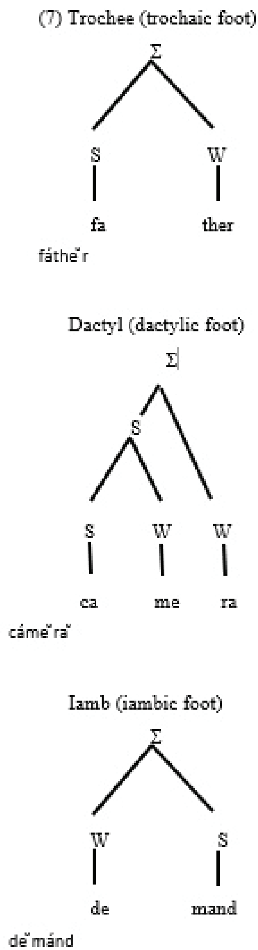
Diagram 4.7



In other cases, the same number of feet may be spread over more than one word, so that ‘*cat flap* has two feet, related as S versus W, while *cat in a ‘hat* also has two feet, although here the first foot is larger, including *in a* as well as *cat*, and the prominence relationship of W S reflects the fact that *cat flap* is a compound bearing initial primary stress, while *cat in a hat* is a phrase, with main stress towards the end.

Feet can also be classified into types, three of which are shown in (7). The iambic type, structured W S, contradicts the claim above that all feet begin with a stressed syllable; but in fact, at the connected speech level, the first, unstressed syllable in such cases will typically become realigned, attaching to the preceding foot. So, in *cup of tea*, the weak syllable *of* will be more closely associated with the preceding stronger syllable, with which it then forms a trochaic foot, than with the following one, as evidenced by the common contraction *cuppa for cup of*.

Diagram 4.8



These foot types are important in scansion, or analysing verse. For example, the blank verse of Shakespeare's plays involves iambic pentameters: each line has five iambic feet, as shown in the metre of two lines from *The Merchant of Venice* (8).

(8) The˘ quálíty´ o˘f mércy˘ ís no˘t stráined

I ˘t dróppe˘th ás the˘ géntle˘ ráin fro˘m héaven

To take a less exalted example, (9) shows two lines with rather different metrical structure. The first consists of two dactyls and a final 'degenerate' foot composed of a single stressed syllable. Note that a foot of this kind, like *dock* here, or any monosyllabic word like *bit, cat* in normal conversation, cannot really be labelled as S or W: since stress is relational, it requires comparison with surrounding feet. The second line is again made up of iambic feet.

(9) Hícko˘ry˘ dícko˘ry˘ dóck

The˘ móuse ra˘n úp the˘ clóck.

Finally (taking another nursery rhyme, since these often have particularly clear and simple metre), a line like Máry˘, Máry˘ quíte co˘ntráry˘ is composed of four trochaic feet.

Poetry also provides an excellent illustration of the English preference for alternating stress. It does not especially matter whether we have sequences of SWSWSWSW, or SWWSWWSWWSWW; but what does matter is avoiding either lapses, where too many unstressed syllables intervene between stresses, or clashes, where stresses are adjacent, with no unstressed syllables in between at all. The English process of Iambic Reversal seems designed precisely to avoid stress clashes of this kind. It affects combinations of words which would, in isolation, have final stress on the first word, and initial stress on the second. For instance, (10) shows that the citation forms (that is, the formal speech pronunciation of a word alone, rather than in a phrase) of *thirteen* and *champagne* have final stress.

(10) A: How many people turned up?

B: Thir teen.

A: What are you drinking?

B: Cham pagne.

However, when final-stressed words like *thirteen* and *champagne* form phrases with initial-stressed ones like *players* or cocktails, the stress on the first word in each phrase moves to the left, so that in ‘*thir teen* ‘*players* and ‘*cham pagne* ‘*cocktails*, both words have initial stress. This is clearly related to the preference of English speakers for eurhythmic alternation of stronger and weaker syllables, as illustrated in (11).

(11) W S	S W	S W	S W
thirteen	players →	thirteen	players
WS	SW	SW	SW
champagne	cocktails →	champagne	cocktails

If these words retained their normal stress pattern once embedded in the phrases, we would find clashing sequences of WSSW, as shown on the left of (11), in violation of eurhythmy; consequently, the prominence pattern of the first word is reversed, changing from an iamb to a trochee – hence the name Iambic Reversal. The result is a sequence of two trochaic feet, giving SWSW and ideal stress alternation.

It is also possible, however, for the normal stress patterns of words to be disrupted and rearranged in an altogether less regular and predictable way, reflecting the fact that stress is not only a phonological feature, but can also be used by speakers to emphasise a particular word or syllable. If one speaker mishears or fails to hear another, an answer may involve stressing both syllables in a word, in violation of eurhythmy: so, the question *What did you say?* may quite appropriate elicit the response *'thir 'teen*. Similarly, although phrases typically have final stress, a speaker emphasising the first word may well produce the pattern *a cat in a hat*, rather than *a cat in a hat*. This is partly what makes the study of intonation, the prominence patterns of whole utterances, so complicated. It is true that there is a typical 'tune' associated with each utterance type in English: for instance, questions typically have raised pitch towards the end of the sentence, while statements have a pitch shift downwards instead. However, the stress patterns of particular words (which may themselves be altered for emphasis) interact with these overall tunes in a highly complex and fluid way.

