The morphological structure of words often influences their phonological shape. Experiments have shown that in some cases (like *may name* vs. *main aim*) people are usually unable to locate the word boundary out of context, in others (like *may cough* vs. *make off*) the word boundary produces an evident phonological difference. A simple phonemic transcription of these two strings (/meIk6f/) does not make the difference predictable, unless supplemented with an indication of whether there is a word boundary in the string (or not, as in the name *Makoff*) and where it falls. Allophonic rules can then refer to this word boundary, to aspirate the k of the first, and to preglottalize that of the second phrase. The three parses are shown in (1).

(1) Possible parses of *meIkof*

- a. *may cough* mer^k^h^of
- b. *make off* mer^k#^of
- c. *Makoff* mer^k^h^of
levels was deprecated. Thus, such a framework used juncture phonemes, of which the different types of boundary symbols used descriptively today ("#", "+", "=") are direct descendants.

8.1 Phonological boundaries in the generative model

Standard generative phonology applies several different kinds of boundary markers. (2) contains a list of these.

(2) Boundary markers

a. the syllable boundary (.)
b. the verbal prefix boundary (=)
c. the morpheme (or formative) boundary (+)
d. the word boundary (#)
e. the phonological phrase boundary (||)

The syllable boundary, as we have seen, is different from the others in that it is phonological in its nature, its location is not (fully) dependent on the morphological structure of the word.1 The phonological phrase boundary is the strongest of all. An ** in English is dark before consonants and also before a phonological phrase boundary, that is, when the speaker pauses. This is all we have to say about this boundary here, we will not be concerned with it any further in this chapter.

In what follows we are going to have a closer look at the remaining three boundary types: the morpheme boundary (also called the weak boundary), the verbal prefix boundary, and the word boundary (also called the strong boundary).

8.1.1 The morpheme boundary

The morpheme boundary (represented by ‘+’) is found between the morphemes that make up the word. In some cases a free stem and a suffix are joined by a morpheme boundary, though in most cases such stems are bound. (3a) lists examples for the former, (3b) for the latter case.

(3) a. free stem
   odd+ity *odd*ti
   post+al *post*al

b. bound stem
   opac+ity *opaque*ti (cf. opaque)
   acid+ic *acid*ik (cf. 'acid')

Rules applying in a given context, that is, to a segment occurring before and/or after certain segments, apply irrespective of the presence of a morpheme boundary in that string. To put it more technically: if _Y_ changes in the environment _X_ _Y_ _Z_, this change will happen in any of the contexts _X_ + _Y_ + _Z_, _X_ + _Y_ _Z_, _X_ _Y_ + _Z_, as well as in

1 Interestingly, this kind of boundary was not applied in the most important representative of standard generative phonology, Noam Chomsky and Morris Halle’s *Sound Pattern of English* (usually referred to as SPE, published in 1968).
XYZ. This means that any phonological change that occurs within a morpheme also occurs across the morpheme boundary, so morphemes separated by ‘+’ behave exactly like monomorphemic forms, that is, a word consisting of a single morpheme. The morpheme boundary, +, is invisible to the phonology. This observation will gain significance later in this chapter.

The opposite is not true: if a phonological rule is stated with the morpheme boundary in its environment, it does not necessarily occur in a boundaryless context. Consider, for example, velar softening, a simplified formulation of which is given in (4).

(4) **Velar softening (the voiceless part)**

\[
\text{k} \rightarrow \text{s} \big/ \_ + \text{i}
\]

The case of opaque **oupeik**~**opacity** **oupæsoti** illustrates the rule: the stem final \(\text{k}\) turns into \(\text{s}\) before the morpheme boundary that is followed by \(\text{i}\).\(^2\) However, it is not generally the case that a \(\text{k}\) turns into \(\text{s}\) before \(\text{i}\) in English: the change does not occur within morphemes (see §8.2.5), \(\text{kiss}\) is not pronounced **sis**, else there would be no cases of **ki** in the language (except perhaps across a word boundary, like in **Eric is**).

Another regularity dependent on the presence of a morpheme boundary is trisyllabic laxing. As is well known, the antepenultimate stressed vowel tends to be lax in English words. Counting starts from the closest word boundary to the right, accordingly the stressed vowel of **cäter**~**ing** is not lax, but that of **crimin+al** (cf. *crime*) is. A large part of the exceptions to this rule are monomorphemic words, like those in (5).

