

# Chapter Four

## The syllable

### 4.1 Introduction

The syllable, just like the sound, seems to be intuitively familiar but on closer inspection turns out to be a very vague notion. The familiarity is largely due to the fact that the term is part of colloquial speech and is often used in discussions where language and language-related issues appear. A case in point are the conventions of breaking words at the end of a line; these are orthographic devices of different sorts and involve the ban, for example in English or German, of breaking certain letter combinations which denote a single sound: *mother* cannot be divided as \**mot-her* or German *Bäche* ‘stream, pl.’ as \**Bäc-he*. The requirement imposed by such conventions in a variety of languages is that the constituent parts of a broken word should form individual syllables, hence in English *val-id* is acceptable, while \**vali-d* is not; in Polish *radość* ‘joy’ may be split up as *ra-dość* but not as \**rado-ść*. Examples of this sort of convention can be found in all languages using alphabetical writing, which of course means that children learning to write are exposed to the term **the syllable** quite early in life. Needless to say, a linguist cannot unquestioningly accept a notion used to define a spelling practice and apply it to the functioning of the sound system. What is needed are phonological rather than orthographic arguments demonstrating the relevance of the syllable; in the following pages we will attempt to provide these and to explore the nature of syllabic organisation a little more closely.

Thus far we have established the need for the skeletal level in addition to the melodic tier. The fundamental justification for the skeleton was connected with properties which could not be reduced to the melody. For one thing we saw the need for skeletal positions without any accompanying phonetic substance, so-called empty positions. On the other hand, some properties of the melody need to be split between two consecutive skeletal positions. It has been argued that there is no one-to-one relationship between the units of the skeletal level and those of the melodic one. Quite clearly, if every skeletal position corresponded to a melodic unit and vice versa, then there would be little or no need to separate the two levels. Putting the matter slightly more technically, the skeleton and the melody are independent levels, and though in many instances units at the two levels are coterminous, it is not the case that the skeletal level is just a projection of the melody. Each level is fundamentally independent of the other. If the division of linguistic forms into syllables, hence the recognition of yet another level of representation, is to be accepted, this means that the syllabic level must be independent of the segmental one. Syllables cannot be simple projections of sounds as there would be little obvious need for such projections. In constructing the syllabic level of representation, we have to keep in mind very clearly that it must offer something new, something which is not present in skeletal slots and melodies. This chapter and the following ones will try to show that phonological regularities in natural languages support this independent level of representation. These regularities can be formulated with greater insight only when related to syllabic constituents. The argument below starts with relatively unquestionable, hence uninteresting, cases where syllable structure coincides with melodic sequences, with more complex examples developed later.

## 4.2 Some simple English syllables

Let us consider a number of stressed words in English which are regarded as monosyllabic.

[1]

a.	oar, awe [ɔ:]	eye, I [aɪ]	aye [eɪ]
	oh [əʊ]	err [ɜ:]	
b.	bay [beɪ]	lie [laɪ]	be, bee [bi:]
	low [ləʊ]	sir [sɜ:]	do [du:]
	row [raʊ]	pour, paw [pɔ:]	bare, bear [beə]
	sear [sɪə]	dour [dʊə]	

All these monosyllabic words end with a vowel, a situation for which the traditional term of an **open syllable** has been used. Additionally, words in [1a] contain nothing but a vowel; since there are no words without a vowel, this would suggest that the vocalic **nucleus** is an indispensable element of the syllable; as the forms in [1b] show, the nucleus may be preceded by a consonant. The consonantal sequence preceding the nucleus is termed the **onset**. Thus the open syllable in [1] contains a vocalic nucleus preceded by an optional consonantal onset. The onset is a constituent present in the syllabic structure of words even if it has no skeletal or melodic content. More will be said about empty onsets as we proceed. Needless to say, the onset may contain two consonants rather than just one.

[2]

play [pleɪ]	pry [praɪ]	tree [tri:]
glow [gləʊ]	blur [blɜ:]	through [θru:]
brow [braʊ]	draw [drɔ:]	Clare [kleə]
clear [klɪə]	pure [pjʊə]	

As can be seen, onsets can comprise one or two skeletal positions in the same way as nuclei; an onset or a nucleus which straddles two slots is said to be **branching**. A constituent embracing just one position is said to be **non-branching**. The words *awe*, *bay*, *play* illustrate a branching nucleus preceded by an empty onset, a non-branching one, and a branching one. Together with the melodic and skeletal representations, the onsets (O) and nuclei (N) of these words are presented in [3].

[3]

O	N	O	N	O	N
	^		^	^	^
	xx	x	xx	xx	xx
	∨			∨	
	ɔ	b	eɪ	pl	eɪ

The representations in [3] indicate that a syllable is made up of an onset followed by a nucleus even if the onset is empty, both skeletally and melodically. The nucleus is indispensable for syllables to exist.

An interesting property of such simple stressed English syllables is that while the onset need not have any melodic content, or may be non-branching or branching, the nucleus must be branching. Note that the following are not possible words of English: \*[plæ], \*[plʌ], \*[bɔ], \*[lɪ], \*[tre], \*[klɔ], i.e. a non-branching nucleus is ruled out in a stressed open syllable. Alternatively, we can say that a stressed open syllable must end in a branching nucleus. This is a phonological regularity of English which crucially involves the notion of the nucleus: there seems to be no natural way of expressing this without involving the nucleus, that is, if we restrict ourselves just to the skeletal and melodic levels. We could make a statement like the following: a word-final stressed vocalic melody must be attached to two skeletal positions (the *awe* case), or must be directly followed by another vocalic melody (the *bay/play* case). The disjunction

contained in the statement betrays its artificial nature. Nothing in the skeleton or melody requires long vowels to pattern with diphthongs since they are independent units. By referring to nuclei, however, we dispense with the need for such unlikely rules as that above. All we need is a statement to the effect that in English stressed final nuclei must branch. Thus there is good reason for postulating the nuclear constituent.

The simple syllables we have discussed above comprise a sequence of an onset followed by a nucleus. The onset is an optional constituent in the sense that it may have no skeletal points attached to it, hence it may be phonetically inaudible. The nucleus is an obligatory part of the syllable in the sense that it always has a skeletal representation. In English the nuclear skeletal point is normally associated with a vowel melody; in a complete description of the language this statement would need to be modified since the nuclear position may be occupied by a sonorant, e.g. in *brittle* [brɪtl̩] or *button* [bʌt̩n̩] there is only one phonetic vowel but the final lateral and nasal are said to be syllabic. A syllabic consonant denotes a consonantal melody associated with the nuclear position. This category of syllabic elements provides an additional argument in favour of the syllabic tier of representation as well as the skeletal and melodic ones. Note that skeletally and melodically there is very little difference between the initial and the final laterals in, say, *little* [lɪtl̩], bypassing the distinction between the clear and the dark variants. The fact that the two laterals are phonologically distinct is due to the fact that the first occupies the onset while the last one is attached to the nucleus, i.e. the difference is in syllabic affiliation, as shown below:

[4]

O	N
x	x
l	l

Syllabic consonants, then, support the decision to introduce an additional level of representation apart from the skeleton and the melody, a level which comprises the sequence of an onset and a nucleus traditionally subsumed under the term of the syllable.

### 4.3 Empty onsets: French *h-aspiré*

Before proceeding further in our discussion of the structure and composition of syllabic constituents we would like to consider in detail an idea which was introduced above, i.e. the existence of empty onsets. These have been assumed above to be of two kinds: an onset is empty when it contains no skeletal position (and hence obviously no melody), or when it does contain a skeletal position but has no melody attached to it. In both cases the phonetic effect is the same, i.e. no consonant melody precedes the nuclear portion. However, if there exist two different structures producing the same effect, we might legitimately ask what justification there is for the diversification of structure. In other words, if we decide to postulate two different structures, we should expect different types of behaviour to follow from them. This is exactly what we find in the case of the French phenomenon referred to as *h-aspiré*.

