# *Final codas: why the west was wrong*[*]

John Harris (UCL)
Edmund Gussmann (KUL)

---

## 0 Introduction

It's commonly supposed that any consonant at the end of a word occupies a syllable coda. Although typically assumed as a matter of self-evident truth, this notion is more often implicitly assumed than explicitly motivated. It is almost certainly wrong. In this paper, we review the main reasons for rejecting it in favour of a rather older view according to which a final consonant occupies the onset of a syllable containing a silent nucleus.

§1 sets up the competition between the two views. §2 explains why a final consonant can't be a coda, §3 why it must be an onset, and §4 why this onset must be followed by an empty nucleus.

## 1 Final consonants: the eastern and western prospects

Neutrally construed, the term SYLLABIFICATION refers to the relation between segment strings and syllabic constituents. In practice, most work in phonology treats the link as a unidirectional relation in which syllable structure is read off segment strings. This essentially phoneme-centred view finds clearest expression in the assumption that syllabic structure is largely absent from lexical representations and is either constructed or mapped by rule (e.g. Vennemann 1972, Kahn 1976, Levin 1985, Itô 1986) or supplied by a phonological generator (e.g. Prince & Smolensky 1993).

In the usual implementation of this view, syllabification hugs the sonority contours of phoneme strings. In a given sequence of segments, each sonority peak assumes the status of the core or nuclear portion of a syllable, while any flanking sonority troughs form the margins of the nucleus. From this it follows that '[e]ach sonority peak define[s] a unique syllable' (Blevins 1995:207). In any given word, there are thus as many nuclei, hence syllables, as there are sonority peaks, and conversely there are no nuclei or syllables without sonority peaks.

A direct consequence of this view is the identification of consonantal word edges with syllable margins: given a word containing just one sonority peak, it seems natural to assume that whatever precedes the peak must be an onset and whatever follows it must be a coda. Thus in the English word **blank**, *bl* and *ŋk* are the consonantal margins of the peak formed by *æ* and are therefore projected as an onset and a coda respectively. Proponents of this view generally take its validity for granted: '[i]n all languages, syllable edges correspond

with word/utterance edges', as Blevins puts it (1995:209).

The phoneme-centred approach yields a typology consisting of a small closed set of core syllables such as CV, V and CVC, which are widely distributed across the world's languages, and an essentially open set of more complex marked syllables. On this view, there is no principled limit on the number of consonants that can occur in complex onsets and codas. For example, the onset supposedly formed by the initial *fstr* cluster of Polish **wstręt** 'repulsion' happens to contain four, as does the coda supposedly formed by the final *rpst* of German **Herbst** 'autumn'. You might even squeeze five coda consonants out of the final *mpfst* of English **thou triumphst** (Whorf 1940).

If 'syllable structure can be determined just from the segmental composition of a word' (Spencer 1996: 96), the question naturally arises as to whether it is necessary at all. Since the sequential specification of segments is a necessary and irreducible part of lexical entries, we might easily conclude that any generalisation about onset or coda clusters could be more economically framed in terms of word- or morpheme-structure conditions — precisely the view adopted in SPE. The only way of justifying the habilitation of syllable structure in phonological representation is to show that it enjoys some degree of autonomy from morphological structure. One step in this direction is to relinquish the assumption that onsets and codas can slavishly mimic word edges. Within the phoneme-centred approach, this move has been accomplished by invoking additional syllabic configurations at word edges, including such devices as SYLLABLE APPENDIX and EXTRASYLLABICITY (see Blevins 1995 for references). Even the use of these devices typically reveals only a grudging acceptance of the notion that word ends might not align neatly with syllable ends. Word-final extrasyllabicity, for example, is typically regarded as no more than a way-station on a consonant's derivational road to surface coda status (see Itô 1986 for an proposal along these lines).