Furthermore, speakers can use stress and intonation to signal their attitude to what they are saying; so that although *No* spoken with slightly dropping pitch signals neutral agreement, it may also be produced with rising pitch to signal surprise, or indeed with rising, falling, and rising intonation, to show that the speaker is unsure or doubtful. In addition, intonation is just as subject to change over time, and under sociolinguistic pressures, as any other area of phonology. To take one case in point, there is currently a growing trend for younger women in the south-east of England in particular to extend to statements the high rising tune characteristic of questions, so that *She's going out and She's going out?* will have the same characteristic intonation pattern for these speakers. Whatever the source of this innovation (with the influence of Australian television soaps like *Neighbours* being a favourite popular candidate), it shows that intonation is not static, and that there is no single, necessary connection between particular patterns and particular utterance types. These complexities, combined with the fact that the analysis of intonation has its own (highly complex and often variable) technical terms and conventions, mean that it cannot be pursued further here.

E. Segmental Phonology of the Phrase and Word

1. Phrase-level processes

Although the main focus of this chapter has inevitably been on stress and prominence, this is not the only phonological characteristic of the word and phrase levels: segments may also be affected by those adjacent to them. The bulk of these segmental phonological processes are characteristic of fast and casual speech, and are often referred to as connected speech processes (CSPs for short). These generally involve either assimilations (whereby two adjacent sounds become more similar in quality, as the articulations used to produce them become more similar), or reductions; both these process types are natural consequences of talking more quickly and perhaps less carefully. Most CSPs are also optional, and will tend to be suspended or at least occur less frequently in more formal situations and in slower speech. To take just two examples, when two adjacent words have final and initial stops, these typically come to share the same place of articulation, so that sit close will tend to have medial [kk], and *odd message* [bm]. Function words like *he, than, you, my* also frequently reduce to [ɪ], [ðən] (or even [ən]), [jə], [mə]: all these component processes, notably loss of consonants (in *he, than*), shortening of vowels (in he again), and reduction of vowels to schwa (in *than, you, my*) as a result of loss of stress, are segmental weakenings.

Speaking quickly and informally will also tend to cut the duration of unstressed vowels in full lexical words like nouns, verbs and adjectives, with a concomitant effect on their quality. In words like *deduce, profound, connect*, the first syllable in careful speech may contain a full vowel, [i], [aʊ] or [ɒ] respectively; but in faster speech and more relaxed circumstances, these are highly likely to be reduced to schwa. Work by Fry in 1947 reported that nearly 11 per cent of vowel phonemes in English consisted of /ə/, with its nearest rival, at 8 per cent, being /ɪ/, the other vowel frequently found in unstressed syllables. To put this in perspective, all other vowels in the survey fell below 3 per cent. This indicates clearly how common unstressed syllables were in 1947; and they are not likely to have reduced in frequency since. In some cases, however, vowels do not only reduce in fast speech: they are deleted. A word like *connect*, in connected speech, could be pronounced either as [kənɛkt] or [knɛkt]; and in cases like this one, and potato [pteɪtoʊ], the result actually violates the phonotactics of English, since *[kn] and *[pt] are not permissible clusters.

Such processes do not always affect vowels, however: sometimes both vowels and consonants are elided in fast speech, so that whole syllables may vanish when we compare the citation forms of words like *February, veterinary* with their fast speech equivalents, [fɛbɹi], [vɛʔnɹi]. Note also [ʔ] for /t/ in the second example; reduction of a stop to a glottal stop, or indeed to a fricative, is another example of lenition or weakening. Moreover, phonological reductions and assimilations across word boundaries typically affect consonants rather than vowels. For example, at the phrase level, word-final /s/ followed by word-initial /j/ often combine to produce [ʃ], so that *race you* is often [ɹeɪʃə], not the citation form [ɹeɪs ju]. In this case, a very similar process also takes place word-internally, resulting in medial [ʃ] in *racial*; but again typically, these word-internal cases are not so clearly optional, and [ɹeɪsjəl] would tend to be seen as old-fashioned or an example of a speaker trying too hard to speak 'correctly'. Another very common process applying between words is [ɹ]-intrusion in non-rhotic accents of English, where [ɹ] appears between [ɑ], [ɔ], or [ə] and another following vowel, although there is no in the spelling and no etymological /r/ in the word concerned. For instance, the name of a tennis tournament, the *Stella Artois event*, will typically in casual speech be pronounced as [ðəstɛləɹɑtwɑɹəvɛnt], with intrusive [ɹ] after both cases of ; and similarly, we find well-known examples like *the idea is* [ðiaɪdiəɹɪz] and *law and order* [lɔɹənɔdə]. Again, this process also takes place within words, as in *sheep baa*[ɹ]ing, *draw*[ɹ]ing, *magenta*[ɹ]ish. This might, on the face of it, seem a rather unusual fast speech process, since it involves the addition of a segment; but producing two vowels side-by-side appears to be rather difficult for speakers, and an intrusive consonant may allow more fluid and less hesitant speech. Many of these processes therefore have a similar rationale, in making life easier for speakers, and allowing speech tempo to be kept consistently fast.

2. Word-internal morphophonological processes

However, there is another class of segmental phonological processes. In contrast to the connected-speech processes discussed above, these do not apply across word boundaries, but are rather confined within words, where they tend to take place in response to the addition of a particular suffix – generally those suffixes identified as causing stress retraction in predicting stress placement. Forms with these suffixes are also prone to odd and irregular segmental processes. For instance, when the suffix *-ity* is added to *electric*, the final [k] of *electric* becomes [s] in *electricity*. The same suffix may also alter the stem vowel: when *-ity* is added to *divine, sane, serene,* the long stressed vowels of the stems are shortened in *divinity, sanity, serenity*. These changes are also unlike CSPs in that it is often hard to see why they take place where they do: while a fast speech reduction or assimilation is generally a response to speed of speech, and involves ease of articulation pressures, the word-internal type typically creates an alternation between two independent phonemes, not directly motivated by the phonological context (as in the /k/ and /s/ of *electric* – *electricity*). Even where there does seem to be a reduction, as in the shortening of the stressed vowel in *divine* to *divinity* on the addition of the *-ity* suffix, it is not obvious why this particular suffix should have this effect; and it cannot be ascribed to speed of speech, since these morphophonological processes are obligatory, regardless of speed of speech or sociolinguistic factors: hence, the citation forms of *electricity, divinity* will also show these changes.