The term is traditional and comes from orthography since in Modern French no [h] sound exists. It refers to the situation where some words spelt with *h* exert a different influence upon the neighbouring sounds than others; one type of *h* is called *h-aspiré* or “aspirated h”, and the other *h-muet* “silent h”, even though both of them are equally silent. Thus *hameau* [a'mɔ] ‘settlement’ and *hameçon* [amə'sɔ̃] ‘hook’ both begin with the vowel [a], and calling the former an *h-aspiré* word and the latter an *h-muet* one entails an intuition which needs to be made explicit in linguistic terms. In what follows we shall try to provide such evidence, using two phonological regularities of French, although it should be kept in mind that our discussion is intended to illustrate a general point rather than provide a definitive and detailed analysis of the French data. In fact readers

familiar with Modern French may want to pursue the problems raised by taking into account additional data, and thus elaborate our somewhat simplified presentation here.

The two phonological regularities mentioned concern the preservation and loss of vowels and consonants in certain positions. In general, vowel sequences tend to be avoided in French, hence the pronoun *je* [ʒə] is pronounced as such before a consonant-initial verb, e.g. *je vais* [ʒə've] 'I go' but without its vowel before a vowel-initial verb, e.g. *j'entre* [ʒɑ̃trə] 'I enter'. The phenomenon of suppressing a vowel before a vowel, called **vowel elision**, shows that when two nuclei come to stand one after the other without a realised intervening onset, the first of the vowels is not audible phonetically. Two nuclei in such direct contact represent a situation in which the intermediate onset has neither a melody nor a skeletal point, as illustrated in the representations in [5].

[5]

a.	O	N	O	N	b.	O	N	O	N	O	N
										^	
	x	x	x	x		x	x		x	xx	x
	ʒ	ə	v	ɛ		j	ə		ɑ̃	tr	ə

In [5a] the two nuclei are separated by an onset with an attached melody, whereas in [5b] the skeletal positions and melodic content of the two nuclei are directly adjacent; the latter situation results in the first nucleus not being pronounced. The necessary condition for elision is that the onset as a syllabic constituent separating two nuclei cannot itself have either a melodic or even a skeletal representation.

Let us now observe what happens when the definite masculine article *le* [lə] is attached to the two nouns starting with an orthographic *h*: *le hameau* [lə'a'mɔ] - *l'hameçon* [lamə'sɔ̃]. Vowel elision fails in one but not the other case. The two *h*-initial nouns behave in the same way as the verbs in [5], where the preceding vowel is elided in one case [5b] but not in the other [5a]; the difference is, of course, that phonetically both nouns begin with a vowel. A possible way of capturing the difference without distorting the facts is to claim that vowel elision occurs if and only if the two nuclei are directly adjacent melodically **and** skeletally. Elision is not expected to occur if the two nuclei are separated by an onset with a skeletal position but no attached melody. On this account the two nouns differ in that the one disallowing elision (the *h-aspiré* noun) starts with an onset which dominates a melodically empty position. The other noun starts with an onset which is both melodically and skeletally, and hence vowel elision follows. Consider the representations below.

[6]

a.	O	N	O	N	O	N		
	x	x	x	x	x	x		
	l	ə		a	m	ɔ		
b.	O	N	O	N	O	N	O	N
	x	x		x	x	x	x	x
	l	ə		a	m	ə	s	ɔ̃

The representations in [6] illustrate the consequences of having two different types of empty onsets: one with and one without an accompanying skeletal point. It is only the onset without any

skeletal representation that is fully empty, while the presence of the skeletal position allows the onset to function differently. Evidently French elision is barred when the intervening onset dominates a skeletal position, irrespectively of whether the position itself dominates a melody or not. On this interpretation, the *h-aspiré* words are items whose initial onset contains a skeletal position, while *h-muet* words have fully empty onsets. In this way certain vowel-initial words are treated as if they were consonant-initial without actually having the consonants pronounced.

A phenomenon closely related to vowel elision is the pronunciation of word-final consonants before vowel-initial words and their loss before consonant-initial words, all subject to further conditions that we will not go into here. This phenomenon, known in French grammars as *liaison* ‘linkage’, is not unlike the linking-*r* found in some English dialects (see our discussion in 2.6) but it works on a far broader scale in French. For example, the pronoun *ils* ‘they’ appears as [il] in isolation and before a consonant and is thus homophonous with the pronoun *il* [il] ‘he’. Before a vowel *ils* - but not *il* - appears as [ilz]. Consider the relevant examples in [7]:

- [7]    il montre [il 'mɔ̃tʁ] ‘he shows’                      il arrive [il a'ʁiv] ‘he arrives’  
       ils montrent [il 'mɔ̃tʁ] ‘they show’                    ils arrivent [ilz a'ʁiv] ‘they arrive’

The generalisation appears clear enough: a consonant is suppressed before a consonant, just as in the case of elision a vowel was suppressed before a vowel. Other examples of the loss of the final consonant when the word is pronounced in isolation or before a consonant, and the preservation of the consonant before vowels, can be seen in [8]:

- [8]
- |                          |                                       |
|--------------------------|---------------------------------------|
| trop [tʁo] ‘very’        | trop heureux [tʁop ø'rø] ‘very happy’ |
| grand [gʁɑ̃] ‘great’     | grand homme [gʁɑ̃ ɔm] ‘great man’     |
| un [ɛ̃] ‘a’              | un enfant [ɛ̃ɑ̃fɑ̃] ‘child’           |
| porc [pɔʁ] ‘pig’         | porc-épic [pɔʁk e'pik] ‘porcupine’    |
| les [le] ‘def. art. pl.’ | les enfants [lez ɑ̃fɑ̃] ‘children’    |

As might be expected, the appearance of a consonant before a vowel is not a watertight rule. There are numerous cases where the consonant which emerges before some vowels, e.g. *ils arrivent*, fails to do so before others, e.g. *ils haletent* [il a'let] ‘they gasp’, *ils haussent* [il ɔs] ‘they raise’ etc. Keeping in mind the alternations in [8], note that the same left hand column words behave differently in [9], with no consonant appearing before the vowel of the next word.

- [9]
- |                          |   |
|--------------------------|---|
| trop [tʁo] ‘very’        | trop hideux [tʁo i'dø] ‘very ugly’                  |
| grand [gʁɑ̃] ‘great’     | grand Hollandaise [gʁɑ̃ ɔlɑ̃dɛ:z ] ‘great Dutchman’ |
| un [ɛ̃] ‘a’              | un hangar [ɛ̃ ɑ̃gɑʁ ] ‘hangar’                      |
| les [le] ‘def.’art. pl.’ | les haches [le aʃ] ‘axe, pl.’                       |

Thus the right hand column words beginning with vowels behave as if they had an onset. This is, of course, completely parallel to the failure of vowel elision before certain ostensibly vowel-initial words. As before, we can assume that the disparity in the behaviour is due to differences in structure: both the failure of vowel elision and the failure of the *liaison* consonant to appear result from the fact that the word-initial nuclei in fact are not initial but are preceded by onsets containing a skeletal point. Such onsets block vowel elision and constitute the required context for consonant elision; they are not associated with any melody, which produces the phonetic effect of vowel-initialness. The dual pattern that initial vowels display can be systematically correlated with the two possibilities that phonology recognises for empty onsets: they can be empty both on the skeletal and melodic level, or on the melodic one only.

## 4.4 English onsets and rhymes

### 4.4.1 Onsets

The onsets of the simple syllable types presented in the first section of this chapter may be non-branching, when they dominate a single skeletal slot, or branching when two such slots are attached to a single onset node. We have seen that stressed final nuclei must be branching in English, although this is by no means the case for other positions. Domain-internally non-branching nuclei can be found in any number of words, e.g.: *lid* [lɪd], *letter* ['letə], *lumber* ['lʌmbə], *bother* ['bɒðə], *soot* [sut], *rapid* ['ræpɪd]. Thus both onsets and nuclei can be branching and non-branching. In what follows we shall refine this observation somewhat and claim that syllabic constituents can only be binary branching, i.e. they can dominate no more than two skeletal positions. If true, this statement rules out three-member syllabic constituents.