(5) **Monomorphemic words with a tense vowel in the antepenult**

stèvedore, nightingale, Abraham, Oberon, ômega

If we formulate the rule with reference to the morpheme boundary, monomorphemic words are not expected to exhibit trisyllabic laxing. The lax vowel in the antepenultimate syllable of a large set of monomorphemic words (e.g., **animal**, **crôcodile**) is, in this case, as unexpected as that in the penult or ult of other words, like **mätter** or **mât** (cf. *cäter*, *mät*).

---

One may object that words with a lax antepenult (like **animal**) are much more frequent than those with a tense vowel there (like **Abraham**). The situation is rather similar to that of front–back vowel harmony in Hungarian. It works across a morpheme boundary: **ház-ban** ‘in a house’ vs. **kéz-ben** ‘in a hand’, but it fails to operate within a morpheme: **hárem** ‘harem’, **Géza** name. It is nevertheless true that the majority of morphemes do have only front or only back vowels, morphemes like **sofør** ‘chauffeur’, **öko-** ‘eco-’ with both a back and a front rounded vowel are very rare.

---

\(^2\) Note the peculiarity that the rule includes an orthographical symbol, \(i\), in its formulation, the pronunciation varies, it can be **i**, **ə**, **ai**.
8.1.2 The verbal prefix boundary

In English the stress rule stresses the ult of a verb if it is heavy, as in (6a), and the penult if the ult is light, as the verbs in (6b) show (cf. §4.5.1.2). This rule regularly fails on a set of verbs that have a stressed light ult, as shown in (6c).

(6) Stress patterns in bisyllabic words

<table>
<thead>
<tr>
<th>a. tormént</th>
<th>b. édit</th>
<th>c. forgéť</th>
</tr>
</thead>
<tbody>
<tr>
<td>salúte</td>
<td>cáncel</td>
<td>compél</td>
</tr>
<tr>
<td>defý</td>
<td>devélóp</td>
<td>omit</td>
</tr>
<tr>
<td>agréée</td>
<td>abándón</td>
<td>bégin</td>
</tr>
<tr>
<td>secréte</td>
<td>mánage</td>
<td>attách</td>
</tr>
</tbody>
</table>

Regarding their syllabic structure, the words in (6c) are not different from those in (6b), what they differ in is their morphological structure: the verbs with a stressed light ult all contain a verbal prefix. This is marked as forget, compel, etc. The stress rule cannot assign stress to a verbal prefix (i.e., to the left of the prefix boundary, =). The same boundary is present in a large set of verbs like resist, observe, evolve, pose, construct, forswear etc., but since the ult of these verbs is heavy, and thereby attracts stress anyway (making them like the verbs in (6a) above), stress placement does not reveal the presence of the boundary.

Another property of stress in English also necessitates reference to the verbal prefix boundary. In verbs of three (or more) syllables, stress regularly falls on the penult if the ult is light (just like in regular shorter verbs), but on the antepenult if the ult is heavy, as shown in (7a) and (7b), respectively.

(7) Stress patterns in trisyllabic words

<table>
<thead>
<tr>
<th>a. astónish</th>
<th>b. vóbłate</th>
<th>c. introduítė</th>
</tr>
</thead>
<tbody>
<tr>
<td>imágine</td>
<td>sátísfy</td>
<td>cómpréhénd</td>
</tr>
<tr>
<td>consídér</td>
<td>cómplément</td>
<td>intervéén</td>
</tr>
<tr>
<td>embáráss</td>
<td>cóloníze</td>
<td>réprézent</td>
</tr>
</tbody>
</table>

As we have seen in chapter 6, the pattern in (7b) is standardly claimed to be the result of a rule (the Alternating Stress Rule) that moves stress two syllables back from the end of the word. The same rule applies in nouns (e.g., húrricáne, anecédóte, Árkansás) and adjectives (e.g., absólúte, máñífést, móribând) with a heavy ult.3 The peculiarity of the verbs in (7c) is that the Alternating Stress Rule does not apply to them: stress is on their heavy ult. What distinguishes words of three or more syllables with stress on the antepenult (as in (7b)) and stress on the ult (as in (7c)) is the = boundary: if it is right before the last syllable, stress cannot move forwards to the antepenult. With the exception of complement, none of the verbs in (7b) contain a verbal prefix, and even in