Although the affixes which provoke these segmental changes generally also influence the position of stress, this is not always the case. For instance, adding the past tense marker *-t* or *-d* to irregular verbs like *keep* – *kept, sleep* – *slept, leap* – *leapt* has no effect on stress, but does seem to cause a categorical shortening of the stem vowel. One of the most important jobs for phonologists, bearing in mind the focus discussed throughout this book on what speakers know about their language, and what they must be assumed to do in order to learn, produce and understand it, is to work out where to draw the line between productive processes which speakers apply regularly and which they will generalise to new forms in the language, and fossilised processes which might have started out as regular phonetic developments, perhaps CSPs, in the history of the language, but which are now simply associated with individual words or small groups of words. That is, perfectly natural phonetic processes may in time become less transparent, and less regular. In the case of *keep – kept,* or *divine – divinity*, we must ask ourselves whether the processes of vowel shortening, which perhaps were and phonetically motivated centuries ago, are still part of native speakers' active knowledge of English, and still involve those speakers in actual processes of adding suffixes and shortening vowels; or whether children must learn that words like *keep* and *divine* have related, but different forms which are stored separately and produced on appropriate syntactic occasions. Since phonology, like all other areas of language, is consistently undergoing change and development, with new processes constantly arising and different accents diverging, our only definite conclusion can be that today's connected-speech processes will present tomorrow's phonologists with exactly the same problem.

F. Morphophonemic Change

According to O Grady (1996, pp.332-344) there are some types of morphophonemic change briefly discusses in this section include: (1) loss of phonemes, (2) addition of phonemes, (3) simple consonant change, (4) assimilation; (5) dissimilation; (6) synthesis; (7) change of syllabic vowel or diphthong; (8) gradation; and (9) suppletion.

1. Loss of Phonemes

The phoneme /n/ of the negative prefix (in-) is lost before the morphemes beginning with sonorant sounds /m/; /r/;/n/ and /l/ (Nurhayati, 2015a; 2016b; 2016f), for examples:

Table 4.1 Table of Example for Phonetics Transcription

Word	Phonetic transcirption
Immobile	/ ɪˈməʊbaɪl /
Immature	/ˌɪməˈtjʊə(r)/
Imbalance	/ɪmˈbæləns/
Immoderate	/ɪˈmɒdərət/
Immorale	/ɪˈmɒrəl/
Irregular	/ɪˈregjələ(r)/
Irrational	/ɪˈræʃənl/
Irrelevant	/ɪˈreləvənt/
Irresolute	/ɪˈrezəluːt/
Irrevocable	/ɪˈrevəkəbl/
Illogical	/ɪˈlɒdʒɪkl/
Illegal	/ɪˈliːgl/
Illiterate	/ɪˈlɪtərət/
Illegible	/ɪˈledʒəbl/
Innocuous	/ɪˈnɒkjuəs/
Innumerate	/ɪˈnjuːmərət/

The phoneme /t/ is lost. It changes the word class (adjective to noun). Example:

Different /ˈdɪfrənt/ àdifference / ˈdɪfrəns/

Confident /ˈkɒnfɪdənt/ àconfidence/ ˈkɒnfɪdəns/

Redundant /rɪˈdʌndənt/ àredundancy/

rɪˈdʌndənsi/

The phoneme ou is lost

Example:

Piano / piˈænəʊ/ → pianist /ˈpɪənɪst/

With spoonerisms, the intended meaning of the words is obscured. For what-ever evolutionary, psychological reason, the beginnings of words are more important for language communication than the ending of words. Given that quality, the ending of syllable and words are often shortened in languages where there is a coda. The more complex the coda, the more likely the coda will be shortened.

Consider your normal pronunciation of the following phrases:

Consider you strength tonight

The front door fell down

A broken flask gasket

Went around a blind curve

In many English speakers pronunciations, several consonant sound will likely not be produced, including the [θ] in *strength*, the [t] in *front*, the [k] in *flask*, and the [d] in *blind*. Now try the following phrases:

Strength on the floor

The front edge

Leave the flask open

A blind alley

With these words, fewer people will drop the consonant in *strength, front, flask* or *blind*. Consider the following phonetic representations to figure out why.

Deletion more likely	Deletion less likely
[stɹɛŋθ tənaɪt]	[stɹɛŋθ ɔn]
[fɹənt doɹ]	[fɹənt ɛʤ]
[flæsk gæskət]	[flæsk opɪn]
[blaɪnd kɪv]	[blaɪnd æli]

The case of the [θ] in *strength,* is a bit different from the others. It is a rare sound across languages in the first place, so it is less frequently used in English (than other consonants) and is more subject to change. The [t], [k], [d] do not have that same excuse. What is it about the phonological environments which prompt them to deletion? It appears that whether the following sounds is a consonant or a vowel greatly influences deletion. The following vowels do not encroach upon the final sound nearly as much as following consonants do.

Every variety of English deletes stops and fricatives before following consonants. It is socially unremarkable. However, some vernacular dialects have more consonant deletion before following vowels, including English in Appalachia and some variety of African-American English (Hazen, 2015, p. 97).