With reference to nuclei, the binary branching claim has seldom been challenged: in numerous languages we find a distinction between short and long vowels or diphthongs, while no convincing case has ever been made for a three way length distinction - such as short, medium and long vowels - that would be phonologically significant. Triphthongs as phonetic sequences of three melodic units are attested but on closer scrutiny they turn out to be combinations of simpler elements. A case in point is English where we have [aɪə, ɔɪə, əʊə, aʊə,] in words such as *higher* [haɪə], *employer* [ɪm'plɔɪə], *mower* [məʊə], *plougher* [pləʊə]. In all these words the triphthongs are clearly divisible into a diphthong [aɪ, ɔɪ, əʊ, aʊ] and the final vowel [ə], in particular since the final vowel is a separate morpheme, indicating the comparative degree in *high+er*, or marking an agentive in the remaining examples. We can extend this observation to cases which allow no morphological division - such as *fire* [faɪə], *paranoia* [pærə'nɔɪə], *flower* [flaʊə] - and conclude that the superficial triphthongs of English are just sequences of nuclei, the first of which is branching and the second non-branching. The words *plougher* and *paranoia* will have the following representations:

[10]

O	N	O	N	O	N	O	N	O	N	O	N
∧	∧								∧		
xx	xx		x	x	x	x	x	x	xx		x
pl	aʊ		ə	p	æ	r	ə	n	ɔɪ		ə

An additional remark about the representations in [10] needs to be made, or repeated: the syllabic level consists of sequences of onsets and nuclei even if a particular constituent happens to have no skeletal or melodic content. This follows from an initial assumption we made, to the effect that the syllabic level of representation is not derivative of the other levels but is an independent one. In many, perhaps most cases, the units of the skeletal, the syllabic and the melodic tiers will dovetail. This is, however, not always true, precisely because the onsets or nuclei are not projections of vocalic or consonantal melodies. We expect to find syllabic constituents to which nothing corresponds on the other levels. More cases of the same sort will be presented in subsequent sections and chapters.

A minor conclusion following from our assumptions is that consecutive units of a melody may belong to different syllabic constituents. A clear case are sequences of more than two consonants: if onsets can be maximally binary, i.e. embracing two skeletal positions, then sequences of three or more consonants can never belong to the same onset. As an example consider English consonant sequences starting with [s] and followed by two consonants, e.g.: *spring* [sprɪŋ], *sclerosis* [sklə'rəʊsɪs], *splash* [splæʃ], *stretch* [stretʃ] etc. Our reasoning leads us to conclude that the s+consonant sequences do not all belong to single onsets. We must also make the general observation that the word-initial position cannot be mechanically identified with the syllable onset:

while in many cases the two will be the same, this is not always so. Thus, the very presence of a specific consonant sequence at the beginning of a word does not necessarily mean that this sequence is a possible syllable onset. A consonantal sequence beginning a word may be an onset but does not have to be. We will consider the position of [s] in such sequences later on the basis of English and other languages; for the moment we will concentrate on other types of branching onsets in English with the exception of *s*-initial clusters.

Typically branching onsets comprise a sequence of a true consonant (an obstruent) followed by a sonorant. Thus in [11a] we have plosives and in [11b] fricatives as the first member of an initial cluster.

[11]

a.	plot [plɒt]	blow [bləʊ]	prison [prɪzn]
	brought [brɔ:t]	treat [tri:t]	drain [dreɪn]
	twist [twɪst]	dwel [dweɪ]	crave [kreɪv]
	grim [grɪm]	clout [klaʊt]	glib [glɪb]
	quite [kwɑ:t]	Guatemala [gwɑ:tə'mɑ:lə]	
b.	flop [flɒp]	fret [fret]	throng [θrɒŋ]
	thwart [θwɔ:t]		

An inspection of the examples shows that of the theoretical combinations of a plosive and a sonorant, some are strikingly absent. For one thing, the sonorant is never nasal. Also, while the velar plosives can precede the sonorants [l, r, w], neither of the remaining classes of plosives is so tolerant: after the coronals [t, d] the liquid [l] is impossible, while after the labials [p, b] the labio-velar semivowel [w] is not admitted. It is probably not an accident that the liquid which is disallowed after coronals is itself coronal or that the labial semivowel is not possible after a labial plosive. Both cases show that homorganic sequences are not possible in branching onsets. We can formulate a condition on English branching onsets stipulating that they must consist of an obstruent followed by a non-homorganic non-nasal sonorant.

The view that syllabic structure is independent of the melody means that once branching onsets are recognised, they should be attested both word-initially and word-internally. Examples of the latter situation are not hard to find:

[12]

diplomat ['dɪpləmæt]	ablative ['æblətɪv]	apricot ['eɪprɪkɒt]
abrupt [ə'brʌpt]	attract [ə'trækt]	address [ə'dres]
abattoir ['æbətɔ:]	Edward ['edwəd]	decline [dɛ'klaɪn]
Anglican ['æŋɡlɪkən]	acrobat ['ækɹəbæt]	aggravate ['ægrəveɪt]
adequate ['ædɪkwət]	anguish ['æŋɡwɪʃ]	Africa ['æfrɪkə]
arthritis [ɑ:'θraɪtɪs]		

However, word-internally we also encounter combinations which are not possible word-initially, such as those which appear to violate the homorganic ban. Some of these examples can be easily dismissed by invoking domain structure: in words such as *quietly* [kwɑɪətli], *deadly* [dedli] the adverb-forming suffix *-ly* is separated from its base which forms a domain of its own, and hence the combinations [tl, dl] do not form branching onsets. The same could be said about the suffix *-less* in *effortless* [efətɪls], *endless* [endɪls], where the sequences [tl, dl] are not different from those we find when words are joined together, e.g. *let Liz*, *led Liz*. Once all such cases have been taken care of, including various real or pseudo-compounds like *outline* ['aʊtlam], *headlong* ['hedlɒŋ] etc., we are still left with a handful of words for which no non-arbitrary morphological domain structure can be posited. A reasonably exhaustive list is offered in [13].

[13]

Atlantic [ət'læntɪk]	antler ['æntlə]	butler ['bʌtlə]
atlas [ætləs]	athlete [æθ'li:t]	motley ['mɒtli]
medley [medli]	maudlin [mɔ:dlm]	bedlam [bedləm]

Our line of reasoning so far has been the following: sequences of a plosive and a homorganic sonorant seem inadmissible as branching onsets. They never appear in word-initial position, and word-internally they are due to the domain structure in most cases. The words in [13], while hardly susceptible to the domain interpretation, display internal sequences which are impossible branching onsets. If our reasoning is correct, then the only conclusion we can draw from forms like these is that the plosive-sonorant homorganic sequences are not what they cannot be, i.e. they are not branching onsets. In other words, rather than belonging to a single constituent, the onset, the offending consonants have to be split between two onsets. An onset is only possible where there is a nucleus, so we are led to conclude that the plosive in the clusters must be followed by a nucleus. Since the nucleus has no phonetic content, it must be empty; recall that we encountered the need for empty nuclei in our discussion of English inflectional morphology in 2.5. A possible representation of the word *medley* is suggested in [14].