However, rather than immediately indulging this increase in the armoury of syllabic structures, we should first raise a fundamental question about the central premise of the phoneme-centred view: is it really the case that syllable structure is projected parasitically from segment strings? Suppose we entertain the alternative idea that syllable structure should be defined independently of segment strings and word structure. What empirical consequences flow from making the conceptual switch to this syllable-centred view?

One immediate consequence is a rejection of the assumption that every syllabic position is necessarily occupied by a segment; there may be syllabic positions without any associated segmental content. This allows us to maintain a highly restricted set of syllable types and to dispense with the complex non-core structures that the phoneme-centred approach sees as ordinary, hence unsurprising, or at least as necessary. It is this alternative view of syllabic structure that we wish to explore in the present paper. Specifically, we will concentrate on the final consonant of the word: under the syllable-centred approach, this does not have to constitute a coda. We will claim that in fact it can't. A survey of the main problems surrounding the final-coda view will set the scene for a discussion of how the syllable-

centred approach leads us to view final consonants rather as as onsets. Explicit arguments for this conclusion have been put forward by Kaye (1990) and have appeared in print in various places (e.g. Charette 1991, Gussmann & Kaye 1993, Harris 1994). Nevertheless, we believe it is worth spelling them out in full again, since they have gone unanswered in much of the current literature on syllable theory. (For example, Blevins' (1995) otherwise extensive survey of the relevant literature makes no reference to them whatsoever.)

We start by placing the discussion in the broader historical context of two distinct linguistic traditions which have adopted quite different perspectives on the syllabification of word-final consonants. The final-coda view is part of an essentially 'western' or Graeco-Roman tradition running through work on versification and phonology. This is in contrast to a more ancient 'eastern' tradition which maintains that a word-final consonant occupies the onset of a 'dull' syllable — one that lacks an audible nucleus.

The eastern view is perhaps most obviously embodied in syllable-based writing systems. By way of illustration, consider how the following modern Amharic words are represented in the Ethiopic *Fidäl* syllabary used for that language (as well as for Tigrinya, Oromo and classical Ge'ez among others):

| (1) | | Fidäl | Alphabetic | |
|---|---|---|---|---|
| | (a) | ናስ | *nas* | 'come' |
| | (b) | ክናስ | *k'ənas* | 'honest' |
| | (c) | ክንድ | *k'ənd* | 'day' |

To appreciate the phonological thinking behind these orthographic forms, it is important to bear in mind that each *Fidäl* symbol stands for an entire syllable. Note how the symbol ና represents the syllable *na* in both (1)a and (1)b and how ክ represents *k'ə* in both (1)b and (1)c. What strikes the eye is the way in which the symbol ድ in (1)c represents the word-final *n*, implying that this consonant occupies a separate syllable from the preceding *k'ə*.

The assignment of a word-final consonant to the onset of a dull syllable is characteristic of all syllabaries. Besides *Fidäl*, examples include the family of *Brāhmī*-derived scripts (e.g. *Devanāgarī* (Sanskrit, Hindi), Bengali, Gujarati, Telugu and Sinhalese), Japanese *Katakana* and *Hiragana*, and Korean *Han'gŭl*. In what follows, we will argue that this eastern tradition contains a fundamental insight into syllabic organisation that modern phonoloical theory would do well to embrace.

## 2 Why final consonants aren't codas

**2.0** Before proceeding to a presentation of the positive evidence supporting the phonological reality of dull syllables, we wish to clear the ground by reviewing some of the negative evidence against the final-coda view. The evidence we will focus on comes from

three main areas — syllable typology, word stress and vowel length.

### 2.1 Language typology

According to one common classification, languages divide into two main syllabic types — one which permits only open syllables (the 'CV' type) and one which tolerates both open and closed syllables (the 'CVC' type). Inherent in the final-coda view are the following typological predictions:

(2) (a) any CV language simultaneously lacks both internal codas and final consonants;
(b) any CVC language simultaneously allows for both internal codas and final consonants.