2. **Addition of Phonemes**

Example:

The phoneme /s/ is added

Sword /sɔːd/ → swordsman /ˈsɔːdzmən/

Sale /seɪl/ → salesgirl /ˈseɪlzgɜːl/

Craft /krɑːft/ àcraftsman /ˈkrɑːftsmən/

3. **Simple Consonant Change**

Example:

Knif /naɪf/ → knives /naɪvz/ ; the phoneme /f/ changes to /v/

Commit /kə'mɪt/→ commission/kə'mɪʃn/ ; the phoneme /t/ changes to /ʃ/

P changes to b

Example:

P^hi	'cloth border'	+ pan	= P^hiban	"border of cloth"
T^ha	'month whole'	+ pum	= T^habum	'the whole month'
k^hoŋ	'leg mother'	+ pi	= k^hoŋbi	'big toe'
ləm	' land arum'	+ pan	= ləmban	'wild arum'
huy	'dog owner'	+ pu	= huyby	'the owner of dog'
san	'cow owner'	+ pu	= sanbu	'the owner of cow'
lay	'land board'	+ pak	= laybak	'clay'
caw	'big fool'	+ pəŋ	= cawbəŋ	'fool'

T changes to d

Example:

P^hi	'cloth type'	+ ta	= P^hida	'type of cloth'
k^hoŋ	'leg shape'	+ ta	= k^hoŋda	'shape of leg'
k^hoy	'navel high'	+ toŋ	= k^hoydoŋ	'one having big naval'
t^həw	'duty to do'	+ təw	= t^həwdəw	'mode of doing'
sen	'money to debt'	+ ton	= sendon	'debt'
ləm	'land to be high'	+ toŋ	= ləmdoŋ	'high land'
ciŋ	'hill to be high'	+ toŋ	= ciŋdoŋ	'high hill'

C changes to j

Example:

P^hi	'cloth to be big'	+ caw	= P^hijaw	'big cloth'
P^hi	'cloth ordinary'	+ cəm	= P^hijəm	'ordinary cloth'
t^hoŋ	'door to be big'	+ caw	= t^hoŋjaw	'door'
k^haŋ	'pan to be big'	+ caw	= k^haŋjaw	'big pan'
səm	'hair near'	+ ci	= səmji	'knot hair'

4. Assimilation

It describes how sounds modify each other when they meet, usually across word boundaries, but within words too, e.g. the words *that* and *book* (Kelly, 2000: 109). Through assimilation, speakers make some sound more similar to other sound. In this way, the first sound usually melts to the next sound. For sound, the degree of similarity varies, so that the change sound could be slightly more similar or completely identical. Consider the following words as example of assimilation

1. Inevitable
   Inoperable
   Inexpensive
2. Insufficient
   Intolerant
   Independence
3. Impractical
   Immature
   Imbalance
4. Illegal
   Illicit
   Illiterate
5. Irresponsible
   Irregardless
   Irregular

The prefix "in-" with the meaning of "not" attaches to many different words in English. Over the history of the language, the [n] of this prefix has made its place of articulation more similar to consonant that follow it. In group 1, the [n] do not change because the following sound is a vowel. In group 2, the following sound is a consonant, but [s], [t],[d] are all part of the same natural class of alveolar sound. Since the [n] sound is already alveolar, it has the same place of articulation as the following sound. In group

3, the [p], [m], [b] are all part of the same natural class of bilabial sounds, and the alveolar [n] has change to a bilabial [m]. in group 4 and 5, the [n] sound has been completely assimilated in both place and manner of articulation. What special quality to the [ɹ] and [l] sound share? They are both like liquid, and since assimilation is a process of one sound flowing into another, these sound are especially good at it.

Assimilation is one of the most common phonological processes for all languages. It happens with both consonants and vowels. Below are seven types of assimilation which are common enough as sound patterns to have earned their own name (Hazen, 2015, p. 90).

a. Anticipatory Assimilation

It happened where one sound changes to another because of the sound which follows. Here are some rules included here:

1. The phonemes /t/,/d/ and /n/ often become bilabial before bilabial consonants

   /p/, /b/, /m/:

   Example:

   He is a rat bag (/t/ assimilates to /p/)

   I am having a plate of out meal (/t/ assimilates to /p/)

   It is a fine month (/n/ assimilates to /m/)

   I meet ten boys (/n/ assimilates to /m/)

   He is a bad boy (/d/ assimilates to /b/)

2. /t/ assimilates to /k/ before /k/ or /g/, /d/ assimilates to /g/ before /k/ or /g/:

Example:

I see the cute girl	/kjuːt gɜːrl/	> /kjuːk gɜːrl/	(/t/ assimilates to /k/)
Bad concert	/bæd'kɑːnsərt/	> /bæd'kɑːnsərt/	(/d/ assimilates to /g/)
He is a bad guy	/bæd gaɪ/	> /bæg gaɪ/	(/d/ assimilates to /g/)
Good girl	/gʊdgɜ:l/	> /gʊggɜ:l/	(/d/ assimilates to /g/)
I got good score	/gɑːt gʊd/	> /gɑːk gʊd/	(/t/ assimilates to /k/)
Front garden	/frʌnt gɑ:dn/	> /frʌŋkgɑ:dn/	(/t/ assimilates to /k/)
I know that kid	/ðæt kɪd/	> /ðæk kɪd/	(/t/ assimilates to /k/)
That car	/ðæt kɑ:/	> /ðæk kɑ:/	(/t/ assimilates to /k/)

3. /n/ can assimilate to /ŋ/ before /g/ or /k/:

   Example:

   Where have you been going? /biːn'goʊɪŋ/ > /biːŋ'goʊɪŋ/

   Go on keeping your life! /ɔːŋ'kiːpɪŋ/ > /ɔːn'kiːpɪŋ/

   I have ten keys /ten ki:z/ > / teŋki:z/

   They have been gabbing /biːngæbɪŋ/ > /biːŋ gæbɪŋ/

4. /s/ can assimilate to /ʃ/ before /ʃ/:

   Example:

   I like this shiny day /ðɪs'ʃaɪni/ >/ ðɪʃʃaɪni/

   He likes shaking soda /laɪks'ʃeɪkɪŋ/ >/laɪkʃʃeɪkɪŋ/

   Dress shop /dresʃɒp/ >/

dreʃ ʃɒp/

5. /z/ can assimilate to /ʒ/ before /ʃ/:

   Example:

I keep his shop	/hɪz ʃɑ:p/	>	/hɪʒɑ:p/
I like cheese shake	/tʃi:zʃeɪk/	>	/tʃi:ʒeɪk/
Is she beautiful?	/ɪz ʃi/	>	/ɪʒ ʃi/

b. Coalescent assimilation

It happened where two sounds combine to form a different one: Example:

1. /t/ and /j/ coalesce to form /tʃ/:

   Don't you love him? /dəʊntju/ >/dəʊntʃu/

2. /d/ and /j/ coalesce to form /dʒ/:

Did you come to the party?	/dɪdju/	>	/dɪdʒu/
Had you come to the party?	/hædju/	>	/hædʒju/

5. Dissimilation

A process quite opposite to assimilation, as the name itself indicates. With this stage, two phonemes form two different morphemes, most often the last of prefix and the first of the root are dissimilated in such a way that they are no longer the same phoneme, but the first one is changed into a different one. The reason for that is easier morpheme identification. The difference may be in the place of articulation, or another sound quality. This is not frequently present change (Javanovic, 2016), for example:

a) IN + NOBLE = INNOBLE > IGNOBLE

b) IN + NOMINY = INNOMINY > IGNOMINY

6. Synthesis

Synthesis is a consonant change commonly occurs in modern English. It is the fusion of consonants, brought together by morpheme combination, into a single new phoneme different from both of its constituents. The new phoneme must be considered to belong to both the allomorphs whose junction-point it represents. Example:

/məN + potoŋ/ becomes /məmotoŋ/ 'cut' ([p] and [m] are both pronounced with the lips)

/məN + tulis/ becomes /mənulis/ 'write' ([t] and [n] are both pronounced with the tip of the tongue)

/məN + kira/ becomes /məŋira/ 'guess' ([k] and [ŋ] are both pronounced at the back of the tongue)

a. Change of Syllabic Vowel or Diphthong

There is a type of morphophonemic change which is very prevalent in English. That is the substitution to another syllabic vowel or diphthong for the one which appears in the normal allomorph.

Example:

i: > oʊ	Steal	/stiːl/	>	stole	/stoʊl/
aɪ > ɪ	five	/faɪv/	>	fifteen	/fɪfˈtiːn/
i: > e	please	/pliːz/	>	pleasant	/ˈpleznt/
ɪə > ɜː	hear	/hɪə(r)/	>	heard	/hɜːrd/
eɪ > e	say	/seɪ/	>	said	/sed/
aɪ > eɪ	lie	/laɪ/	>	lay	/leɪ/

b. Stress Shift

Stress shift is a change of a stress occurring in the syllables of newly formed word due to the addition of an affix to a word in English. The stress shift is commonly accompanied by vowel change. But there are some cases, without the accompanying of vowel change, as given in the following example:

Scientist	/ˈsaɪəntɪst/	> scientifict	/ˌsaɪənˈtɪfɪk/
Economy	/ɪˈkɒnəmi/	> economical	/ˌiːkəˈnɑːmɪkl/

c. Suppletion

Suppletion happens when an allomorph fits into a paradigm with another allomorph; the two belong to the same morpheme even though they may be phonemically completely different.

Total modification is included here not as a regular process but in the spirit of exhausting the logical possibilities. Its occurrence is by its nature sporadic and idiosyncratic within inflectional categories established by regular processes, as for example the English past inflection, where it is the regular ablaut and -*ed* past tense forms that establish the category in which suppletive *went* occurs as an isolated example:

- Good > better > best
- Bad> worse > worst

Present	**Past**
strike	struck
string	strung
fling	flung
go	went
play	played
miss	missed
need	needed

d. Gradation

As previously discussed, the process of derivation involves stress shift usually also involves certain types of vowel change. In this case, the other vowels and diphthongs tend to be replaced by /i/, /i/, or /ə/ when the stress shifts happens to another syllable, and vice versa. This kind of vowel change resulting from shift of stress happens is called *gradation.* Example: 1) Courage→Courageous, 2) Industry →Industrial, 3) ParentàParental, and 4) Symbol→ Symbolic.

7. Elision / Deletion

The nature of elision may be stared quite simply: under certain circumstances sound disappear; one might express this in more technical language by saying that in certain circumstances a phoneme may be realized as zero, or have zero realization or be deleted. As with assimilation, elision is typical of rapid, casual speech; the process of change in phoneme realization produced by changing the speed and casualness of speech is sometimes called gradation. Producing elisions is something which foreign learners do not need to learn to do, but it is important for them to be aware that when native speakers of English talk to each other, quite a number of phoneme that the foreigner might expect to be hear are not actually pronounced. We will look at some examples, though only a small number of the many possibilities can be given here

i. Loss of weak vowel after p, t, k.

   In words like ‘potato’, ’tomato’, ‘canary’, ‘perhaps’, ‘today’, the vowel in the first syllable may disappear; the aspiration of the initial plosive takes up the whole of the middle portion of the syllable, resulting in these pronunciations (where ^{h} indicates aspiration): p^h’teɪtəʊ; t^h’mɑ:təʊ; k^h’neəri; p^h’hæps;

t^hdeɪ

ii. Weak vowel +n, l or r becomes syllabic consonant.

Example: 'tonight' tnəɪt; 'police' pli:s; 'correct' krekt

iii. Avoidance of complex consonant clusters.