3 The Alternating Stress Rule leaves a stress on the last syllable. This stress is here marked as secondary, but it may be analysed as tertiary as well, in either case it is less prominent than that on the antepenult.
complement the prefix boundary is not before the last syllable. On the other hand, the verbs in (7c) contain either a bisyllabic prefix, or two monosyllabic ones, but in either case there is a prefix boundary before their last syllable (intro=duce, com=pre=hend, inter=vene, re=pre=sent).

In some of these verbs, the boundary can be detected by other phonological tests, like, for example, s voicing. While ⟨s⟩ is not normally voiced intervocically in English (cf. analy[2]s is, epi[2]s ode), it is when the prefix boundary comes between the vowel and the ⟨s⟩ (cf. re=[2]ist, pre=[2]erve, de=[2]ign, re=[2]ume etc., vs. in=[2]ist, con=[2]erve, con=[s]ume). Comparing pairs like re=[2]olve ‘determine’ vs. re-[s]olve ‘solve again’, or re=[2]erve ‘withhold’ vs. re-[s]erve ‘serve again’ clearly shows that it is the verbal prefix boundary that must be referred to if this pattern is to be explained as a phonologically regular alternation.4

The voicing of s is sensitive to historical contexts that are only preserved in the spelling. For example, there is no voicing in assign or persist, although they contain the verbal prefix boundary followed by an s, which in current (Standard Southern British) English is intervocalic. Their spelling shows that they were not intervocalic in some earlier stage of the language.

8.1.3 The word boundary

Word boundaries occur between words. The problem is that it is far from obvious what it means to be a word in linguistics. Furthermore, words are hierarchically organized: a word may contain other words. For example, blackbird is a word which contains two other words, black and bird, accordingly one would posit #black#bird# as its representation. This, however, does not show the difference between blackbird and black bird, although the phonological representation of the two must be distinguished, since their stress patterns differ (it is 13 for the type of bird, and 21 for any bird which is black; see chapter 7).

A word is a free form, that is, a free morpheme. Bound morphemes (affixes, like re-, un-, -ing, -ness; bound stems, like opac-(ity), wive-(s)) cannot be considered words, since they are not free forms. Taking a “word” like pitiless then, we must conclude that there is a word boundary around the stem pity, since that is a free form here: #piti#less (note that the i/y “alternation” is merely orthographical). In #piti#less#ness both pity and pitiless, as well as pitilessness are words. Accordingly, we can represent the latter one as #piti#less#ness#.

The representation above is still not acceptable. It falsely implies that the suffixes -less and -ness are on a par with the stem pity, that is, that they are words themselves: there is no difference between the representations of #piti#less# and #black#bird#. But this is wrong: -less and -ness are not free forms. The reason for the faulty implication is that the word boundary symbol is undirected, it suggests that wherever a word finishes another one begins. In reality, except for exclusively isolating languages, this state of affairs rarely occurs. In most cases words end without a following word beginning, and a word begins without a previous word ending. In #piti#less#3, #2 indicates the

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4 Although counterexamples are rare, it must be noted that there is no such voicing in the case of the Germanic verbal prefix be-, cf. be=[s]eech.
8.1.4 Identifying boundaries

We now face a more practical problem: how to determine whether a certain morpheme boundary is to be represented with the morpheme boundary proper (\(+\)), or with the word boundary (\(\#\)).

