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Phonological change I: Change in pronunciation

All types of change in pronunciation are collectively known as **phonological change**, or, using a more traditional term, as **sound change**. Phonological change has been more intensively studied than any other type of language change; after nearly 200 years of scholarly investigation, we now know a great deal about the subject.

Here I find it convenient to divide the study of phonological change into two chapters, each looking at the subject from a different point of view. This first chapter deals with **syntagmatic change**: change in the sequence of speech sounds representing the pronunciation of a particular word, or, more accurately, of groups of similar words. The next chapter will then go on to consider the consequences of such change for the phonological system of an entire language.

As a result of this long tradition of study, syntagmatic changes have been classified into a number of different types, and these types have been given names in the form of technical terms. These several dozen terms you will have to learn, but fortunately the task is not difficult. The great majority of sound changes are phonetically natural: they are easy to understand in terms of the structure and movements of the speech organs, and the terms which label various types of change mostly reflect rather directly what the speech organs are doing.

3.1 *The phonetic basis of phonological change*

If you are reading this book, you should already know something about the organs of speech, about the ways in which they are used to produce speech sounds, and about the conventional system for classifying and labelling speech sounds. For our purposes, the key point to bear in mind is that the lips, the various parts of the tongue, the velum, the jaw, the larynx, and the glottis can be manipulated during speech in ways which are partly independent but also partly interrelated. For example, you can round your lips or not,

regardless of what the tongue is doing, but you can't round your lips tightly and keep your jaw lowered at the same time, nor can you produce a trill with your tongue while your mouth is closed. You can produce a uvular plosive or a palatal lateral, but you can't do them one right after the other: the organs just can't be moved fast enough. Moreover, even a possible manoeuvre is of little use if it produces no audible sound: you can certainly open your glottis, make an alveolar closure, lower your velum, and expel air through your nasal cavity, but the result will produce nothing that anyone can hear. A great deal of phonological change (though not all of it) can be readily understood in terms of these limitations.

When we speak, we produce a stream of **speech sounds**, or segments, one after the other. Thus, for example, our word *cleaned* is conventionally represented at the phonological level as a series of English phonemes /kli:nd/, and at the phonetic level by something with more detail included, such as [k^hi:nd]. In each case, the representation shows a series of segments. In fact, we know that these segments are more of a psychological reality than a physical one: physically, the various speech organs are all moving about at their own pace, and they do not all simultaneously and instantly jump from one configuration to another, as you move from one speech sound to the next. Instead, the organs spend a good deal of time moving away from one configuration and towards the next one, leaving and arriving at different times. When you say *cleaned*, for example, the velum is lowered to begin the nasalization required for /n/ well before the tongue is moved up to make the closure also required for that consonant, and the vibration of the vocal folds required for /d/ is stopped some time before the tongue stops making the closure for it.

In spite of such unsynchronized timings, our ears and brains still hear the individual segments which are 'supposed' to be there. All this being so, however, you might suspect that small changes in the movements of the speech organs, even small changes in timing, might have significant effects on what is heard, and you would be right: a great deal of phonological change derives merely from such small adjustments in the movements of the organs of speech.

3.2 *Assimilation and dissimilation*

One of the commonest types of sound change is **assimilation**: the process by which two sounds that occur close together in speech become more alike. This sort of change is easy to understand: moving the speech organs all over the place requires an effort, and making nearby sounds more similar reduces the amount of movement required, and hence the amount of effort. Here is a simple example: the spoken Latin word *nocte* 'night', pronounced [nokte], has become *notte* [notte] in Italian, which is a modern form of spoken Latin. The earlier [k] has turned into a [t] by assimilating to the following [t], thus

reducing the amount of movement required. This is a case of **total assimilation**: the sound undergoing assimilation has become identical to the influencing sound. Most assimilations, however, are **partial assimilations**: the assimilated sound becomes only more similar, and not identical, to the influencing sound. For example, Basque has the words *lan* 'work' [lan] and *bide* 'way' [bide], these form a compound *larbide* 'occupation, profession', which, in spite of its spelling, is pronounced [larbide], with a labial nasal. The nasal undergoes partial assimilation to the following labial plosive, but remains a nasal.

Both of these are also examples of **contact assimilation**, in which the two sounds involved are directly adjacent, but we also often encounter **distant assimilation**, in which the sounds in question are separated by other sounds. The ancestor of German had a noun *gast* 'guest' [gast], whose plural was **gastiz* [gastiz] (the asterisk in this case marks a form which is not recorded, but which linguists are sure must have existed). The back vowel in the plural underwent assimilation to the front vowel in the following syllable, producing **gestiz* [gestiz]. As a result of other, later, changes, the word comes into modern German as *Gast*, plural *Gäste* [gestə], in which the vowel [e] is written as <ä> in order to show the connection with the singular form. Another example of distant assimilation, this time total, is provided by the Latin word for 'five'. This was originally **[peŋkʷe]*, but the initial [p] underwent assimilation to the later plosive, yielding **[kʷenkʷe]*, which, after a later vowel change, produced the classical form *quinque*.

All the examples we have seen so far involve the assimilation of an earlier sound to a later one: this very common type is called **anticipatory assimilation**, or sometimes **regressive assimilation**. But it's also possible for a later sound to assimilate to an earlier one, and then we speak of **perseverative assimilation** or **progressive assimilation**. For example, the Basque words for 'side' and 'sturdy' were originally *alde* and *sendo*, respectively, and these are still the forms in the eastern dialects. In all other dialects, though, the words have become *alde* and *sendo*: the plosive has been assimilated in voicing to the preceding sonorant. Similarly, the pre-Icelandic words **munn* 'mouth' and **gulð* 'gold' have undergone total perseverative assimilation to yield the modern forms *munn* and *gull*.

(A cautionary note: while most linguists use the terms 'regressive' and 'progressive' as described here, more than a few use them exactly the other way round. I therefore advise you to avoid the use of these terms altogether: the terms 'anticipatory' and 'perseverative' are unambiguous and should be preferred.)

It is possible for assimilation to operate in both directions at the same time, and here we speak of mutual assimilation. For example, the Basque word for 'blind' is *isitu* in most dialects, but the Zuberoan dialect has *isüü*, where <ü> represents a front rounded vowel. Here the vowel [i] has assimilated in rounding to the following [u], and that [u] has itself been assimilated in frontness to the preceding [i].

Any assimilation can therefore be classified as **mutual** or **total**, as **regressive** or **distant**, and as **anticipatory** (right-to-left), **perseverative** (left-to-right), or **mutual** (both directions at once). All possible combinations are found, though some are commoner than others. Thus, when the word *oungarian* is pronounced (as it often is) *oungarung*, we have an instance of distant total perseverative assimilation. The combination of Welsh *yn* 'in' with *Cymru* 'Wales' yields *ynŋ Nghymru*, where the [n] of the preposition becomes [ŋ] before the velar plosive and the [k] of the noun becomes a voiceless velar nasal [ŋ] after the preceding nasal: an instance of partial contact mutual assimilation. Specialists in particular languages sometimes give distinctive names to particular types of assimilation which are important in those languages. For example, the type of anticipatory vowel assimilation shown in the example of German *Gast/Gäste* above is very important in the Germanic languages, and it is called **umlaut** by specialists in Germanic. As far as possible, I'll try to avoid using such additional terms.