Languages of the predicted sort are not difficult to find: for example, Zulu and Yoruba instantiate (2)a, while English and Polish instantiate (2)b. However, as Kaye (1990) points out, there are two other observed types that the classification fails to account for — one which excludes internal closed syllables but allows final consonants (Luo and Yucatec Maya for example) and another which allows internal closed syllables but forbids final consonants (Italian and Telugu for example).

Thus it seems that languages face two separate choices in this matter: whether or not to have domain-internal codas, and whether or not to have word-final consonants. As tabulated below, the intersection of these two options defines four rather than just two different types of syllabic systems (• indicates a syllable boundary).

(3)

| Final VC]? | Internal VC•? No | Internal VC•? Yes |
|---|---|---|
| No | **Ia** ...V•CV] Zulu | **IIa** ...V(C)•CV] Italian |
| Yes | **Ib** ...V•CV(C)] Luo | **IIb** ...V(C)•CV(C)] English |

The four-way typology in (3) contradicts the predictions in (2). Moreover, it undermines any assumption that a domain-final consonant should automatically be equated with a domain-internal coda.

## 2.2 Stress

The standard work on metrical phonology has long felt uncomfortable with the final-coda view. This is revealed in the acknowledgement that, for stress purposes, a word-final consonant sometimes has to be treated as EXTRAMETRICAL in that it fails to contribute to the weight of the preceding syllable (e.g. Hayes 1982). To illustrate, let us consider a well-known sub-regularity involving stress-placement in English verbs. The generalisation in question is that the final syllable of a verb attracts stress when it is heavy (that is, when its rhyme contains a complex nucleus or a simplex one followed by a consonant); otherwise it is the penultimate syllable that is stressed. The examples in (4)a and (4)b illustrate final stress, those in (4)c the penultimate pattern.

| | | | | | | |
|---|---|---|---|---|---|---|
| (4) | (a) | torménт | (b) | cajóle | (c) | édit |
| | | lamént | | maintáin | | astónish |
| | | collápse | | caróuse | | cáncel |

The examples in (4)c clearly indicate that the final consonant does not contribute to the weight of the preceding rhyme, i.e. it does not make the rhyme heavy, hence stress-attracting. The word **cancel** shows that *kæn* and *səl* are not equal from the point of view of stress; otherwise *səl* would be stressed. Since this particular regularity does not take into account the word-final consonant, the relevant stress domains (which are in fact feet) are represented as in the parenthesised portions of **tor(mén)t**, **ca(jó)le** and **(édi)t**. Similar examples could be cited from many languages (see Hayes 1995 for a referenced survey).

The negative conclusion that emerges from stress considerations such as these is that a word-final consonant does not behave like a coda.

## 2.3 Vowel length

Under certain circumstances, a consonant is observed to force a preceding vowel to be short. Significantly, a necessary (though apparently not sufficient) condition on this occurrence is that the consonant form a coda. The phenomenon — closed-syllable shortening — can thus be expected to provide a useful test of whether a vowel and a following consonant occupy the same syllable. Here we review the relevant evidence from English and Icelandic, focusing on the bearing it has on the status of domain-final consonants.

*English*. In English, the ability of a syllable nucleus to support a length distinction is partially determined by the identity of a following consonant. Significantly, this constraining influence is evident in domain-internal consonants but not in those occurring

finally.

Long nuclei in English are free to occur before a domain-internal onset, as in **final, Peter, lady, loiter**, etc. They can also be found before an internal coda (as in **council, shoulder**, etc.), but there are quite severe restrictions on the nature of the consonant that can appear in super-heavy VVC• combinations of this type. Specifically,

(5) (a) the C must be a fricative or a sonorant, e.g. **pastry, oyster, danger, council, boulder, ancient** (**beypti, *aːkmi*);
(b) if sonorant, C must be homorganic with the following onset, e.g. **council, paltry** (**kawnbəl*, **pɔːlbri*);
(c) in the case of (b), the place is (almost) invariably coronal (**kaympəl*, **iːmpri*).