[14]

O	N	O	N	O	N
x	x	x	x	x	x
m	e	d		l	i

The words in [13] differ from words like *dill* [dɪl], *tell* [tel] in that they have a nucleus with no melody attached to it. A further piece of evidence supporting the existence of a nucleus between the obstruent and the sonorant is that there are words of the relevant structure with alternative pronunciations with and without a melody. A case in point is the noun *athlete* and the derived adjective *athletic*. These are usually pronounced [æθ'li:t] and [æθ'letɪk] respectively. However, these words are pronounced by some speakers with the vowel [ə] appearing between the members of the homorganic cluster: [æθə'li:t] and [æθə'letɪk]. The existence of such pronunciation variants strengthens the conclusion that the counterexamples to the homorganicity ban are only apparent: they involve either domain structure or an empty nucleus separating the plosives from the following homorganic sonorant. In other words, their neighbourliness is only superficial and misleading. True branching onsets are different, in that they do not violate the homorganicity ban.

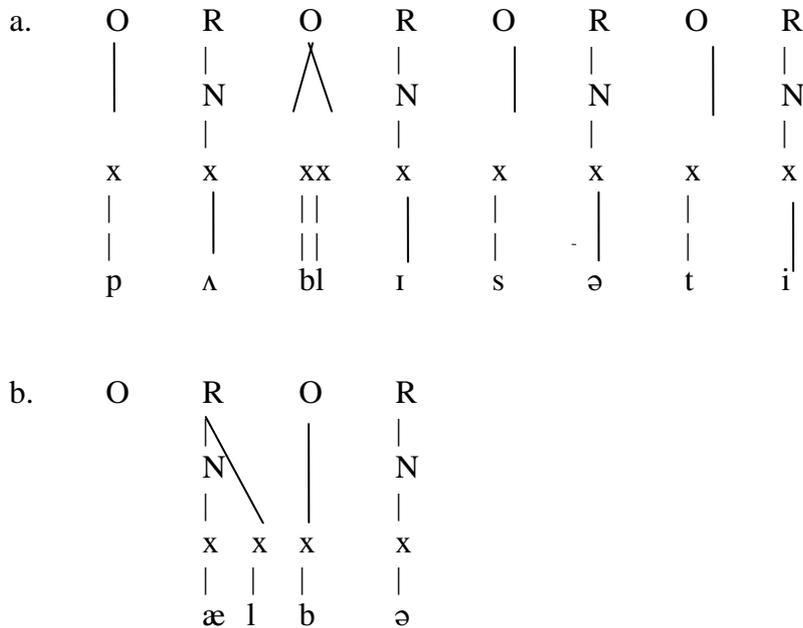
#### 4.4.2 Rhymes

The open syllables that we have just briefly discussed presuppose the existence of closed syllables, i.e. cases where the nucleus is followed by a consonant which is not in the onset of the following syllable. In words such as *panda* [pændə], *Rumbo* [rʌmbəʊ] the nasal consonant belongs together with the first nucleus rather than the second onset; the consonant in such positions is called the **coda** and together with the preceding nucleus it forms the **rhyme** of the syllable. Properly speaking, then, the syllable breaks up into the onset and the rhyme; the latter dominates the vocalic nucleus but it can also contain a complement in the form of a consonantal coda, which is also called the **rhymal complement**. If a rhyme contains just a nucleus, the syllable is said to be open, while it is closed if a consonantal coda complements the nucleus. In our representations we will often take shortcuts and if reference to the coda is not explicitly required, we will continue to divide syllables into onsets and nuclei.

Given what has been said so far about the relation between the melodic and syllabic structure it comes as no surprise that the same consonants, when differently arranged in words, will be associated with different syllabic constituents. Consider the consonants [b] and [l] in the words

*publicity* [pʌb'lɪsəti] and *alba* ['ælbə]. In the first word they appear as [bl] with the obstruent preceding a lateral with which it is not homorganic - the cluster thus meets the criteria for onsethood. In *alba* the sequence is [lb], hence it cannot constitute an onset and must be broken up between the rhymal complement of the first and the onset of the second syllable. The representation of the two words is given below.

[15]



As can be seen from the representations, the consonants appearing as the coda-onset sequence in [15b] are the reverse or mirror-image of those found in the onset in [15a]. This combination constitutes only a subpart of all the coda-onset possibilities. Let us consider in somewhat greater detail the options open to the coda and compare them to the onset.

One combination which, as we have seen, is banned from the onset position is a cluster of homorganic consonants. Rhymal sonorants homorganic with onset obstruents are well-attested, as is the combination of a nasal and a following plosive, something which is not allowed in the onset even in the order plosive - nasal, e.g. \*[knɒt], \*[pmæŋ]. The available coda-onset combinations are illustrated below.

[16]

[lf] alphabet ['ælfəbət]

[lθ] healthy ['helθɪ]

[ld] boulder ['bəʊldə]

[lz] palsy ['pɔ:lzi]

[ltʃ] pilchard ['pɪltʃəd]

[lk] milky ['mɪlki]

[mp] tempest ['tempɪst]

[mf] symphony ['sɪmfəni]

[nv] invalid [ɪnvəlɪd]

[nz] frenzy ['frenzi]

[nd] bandit ['bændɪt]

[nʒ] lingerie ['lænzəri]

[ndʒ] manger ['meɪndʒə]

[ŋg] finger ['fɪŋgə]

[lv] Elvis ['elvɪs]

[lt] helter-skelter ['heltə'skeltə]

[ls] calcium ['kælsiəm]

[lf] revulsion [rə'vʌlʃən]

[ldə] nostalgic [nə'stældʒɪk]

[lg] vulgar ['vʌlgə]

[mb] chamber ['tʃeɪmbə]

[nf] infant ['ɪnfənt]

[ns] rancid ['rænsɪd]

[nt] mountain ['maʊntɪn]

[ŋ] tension ['tenʃən]

[ntʃ] concerto [kən'tʃɜ:təʊ]

[ŋk] anchor ['æŋkə]

The examples show that the range of possible coda-onset combinations far exceeds the reverse sequences found in the onsets. Even if some of the clusters are not very frequent, they are undoubtedly possible, whereas the same sequences in onsets are totally ruled out in English, e.g. \*[lvɪk]. In brief, we see that the coda sonorant can be followed by practically any obstruent, irrespective of any homorganicity holding between them. However, the range of consonants that can occupy the coda position is not restricted to sonorants only. As the examples in [17] demonstrate, the coda can also be a plosive or a spirant.

[17]

[dʒ]	Edgar [edʒə]	[kt]	factory ['fæktəri]
[pt]	baptise ['bæptɪz]	[pʃ]	Egyptian [i:'dʒɪpʃən]
[gd]	Magdalen [mægdələn]	[gz]	zigzag ['zɪgzæg]
[ft]	crafty ['krɑ:ftɪ]	[sp]	aspen ['æspən]
[st]	custard ['kʌstəd]	[sk]	rascal ['rɑ:skəl]
[zd]	Mazda ['mæzdə]		

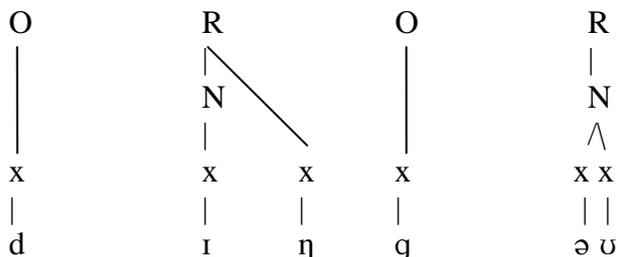
Although plosives in the rhymal complement position are not as numerous attested as sonorants, their existence in that position is definitely possible. An exhaustive study of English phonology would need to provide a detailed account of the coda possibilities, something that is not our aim here. Suffice it to say that in English a coda can be a sonorant or a simple obstruent (plosive, spirant) and that these precede the obstruent of the following onset. Facts similar to those of English can be found in other languages, a situation which suggests that they all reflect certain general properties of the phonological organisation of language.

#### 4.5 Nasal assimilation or nasal place sharing in English

As noted above, the rhymal complement position is frequently occupied by a sonorant while a following onset dominates an obstruent. We would like now to consider a specific instance of this configuration, one where the rhymal position is filled by a nasal consonant. This combination is frequently found in a variety of languages and in some sense appears to be natural, being favoured especially when the nasal is homorganic with the following onset obstruent. We will look at this form of nasal-obstruent homorganicity in a few languages, starting with English.