The opposite of assimilation is **dissimilation**: making sounds more different than they were before. Given what I have said about the naturalness of assimilation, you might wonder why dissimilation should ever occur at all. The explanation lies in what we might call the 'tongue-twister effect'. One reason why a tongue-twister is hard to say is that our speech organs can get weary of making the same sound (or very similar sounds) repeatedly. This effect occasionally shows up in ordinary speech. For example, the Latin word *arbor* 'tree' has become *árbol* in Spanish (another modern form of Latin), in which the second of the two [r] sounds has been dissimilated to an [l]. On the other hand, Italian *colonello* 'colonel' appears in Spanish as *coronelo*: this time the first of the two [l] sounds has been dissimilated to [r]. (Note that English, bizarrely, uses the Italian-type spelling but the Spanish-type pronunciation.) Dissimilation of liquid consonants is particularly common, but other types occur. Latin *anima* 'soul' has been taken into Basque as *arima*, with dissimilation of the first of the two nasals, and in Afrikaans, a distinctive offshoot of Dutch, Dutch [sxɔ:n] 'clean' has become [skɔ:n], in which the second of two fricatives has been dissimilated to a plosive. As you might expect, dissimilation is far less common than assimilation.

Certain changes can be equally regarded as assimilations and dissimilations, such as the change of Basque *inguru* 'vicinity' (a loan from Latin *gyru* 'around') into *inguru* (now the more widespread form), in which the medial [j] can be regarded either as dissimilating from the preceding [i] or as assimilating to the following [u].

3.3 *Lenition and fortition*

Another major class of changes is represented by **lenition**, or **weakening**, which affects only consonants. Consonants can be classified as stronger or

weaker on several different scales; the symbol '>' here means 'is stronger than':

1. geminate > simplex
2. stop > fricative > approximant
3. stop > liquid
4. oral stop > glottal stop
5. non-nasal > nasal
6. voiceless > voiced

Each of these scales has a clear phonetic basis: the first four all reflect differing degrees of obstruction of the airflow in the mouth; the fifth reflects differing degrees of obstruction of the airflow through the nasal cavity; the last reflects differing degrees of distance from a vowel and often also differing degrees of tension in the speech organs. A 'weaker' consonant is thus one which involves less articulatory effort than a corresponding 'stronger' one, or which is generally less 'consonantal' and more 'vocalic'.

Naturally, speakers, being human, prefer to make less effort rather than more, and there is an understandable tendency for consonants to shift from left to right along one or another of these scales; this is what we call 'lentition'. Lentition processes are pervasive, but they occur above all between vowels. The passage from a vowel to a consonant and then back to a vowel again typically involves a great deal of movement of the speech organs, and lentition the consonant generally has the effect of reducing that movement. In effect, the consonant becomes more 'vowel-like', and this type of lentition can therefore be regarded as a kind of assimilation. Here are some examples involving my six scales; the symbol '>' this time means 'develops into':

1. Latin *cuppa* 'cup' > Spanish *copa* 'wine glass'
Latin *guita* 'drop' > Spanish *gota*
Latin *siccū* 'dry' > Spanish *seco*
Latin *flamma* 'flame' > Spanish *llama*

This type of lentition is, for obvious reasons, called **degemination**.

2. Latin *habebat* 'he had' > Italian *aveva*
Latin *fabā* 'bean' > Italian *fava*

The Italian examples illustrate a type of lentition called **spirantization** (conversion to a fricative; *spirant* is an old synonym for *fricative*, and *fricativization*, while used occasionally, is regarded by most linguists as clumsy and ugly).

3. English *wal|er* > General American *wal|r|er*

This is the well-known 'r-tapping' of American English, in which /l/ and /d/ between vowels develop into the tap [r]. and hence the distinctive American pronunciation of words like *city*, *Betty*, *metal*, *Italy*, *writer*, *rider*, *medal*, and *body*. Some accents in Canada, England,

Northern Ireland, Australia, and New Zealand show the same phenomenon.

4. English *wal|er* > London, Glasgow, etc. *wal|r|er*

And this is the equally well-known 'glottalization' of intervocalic /l/ in certain urban accents of Britain, and hence the distinctive Cockney and Glaswegian pronunciation of words like *little*, *bottle*, *better*, *city*, and *bottom*.

The development of an oral stop into a glottal stop is called **debuccalization**, a fancy Latinate word which just means 'removal of activity from the mouth'. You can see why.

5. Latin *sabanu* 'covering' > pre-Basque **zabanu* > Basque *zamanu* 'tablecloth'

(The Basque word is borrowed from Latin.) This is the rarest of my six types in intervocalic position, and the example cited can readily be interpreted as an instance of assimilation of the plosive to the following nasal.

This is one type of **nasalization**, a change in which the velum, formerly raised (closed) during a certain segment, comes to be lowered (opened). Later we will be seeing other examples of nasalization.

6. Latin *strata* 'road' > Italian *strada*
Latin *lacu* 'lake' > Italian *lago*

This type of lentition is called **voicing**, for obvious reasons.

It is possible for lentition to travel more than one notch to the right and to involve more than one of my six scales. Consider some examples of the development of Spanish from its Latin ancestor:

- Latin *cūpa* 'barrel' > Spanish *cuba* [kuβa] 'wine vat'
- Latin *catēna* 'chain' > Spanish *cadena* [kadena]
- Latin *secūru* 'sure' > Spanish *seguro* [seγuro]

Between vowels, the voiceless plosives of Latin have both become voiced (scale 6) and lentited all the way to approximants (scale 2).

Of course, it is possible for a lentition to continue to the point at which the affected segment disappears entirely, and several of my scales, especially (2), might reasonably have 'zero' added at the right-hand end. Such disappearance is called **loss** or **deletion**; here are some examples:

- Old English *hēafod* > English *head*
- Latin *catēna* 'chain' > pre-Basque **katēna* > Basque *katea*
- Latin *regāle* 'royal' > Spanish *real*
- Latin *sedēre* 'sit' > Spanish *ser* 'be'

Lentition and loss are by no means confined to intervocalic position, though they are particularly common there. Here are a few examples in other

positions. (Proto-Indo-European (PIE) is the remote ancestor of most European languages.) Word-initially:

- pre-Japanese **pana* 'flower' > Japanese *hana*
- PIE **kel-* > English *hill*
- PIE **porko-* 'pig' > Irish *orc*
- PIE **sweks* 'six' > Ancient Greek *hex*

Word-finally:

- pre-Turkish **dag* 'mountain' > **day* > Turkish *dağ* [da:]
- Spanish *mismos* 'same' (plural) > dialectal Spanish *m[ɪh]m[ɔh]*
- Latin *nos* 'we', *vos* 'you' > Italian *noi*, *voi*

Note in particular the frequency with which other voiceless consonants develop into [h]. The sound [h] may be regarded as a kind of 'minimal' consonant, the last faint trace of anything that can be regarded as a consonant at all. Phonetically, of course, [h] is nothing but a voiceless vowel, involving an absolute minimum of articulatory effort. Even a very slight further reduction in that effort will cause the articulation to disappear altogether, and hence [h] is typically a weak and unstable consonant, and very frequently it does disappear.