One criterion might be whether the stem is free or not. If not, we are strongly persuaded to posit a morpheme boundary. In the case of a word like _opacity_ or _acidic_, the vowel shift (\(\text{ei} \sim \text{æ}\)) and the velar softening (\(\text{k} \sim \text{s}\)) in the first, or the stress change (\(\text{ácid} \sim \text{ácídic}\)) in the second are reason enough not to suppose a word boundary: the stems are evidently not free. But if we supposed that in words like _oddity_ or _postal_, in which the stems are free, there is a word boundary between stem and suffix, our “explanation” would be circular: if the stem is a free form there is a word boundary after it, and there is a word boundary after a stem if it is free. This is not acceptable. Instead, we would want some clearcut method, which always enabled us to tell the type of boundary between morphemes. A great majority of the relevant data suggest that suffixes and prefixes come in two types, one connecting to the stem with a morpheme boundary, the other with a word boundary. Thus, if _-ity_ proves to be a morpheme-boundary suffix, inducing velar softening, vowel shift, and stress shift, then it attaches to the stem with a morpheme boundary even when the stem is such that none of these changes are applicable (is not velar-final, has a lax vowel anyway, is monosyllabic, etc.), as in _odd+ity_. Twisting the well-known wisdom about phonemes, we could say “once a morpheme-boundary suffix, always a morpheme-boundary suffix.”

Nevertheless, there are cases when an affix, like _-ity_, which we get to know as a weak-boundary affix, behaves unexpectedly, for example, it fails to cause trisyllabic laxing in _obésity_. There are two possible cures for such a problem. We either claim that there exist two _-ity_ suffixes, one attaching to stems with a morpheme boundary, the other with a word boundary. Alternatively, we may suggest that the morpheme boundary does not exist: both _opácity_ and _obésity_ are monomorphemic, the fact that one has a lax vowel in its stressed antepenult, the other a tense one is no more significant than the same difference between _Ánnabel_ and _Abraham_.

Another useful test for boundary types is phonotactic constraints. There are very few such constraints about clusters separated by a word boundary, phonotactic constraints typically regulate _TAUTOMORPHEMIC_ clusters (clusters not separated by a word boundary). These constraints on the other hand are rather strict. Therefore, many consonant clusters are only possible when separated by a word boundary. Faced with the string...
tactful, for example, the analyst has but to posit a word boundary between the t and the f, since we never encounter tf within a morpheme in English.

8.2 Clitics

For people growing up in a literate society, it always comes as a surprise to learn that orthography is a very unreliable indicator of phonological structures. As we have seen, orthography does not indicate a significant portion of phonological word boundaries, in pitiless, for example, spelling does not show the word boundary after the free form piti-. At the same time, orthography may indicate a word boundary where there is none (like in at all at'b'l, aspiration shows that this is one word, at least in SSBE, where the t is aspirated). One might think that solitary boundaries (i.e., ‘]’ and ‘[’ are not indicated in spelling, but double boundaries (i.e., ‘][’ are. To take an example: [[pity][less]] is written as one word, but [][pity]] as two.

However, there are a number of “words” that orthographically appear to be full-fledged words, but are not free forms. Articles are an obvious example: forms like of, in, and on do not appear in isolation, as utterances. (When they seem to occur in isolation, in metalinguistic use, when talking about the article itself, it is another allomorph, di: and ei or zen, that appears.) They also lack an important phonological characteristic of wordhood, stress, and the full vowel that always accompanies stress. Other examples of this category include auxiliaries, prepositions, many kinds of pronoun, etc., basically monosyllabic function words. Such phonologically dependent units are called Clitics. Clitics (like affixes) come in two types: some cliticize to a host to the right, these are called proclitics, others to a host to the left, they are the enclitics. (8) shows the parallelism between clitics and affixes.

(8) Affixes and clitics

<table>
<thead>
<tr>
<th>scheme</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>proclitic–host–enclitic</td>
<td>will [[like]it] = will like it</td>
</tr>
</tbody>
</table>

Phonologically there is little if any difference between clitics and affixes. The reason the two categories are distinguished terminologically (and also orthographically) is syntactic, i.e., combinatorial: it is possible to insert words between a clitic and its host, e.g., will never like all of it, while there is no such possibility in the case of affixation. The phonological structure of such phrases is radically modified, the host of the clitics change, as shown in (9).

(9) Clitics attach to a different host

[ will [ never ] ] [ like ] [ [ all ] of ] it ]

5 Note that ‘[]’ is not an occurring configuration.
Note that the bracketing in (9) does not reflect syntactic structure, only hosts and clitics. Units consisting of a host and its enclitic(s) usually make up a foot, but it may occur that a host itself consists of more than one foot (i.e., contains more than one major stressed syllable): e.g., she introduced him.