A typical structure for the homorganic nasal-obstruent sequence can be illustrated by the English word *dingo* [ˈdɪŋəʊ]:

[18]



This is the syllabic structure of the velar nasal in English which we discussed in 3.2. Recall that we argued there that the velar nasal always appears before a following velar plosive, in other words, the two consonants are homorganic. This is true even if the voiced velar plosive itself remains inaudible in the domain-final position, e.g. *king* [kɪŋ]. In effect, then, the distribution of the velar nasal is seriously restricted in English.

An inspection of other combinations of a nasal and a plosive reveals that domain-internally they are almost exclusively restricted to homorganic clusters, either bilabial or alveolar.

[19]

a.	bimbo ['bimbəʊ] lumber ['lʌmbə]	Cumbria ['kʌmbriə] samba ['sæmbə]	bamboozle [bæm'bu:zl] rhombus ['rɒmbəs]
b.	rampant ['ræmpənt] crumpet ['krʌmpɪt]	limpid ['lɪmpɪd]	dimple ['dɪmpl]

Here we have the bilabial nasal preceding either a voiced or voiceless bilabial plosive - the homorganicity requirement seems fully observed. One admittedly does find words like *gimcrack* ['dʒɪmkɹæk], *lambkin* [læmkɪn] with a bilabial nasal before a velar plosive, or *sometimes* [sʌmtaɪmz], *amtrack* [æmtræk] where the bilabial is followed by a coronal plosive. However, all such forms are morphologically complex and hence it is perfectly legitimate to claim that the bilabial nasal is not directly adjacent to the following plosive since the two consonants belong to different domains; thus the [mk] of *lambkin* is not different from what we find in *tomcat* ['tɒmkæt]. As we argued in Chapter Three domain structure can be utilised in cases where morphological motivation may not be obvious, such as place names and personal names. Given a name such as *Fromkin* [frɒmkɪn], rather than abandon the homorganicity generalisation we can propose that it comprises two domains and as such the bilabial nasal does not form a coda which is directly followed by an onset plosive.

Although such a procedure might appear somewhat ad hoc and intended to patch up holes in the analysis, it should be kept in proper perspective: the absolute majority of English words does conform to the homorganicity generalisation, while some of those which do not are clearly morphologically complex and in this sense remind us of the ordinary concatenation of words within larger speech chunks, e.g. the [mk] of *Tom can* [tɒm kæn]. Note that an alternative analysis of the offending forms would probably be far less acceptable as a general statement about English. Imagine that on the basis of forms such as *gimcrack* etc. we abandon the homorganicity generalisation. That would mean that in effect that nasals can be followed by any plosives whatsoever. In such a case the offending forms and the non-offending majority would have an equal status in English phonology, so that we would expect to find single morphemes like \*[bæŋti], \*[frɪnkə] etc. The question we would find difficult to answer would be why there are so few words of the latter type, just a handful in fact. Their very paucity speaks for their exceptionality, which is dealt with by the postulation of a (morphologically) unmotivated domain structure.

Just as the bilabial rhymal nasal is homorganic with the onset plosive, so is the alveolar one homorganic with the following onset, regardless of whether it is voiced or voiceless, e.g.:

[20]

a.	thunder ['θʌndə] window ['wɪndəʊ]	kindle [kɪndl̩] abandon [ə'bændən]	random [rændəm] abundant [ə'bʌndənt]
b.	mentor ['mentə] entry ['entri]	until [ʌn'tɪl] gentile [dʒentaɪl]	lentil ['lentɪl] Benton ['bentən]

Keeping in mind our discussion of the velar nasal and its implications we can say that a rhymal nasal and a following onset plosive share their place of articulation. Whatever forms appear to contradict this generalisation are not exceptions, but rather arise as a result of the nasal and the plosive not occupying contiguous syllabic positions. They are either separated by an empty nuclear position or they belong to distinct phonological domains.

Although we have explicitly restricted ourselves above to sequences of nasals and plosives, it is easy to observe that the homorganicity requirement generally holds for any combination of a nasal and a following obstruent. Thus before the coronal fricatives and affricates [s, z, ʃ, ʒ, tʃ, dʒ] the nasal is coronal although it may be either alveolar or post-alveolar, just like the following obstruent, e.g.:

[21]

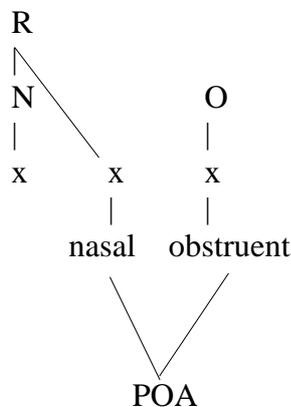
fancy ['fænsi]	answer ['ɑ:nsə]	density ['densəti]
ancestor ['ænsəstə]	bonanza [bə'nænzə]	Kensington ['kɛnzɪŋtən]
benzine ['benzi:n]	ancient ['eɪnfənt]	detention [dɪ'tenʃən]
banshee ['bænsi:]	differential [dɪfə'renʃəl]	lingerie ['lænzəri]
ranch [rɑ:ntʃə]	concerto [kən'tʃɜ:təʊ]	Winchester ['wɪntʃəstə]
enfranchise [ɪn'frɛntʃaɪz]	angel ['eɪndʒəl]	angina [æ'n'dʒaɪnə]
danger [deɪndʒə]	Benjamin ['bendʒəmɪn]	

Although sequences violating homorganicity are in certain cases immediately assignable to domain structure, e.g.: *himself* [hɪm'self], we should, for the sake of completeness, note the few words which do not in any obvious way lend themselves to such treatment. Examples are very few: *damsel* [dæmzəl], *crimson* ['krɪmzən], *flimsy* ['flɪmzi], *clumsy* ['klʌmzi]. They can be handled by either of the two ways - arbitrary domain structure or separating the consonants by a nucleus with no melody. The extreme rarity of such forms follows from their unsystematic nature.

Before the labio-dental spirants [f, v] we normally find either the labio-dental nasal [m] or, in careful speech, the coronal nasal [n], e.g. *invalid* [ɪnvəlɪd] or [ɪnvəlɪd], *infant* [ɪnfənt] or [ɪnfənt]; before the voiceless interdental spirant [θ] - there seem to be no examples for the voiced [ð] - the nasal is normally dental, e.g.: *epenthesis* [ɪ'pɛnθəsɪs], *anthem* ['æŋθəm], *anthropology* [æŋθrə'pɒlədʒi], etc. Once again, it is significant that there are no words containing sequences such as [mθ, ɲf], which would require some extra adjustment of the general rules.

The discussion of the English nasal plus obstruent sequences reveals that a rhymal nasal **always** shares its place of articulation (POA) with the following onset, i.e. the relevant representation is

[22]



We may call the above constraint *POA Sharing*. A crucial property of forms meeting this condition is that the nasal and the obstruent are directly adjacent within a phonological domain with the obstruent following the nasal. Whenever an apparent violation emerges, it really indicates that the two consonants do not form a coda-onset sequence and thus fail to meet the syllabic requirements for *POA Sharing*.