(For summaries and discussion of these facts, see Selkirk 1982, Borowsky 1986 and Harris 1994.)

The vowel length contrast can also appear before a final consonant, the difference being that any consonant is allowed to appear after either a short or a long vowel. In other words, a final consonant imposes no systematic constraints on the length of the preceding vowel. Consider the examples below:

(6) VC **lid, run, back, top, step, foot, fill, spliff, rich**
VVC **slide, spoon, soap, rake, boot, feel, leaf, reach**

The differences between final (V)VC] and internal (V)VC• are further displayed in English alternations involving closed-syllable shortening, as in **perceive–perceptive** (cf. Myers 1987). The conditions under which the short-vowel alternant occurs, namely when the vowel appears in an internal closed syllable, include those listed in (7). Significantly, no such shortening takes place before a word-final consonant. Here are some further examples:

(7)

| DOMAIN-FINAL | | DOMAIN-INTERNAL | |
|---|---|---|---|
| **perceive** | *iː* | **perceptive** | *ɛ* |
| **describe** | *ay* | **description** | *ɪ* |
| **scribe** | *ay* | **scripture** | *ɪ* |
| **reduce** | *uː* | **reduction** | *ʌ* |
| **five** | *ay* | **fifty** | *ɪ* |
| **wise** | *ay* | **wisdom** | *ɪ* |
| **intervene** | *iː* | **intervention** | *ɛ* |
| **retain** | *ey* | **retentive** | *ɛ* |

The validity of closed syllable shortening as counterevidence to the final-coda assumption is quite unaffected by any controversy that might arise over the derivational status of alternations such as those in (7). On one view, the long and short alternants of a given root are derived from a common underlying form (SPE *et passim*); on another, they are independent lexical forms. (We happen to think there are good reasons to favour the latter.) But this is beside the point: what is crucial is that the phonology of present-day English requires closed-rhyme shortness in specified contexts. The failure to impose shortness before word-final consonants, which gives rise to the alternations in question, is quite at variance with the claim that a word final consonant is a coda.

*Icelandic*. Modern Icelandic, like many other languages, displays the phenomenon of metrical lengthening, the requirement that a stressed open syllable contain a long vowel (for extensive discussion see Árnason 1980, Gussmann 1985 and the references therein). The overall result is that any stressed rhyme in Icelandic must be heavy, being composed of either VC or VV. One consequence is that a word-final stressed vowel must be long, as in the following examples:

| | | | | | | |
|---|---|---|---|---|---|---|
| (8) | **svo** | *svoː* | ‘so’ | **þú** | *θuː* | ‘you’ |
| | **fæ** | *faiː* | ‘I get’ | **fé** | *fjɛː* | ‘livestock’ |

Domain-internally, stressed vowels are long before single consonants, which clearly belong to the onset of the following syllable (see (9)a), and before clusters of two consonants which form branching onsets (see (9)b).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (9) | (a) | **fela** | *fɛːla* | ‘hide’ | **tala** | *tʰaːla* | ‘speak’ |
| | | **ráða** | *rauːða* | ‘advise’ | **éta** | *jɛːtʰa* | ‘devour’ |
| | | **þola** | *θɔːla* | ‘tolerate’ | **yfir** | *ɪːvɪr* | ‘over |
| | | **sími** | *siːmɪ* | ‘telephone’ | | | |
| | (b) | **betri** | *bɛːtʰrɪ* | ‘better’ | **nepja** | *nɛːpʰja* | ‘cold weather’ |
| | | **vökva** | *vøːkʰva* | ‘water flowers’ | | | |
| | (c) | **panta** | *panta* | ‘order (vb.)’ | **senda** | *senda* | ‘send’ |
| | | **mælti** | *maʸltɪ* | ‘speak (pret.)’ | | | |

Before an internal coda, on the other hand, a vowel must be short, as in (9)c.