### 8.3 Types of phonological rules

We have seen that rules like velar softening and trisyllabic laxing, as well as stress rules are blocked by a word boundary. Other rules, like l-darkening or r-dropping, are not, the word boundary is invisible to them. This is a major split in the realm of phonological rules. The first type (those that are sensitive to the presence of a word boundary) are called *lexical rules* (or structure-dependent rules), the second type (those that are insensitive to word boundaries, and work “across the board”) are called *postlexical rules*. (10) collects points where the two types of rules differ.

(10) *Some properties of lexical and postlexical rules*

<table>
<thead>
<tr>
<th></th>
<th>lexical rules</th>
<th>postlexical rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. apply only between #s</td>
<td>apply between and across #s</td>
<td></td>
</tr>
<tr>
<td>b. produce phonemic changes</td>
<td>produce allophonic changes</td>
<td></td>
</tr>
<tr>
<td>c. may have exceptions</td>
<td>do not have exceptions</td>
<td></td>
</tr>
<tr>
<td>d. are not blocked by pauses</td>
<td>may be blocked by pauses</td>
<td></td>
</tr>
<tr>
<td>e. their outcome cannot be undone</td>
<td>their outcome can be undone</td>
<td></td>
</tr>
</tbody>
</table>

One can only hope that the properties listed above characterize each phonological rule, that each rule shows properties of either only the lexical, or only the postlexical type. (We return to the cryptic-sounding property in (10e) in §8.5.) We are now going to examine some examples of the two types of affixes, looking for cases when our expectations of their behaviour are frustrated. The affixes that trigger lexical rules are going to be referred to as *lexical affixes*, those that do not will be called *neutral affixes*.

#### 8.3.1 Aspiration

The rule of aspiration is sensitive to three factors: stress on the following vowel, a word boundary preceding the voiceless stop, and a fricative preceding the voiceless stop. (You may check §4.4.3 for details.)

The fact that the word boundary is referred to in the rule strongly suggests that we are dealing with a lexical rule. Other properties of the rule corroborate this. The t of *hit Éve* is unaspirated, although it is followed by a stressed vowel. This is because the intervening word boundary shields that vowel off. The t of *mistime* is aspirated on the other hand, although it is preceded by an s. This is because the word also contains a word boundary (*mis#time*), which makes the preceding fricative invisible. It is telling that pronunciation dictionaries, which intend to mark only phonemic features of words, indicate whether a voiceless stop is aspirated or not by placing the stress mark either before it (in which case it is aspirated, as, e.g., in *mistime* _mis'taIm_) or before the preceding s (in which case the stop is not aspirated, as, e.g., in *mistake* _mɪ'steɪk_). This
amounts to the admission that aspiration is not predictable merely from the sequence of segments and the location of stress in a string, morphological structure also influences it.

At the same time, aspiration is held to be an allophonic rule. This is problematic, because, as (10b) suggests, lexical rules ought to produce phonemic changes.

This apparent paradox can be resolved by assuming (as chapter 3 proposes) that the two series of plosives (p t k vs. b d g) are not distinguished by voicing, but, among other things, by aspiration. Accordingly, aspiration is a contrastive feature of voiceless plosives. Under such a scenario the two series of plosive in English are \(p^h\) t\(h\) k\(h\) and \(p t k\) (the first typically spelt \(p\), \(t\), \(c\)/\(k\), the latter set \(b\), \(d\), \(g\)). We now do not need an aspiration rule any more: what we need instead is a voicing rule that will make unaspirated plosives voiced. This rule would indeed be allophonic, and, as expected, postlexical (it would not affect the \(d\) of read to her, but it would voice that of read it). In this analysis the voiceless unaspirated stops following the \(s\) in, e.g., spot, stop, scope are in fact instantiations of \(b\), \(d\), and \(g\), respectively.

Unfortunately, even such a change of the relevant contrast does not solve the problem, since now the deaspiration rule is allophonic, but lexical.