The POA agreement captured in [22] is traditionally referred to as nasal assimilation. There is a certain difference between the two formulations: an assimilation formula implies that something gets more similar to something else. In other words, at first the two consonants are different but become more similar as a result of the assimilation process. This prompts a temporal sequence involving a stage before and after a change, and also suggests a dominating and a dominated partner in the relationship. *POA Sharing*, on the other hand, makes no such implications: it states simply that in English a coda nasal and a following onset obstruent may not differ in their place of articulation, without entailing any temporal - or before and after - considerations, or without taking a stand on whether it is one or the other consonant that exerts the assimilatory influence. Put simply,

a formulation like [22] says that English words do not violate the specified configuration. There are no stages or derivations but a static description of the way things are. The derivational statement may be more adequate for historical purposes, where time and different representations of what is the same unit play a role. For example, historically the homorganic [mp] in *empower* [im'paʊə] may derive from the [n] of *en-* assimilating to the following bilabial plosive. Synchronically, however, the claim that the nasal gets assimilated to the plosive is no more justified than the reverse view: given a sequence of a rhymal nasal [m] followed by an obstruent, the obstruent assimilates to the place of articulation of the nasal. What we have is necessary identity of the place of articulation in two consonants meeting specified conditions. Any reference to derivations is nothing but a historical metaphor or a terminological shortcut. If we occasionally use it, it should be understood as just such a shortcut.

#### 4.6 Nasal place sharing in Dutch and German

The constraint imposing place of articulation sharing between a rhymal nasal and an onset obstruent is also found in two closely related languages, namely Dutch and German, although some differences will also need to be noted. In principle, however, we find sequences of homorganic nasals and obstruents. In Dutch these comprise the labial, labio-dental, dental, palatal and velar consonant areas. Consider some examples:

[23]

- |    |  |  |
|----|--|--|
| a. | gember ['gɛmbər] 'ginger'                | inpakken ['ɪmpəkən] 'wrap up'                |
|    | aanbod ['ambɔt] 'offer'                  | riempje ['riɪmpjə] 'belt, dim.'              |
|    | sympathiseer [sɪmpatɪ'zɛ:r] 'sympathise' | stiekempjes ['stikɛmpjəs] 'stealthily'       |
| b. | onfatsoenlijk [ɔɱfat'sunlək] 'indecent'  | onvast [ɔɱvɑst] 'unstable'                   |
|    | inwijden ['ɪɱɔɛidən] 'initiate'          |  |
| c. | ponton ['pɔntɔn] 'pontoon'               | alliantie [ɑli'ɑntsi] 'alliance'             |
|    | financieel [finɑn'ʃe:l] 'financial'      | presidentieel [prɛziden'ʃe:l] 'presidential' |
|    | wandelen ['wɑndələn] 'walk, vb.'         | antiek [ɑn'tik] 'antique'                    |
|    | gewoontjes [ɣə'vɔntjəs] 'ordinarily'     |  |
| d. | Spanje ['spɑɱjə] 'Spain'                 | bonje ['bɔɱjə] 'fight'                       |
|    | oranje ['o:rɑɱjə] 'orange, adj.'         |  |
| e. | tango [tɑɱgo:] 'tango'                   | onkies [ɔɱ'kis] 'indecent'                   |
|    | ongeluk ['ɔɱɣələɣk] 'mishap'             | koninkje ['kɔ:nɪŋkjə] 'king, dim.'           |
|    | fungeren [fɱɱ'ɣɛrən] 'function, vb.'     |  |

It does not matter in our interpretation that some of these words are morphologically complex: what is significant is that phonologically they are direct neighbours, which translates into homorganicity. What requires attention are the cases where homorganicity is not observed. As in English this is found primarily with productive inflectional morphology, e.g.: *roemde* ['rumdə] 'praise, past', *mengde* ['mɛɱdə] 'mix, past' (compare the infinitives *roem* [rum], *meng* [mɛɱ]) and thus invites an interpretation involving either domain boundaries or empty nuclei between the nasal and the dental of the past tense suffix. In this sense it parallels the English forms like *seemed* [si:md], *hanged* [hæɱd] where the nasals are also followed by a non-homorganic alveolar plosive. In both the Dutch and the English cases the phonological identity of the verbal base in both the infinitive and past suggests that the consonant of the suffix is not directly adjacent to the final consonant of the stem, hence place of articulation sharing is not possible.

As in English there are further examples of morphological compounds. These, just like words joined in a sentence, tolerate phonetic sequences of nonhomorganic consonants: they are possible because in phonological terms they do not form a coda-onset combination which constitutes the required context for homorganicity. Thus in *damkampioen* ['dɑmkɑmpijun] 'draught champion' or the careful pronunciation of the name *Uhlenbeck* ['ɣlənβɛk] (side by side with

[ylæmbək]) the [mk] and [nb] phonetic sequences do not undermine the general conditions on place of articulation sharing; rather they indicate that the nasal and the following stop do not conform to the conditions for *POA Sharing*. Similarly in words like *imker* [ʔmkər] ‘bee keeper’ or *hemdje* [hɛmtjə] ‘shirt, dim.’ the non-homorganic sequences mean, quite simply, that the consonants are not adjacent: in all probability they should be separated by an empty nucleus which is phonetically inaudible and produces the impression of a phonetic sequence of nonhomorganic consonants. It is also possible that different domains are involved.

A complete description of nasal sharing in Dutch would need to include related phenomena which depend not only on the phonological composition of adjacent segments and the phonological domain structure of words, but also on factors such as the position of a given word in a syntactic configuration and the tempo of speech. One phenomenon should be noted here: in compounds and in connected speech the alveolar nasal before a continuant can be suppressed while the preceding vowel is nasalised (and somewhat lengthened). In other words, rather than producing nasal sharing, this context admits merger of the nasal with the preceding vowel, e.g.: *on-zeker* ‘uncertain’ and *ongewoon* ‘abnormal’ can be pronounced [ɔ̃zəkər] and [ɔ̃ŋəʋon] side by side with the more studied variants [ɔnʔzəkər] and [ɔŋŋəʋon]. The fact that contact between two consonants may result in either place sharing or partial elimination of one of the parties involved suggests that there exist options which an individual language may select. While the general tendency for a nasal and an adjacent consonant to be homorganic is well-attested, other ways of interpreting this configuration are available. We have seen that Dutch place sharing in certain ways is different from English; below we will consider from this point of view the facts of another closely related language, German, and a somewhat more distant one, Polish. We will see that within the basic tendency towards place sharing certain minor and major differences can be detected.

The basic facts of the phenomenon in Modern German are very similar to those of Dutch, namely bilabial, labio-dental (optionally), alveolar and velar nasals share their place of articulation with directly following obstruents.

[24]

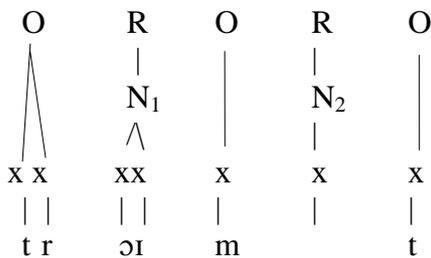
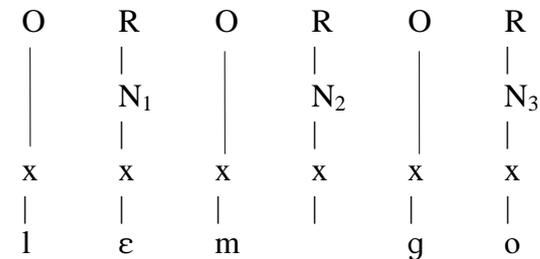
- |    |  |                                 |
|----|--|---------------------------------|
| a. | Tempo [ˈtɛmpo] ‘tempo’<br>kompetent [kɔmpɛˈtɛnt] ‘competent’   | Amboß [ˈambɔs] ‘anvil’          |
| b. | Unfall [ˈʊmfal] ‘accident’                                     | Konflikt [kɔŋˈflikt] ‘conflict’ |
| c. | Stunde [ˈʃtʊndə] ‘hour’<br>hänseln [ˈhɛnzəlŋ] ‘tease, vb.’     | bändigē [ˈbɛndɪŋən] ‘tame, vb.’ |
| d. | danken [ˈdaŋkən] ‘thank’<br>fingieren [fɪŋˈgi:rən] ‘fake, vb.’ | Tango [ˈtaŋgo] ‘tango’          |

In some cases, most typically at morphological boundaries, forms with and without the shared place of articulation can be found. In our terms this means that the two consonants either are directly adjacent and consequently homorganic or are separated and hence no sharing is possible. Taking the word *Unglück* ‘mishap’ as an example we record two possible pronunciations: [ˈʊŋglyk] without and [ˈʊŋglyk] with place sharing. If the condition for the sharing is direct consonant adjacency, then the two variants must have somewhat different representations. The form where the nasal is the rhymal complement position and the plosive is in the onset will constitute the required context for the shared place of articulation; if the consonants belong to separate domains, or if they are separated by an empty nucleus, the nasal is alveolar while the plosive is velar. No interaction between the two consonants takes place any more than it does between two identical consonants in separate words.