Latin had an [h] in very many words, such as *habere* 'have', *homō* 'human being', *honor* 'honour', *hora* 'hour', *hortus* 'garden', *nil* 'nothing', and *mihi* 'to me', but the consonant was completely lost at an early stage, and not one of these [h]s survives in any of the modern forms of Latin (it is true that <h> is sometimes still written today, as in Spanish *honor* and *hora* and French *homme* 'man', but this is purely for old times' sake: these [h]s have been pronounced by no one for 2000 years). Long after this loss of [h], both French and Spanish acquired a new [h]. Between the fifth and eighth centuries, French borrowed a number of Germanic words with [h], such as *hache* 'axe', *houx* 'holly', *hibou* 'owl', and *haie* 'hedge', and [h] thus rejoined the French phonological system, but by the sixteenth century these new instances of [h] were already disappearing, and, in spite of the bitter complaints of purists about 'h-dropping', the new [h]s had disappeared by the eighteenth century. Spanish acquired some new instances of [h] from the lenition of [f]: hence Latin *ficu* 'fig' became *higo*, *fitiu* 'son' became *hijo*, *farina* 'flour' became *harina*, and *facere* 'do' became *hacer*, and all these words were then pronounced with [h]. As in French, these new [h]s have more recently been lost, and modern Spanish again generally lacks [h], except in a few regional varieties which have retained [h] in this last group of words. However, in many varieties of Spanish spoken in the south of Spain and in Latin America, the Spanish velar fricative [x], as in *general* 'general' [x]eneral, *juego* 'play, game' [x]uego, and *hijo* 'son' hi[x]o, has been lenited to [h], thus producing yet a third generation of [h]s in the language; it remains to be seen whether these new [h]s will also in turn disappear.

English, of course, has been losing [h]s for centuries. The Old English [h]s in words like *hnutu* 'nut' and *hlūd* 'loud' were lost centuries ago, and the [h] of

hit 'it' has disappeared more recently. The [h]s in words like *whine* (hwine) and *where* (hwere) have totally disappeared from England and are now rapidly disappearing from American speech, and *whine* and *where* are thus becoming homophonous with *wine* and *wear*. Indeed, the vast majority of speakers in England have now lost all their [h]s, and hence make no difference between *hair* and *air*, or between *harm* and *arm*. Just as in sixteenth-century France, purists in England constantly decry this 'sloppy' h-dropping, but there is every reason to suppose that [h] is now on the way out of English, at least in England, and perhaps eventually in the rest of the English-speaking world.

Instances of [h] in native English words generally derive from the lenition of an earlier *[k]: such words as *head*, *heart*, *help*, *hill*, and *he* all began with [k] in a remote ancestral form of English, but this [k] was lenited first to [x] and then to [h], and the modern lenition of [h] to zero merely completes a process of lenition stretching over several thousand years. You would doubtless be startled to hear somebody pronounce words like *key*, *kill*, *like*, or *brick* with [h] or zero in place of [k], but lenition usually works more slowly than that, and there is no guarantee that the [k]s in modern English words will not also be ultimately lenited into oblivion. Indeed, the first faint signs of this have perhaps already appeared. In the English city of Liverpool, word-initial [k] has become an affricate [kx], and [k] in other positions has been lenited to the fricative [x]. Thus Liverpool speakers famously pronounce *key* as [kx]ey, *kill* as [kx]ill, *like* as li[x], and *brick* as bri[x]. We may here be witnessing the very first stages of a lenition process which, during the next thousand years or so, will once again remove the consonant [k] from the language.

Given that lenition is so natural and so frequent (and seemingly also so remorseless), you might begin to wonder why our languages have any consonants left at all. But, of course, lenition cannot be allowed to ravage our consonant systems unchecked: we have to communicate, and we would doubtless find it very difficult to communicate with nothing but vowels. Lenition must, therefore, be opposed by other processes which tend to maintain or restore consonants.

One of these is, obviously, borrowing. Centuries ago, Basque lost all instances of intervocalic [n], but since then it has borrowed hundreds of words from neighbouring languages with intervocalic [n], thus to some extent making good the loss. In Italian, intervocalic [b] was generally lenited to [v] centuries ago, but borrowing has likewise restored intervocalic [b] in this language. Almost all instances of ancestral [k] in English were long ago lenited to [x] and then to [h] or zero, but new instances of [k] were introduced by the devoicing of [g], and later also by the introduction of loan words like *sky*, *kilt*, and *skin* from Old Norse, *carry*, *carrot*, and *picture* from Norman French, *kinetic* from Greek, *actor* from Latin, and *kayak* from Eskimo: all this has helped to restore the frequency of [k] in English.

In the Basque case, intervocalic [n] was also restored to some extent by a further lenition. Pre-Basque had words with geminate [nn] between vowels;

after intervocalic [n] had been lost, these instances of [m] were then lenited to [m̥] (scale 1), as in the case of **gonna* > *gona* 'skirt'.

There are various other processes, both phonological and morphological, which tend to oppose the effects of lenition, and we will be looking at some of them in this chapter and the next two. The most obvious one, however, is **fortition**, or **strengthening**: the evolution of a consonant from right to left on one of my scales.

Fortition is much less frequent than lenition, for the phonetic reasons described above, but it is by no means rare. Here are a few examples illustrating fortition on my six scales:

1. Latin *acqua* 'water' [akwa] > Italian *acqua* [akka]

Latin *sapiat* 'he knows' > Italian *sappia*

This type of fortition is **gemination**.

2. Latin *Maius* 'May' [majus] > Italian *maggio* [maddʒo]

Old Norse *þar* 'there' [θar] > Swedish *där*
3. pre-Basque **errur* 'snow' > western Basque *edur*
4. No examples found. The development of glottal stop into an oral stop is, at best, extremely rare.
5. Basque *musti* 'moist' (borrowed from Occitan, a language of southern France) > *busti* (in most dialects)

This is **denasalization**.
6. Russian *xl'eb* 'bread' > *xl'e[p]*

Russian *sad* 'garden' > *salt*

Russian *drug* 'friend' > *dru[k]*

Such **devoicing** of consonants at the end of a word is extremely common in the languages of the world; it may perhaps be regarded as a kind of assimilation to the following silence.

3.4 Addition and removal of phonetic features

As we have seen, most types of phonological change involve the redistribution of phonetic features on segments: a feature is added to a segment or removed from a segment, or it spreads from one segment to another. Certain particular types of such feature rearrangement are so common that they are given individual names; the majority of these can be regarded as varieties either of assimilation or of lenition.

If you have done some phonetics, you will know that the /k/ of English *key* is articulated much farther forward in the mouth than the /k/ of *car*: because of the following palatal vowel /i/ in *key*, the closure for the /k/ is made closer to

the palate, in order to ease the transition, as I explained at the beginning of this chapter. In this case, the **palatalization** of /k/ involves only a minor articulatory adjustment, but palatalization can, and often does, go much further than this.

In an ancestral form of English, the words *cheese*, *child*, and *chin* were all pronounced with an initial [k] (compare the German words *Käse* 'cheese', *Kind* 'child', and *Chin* 'chin', which preserve this ancestral sound), and the word *church* was pronounced with two [k]-sounds (compare Scottish *kirk*, borrowed from Old Norse). In these cases, however, the palatalization of the [k] before a following front vowel (the word for 'church' anciently had an [e] on the end: Old English *cyrice*) went so far that the closure moved all the way to the front of the palate, resulting in the palato-alveolar [tʃ] which we now use in these words.