It has been said that no normal English speaker would ever pronounce all the consonant between the last two words of the following:

'George the sixth throne' ʤɔ:ʤ ðə sɪksθs θrəʊn

Though this is not impossible to pronounce, something like . . . sɪksθrəʊn is more likely. In clusters of three plosive of two plosives plus a fricative, the middle plosive may disappear, so that the following pronunciation results: 'acts' æks; 'looked back' lʊk bæk; 'scripts' skrɪps.

iv. Loss of final v in 'of' before consonant.

Examples: 'lots of them' lɒts ə ðəm; 'waste of money' weɪst ə mʌni.

v. It is difficult to know whether contractions of grammatical words should be regarded as examples of elision or not. The fact that they are regularly represented with special spelling forms makes them seem rather different from the above examples. The best-known case are:

- 'had', 'would' : spelt 'd, pronounced d (after vowels), əd (after consonant).
- 'is', 'has' : spelt 's pronounced s (after fortis consonants), z (after lenis consonants), except that after s, z, ʃ, ɜ, tʃ, ʤ 'is' pronounced ɪz and 'has' is pronounced əz in contracted form.
- 'will' : spelt 'll, pronounced I (after vowels', l

(after consonant).

- 'have' : spelt 've, pronounced v (after vowels), əv (after consonants).
- 'not' :spelt n't, pronounced nt (after vowels), nt (after consonants).
- (there are also vowel changes associated with n't, e.g. 'can' kæn – 'can't' kɑ:nt, 'do' du: - 'don't' dəʊnt.)
- 'are': spelt 're, pronounced ə after vowels, usually with some change in the preceding vowel, e.g. 'you' ju: - 'you're' jʊə, 'we' wi:
- 'we're' wɪə, 'they' ðeɪ - 'they're' ðeə; linking r is used when a vowel follows. Contracted 'are' is also pronounced as ə or ər when following a consonant.

(Roach, 1998:127-128)

8. Yod Variation

Some sound variation in English are new, while other happened and then disappeared. This next has happened on and off for a long time. In the word *Tuesday*, variation between a pronunciation [j] and a pronunciation without [j] has been ongoing since Middle English: [tjuzde] vs [tuzde]. Originally, the word for the day after Monday was a compound of the Germanic sky god's name. *Tiw* and the word for *day*. The pronunciation has certainly changed since then. The Oxford English Dictionary finds that British speakers have the [tjuzde] version, while US speakers variably have [tjuzde] or [tuzde]. This process is called *yod variation*. The [j] sound has the name *yod* (borrwowed from Hebrew name for the tenth letter of that alphabet). This process is often called *yod dropping*, although with words like *coupon*, it is actually *yod insertion*; [kupan] (the original) vs [kjupan] (the innovation).

Throughout the English world, the following words have had yod variation: *suit, educate, dew, tune, assume, Houston*. As sounds go, these pronunciations fall in and out of fashion. The form of *suit* [sjut] without the yod [sut] was non-standard for some time in English, but has become standard in the United States. These variations rarely come up in spelling differences. The exception may be during NCAA basketball season when Duke University is playing, and their opponents hold up various "Dook" signs.

9. Devoicing

The process where a sound becomes transparent is named *devoicing.* For example, *crypt, clean, trip* and *tread,* many English speakers can produce the [ɹ] and [l] sounds as voiceless. Sounds made voiceless are marked with a small circle subscript [ɹ̥] and [l̥]. in terms of when this happens, devoicing can be a "sometimes" feature for people, so that the same person can produce *trip* [tʰɹ̥ɪp] sometimes [tʰɹɪp] at other times. As far as we can tell, no social factors drive when devoicing happens and when it does not.

10.Palatalization

The kind of assimilation that alveolar sounds more palatal when they come before the palatal glide [j]. in the following combination of US English, the alveolar stops [t] and [d] become the palatal affricates [tʃ] and [dʒ] by absorbing the [j].

It hit you. [ɪthɪtju] → [ɪthɪtʃu]

Did you? [dɪdju] → [dɪdʒu]

Palatalization can also happen within single words, but there is a lot of variation between speakers in these:

OSU [oɛsju] → [oɛʃu]

Tuesday [tʰjuzde] → [tʃuzde]

Both the place and manner of articulation are changed for the [t] and [d] sounds, but only place with alveolar [s].

11. Flapping

The conditioning environment for **flapping** is more complex than one for nasalization. The **flap** is a sound in the same natural class as the alveolar [t] and [d] sounds, except that when producing it, you do not fully stop the air, but you almost do. For most Americans, it can be heard in words like *butter* [bərɹ] and *rider* [raɪrɹ]. with a more formal pronunciation, American speakers may be able to produce *butter* [bətɹ] and *rider* [raɪdɹ], but most of the time, their pronunciations are with the flap [r]. It is a kind of assimilation because the alveolar stops become less constricted, like their surrounding sounds. The conditioning environment also includes the relative stress in the words: the syllable following the flap has to be unstressed.

12. Glottalization

Although flapping might be a regular part of English in the United States, many British dialects use a difference phonological process on [t] sounds inside of words. Glottalization is when the glottal stop [ʔ] is substituted for [t] in words like *kitten, water* and *bottle*. What phonological. What phonological environment do all three of these words have? The [t] sound precedes an unstressed syllable in each case (if you doubt that, try to say each word with the main word stress in the last syllable and see how that sounds). North Americans also have glottalization, but it is less frequent and competes with flapping.

The following pronunciation illustrate the difference between flapping and glottalizing.