As in Dutch and English, forms can be found for which no domain structure can be justified in a natural way. The German place name *Lemgo* [ˈlɛmgo] or the word *Imker* [ʔmkɛ] ‘bee-keeper’ are a case in point. Nonhomorganic sequences emerge where the relevant consonants are not adjacent: in cases such as these the simplest solution is to suggest that an empty nucleus intervenes between the two consonants. This solution may apply not only to indivisible words but also to

combinations arising as a result of morphological operations: in *träumt* [trɔɪmt] ‘(s)he dreams’ a bilabial nasal is followed by an alveolar plosive, while in *singt* [zɪŋt] ‘(s)he sings’ the velar nasal appears in the same context, which at first blush violates the homorganicity requirement. However, since the plosive clearly represents the ending of the 3<sup>rd</sup> pers. sg. present tense, it is natural to suppose that the consonants are separated by a nucleus (recall the English lack of homorganicity in *dreams* [dri:mz] and *sings* [sɪŋz]). The words *Lemgo* and *träumt* could be represented as follows:

[25]



The presence of the inaudible nucleus (N<sub>2</sub>) amounts to a claim that nasal sharing is general in German and the cases where it seems to be flaunted are only apparent. (The onset status of the final [t] in *träumt* will be discussed in the following chapter.)

A final point that should be made in connection with this brief overview of German nasal homorganicity concerns a certain difference vis-à-vis Dutch: as shown in [23d] Dutch has a palatal nasal before a following palatal. In German this does not seem to happen: taking the words *wünschen* [ˈvʏnʃən] ‘wish’ and *manche* [ˈmançə] ‘some’ as typical we observe the presence of an alveolar nasal both before the palato-alveolar [ʃ] and the palatal [ç]. While the palato-alveolar spirant could perhaps be interpreted as an alveolar consonant, this position cannot be adopted for the palatal spirant without gross violation of the phonetic facts. We must recall at this stage, however, that in 3.4 we discussed at length why the phonetically palatal spirant should be seen phonologically as just a spirant with no place of articulation specified in its melodic representation. In some dialects, including the standard variety, the spirant is palatal, but this is merely what we have called a phonetic effect without phonological consequences. The absence of place sharing in words like *manche* bears out the correctness of this interpretation: there is no sharing because the spirant has nothing to share as it is without place specification. In this way the facts of German place sharing support an observation based on completely independent evidence.

#### 4.7 Nasal place sharing in Polish

In Modern Polish place sharing between a nasal and a following obstruent is amply attested and in certain ways it duplicates the Germanic situation. Thus before labial, dental, palatal and velar plosives and affricates we find nasals with the same place of articulation. Some examples follow in [26]. Stress is not marked in the transcriptions since it is invariably penultimate (at least in the words which appear below).

[26]

labial

lampa [lampa] ‘lamp’  
 dębu [dembu] ‘oak tree, gen. sg.’

sępy [sɛmpɨ] ‘vulture, nom. pl.’  
 rąbać [rɔmbatɕ] ‘hew’

dental

ręce [rɛntɕɛ] ‘hand, dat. dg.’  
 pętać [pɛntatɕ] ‘to fetter’

wstędze [fstɛndzɛ] ‘ribbon, dat. sg.’  
 nadęty [nadɛntɨ] ‘pompous’

palatal

pędzi [pɛɲdzi] ‘(s)he rushes’  
 sądzi [sɔɲdzi] ‘(s)he thinks’

rządzi [ʒɔɲdzi] ‘(s)he governs’  
 chęci [ʧɛɲtɕi] ‘willingness, nom. pl.’

velar

księga [kɕɛɲga] ‘book’  
 stęka [stɛɲka] ‘(s)he grumbles’

urąga [urɔɲga] ‘(s)he abuses’  
 obłąkany [ɔbwɔɲkani] ‘crazy’

More subtle divisions could be introduced, such as alveolar or pre-velar but we need not be concerned with these here. The examples above show that Polish, too, enforces the requirement that a nasal and a following stop should share their place of articulation.

The examples above are restricted to the context of a nasal and a stop obstruent (plosive or affricate) for a very good reason: before a following spirant a new situation is attested. (Recall in this context the option available for Dutch nasals before spirants when a domain boundary follows). In native vocabulary the nasal that appears before an adjacent fricative has the form of a short back nasal glide [w̃] which forms a diphthong with a preceding vowel. Consider the examples in [27].

[27]

wąwóz [vɔw̃vɔs] ‘ravine’  
 męstwo [mɛw̃stfɔ] ‘valour’  
 więzi [vjɛw̃zi] ‘bond, gen. sg.’  
 węszy [vɛw̃ʃɨ] ‘(s)he sniffs’  
 węchu [vɛw̃xu] ‘smell, gen. sg.’

kąsa [kɔw̃sa] ‘(s)he bites’  
 mięsie [mjɛw̃ɕɛ] ‘meat, loc. sg.’  
 więzy [vjɛw̃zi] ‘fetter, nom. pl.’  
 dąży [dɔw̃ʒɨ] ‘(s)he aspires’

One thing which transpires from examples such as these is that Polish nasal sharing before spirants differs from the straightforward homorganicity observed before other obstruents. As we will see in 6.4 there are additional factors which require that we treat the nasal diphthongs in a separate way from sequences of nasal consonants and plosive obstruents. It is the latter that we concentrate on here.

A by-product of Polish nasal sharing is the existence of alternations showing different nasal plus plosive sequences. The alternations arise when a given morpheme combines with inflectional and derivational affixes which require a somewhat different shape for the base. Consider the nouns in [28] with some of their closely related forms.

[28]

ręce [rɛntɕɛ] ‘hand, loc. sg.’  
 łąka [wɔɲka] ‘meadow’  
 księga [kɕɛɲga] ‘(big) book’  
 wstędze [fstɛndzɛ] ‘ribbon, loc. sg.’

ręka [rɛɲka] ‘id. nom. sg.’  
 łączka [wɔɲtʃka] ‘id. dim.’  
 księdze [kɕɛndzɛ] ‘id. dat. sg.’  
 wstęga [fstɛɲga] ‘id. nom. sg.’

The different phonetic shapes of the same base morpheme, such as [kɕɛɲg-, kɕɛndz-] denoting ‘book’ all conform to the place sharing requirement in its Polish shape. In other words, a nasal is homorganic with a following plosive. In this sense the existing alternations merely conform to the pattern we have observed in non-alternating words such as those in [26]. Morphophonemic alternations play a significant role in phonological analysis since they may be used to identify existing phonological regularities. These, however, may also be established independently of such alternations, and even when such alternations are absent in the language.

A far more significant observation is connected with the presence of words where nasal sharing seems to be disregarded. We have seen such instances in the Germanic cases - recall English words like *flimsy*, *banged* - but they were quite infrequent or formed large but regular morphological subclasses such as the past tense ending, for example. We accounted for these forms by suggesting that the relevant consonants are not adjacent, being separated either by an empty nucleus or domain boundary. In Polish the number of forms that appear to violate the sharing property is quite considerable, but if our reasoning so far is correct we have to assume that the consonants in question rather than being adjacent are separated from each other. The following cases illustrate the problem.