Less obvious is the phonetic motivation for **velarization**, in which the back of the tongue comes to be raised towards the velum during an articulation. In English, there has for centuries been a tendency to velarize the lateral [l] in syllable-final position. Unless you come from Wales, Ireland, or the Caribbean, you should be able to notice that the lateral in words like *ball*, *feel*, *field*, *bean*, and *milk* is conspicuously 'dark' (velarized). (In fact, if you come from the Scottish lowlands or North America, you will probably find that *all* your laterals are velarized.) Centuries ago, this velarization of [l], in certain positions, went so far that the consonant lost its alveolar articulation altogether and became a velar glide, more or less a [w]. This is the reason for spellings like *walk*, *talk*, *yolk*, and *folk*: the earlier [l] was velarized all the way to [w], and since then the [w] has more or less merged into the preceding vowel. (The same thing happened in *calm* and *palm*, but here many speakers have restored the [l] under the influence of the spelling.) More recently, this process has been continuing: in the south-east of England *all* syllable-final [l]s have been reduced to [w], and a speaker from this area pronounces *ball* as *ba[w]*, *feel* as *fe[w]*, *field* as *fel[w]*, and *milk* as *mil[w]*. Standard Polish has done the same thing to dark [l]s in all positions. The Polish consonant spelled <t> was formerly a dark [l] but is now pronounced [w], so that *thugo* 'for a long time' is [dwugo], and the city-name *Łódź* sounds something like English *woods*.

Lowering of the velum during an articulation is **nasalization**, and this process chiefly affects vowels. Nasalization is most often induced by the presence of a neighbouring nasal consonant, especially a following one: the velum is lowered a little too 'early', and the preceding vowel acquires a nasal character. Many English-speakers, particularly in North America, have conspicuous nasalization of vowels before a nasal consonant, in words like *can't*, *don't*, and *putt*, and it takes only a slight delay in making the alveolar closure for the [n] to disappear altogether. Hence many Americans pronounce these words as [kæ̃t], [dó̃ŋ], and [pá̃t], with the nasalization of the vowel solely responsible for distinguishing these words from *car* [kæ̃t], *dote* [dó̃t], and *putt* [pá̃t].

Exactly the same process happened on a massive scale in the history of French: vowels were nasalized before syllable-final [n] or [m], and then the nasal consonant was simply lost. This is the origin of the modern French pronunciations like *pain* 'bread' [pɛ̃], *faim* 'hunger' [fɛ̃], *langue* 'tongue' [lɑ̃:ɡ], and *bon* 'good' [bɔ̃].

In this last case, the end result was that two segments, an oral vowel and a nasal consonant, combined into a single segment, a nasal vowel. Effectively, the redistribution of features was so great as to change the number of segments in a word, leading to results which almost belong to the next section. Such a combination of two segments into one is called **fusion**. Fusion is very common in English with sequences like /tj/, /dj/ and /sj/. Do you pronounce *nature* as *natʃjʊr*, with a [t] followed by a yod, or as *natʃʃjʊr*, with a single segment, an affricate? Do you say *education* or *edʒʃʌkʃən*? And is *tissue* for you *tʃʃjʊ* or *tʃʃjʊ*? Does *can't you* come out as *can'tʃjʊ* or *canʃjʊ*? The two-segment pronunciation was formerly usual for all of these, but fusion is now probably universal in *nature*, and it is normal for most (not all) speakers in *education* and *tissue*. With *can't you*, even a single speaker may sometimes use one and sometimes the other. In Czech, the former sequence [rj], with a trilled [r], has fused into the single consonant spelled <ř>, as in the name of the composer *Dvořák*: the famous fricative trill of Czech. In Swedish, the post-alveolar [r] has undergone fusion with a following dental or alveolar consonant, producing a single retroflex consonant, so that *fart* 'speed' is pronounced [fa:tʃ], *korn* 'grain' is pronounced [ko:ɳ], and *kors* 'cross' is pronounced [ku:s]. In western Basque, the word *joan* 'go', pronounced [xwan], has become in some regions [fan]: the voiceless fricative [x] has fused with the following labial [w] to produce the voiceless labial fricative [f].

The opposite of fusion is **unpacking**, also called **segmentalization**. Here the phonetic features formerly present in a single segment are split into a sequence of two segments. Unpacking is less common than fusion, but not rare. Basque *baño* 'bath' and *ollo* 'hen', with a palatal nasal and a palatal lateral respectively, have become in eastern varieties *baɲo* [baɲo] and *olo* [olo], in which the palatal element has been removed from the nasal or lateral and converted into a distinct preceding segment, a palatal glide. Something similar is happening in contemporary French, but in the other direction. The French palatal nasal [ɲ], spelled <gn>, as in *gnon* '(a) blow' and *mignon* 'cute', has for many speakers been unpacked into the sequence [ɲj], producing [ɲj] and [miɲj]. Unpacking is frequent when words are borrowed: for example, English-speakers, unable to reproduce the palatal nasal of Spanish *cañón*, have borrowed the word as *canyon*, with an alveolar nasal followed by a palatal glide; likewise unable to produce the front rounded vowel [y] of French *musique*, we have borrowed it as *music*, in which the front rounded vowel is unpacked into a front glide followed by a back rounded vowel. English-speakers learning Spanish or French often do the same things in

trying to pronounce the unfamiliar words of those languages, producing a conspicuous English accent.

Finally, before leaving this section, I shall briefly note that there exist a few other labels for specific types of change which you may occasionally encounter, such as **affrication** (conversion of another sound into an affricate), **labialization** (addition of lip-rounding or lip-compression to a segment), **retroflexion** (conversion of another sound into a retroflex), **dentalization** (conversion of another sound into a dental), **glottalization** (addition of a glottal closure to a sound, or sometimes the conversion of another sound into a glottal stop), **rotacism** (conversion of another sound into [r]), and **lambdacism** (conversion of another sound into [l]). The last two of these derive from the names of the Greek letters equivalent to R and L, and the others are generally self-evident if you know some phonetics. You will find examples of some of these in the exercises.

3.5 Vowels and syllable structure

Unlike consonants, vowels are produced without an obstruction of the airstream, and hence they have no precisely defined place of articulation. Understandably, then, vowels tend to be somewhat less stable over time than consonants in most languages – though it is reported that, in Pacific languages, vowels have historically been more stable than consonants.

The most frequent descriptive terms applied to changes in vowels are derived from phonetics in a very straightforward way. Here are these terms with examples:

- **raising**: Basque *astoa* 'the donkey' > *astua* in many varieties
- **lowering**: pre-French * [vī] 'wine' > French *vin* [vɛ̃]
- **fronting**: Basque *dai* 'I have it' > Zuberoan *dai* [dɛv]
- **backing**: pre-Old English * *dægaz* 'days' > Old English *dagas*
- **rounding**: pre-Old Norse * *allum* 'all' (dative pl.) > Old Norse *ollum*
- **unrounding**: Old English *byrig* [byziʒ] > English *busy* [bɪzi]
- **centralization**: Latin *campu* 'field' > Romanian *cîmp* [kɪmp]
- **lengthening** (also called **tensing**): Old English *cild* 'child' > Middle English *chil:ɹ*
- **shortening** (also called **laxing**): Old English *fifra* 'fifth' > English *fifth*
- **diphthongization**: Latin *bonu* 'good', *bene* 'well' > Spanish *bueno*, *bien*
- **monophthongization**: Old French *eux* 'them' [ew], *aube* 'dawn' [awb] > French [ø], [o:b]

It is possible for more than one of these processes to affect the same vowel. Latin *demandare* 'ask' and *limaca* 'slug' give Italian *demandare* and *lumaca*, in which the first vowel has been both backed and rounded; Latin *ebriacu*

'drunk' yields Italian *ubriaco*, in which the first vowel has been backed, rounded, and raised; Latin *rota* 'wheel' gives Italian *ruota* [rwɔ:ta], in which the first vowel has been both diphthongized and lengthened.