8.3.2 The peculiarities of -ize

The suffix -ize embarrasses the analyst. The fact that it causes velar softening (e.g., criti\([s]\)ize, Catholi\([s]\)ize) categorizes it as a lexical affix. Despite this, trisyllabic laxing often fails to apply before it: e.g., final\(i\)ze, p\(e\)nal\(i\)ze. Although one could argue that we are facing two -ize suffixes, one lexical, the other neutral, such a solution would yield a circular explanation. Furthermore, it turns out to be untenable, since in some cases the same -ize-suffixed word exhibits both phenomena: the lack of velar softening in diphthon\([g]\)ize implies a neutral suffix, but the fact that the \(g\) is pronounced at all implies a lexical suffix, as we are going to see in §8.3.3.

8.3.3 The comparative -er

Recall that comparative forms like stronger strong\(a\) were analysed as counterexamples to the generalization that postnasal \(g\) is dropped before a morpheme boundary. The difficulty of explaining why \(g\) is not dropped in this case disappears if we take -er to be a lexical suffix. If so, we do not expect the \(g\) to be dropped in comparative adjectives, since there is no word boundary following them. In fact, we are claiming that there are two -er suffixes: -er\(_1\), which is neutral and \(g\)-dropping takes place before it (e.g., si\([u]\)er), and -er\(_2\), which is lexical and \(g\)-dropping does not take place before it (e.g., stro\([n\]g\]er). The two suffixes are also distinct in their functions: -er\(_1\) is an agentive suffix producing nouns out of verbs, -er\(_2\) is a comparative suffix added to adjectives to get their comparative form. The superlative -est has the same properties, thus it may also be analysed as a lexical suffix.

It is not only the \(ng\) cluster that is banned in word-final position in English, but also the other noncoronal nasal+voiced stop cluster, mb. Alternations are fewer in number, but examples like iamb nam\(a\)m ∼ iambic naan\(m\)bik, rhomb r\(u\)m ∼ rhomboid r\(o\)mb\(o\)id show the pattern clearly. Intriguingly, the comparative forms number nam\(a\) and dumber d\(a\)na\(m\) do not contain a \(b\), counter to our current predictions. (Note the homograph of nam\(a\):
Actually, there is no other reason than their spelling to assume that these comparatives should contain a b, phonologically they are no different from other adjectives like dim or calm, which simply end in an m, and have the comparative forms dimmer dimə and calmer kəmə. That is, phonologically there is nothing peculiar about the comparatives number nəmbə and dumber dəmə, only their spelling is misleading.

Another factor that distinguishes lexical and neutral suffixes is the obligatoriness or optionality of syncope before them. Adjectives ending in a syllabic l contain a nonsyllabic l in their comparative (and superlative) form, as shown in (11b). This alternation is typical of lexical suffixes, but not of neutral ones, as the lexical -ic and the neutral -ing show in (11a).6

(11) Losing syllabicity before a lexical suffix

Most adjectives that end in a syllabic l loose the syllabicity in the comparative and superlative forms (abler, ampler, feebler, gentler, hambler, idler, nimbler, nobler, suppler). However, littler and subtler may preserve it: litlə or lɪtlə and satlə or sɑtlə.

In §8.6, we are going to introduce another test, which, unfortunately, argues for a neutral comparative and superlative suffix.

### 8.3.4 Velar softening and -ic

The suffix -ic, as has been argued up to now, is clearly a lexical suffix. Since it begins with i, we expect velar softening to apply before it. In some cases, it indeed does (e.g., pedago[g] ∼ pedago[θ]ic), but in others it does not (e.g., monár[k] ∼ monár[k] ic). Claiming that in the latter case we are dealing with another -ic, one which is attached to stems with a word boundary, is not an option since, as shown in the example, this hypothetical -ic2 shifts stress, something that neutral suffixes can never do. A more promising solution is offered in the next section.

### 8.4 The status of lexical rules

In §8.1.1 it was noted that words containig only a morpheme boundary behave like monomorphic forms, that is, crimin + al and animal are not different from the viewpoint of phonology. According to the as-if principle of chapter 1, this means that words containing a morpheme boundary are monomorphic phonologically, that is, phonological rules treat them as they treat single morphemes. The phonology cannot tell whether such a word is morphologically simplex or complex, it is not sensitive to the morpheme boundary, +, at all. The repercussions of this claim are far reaching.