[29]

- |    |                                  |                                     |
|----|----------------------------------|-------------------------------------|
| a. | słomka [swɔmka] ‘straw, dim.’    | ósemka [usɛmka] ‘number eight’      |
|    | ramka [ramka] ‘frame, dim.’      | kłamcie [kwamtɕɛ] ‘lie, imper. pl.’ |
|    | zamknąć [zamknɔɲtɕ] ‘close, vb.’ | mgła [mgwa] ‘mist’                  |
|    | mgnienie [mgɲɛɲɛ] ‘twinkling’    |                                     |
| b. | państwo [paɲstfɔ] ‘state’        | koński [kɔɲsci] ‘equestrian’        |
|    | małeńka [maɛɲka] ‘little, fem.’  | wińsko [vʲiɲskɔ] ‘wine, express.’   |
| c. | sanki [sanci] ‘sled’             | rankiem [rancɛm] ‘in the morning’   |
| d. | Irenka [irɛnka] ‘name, dim.’     | piosenka [pʲɔsɛnka] ‘song’          |
|    | słonka [swɔnka] ‘woodcock’       | cienka [tɕɛnka] ‘thin, fem.’        |

In [29a] we find the bilabial nasal before a velar plosive, without the consonants showing any sign of sharing their place of articulation; in [29b] the palatal nasal appears before a non-palatal consonant, either the dental [s] or the velar [k], also in obvious violation of homorganicity sharing. In [29c] we find the dental (non-palatalised) nasal before the voiceless palatal plosive [ç]. Finally in [29d] the dental rather than the velar nasal appears before the voiceless velar plosive. Following the reasoning established so far, we can say that if a nasal is not homorganic with an obstruent that follows it, the consonants are only superficially adjacent. A vowel must separate them and thus they must belong to consecutive onsets rather than forming a coda-onset sequence. The vowel itself has no melodic content and hence remains inaudible.

It might be objected that inaudible nuclei are just a device which allows us to maintain a uniform analysis of place sharing. Is there any evidence independent of the regularity of place sharing which would support our supposition that the nasals and the following non-homorganic obstruents in [29] are separated by a nucleus? The answer is that in some cases we can provide morphophonemic alternations where the nuclear slot between the nasal and the following obstruent is filled by a melody. Examples follow:

[30]

- |                                |                                       |
|--------------------------------|---------------------------------------|
| słomka [swɔmka] ‘straw, dim.’  | słomek [swɔmɛk] ‘id. gen. pl.’        |
| ósemka [usɛmka] ‘number eight’ | ósemek [usɛmɛk] ‘id. gen. pl.’        |
| ramka [ramka] ‘frame’          | ramek [ramɛk] ‘id. gen. pl.’          |
| zamknąć [zamknɔɲtɕ] ‘shut’     | zamykać [zamɪkatɕ] ‘id. imperfective’ |
| sanki [sanci] ‘sled’           | sanek [sanɛk] ‘id. gen. pl.’          |
| Irenka [irɛnka] ‘name’         | Irenek [irɛnɛk] ‘gen. pl.’            |
| piosenka [pʲɔsɛnka] ‘song’     | piosenek [pʲɔsɛnɛk] ‘id. gen. pl.’    |
| słonka [swɔnka] ‘woodcock’     | słonek [swɔnɛk] ‘id. gen. pl.’        |

It can be seen that the offending non-homorganic sequences in the left-hand column are all invariably separated by the vowel [ɛ] or [i] in a different form of the word in the right-hand column. Thus our prediction, made on the basis of the general expectation that it is only directly adjacent sequences that are homorganic, is confirmed by independent morphophonemic alternations. Their existence strengthens the case for inaudible vowels, but it must be admitted that morphophonemic

alternations are not available in every case. Nor is there any reason to expect that they should be: alternations are the result of specific morpheme combinations which depend on the shape and the category of the participating members. Recall that in English the nucleus of the plural and the past tense preserves its phonetic content only when the surrounding consonants are sufficiently similar, e.g. *watches, waited* vs. *watched, waits*. There are no alternations for words such as *flimsy, clumsy*, and the presence of nuclei between the consonants of the superficial clusters can only be deduced from the pattern established for the language as a whole. Similarly in Polish, some of the examples in [29] do not admit of alternants with a phonetic vowel in the required position, and this is nothing particularly surprising. We have enough cases of alternations together with massive evidence in favour of the place sharing generalisation to conclude that the non-alternating forms, if they contain non-homorganic clusters, are separated by inaudible or empty nuclei.

In our discussion of place sharing between a nasal and a following obstruent we have seen that the general tendency towards uniformity may be interpreted in partially different ways by individual languages. It is the task of the phonology of each language to specify the conditions under which full conformity to the required pattern is observed, and to describe the ways in which the sharing is implemented. The analysis forces us to look closely not only at consonant sequences within words, but also at morphophonemic alternations which help us to decide the phonological representation of specific words or which confirm the representations we suspect to be valid on other grounds.

#### 4.8 Summary

The study of linguistics often involves fundamental re-assessments and re-definitions of what appear to be familiar or “obvious” notions. In phonology these include the word, the sound, the sound sequence and the syllable. In this chapter we started looking more closely at the concept of the syllable and its role in formulating generalisations.

The syllable and the syllabic level of representation need solid phonological backing if they are to be regarded as real components in the organisation of language. Intuitive judgements, often based on and deriving from orthographic conventions, are simply not good enough. In this respect phonology cannot be different from syntax where, say, constituent structure or case-marking must be established on syntactic rather than purely intuitive criteria.

English supplied evidence for the existence of nuclei and onsets. French went one step further and revealed that onsets can be either melodically empty or melodically and skeletally empty, with different consequences for vowel and consonant alternations.

Perhaps the main protagonist of this chapter has been silence or the motivated non-manifestation of a structural unit. This unit needs to be recognised for phonological reasons but has no phonetic realisation. A typical example of the use of silence is the presence of skeletal positions without associated melodies, the so-called empty positions. We have also seen that an onset may be unattached to a skeletal position, and in 2.6 we recognised unassociated melodies, sometimes called **floating melodies**.

Empty nuclei figured prominently in the analysis of onsets where we showed that a mere linear sequence of consonants does not necessarily amount to their being adjacent skeletally. If they are not adjacent skeletally, they cannot form a constituent such as an onset. The phenomenon of nasal sharing as illustrated in a number of languages served to demonstrate the same point on the basis of the coda-onset proximity. The existence of empty nuclei forces us to abandon what is probably an act of faith for most ordinary language users, i.e. the conviction that if sound *a* directly precedes sound *b*, then nothing separates *a* from *b*. We have seen evidence coming from phonological constraints, coupled with morphophonemic alternations, which shows that the commonsense view is a grand illusion. Progress in phonology is achieved by exposing illusions and formulating analyses without them, no matter how familiar or intuitively correct they may appear.

#### **4.9 Suggested further reading**

Different approaches to the syllable can be found in most surveys of phonological theory and the history of phonology. Some of the most relevant readings include Vennemann (1972), Hooper (1972, 1976, Chap. 11-12), Anderson (1974, Chap. 14), Clements and Keyser (1983), Selkirk (1982), Goldsmith (1990, Chap. 3), Giegerich (1992, Chap. 6), Harris (1994, Chap. 2.2-3), Kenstowicz (1994, Ch. 6), Blevins (1995), van der Hulst and Ritter (1999). For the role of the concept in earlier phonological approaches see Fischer-Jørgensen (1975).

French facts are presented and analysed in a variety of ways in Clements and Keyser (1983, Chap. 3.8), Durand (1986), Charette (1991), and Brockhaus (1995b).

Nasal assimilation in Dutch is presented in Booij (1995, Chap. 4.2.2 and 7.2.2); for German see Hall (1992, Chap. 4) and Wiese (1996, Chap. 7.3.4), for Polish see Gussmann (1980, Chap. 3.1) and Bethin (1992, Chap. 2.2.2).