In many cases it is very difficult to see any particular phonetic motivation for such changes: it just looks as though vowels like to move around. More mysteriously still, vowels are far more stable in some languages than in others. On the one hand, the vowels of Basque and of Italian appear not to have changed significantly for 1500 years at least. On the other hand, during that same period the vowels of English and of French have changed repeatedly and dramatically, and in many parts of the world the English vowels are changing rapidly at this very moment. A New York City pronunciation of *bad* can sound just like *beard*: a New Yorker's version of *Gee, that's too bad* often sounds to everybody else something like *Chee, des too beard*. In the prestigious accent of England called *Received Pronunciation*, or *RP*, the vowels of *cat* and *cut* have been moving so close together that they are now nearly indistinguishable. The linguist David Crystal has recently reported a striking instance of misunderstanding between two RP speakers resulting from this change. A High Court judge apologized to the lawyers in his court for a delay: it seemed he had left a crucial document at his weekend cottage, and would have to go back down there to fetch it. One of the barristers present suggested helpfully, 'Fax it up, m'lud.' The judge replied, 'Yes, I'm afraid it does, rather.'

In some cases, however, we can see a clear motivation for changes in vowels. One of these is the effect of **stress**. The additional energy involved in stressing a syllable may cause its vowel to become longer, tenser, more peripheral, sometimes even higher; stress may also tend to diphthongize a vowel. An unstressed vowel, in contrast, may become shorter and more central. In languages with strong stress, like English and Russian, these effects are very conspicuous. Compare the qualities of the stressed and unstressed vowels in a set of words like *photograph*, *photography*, and *photographic*. As is usual in English, most of the unstressed vowels lose the distinctive phonetic characteristics which they have when stressed and just appear as the indistinct central vowel schwa [ə]. Such conversion to schwa is a very common type of vowel **reduction**: reduction is the removal of some or all of the phonetic characteristics that distinguish one vowel from another. Reduction can even go as far as total loss of the vowel, as illustrated in the next section.

Another factor in vowel change is **syllable structure**. Languages seem universally to prefer certain types of syllables, with CV being the most frequent, or 'unmarked', syllable structure, followed by CVC. Very commonly also, we observe a tendency for a vowel in an open syllable (one with no final consonant) to be long and for one in a closed syllable (ending in a consonant) to be short: note the difference in the length of the vowel /i:/ in *see* and *seat*. There is a particular tendency for a vowel to be short if it is followed by a consonant cluster: note that the long vowel of Old English *fi:f*

'five' was shortened before the cluster in *fifth*, and that the short vowel of *cild* 'child' was lengthened in the singular but not in the plural *children* (the original long vowel [i:] has been further diphthongized to [ai], thereby exaggerating the earlier length distinction).

Particularly unstable are vowels in **hiatus**: two consecutive vowels with no intervening consonant. Such sequences are apparently uncomfortable, and languages employ a variety of strategies for eliminating the hiatus. Most of these strategies can be illustrated from Basque. The Basque definite article is *-a*, which is suffixed to a preceding noun. If that noun ends in a vowel, a hiatus is produced, and the various dialects of Basque have resolved the hiatus in several different ways.

Consider *asto* 'donkey' and *lore* 'flower'. The definite forms of these are *astoa* 'the donkey' and *lorea* 'the flower' in the standard orthography. Many eastern dialects have resolved the hiatus by converting these forms into *ast[w]a* and *lor[j]a*. We call this **glide-formation**: one of the vowels (usually the higher one) is converted into a non-syllabic glide. Western dialects, however, do something different: they have *ast[u]a* and *lor[i]a*, in which the first vowel has merely undergone raising, thereby making it as different as possible from the adjacent vowel.

Now consider *zaldi* 'horse' and *buru* 'head', with definite forms *zaldia* and *burua*. Eastern varieties have left these unchanged, but western varieties have this time eliminated the hiatus in a rather different manner: they have *zaldi[j]a* and *buru[w]a*, in which glides have simply been inserted between the adjacent vowels, thus producing a CV structure. This is **glide-insertion**, and you can see that the glide matches the preceding high vowel in quality. In the case of *zaldia*, many western varieties have gone further: they have *zaldi[ɟ]e*, *zaldi[ʒ]e* or even *zaldi[ʃ]a*, in which the glide has been converted to a plosive or a fricative; this is called **glide-strengthening**, and it is a kind of fortition (some of these have also raised the final vowel).

Finally, consider *neska* 'girl'. The expected definite form would be **neskaa*, but this is found nowhere. Most varieties have the definite form *neska*, in which the two identical vowels have simply combined into one, in a process called **coalescence**. Some western varieties, however, have instead either *nesk[e]a* or *nesk[i]a*, in which the first vowel has been raised.

A particularly striking process is **compensatory lengthening**, in which a vowel is lengthened at the same time that another segment is lost from the word, thereby roughly preserving the total time required to pronounce the word. It is thought that the ancestral form of English *five* was something like **finf*, with a short vowel (compare German *fünf*), but that the [n] was lost early, and the preceding vowel was lengthened to [i:] in compensation. Old French *beste* 'beast', *feste* 'festival', and *maistre* 'master' were all pronounced with [ɛs], but syllable-final [s] was lost, and the vowel underwent compensatory lengthening, producing modern French *bête* [bɛ:t], *fête* [fɛ:t], and *maître* [mɛ:tr]. The diacritic in the spelling marks the vowel as long, but there is a recent tendency to shorten these long vowels, making *maître*, for

example, homophonous with *metre* 'put', which has always had a short vowel, and the French Academy has recently proposed dropping the length mark from the French spelling system.

Other, rather different, cases of compensatory lengthening are represented by the change of pre-Hindi **sati* 'seven' into Hindi *sa:t*: and by the change of Proto-Slavic **hognŭ* 'God' into early Serbo-Croatian *bo:g*.

Occasionally we find consonantal changes which also operate in such a way as to maintain a preferred syllable structure and avoid hiatus. A good example occurs in the *non-rhotic* accents of English, in which the historical /r/ has been lost everywhere except before a vowel, so that *far* and *dark* are pronounced /fa:/ and /da:k/. The /r/ is retained before a vowel, and so *far away* is realized as /fa:ra:weɪ/, thereby avoiding hiatus. Many speakers with non-rhotic accents have extended this **linking r** to cases in which no /r/ was historically present, producing the well-known **intrusive r** of much of England and New England: *Cuba[r]* and *China, the ideal[r] is, I saw[r] it, this bra[r] is made of . . . , awel[r]-inspiring*, and sometimes also *draw[r]ing* and *withdrew[r]al*. I have even heard the name of the squash player *Lisa Opie* pronounced as *Lisa Ropie*.