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6 It must be admitted that no such alternation is found for r before the comparative and superlative suffixes (cf. clev[r]er, tend[r]er, but *cle[r]er, *tend[r]er), although the alternation holds before other suffixes (cf. cent[r]+al ∼ cent[r] # ing).
If words like opacity are monomorphemic, rules like trisyllabic laxing lose their validity. Opacity now just happens to be a word that contains a lax vowel in its antepenultimate syllable, and there is no point in positing a rule about this, since (as has been argued) antepenultimate-stressed monomorphemic words are not subject to trisyllabic laxing: their stressed vowel may be tense or lax alike. Or, to take another example, velar softening is not a rule anymore: it would take an excessively hard-core generative phonologist to derive the s of a monomorphemic word like city from a k. Being monomorphemic, the s in opacity is not any different. What is more, exceptions are trivially managed this way: the k in monarchic needs no more of an explanation vis-à-vis the s in opacity than the k in Kitty or the s in city. The same considerations will prove any lexical rule to be useless and redundant. In fact, when a lexical rule has no exceptions (like aspiration or breaking), it produces absolute neutralization (see chapter 2): no alternations will be found, since opacity is now not derived from opaque any more than went is from go.

8.5 Word and syllable boundaries

We have seen in chapter 4 that certain phonological rules are well describable by reference to syllable boundaries: some phonological changes occur in coda (others in onset) position. Also recall that onset maximization was claimed to be a universal principle, that is, a string VCV is always expected to be syllabified as V.CV. The question in this section is how boundaries affect syllabification.

The case of the morpheme boundary is clear: it has no effect on syllabification. Indeed, the data in (12) show that in a C + V string the consonant is unambiguously in onset position.

(12) a. atmosphèreic b. sincéritiy c. sett'hée d. spitt'hón
   histőric parity escap'hée block'håde
   lýric minórity marq'huée escap'håde

The words in (12a) and (12b) each contain a morpheme boundary between the r and the -ic or -ity suffix. The lack of broadening shows that the r must be in the onset of the last syllable (just like in carrot). The words in (12c) and (12d) show the same thing: the stem final voiceless plosive is aspirated, which it can only be if it is in the onset of the last syllable. This fact is not surprising if A + B strings are treated by the phonology as monomorphemic; onset maximization prevails as in any other monomorphemic form.

The situation is more intricate in the case of word boundaries. Recall that broadening and the breaking of true diphthongs occurs when the vowel and the following R are in the same syllable (see §8.4.4.2). Now consider the data in (13).

(13) a. st[ɑː]rry b. wiry waоiri c. hilly
   f[ɑː]rry scourer skаооо filler
   abh[ɑː]rring devouring диваооо peeling

The fact that the vowel is broad in (13a) and the true diphthong is broken in (13b) is evidence that the following r is tautosyllabic, hence VC#V is syllabified with the
consonant (r) in coda. However, the l’s in (13c) are all clear, and the r’s in (13a) and (13b) are pronounced. This is an indication that the word-final consonant (r or l) is now in onset.

The contradiction is only apparent: breaking and broadening are lexical rules, i.e., they apply to a string between word boundaries (cf. (10a)), and their result cannot later be undone (cf. (10e)). R-dropping (or R-insertion), as well as L-darkening are, on the other hand, postlexical. Thus at the point where breaking and broadening applies the string #star#, #wire#, etc. is considered. In them, the r is in coda position and tautosyllabic with the preceding vowel. Postlexically, the string starry is considered. Here the r is in the onset of the second syllable, it is pronounced, but lexical breaking cannot be undone.

You may have noticed another trick in the discussion: at one point word-final consonants were claimed to be the onset of a degenerate syllable, whereas now they are treated as in coda position. In some respects word-final consonants do exhibit coda-like behaviour (e.g., in the case of l and r here), in others they are unlike codas (they do not make the last syllable of a word heavy). We do not have the space here to elaborate a theory that explains this double behaviour of word-final consonants, but there do exist plausible explanations.

8.6 Remaining paradoxes

There remain some unsolvable paradoxes. Some of them will be listed here, without any attempt at an explanation.