	Flapping	Glottalization
Kitten	[kʰɪɾn̂]	[kʰɪʔn̂]
Bottle	[baɾl]	[baʔl]
Water	[wəɾɹ]	[wəʔɹ]

13.Aspiration

Aspiration is where a bit of breathiness gets attached to some sounds. For English, aspiration is restricted to voiceless stops at the start of a stressed syllable. For the following English words, aspiration happens with the left column, but not with the right.

A	B
[tʰæn] *tan*	[dæn] *Dan*
[tʰək] *tuck*	[stək] *stuck*
[pʰon] *pone*	[bon] *bone*
[pʰɪt] *pit*	[spɪt] *spit*
[kʰot] *coat*	[got] *goat*
[kʰɪt] *kit*	[skɪt] *skit*

Aspiration in Sindhi, a language 22 million speakers, has a different role than it does in English. For Sindhi speaker, the [p] and [pʰ] are used to mark a difference in meaning between words. Consider these two Sindhi words:

/peru/ ‘the foot’ or ‘footprint’

/pʰeru/ ‘difference’

Here the only difference in the aspiration. For children acquiring the Sindhi language there is no way to predict that [p] or [pʰ] will show up in certain places. In the same way that children acquiring English have to memorize where the [b] and [p] show up, Sindhi have to memorize the difference between [p] and [p^h] (Hazen, 2015, p. 94).

14.Intonation

The pitch in your voice, whether your voice is lower or higher than normal, operates within complex parameters. English uses higher and lower pitch to make some differences in meaning, as all verbal languages do. Some of these languages use pitch for limited ranges of meaning. Languages that use the pitch of individual vowels or syllables to contrast meanings of words are called tone languages. For English, these meanings include disbelief, question, and surprise. For example, by changing the pitch of your voice, how many different meaning can you squeeze from the phrase “you are going out tonight.” At the very least, you can make it a statement or a question, or possibly imply disbelief also.

Some other languages, called tone languages, use pitch to mark differences between words. Over half the world’s languages are tone languages. There are more than one thousand tone languages spoken in Africa alone. In Ethiopia, the Bench language of the Omotic branch of the Afroasiatic family has at least five different tones which work phonemically. That means different pitches on the same consonant and vowel will yield different words. The different varieties of Chinese are the most populated of tone languages, and for those speakers, both the relative highness-lowness of the pitch is important, as is whether the pitch is falling or rising across a syllable. In Mandarin Chinese, for example, the same consonant vowel combination can carry five different tones, yielding five different words. For example, the word *horse /mǎ/* has a mid-level pitch rising to a high pitch (on the same vowel!), but the separate word *mother /má/* has a high-level tone.

Considering that Mandarin-speaking children do not like to get in trouble any more than children of other languages, distinguishing between *horse* and *mother* is important. This kind of tonal system is acquired as a regular part of phonology (Hazen, 2015, p. 94).

In a tone language it is not the absolute pitch of the syllables that is important but the relations among the pitches of different syllables. Thus men, women, and children with differently pitched voices can still communicate ina tone language.Tones generally have a lexical function, that is, they make a difference between words. But in some languages tones may also have a grammatical function, as in Edo spoken in midwestern Nigeria. The tone on monosyllabic verbs followed by a direct object indicates the tense and transitivity of the verb. Low tone means present tense, transitive; high tone means past tense, transitive, as illustrated here:

òtà gbẽ̀	èbé
Ota write+PRES+TRANS	book
Ota writes a book.	
òtà gbẽ	èbé
Ota write+PAST+TRANS	book
Ota wrote a book.	

In many tone languages have found a continual lowering of the absolute pitch on the tones throughout an utterance. The lowering of the pitch is called downdrift. In languages with downdrift, a high tone that occurs after a low tone, or a low tone after a high tone, is lower in pitch than the preceding similarly marked tone. Speakers of tone languages are able to ignore the linguistically irrelevant absolute pitch differences between individual speakers and attend to the linguistically relevant relative pitch differences, much like speakers of non-tone languages ignore pitch altogether.

Intonation is variation of pitch that is not used to distinguish words. Languages that are not tone languages, such as English or French, are called intonation languages. The pitch contour of an utterance may affect the meaning of the whole sentence, so here is speak with falling pitch at the end is interpreted as a statement, but with rising pitch at the end, a question. We'll have more to say about intonation in the next chapter.

15.Spoonerisms

Sound pattern sometimes get sidetracked. Almost everyone at some point has sound which are switched with other sound. It may seem like a mess when you say, "lable teg" rather than "table leg", but there is a pattern to the mistake. This kind of sound switch is called a *spoonerism.* It is named for William Spooner (1844-1930), a reverend and warden at the New College, Oxford. Renowned as a lecturer and leader of the college, Spooner also had many slips of the tounge which entertained his listeners, including these attributed to him: "queer old dean", "fighting a lire", "shoving leopard", "blushing crow". What is switched in these words?

/laɪtɪŋ e faɪɹ/ [faɪtɪŋ ə laɪə]

/ləvɪŋ ʃɛpaɹd/ [ʃəviŋ lɛpa:d]

/diɹ old kwin/ [kwiə old din]

/kɹəʃɪ blo/ [bləʃiŋ kɹo]

In the first two, the consonant at the beginning of the two words are switched, but in the last two, there is something else going on. Can you tell what unit of sound organization is being used here? The onset of the syllable is switched in each case. Using the onset as the unit of switching works for all the examples (Hazen, 2015, p. 96).