3.6 *Whole-segment processes*

Certain phonological changes are somewhat unusual in that they involve, not just changes in the nature of segments, but a change in the number or ordering of segments, and these we call **whole-segment processes**.

We have already seen instances of deletion as the end result of lenition, but not all deletions are like that: it is possible for a segment simply to disappear at one go. For example, the words *knee*, *knot*, and *knife* were once pronounced, as the spelling still suggests, with an initial cluster /kn-/. Several centuries ago, however, people simply dropped the /k/, with no lenition via [x] and [h]. The same thing has happened to a whole range of final consonants in French. French words like *lit* 'bed' /li/, *gros* 'big' /grɔ/, *soul* 'drunk' /su/, *murs* 'walls' /myʁ/, *part* 'leaves' (verb) /paʁ/, and *aimer* 'love' /emɛ/ were all formerly pronounced with the final consonants that are still there in the spelling, but all these consonants were simply dropped. Loss of an initial segment, as in *knee*, is called **aphaeresis** (less commonly **aphesis**), while loss of a final segment, as in French *lit*, is **apocope**.

Aphaeresis and apocope may also apply to vowels, and in fact some linguists apply these two terms *only* to the loss of vowels, but there seems little point in such a restriction. The word *especial* is now usually reduced to *special*, and *opossum* is commonly reduced in many areas to *possum*, both showing aphaeresis, and the words *make* and *time*, as the spelling suggests, once had a final vowel which has undergone apocope.

Word-medially, consonants are rarely lost abruptly except in the simplification of clusters, as illustrated by the loss of the first /d/ in *Wednesday*. Much more frequent is **syncope**: the loss of a medial vowel. English words like *chocolate* and *camera* have now lost the vowel in the second syllable for nearly all speakers, and many speakers in England have further lost the first vowel in words like *police* and *correct*, the second vowel in words like *medicine* and *battery*, and the third vowel in words like *dictionary*. Such syncope was pervasive in late Latin: compare Latin *saeculu* and Spanish *siglo* 'century', Latin *littera* and Spanish *letra* 'letter', Latin *dominiu* and Spanish *domingo* 'Sunday', Latin *paupere* and Spanish *pobre* 'poor', Latin *asinu* and Spanish *asno* 'donkey'.

It is also possible for entire new segments to be added to words, and again we have a collection of specific terms for such addition (well, I did warn you about the terms). Adding a segment at the beginning of a word is **prothesis**, and only vowels are commonly added in this position. In late Latin, the vowel /e/ was added before any word-initial cluster beginning with /s/. and we can still see the result in Spanish: Latin *spatha* 'sword' > Spanish *espada*; *statu* > *estado* 'state'; *scala* > *escala* 'ladder'; *smaralda* > *esmeralda* 'emerald'. Such prothesis is still regularly applied to loan words in Spanish today, producing results like *esnob* 'snob', *eslalom* 'slalom', *estricnina* 'strychnine', and *Estrasburgo* 'Strasbourg'. In Basque, in which no word can begin with an /r/, loan words have for 2000 years been borrowed with a prothetic vowel, ranging from *arrosa* 'rose' and *Erroma* 'Rome', borrowed from Latin *rosa* and *Roma*, down to such recent loans as *erradio* 'radio', *errubi* 'ruby', and *Errusia* 'Russia'.

The addition of a segment to the end of a word is occasionally called **paragoge**, but only consonants are commonly added in this position, and usually only after another consonant, and most linguists prefer to call this **excrescence**. Middle English *amonges*, *amidtes*, and *betwix* have acquired an excrescent /v/, producing *amongst*, *amidst*, and *betwixt*. A very odd example is the development of *no* into colloquial *nope*, presumably from our habit of closing our mouths after uttering this word. Final excrescence is not common.

When it comes to adding segments to the middle of a word, our terminology is in something of a muddle. This is widely called **epenthesis**, but some people would apply this term only to the insertion of a vowel between consonants, and exactly such vowel addition is also called both **anaptyxis** and **svarabhakti** (this last from Sanskrit, the classical language of India). (Moreover, some people use 'epenthesis' more broadly for *any* addition of a segment in any position.) The insertion of a consonant between consonants is once again called **excrescence**. Anaptyxis happens sporadically in English: you may have heard *athlete* pronounced as *athalete*, or *film* pronounced as *fillum* – not to mention the distinctive Cockney pronunciation of *Henry* as *Emery*. These have not so far become standard English. In contrast, the early Latin words *facilis* 'easy' and *poclum* 'goblet' appear in standard classical Latin as *facilis* and *poculum*, with anaptyctic vowels matching the following

vowels in quality. Anaptyxis may also affect loan words: Arabic *wagt* 'time' and *ism* 'name', with final clusters not permitted in Turkish, were borrowed into Turkish as *vakti* and *isim*. All these examples have the effect of reducing consonant clusters and of adjusting the forms of words towards the seemingly universally preferred CV structure.

Consonantal epenthesis is not rare in the history of English. Most of us pronounce *prince* just like *prints*, with a /t/ between the /n/ and the /s/. Once again, this is phonetically understandable: moving from [n] to [s] requires changes in the position of the vocal folds, the velum and the tongue, and it's difficult to do all these simultaneously, so we leave the tongue movement for last, producing an automatic [t] as a result. Earlier examples in the same vein include the change of Old English *æmtig* and *thymel* to modern *empty* and *thimble*, and of Middle English *nemel* and *thuner* to modern *empty* and *thunder*.

Table 3.1 sums up this terminology. A rather unusual type of whole-segment process is **metathesis**: changing the order of segments in a word. This is not common in English, but a good example is Old English *wæpps*, which has become *wasp* in modern English, with metathesis of the last two consonants (in fact, some regional varieties have *wops* today). Since the Old English period, speakers have been vacillating between *ask* and *aks*; the first has finally won out, but again some regional varieties have *aks* (often spelled Spanish. The Latin words *crepare*, *parabola*, *miraculu*, *periculu*, and *crocodilu* should, by the regular developments, have yielded Spanish **crebar* 'break', **parabla* 'word', **miraglo* 'miracle', **periglo* 'danger', and **crocodilo* 'crocodile', but the actual forms are *quebrar*, *palabra*, *milagro*, *peligro*, and *cocodrilo*, all showing metathesis. (In some cases two consonants have exchanged places; in others, one consonant has just moved to a different position.)

More dramatic still is **haplology**, in which one of two consecutive identical or similar syllables is lost. The combination of the Latin stem *nurti-* 'give milk to' with the female agent suffix *-trix* should have yielded **nurtitrix*, but the actual form is *nurtix* 'wet-nurse', in which one of the two *-tri* sequences is dropped. Similarly, the combination of Basque *sagar* 'apple' with *ardo* 'wine' should give **sagar-ardo*, but the word is *sagardo* 'cider', also with haplology.

Table 3.1 Summary of whole-segment processes

	Initially	Medially	Finally
Addition	prothesis	epenthesis [anaptyxis, svarabhakti, excrescence]	paragoge [excrescence]
Removal	aphaeresis	syncope	apocope

and Basque *maite* 'beloved' plus *-tasun* '-ness' should give **maitatasan*, but the result is *maitasun* 'love'. In English, the regular adverbs **gentle-ly* and **simple-ly* are reduced by haplology to *gently* and *simply*.