As hinted at in §8.3.3, the categorization of comparative and superlative suffixes is made dubious by the “breaking test.” The diphthong of sourer and sourest is broken. This is problematic if -er and -est are taken to be lexical suffixes. It does not help blaming the exceptionality on (10c), namely, that lexical suffixes may have exceptions. The breaking rule does not have exceptions, if sourest were monomorphemic the form *saurst would be acceptable, but it does not exist.

Note that claiming comparative -er and -est to be neutral suffixes is even worse a solution. Although it explains the breaking facts, now stron[ɡ]er and stron[ɡ]est become exceptional in having ɡ before the alleged word boundary.

The phonological shape of the word grateful’grætfəl suggests the structure [[græt]ful] for several reasons. For one thing, the cluster tf does not occur tautomorphemically in English. For another, we do not expect a tense vowel to occur before a noncoronal cluster like tf even if it did occur tautomorphemically. Since -ful bears no stress, it must be a suffix (or enclitic), with grate- as its stem. Unfortunately, *grate is not a free morpheme, despite the prediction made by this theory. Although there are two morphemes pronounced great, great and grate, neither can be the stem of grateful for semantic reasons.

The case of wives warvz is similar: the stem alternation (waɪf ~ warv) suggests that there is no word boundary involved in this plural suffixation, but the cluster vz and the tense vowel preceding it are possible only with a word boundary separating the two consonants. In dreɪmt dreɪnt and depth depθ the vowel shortens (cf. dream dri:m, deep.
di:p), but the clusters mt and p0 do not occur within a morpheme—except in these two words, provided they are monomorphemic from the viewpoint of phonology.

The categorization of the suffix -ly is highly problematic. In many respects it behaves like a neutral suffix. In a word like *logically logikali it does not affect the place of the stress, for example. If -ly were a lexical suffix, there could hardly remain preantepenultimate stress in a word containing it. At the same time, if -ly were indeed a neutral suffix, we would not expect degemination, the word should be *logikal#li (cf. drunken#ness drunjkonas), which it is not. To add to the confusion, stem-final unstressed -i also changes as if it became stem internal before -ly: happy ∼ happily haepili (*haepili). Neutral affixes do not influence the stem-final vowel: happy haepi ∼ happiness haepinass, carry keri ∼ carried kærid ∼ carrying kærin, copy kopi ∼ copies kopiz. The suffix -ly does.

The stem final tense i is laxed and/or reduced not only before -ly, but also before two other, allegedly neutral suffixes, -less and -ful: mercy mæsi ∼ merciless mæsolas, beauty bjutli ∼ beautiful bjutəfal.

In fact, -ly may alter the location of the stressed syllable: nécessary ∼ nécessarily is an optional alternation. These properties of -ly categorize it as a lexical suffix, a status which is incompatible with the fact that we find fake geminates and other tautomorphemically unprecedented consonant clusters resulting from -ly-suffixation (e.g., promptly, beastly, worldly, laxly, etc.).

### 8.7 Conclusion

The aim of this chapter was to provide a glimpse of how morphology and syntax seep down to phonology, what the phonology machine gets to know of these higher organizational modules of language, and what it does not get to know. As is usually the case, the analyses are not fully hygienic, paradoxes remain to be solved by future analysts. Perhaps you.

### 8.8 Checklist

The following list serves for you to check whether you have understood the topics discussed in this chapter. If you know what the items mean, you are on the right track.

- * morpheme (formative) boundary (+) vs. word boundary (#)
- * the effects of the verbal prefix boundary (=) on stress rules
- * the invisibility of the morpheme boundary
- * velar softening, trisyllabic laxing and the morpheme boundary (+)
- * clitics: proclitics, enclitics
- * the difference between a natural affix and a clitic is only syntactic

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7 We do find a fake geminate l at the end of monosyllabic stems containing a tense vowel, suffixed with -ly: coolly ku:lili, foully fauli, palely pælli, vilely vauli, wholly houlili, as well as in dally dalli, with a lax stem vowel, but the same pattern is expected for any l-final stem.
the word boundary (#) and phonotactic constraints

lexical vs. postlexical rules

lexical vs. neutral affixes

aspiration is lexical but allophonic

the peculiarities of -ize, -er, -est, -ly

the redundancy of lexical rules

breaking and broadening vs. R-dropping/insertion (e.g., wiry waI@ri)