G. FUTHER MATERIAL VIDEO

https://youtu.be/i_ohrkQmzdQ
https://youtu.be/wLprxwzWtc4
https://youtu.be/Z-xmtUZuzmc (syllable)
https://youtu.be/aSfHb4Qx2hc (syllable)
https://youtu.be/ZdRCfsr8uDE (syllable)
https://youtu.be/b-DugXTDwLQ (syllable)
https://youtu.be/70JZWxC9bKU (syllable)
https://youtu.be/beo1mezedJw (Syllable)
https://youtu.be/4xDtxoL54lU (syllable)
https://youtu.be/teRjAy5yte4 (syllable)
https://youtu.be/RHh24MwG7Dg (syllable)
https://youtu.be/MzhjD-XrYjg (syllable)
https://youtu.be/6PSdlctYBsw (aspiration)
https://youtu.be/6j4pLozlI2s (pronounce -ed)

H. EXERCISE

Group work

1. Pairs like *top* and *chop*, *dunk* and *junk*, *so* and *show*, and *Caesar* and *seizure* reveal that /t/ and /ʧ/, /d/ and /ʤ/, /s/ and /ʃ/, and /z/ and /ʒ/ are distinct phonemes in English. Consider these same pairs of nonpalatalized and palatalized consonants in the following data. (The palatal forms are optional forms that often occur in casual speech.)

Nonpalatalized	Palatalized
[hɪt mi] 'hit me'	[hɪʧ ju] 'hit you'
[lid hĩm] 'lead him'	[liʤ ju] 'lead you'
[p^hæs ʌs] 'pass us'	[p^hæʃ ju] 'pass you'
[luz ðem] 'lose them'	[luʒ ju] 'lose you'

Formulate the rule that specifies when /t/, /d/, /s/, and /z/ become palatalized as [ʧ], [ʤ], [ʃ], and [ʒ]. Restate the rule using feature notations. Does the formal statement reveal the generalizations?

2. Following are listed the phonetic transcriptions of ten "words." Some are English words, some are not words now but are possible words or nonsense words, and others are not possible because they violate English sequential constraints. Write the English words in regular spelling. Mark the other words as *possible* or *not possible*. For each word you mark as "not possible," state your reason.

Example:	Word	Possible	Not Possible	Reason
[θrot]	throat			
[slig]		X		
[lsig]			X	No English word can begin with a liquid followed by an obstruent.

	Word	Possible	Not Possible	Reason

a. [pʰril]
b. [skriʧ]
c. [kʰno]
d. [maɪ]
e. [gnostɪk]
f. [jũnəkʰɔrn]
g. [fruit]
h. [blaft]
i. [ŋar]
j. [æpəpʰlɛksi]

3. What is word stress?
4. Identify the number of syllables and the positioning of stress in the following words, by re-write over each syllable where stress is placed:

   Dictionary

   achieve

   fantastic

   funny

   project (Noun)

   project (Verb)
5. Find examples of English words which consist of the following foot

   structures:

   one iamb

   one trochee

   one dactyl

   one iamb followed by one trochee

   one dactyl followed by one trochee

I. Final Exercise!

1. What is minimal pair?
2. How are mental symbols for sounds represented?
3. What is phonology's job in the mental grammar?
4. What are social meanings?
5. What are natural classes?
6. What natural classes can divide all sounds into two groups?
7. What are syllable?
8. Do all languages have the same syllable structure?
9. What is hierarchy?
10. What is the structure of syllables?
11. What is onset maximization?
12. What are phonotactic constraints?
13. What is sonority?
14. What are the names of the two L sounds?
15. What is the low-back merger?
16. What is the pattern for the front-lax merger?
17. What is deletion?
18. What is assimilation?
19. What is the conditioning environment for nasalization?
20. What happens in devoicing?
21. What is palatalization?
22. What is social difference between R-vocalization in the United stated and England?
23. What is aspiration?
24. How is aspiration used in language other than English?
25. Does English use pitch to mark a difference in meaning?

26. What is synchronic variation?
27. What is diachronic variation?
28. What is spoonerism?
29. What kind of things can happen to yod?
30. What is glottalization, and who uses it?

J. GROUP WORK

Find any kind of phonological processes in these linked video!

https://youtu.be/byKELv7gcDE (exercise)

https://youtu.be/GP4Cq3VTagU (exercise)

https://m.youtu.be.com What can I do (the Corrs)

REFERENCES

Eka, D. (2010). *Introduction to Phonetics and Phonology of English*. Victoria Island: National Open University of Nigeria.

Fromkin, V, *et al*. (2014). *An Introduction to Language*. New York: Wadsworth

Gussmann, E. (2002). *Phonology Analysis and Theory*. New York: Cambridge University Press.

Hazen, K.(2015). *An Introduction to Language*. United Kingdom: John Wiley & Son, Inc.

Jovanović, Z. V. (2016). *English morphology*, p.81-89.*morphology.pbworks. com/f/ morphophonemic+changes.doc. Acccesed on March,25 2016.*

Kelly, G. (2000). *How to Teach Pronunciation*. England: Pearson Education Limited.

Maharsi, E. (2002). *Introduction to Linguistics*. Malang: Cintra Mentari Group.

McMahon, A. (2002). *An Introduction to English Phonology*. Edinburgh: Edinburgh University Press.

O'Grady,W.et al. (1997*). Contemporary Linguistics*. Edinburg: Pearson Education Limited.

Nurhayati, D. A. W.(2015a). Morphological process and morphophonemic process of alay variation. *Lingua*. Vol.12, (1),61-72.

Nurhayati, D. A. W. (2016b).Word formation processes and a technique in understanding waria slang Tulungagung. *EFL Journal*, Vol. 1 (1), 59-87.

Nurhayati, D. A. W. (2016f). Inverstigating morphological process of payandra on Javanese metaphor. *Journal of English Language Teaching and Linguistics (JELTL),* Vol.1 (3), 245-259.

Roach, P. (1998). *English Phonetics and Phonology*. United Kingdom: Cambridge University Press.

Yule, G.(2006). *The study of language*. New York: Cambridge University Press.