The opposite of haplology, the repetition of a syllable, does occur and is called *reduplication*, but this is strictly a morphological process, and not a phonological one, and hence is not treated here.

3.7 The regularity issue: a first look

Here I shall introduce for the first time an issue which will be a recurrent theme in this book: is phonological change *regular* or not? That is, when a change in pronunciation is introduced into a language, does it apply to all words of a relevant form, or only to some of them? This question has been a central issue in historical linguistics for well over a hundred years, and the answer is neither obvious nor simple.

Certain changes are conspicuously not regular at all, such as metathesis. Latin *miraculu* 'miracle' has undergone metathesis in producing Spanish *milagro*, but most Latin words underwent no metathesis. Metathesis is almost always a **sporadic change**: a change that happens once in a while to this word or that, in a seemingly arbitrary manner, and no more.

But most changes do not appear to be like this. If you have some experience of the vernacular speech of London, you will have noticed that the consonant /t/, at the beginning of a word, is pronounced as an affricate [tʃ]. And this happens with every single word beginning with /t/ followed by a vowel: *time*, *take*, *two*, *tell*, *tooth*, and so on are all pronounced with [tʃ]. In this case, it appears that the change of the historical [t^h] to [tʃ] has been completely regular: it has applied to every relevant word.

Many of the other changes mentioned in the chapter appear to have been equally regular. The Latin geminates were invariably reduced to single consonants in the development of Spanish, as in *cuppa* > *copa* 'cup'; not a single geminate survived. American speakers who use a tapped /t/ between vowels do so in every single case (providing the second vowel is not stressed; such stress blocks the change, as in *attack*). Old Japanese /p/ has developed into modern /h/ in every single word containing it (except when it was geminated; this also blocked the change). The former Turkish /g/ has been lenited after a vowel in every relevant word in the language. All word-final obstruents in Russian have been devoiced, without exception. And so it goes: thousands and thousands of pronunciation changes have been identified in the histories of many hundreds of languages, and they almost always appear to be highly regular: they have applied to every relevant word.

But there are exceptions. Latin *strata* 'street' and *lacu* 'lake' have yielded Italian *strada* and *lago*, with voicing of the intervocalic consonant, and dozens of other words show the same voicing, but the majority of Italian words have

not undergone such voicing: Latin *rota* 'wheel' and *ficu* 'fig' give Italian *ruota* and *fico*, and not **ruoda* and **figo*. This is a puzzle which has long vexed Italianists, especially since in Spanish, another modern form of Latin, every single word has undergone this voicing. Spanish has *rueda* and *higo* for the last two words, and so on throughout the vocabulary.

It is, therefore, too much to claim that 'ordinary' sound changes (that is, those other than the purely sporadic ones like metathesis) are invariably regular, and that's all there is to it. It is only very recently that linguists have managed to learn enough about the mechanisms of language change to provide plausible explanations for why many changes are regular but others not, and these explanations will have to wait until much later in the book. For now, I shall merely adopt a policy as a basis for further discussion: sound change is normally regular, and the cases that are not regular are puzzles calling for an explanation. This policy has proved to be of great benefit in historical linguistics, and it will provide a firm foundation for our discussion in this book, in spite of the fact that it is not strictly true. By the time you have finished this book, you will understand both why it is not true and why it is none the less an excellent working hypothesis.

3.8 Summary

In this chapter we have surveyed phonological change from a syntagmatic point of view: that is, from the point of view of changes in the sequence of speech sounds making up the pronunciations of particular words, or occasionally sequences of words. We have seen that the majority of such changes can be understood in terms of the movements of the vocal organs during speech, and sometimes more particularly in terms of a tendency to reduce articulatory effort. We have learned a no doubt depressing number of technical terms which will allow us to label economically almost any sound change we are likely to encounter. Finally, we have had our first brush with the idea that a phonological change may be regular – that is, that it may apply without exception to every single word in the language of a relevant form. This idea you should keep at the back of your mind while reading the following chapters; I shall return to it at intervals.

Further reading

J. C. Wells (1982) is a comprehensive survey of the various accents of English, including an account of the changes which have occurred in the different regional varieties of English around the world and those which are happening now. A wealth of data on the changes occurring in English pronunciation today can be found in Labov (1994). The standard histories

of English, French, German, Spanish, Italian, and Portuguese listed in the Further Reading in Chapter 1 all include detailed descriptions of the major changes in pronunciation which have occurred in those languages during the last 1500 or 2000 years. Some other textbooks of historical linguistics devote considerably more space to phonological change than I am doing here, notably Hock (1986) – though note that almost all of Hock's examples are taken from very ancient languages indeed, and you might prefer to read his several chapters in small chunks. Bloomfield (1933) is a classic textbook of general linguistics whose chapter on phonological change is still eminently readable.

Exercises

Note: If you are familiar with the standard notation for writing phonological rules, you may find it convenient in attempting these exercises to write out rules for the phonological changes you identify. Some of these exercises introduce topics which will be discussed in the next chapter.

Exercise 3.1

This exercise is designed merely to let you test your command of the technical terms introduced in the chapter. How would you label each of the following changes?

- (a) pre-Icelandic **bro[θ]er* > Old Icelandic *bro[ð]er* 'brother'
- (b) pre-Greek **g^wous* > Greek *bous* 'cow'
- (c) Basque *bake* 'peace' > western Basque *pake*
- (d) pre-Latin **flō:sēs* > Latin *flō:res* 'flowers'
- (e) English *Deborah* (three syllables) > *Debra* (two syllables)
- (f) pre-Finnish **kāhi* > Finnish *käsi* 'hand'
- (g) English *furorē* (three syllables) > American English *furor* (two syllables)
- (h) Latin *lege* 'law' [lege] > Italian *legge* [leddʒe]
- (i) This is thought to be the history of the French word *cent* [sā] 'hundred' over the last 6000 years or so; if you don't find a suitable label for a particular step, try to coin one from your knowledge of phonetics:
 - [kntm] > [kemtóm] > [kentóm] > [kentū] > [kentu] > [kento] > [k'ento] > [tsento] > [tsent] > [sent] > [sē] > [sā]

Exercise 3.2

Certain English words which were formerly pronounced with a /t/ have lost that /t/, though we retain a <t> in the spelling. Among these are *soften*, *listen*,

fasten, *hasten*, *castle*, *bustle*, *bristle*, and *mistlerae*. On the other hand, the /f/ has not been lost in words like *muster*, *blister*, *foster*, and *custom*, nor has it been lost in cases like *astound* and *extend*. Describe as accurately as you can the circumstances in which the /f/ was lost.

Now note the peculiar case of *often*. Some people pronounce a /f/ in this word while others do not. What do you suppose might have happened in this case?

Exercise 3.3

Old English had both long and short vowels, and the long vowels have changed in systematic ways during the development of modern English. Table 3.2 shows some typical examples; the Old English vowel letters have approximately their IPA values. Explain what has happened to the long vowels.

Exercise 3.4

Historically, intervocalic /n/ was categorically lost in medieval Basque, so that, for example, **ardano* 'wine' became *ardao*, **ini* 'reed' became *ihí*, and

Table 3.2

Old English	Modern English
1. <i>brun</i>	brown
2. <i>de:man</i>	deem
3. <i>do:m</i>	doom
4. <i>du:n</i>	down
5. <i>æ:i</i>	eel
6. <i>æ:fen</i>	even(ing)
7. <i>fi:f</i>	five
8. <i>he:</i>	he
9. <i>hæ:iþ</i>	heath
10. <i>ha:i:m</i>	home
11. <i>hu:s</i>	house
12. <i>i:s</i>	ice
13. <i>læ:ce</i>	leech
14. <i>me:d</i>	meed
15. <i>mu:iþ</i>	mouth
16. <i>mi:n</i>	my, mine
17. <i>a:c</i>	oak
18. <i>ra:d</i>	rode
19. <i>ro:st</i>	roost
20. <i>ro:t</i>	root
21. <i>so:iþ</i>	sooth
22. <i>sta:n</i>	stone
23. <i>te:p</i>	teeth
24. <i>ti:d</i> 'time'	tide
25. <i>to:p</i>	tooth
26. <i>hw:i:t</i>	white

**katena* 'chain' became *kateu* (the [h] in the second serves only to prevent hiatus). In some cases, however, the result was different:

- | | |
|---|---|
| (a) <i>*zain</i> > <i>zain</i> 'watchful' | (g) <i>*imiz</i> > <i>imiz</i> 'dew' |
| (b) <i>*garana</i> > <i>garann</i> 'grain' | (h) <i>*bedenikatu</i> > <i>bedeninkatu</i> 'bless' |
| (c) <i>*seni</i> > <i>sein</i> 'boy' | (i) <i>*zizani</i> > <i>zizain</i> 'worm' |
| (d) <i>*zunai</i> > <i>zuhain</i> 'hay' | (j) <i>*arrani</i> > <i>arrann</i> 'fish' |
| (e) <i>*usani</i> > <i>usain</i> 'odour' | (k) <i>*lehone</i> > <i>lehoin</i> 'lion' |
| (f) <i>*azkone</i> > <i>azkoin</i> 'badger' | (l) <i>*arrazone</i> > <i>arrazoin</i> 'reason' |

Explain as clearly as you can what has happened in these cases. Note that this is *not* a metathesis: the development involved more than one step, and each step was a process discussed in the chapter.

Exercise 3.5

The Latin consonant /k/ was spelled <g> before <u> and <c> in all other cases. In the development of Latin into Spanish, this [k] has developed in an interesting way. In some cases, it remains [k] today. In other cases, it has changed into a voiceless fricative. That fricative is [θ] in standard European Spanish (Castilian) but [s] in most other varieties of Spanish, including all types of American Spanish. In still other cases, [k] has developed into a voiced velar fricative or approximant [ɣ]. Table 3.3 lists some Spanish words

Table 3.3

Latin	Castilian	American	Orthography	Gloss
1. <i>saccu</i>	[sakol]	[sakol]	saco	'bag'
2. <i>caecu</i>	[θjeryo]	[sjeryo]	ciego	'blind'
3. <i>caule</i>	[kol]	[kol]	col	'cabbage'
4. <i>certu</i>	[θjerto]	[sjerto]	cierto	'certain'
5. <i>cuna</i>	[kunal]	[kunal]	cuna	'cradle'
6. <i>corona</i>	[koronal]	[koronal]	corona	'crown'
7. <i>aquila</i>	[ajljal]	[ajljal]	águila	'eagle'
8. <i>facile</i>	[faθil]	[fasil]	facil	'easy'
9. <i>pisce</i>	[peθ]	[pes]	pez	'fish'
10. <i>locu</i>	[xweryo]	[hweryo]	juego	'game'
11. <i>capra</i>	[kaβraj]	[kaβraj]	cabra	'goat'
12. <i>centu</i>	[θjento]	[sjento]	ciento	'hundred'
13. <i>lacu</i>	[lajro]	[lajro]	lago	'lake'
14. <i>facere</i>	[afer]	[aser]	hacer	'make'
15. <i>circa</i>	[θerkaj]	[serkal]	cerca	'near'
16. <i>vicinu</i>	[beθino]	[besino]	vecino	'neighbour'
17. <i>dicit</i>	[diθel]	[disel]	dice	'says'
18. <i>caelu</i>	[θjelo]	[sjelo]	cielo	'sky'
19. <i>calcea</i>	[kalθaj]	[kalsaj]	calza [obs.]	'stocking'
20. <i>flaccidu</i>	[laθlo]	[laslo]	lacio	'withered'
21. <i>quid</i>	[kel]	[kel]	qué	'what?'

illustrating these developments. Identify the circumstances in which each development occurs, and try to propose plausible phonetic reasons for the changes, in terms of what you have learned in the chapter. Is it possible to decide the order in which the various changes must have occurred? How satisfactory do you find your account?

Exercise 3.6

Like some other Australian languages, Yinwum has historically undergone some highly unusual phonological changes which are neither easy to classify nor easy to understand in phonetic terms. However, the changes were extremely regular, and all words were apparently affected in the same way. Table 3.4 shows some typical data. The first column gives the (asterisked) form each word is thought to have had in the ancestor of Yinwum, and the second the modern form. Describe the changes in as much detail as you can. If you are writing phonological rules, you may find the formalism somewhat stretched by these data. (Data from Hale 1976 and Dixon 1980.)

Table 3.4

Ancestral	Modern	Gloss
1. *kalma-	ima-	'arrive'
2. *wuna-	nwa-	'be lying down'
3. *tʷŋku	ŋke	'black'
4. *ŋula	lwa	'by-and-by'
5. *ruŋka-	ŋkwa-	'cry'
6. *wari-	te-	'dig'
7. *kuta	twa	'dog'
8. *kuna	nwa	'excrement'
9. *kaalka-	aki-	'fall, die'
10. *puula	ulwa-	'father's father'
11. *piin'a	in'a-	'father's older sibling'
12. *piimu	imu-	'father's sister'
13. *tʷaru	tju	'foot'
14. *tʷampa-	mpi-	'give'
15. *jana-	ni-	'go'
16. *nʷiliu	liu	'he'
17. *nʷuju-	ŋju-	'(to) him/her'
18. *ŋaju	aju-	'I'
19. *tʷipa	pja	'liver'
20. *ŋari	nʷi	'meat, animal'
21. *mir'a	n'a	'me'
22. *papi	pɛ	'mother's father'
23. *ŋatʷi	nʷi-	'mother's father'
24. *karni	me	'mother's mother'
25. *mukur	ʷkur	'mother's older brother'
26. *tʷalan	lin	'mouth'
27. *kujka	ŋkwa	'north'

28. *nʷipi	ʷpi	'one'
29. *pama	ma	'person'
30. *nʷatʷi-	nʷi-	'see'
31. *nʷina-	ina-	'sit'
32. *nʷuŋka-	iʷkwe-	'smell'
33. *jiipa	ipja-	'south'
34. *kalka	ika	'spear'
35. *jinta-	nti-	'spear' (verb)
36. *tʷuku	ke	'tree'
37. *kuuti-	uti-	'two'
38. *kumpu	mpu	'urine'
39. *maji	aji	'vegetable food'
40. *ŋanʷi	nʷi	'we'
41. *ŋana	na	'we all'
42. *ŋali	le	'we two'
43. *ŋaani	ani	'what'
44. *waari	ate-	'who'
45. *nʷipul	ʷpju	'you' (pl.)
46. *nʷuntu	ʷti	'you' (sing.)
47. *ŋali	li	'you and I'
48. *japu	pju	'younger brother'