As described to this point, the pattern is quite straightforward: stressed nuclei must branch in open syllables and must not branch in closed syllables. This unremarkable regularity encounters a major obstacle if a final consonant is deemed a coda: monosyllabic

words ending in C] should constitute closed syllables and should thus only contain short vowels. In fact, the vowel is invariably long in such cases:

| (10) | | | | | | |
|---|---|---|---|---|---|---|
| | **tal** | *tʰaːl* | 'number' | **von** | *vɔːn* | 'hope' |
| | **hæð** | *haiːð* | 'height' | **þjóð** | *θjouːð* | 'nation' |
| | **rök** | *røːkʰ* | 'cause' | **bil** | *bɪːl* | 'moment' |
| | **fet** | *fɛːtʰ* | 'step' | | | |

It is clearly desirable that we produce a uniform account of stressed vowel quantity that will subsume the long vowels of **tal** *tʰaːl* and **tala** *tʰaːla* under the same generalisation. Meddling with syllable boundaries is not a satisfactory solution, because some word-final two-consonant clusters allow a preceding vowel to be long, while others do not. If final consonants are to be assigned to codas, then we would be doubly hopeful of finding a short vowel before two consonants in this context. But a comparison of the long vowels in (11)a with the short in (11)b shows that this does not have to be the case (examples from Thráinsson 1994: 150).

| (11) | | | | | | |
|---|---|---|---|---|---|---|
| (a) | **snupr** *snʏːpr* | 'scolding' | **flysj** | *flɪːsj* | 'peeling' |
| | **pukr** *pʰʏːkr* | 'secretiveness' | **sötr** | *søːtr* | 'slurping' |
| (b) | **kumr** *kʏmr* | 'bleating' | **emj** | *ɛmj* | 'wailing' |
| | **bölv** *bølv* | 'cursing' | | | |

The conclusion which Thráinsson reaches with respect to Icelandic is the following: 'either we need a more sophisticated theory of syllables, namely one that does not consider final consonants and certain final consonant clusters part of the preceding syllable in some sense, or the length of stressed vowels in Icelandic does not depend on syllable boundaries' (1994: 150).

Thus, although Icelandic differs from English in exhibiting metrical lengthening, the vowel-length evidence points to the same conclusion in the two languages: word-final consonants do not affect the quantity of the preceding nucleus. In English, the vowel can be either short or long exactly as domain-internally before a single (onset) consonant. In Icelandic, a stressed vowel before a word-final consonant is invariably long for the same reason as one occurring before a single internal consonant.

The nature of nuclear quantity in both English and Icelandic supports the conclusion that word-final consonants are not codas.

## 3 Word-final consonants are onsets

**3.0** Having built up a case against the notion that a final consonant is a coda, we now outline two main reasons for concluding positively that it must be an onset. We will first consider evidence relating to the phonotactics of word-final clusters, before returning to the issue of preconsonantal vowel length.

### 3.1 Final clusters

Once a syllable template has been established for a given language, it would be naively reasonable to expect it to be as applicable word-internally as at word edges. At least that's the initial supposition you'd be entitled to make on the basis of the view that syllable constituency enjoys independent structural status. In fact, this expectation is rarely met by orthodox analyses of particular languages — hardly surprising when you consider that the templates proposed in such accounts are constructed on the assumption that word edges correspond to syllable edges. What we typically find is that the set of possible consonant clusters allowed for in such templates far exceeds what is attested word-internally. For example, the orthodox notion that the English coda can contain up to four or even five consonants does not prepare us for the disappointment of discovering that morpheme-internal closed syllables can contain at most one. Simple observation confirms this as the overwhelming internal pattern, as found in **win•ter, shel•ter, af•ter, chap•ter**, etc. A certain amount of argumentation is required to press home the point that this is the maximal pattern for internal codas (see Harris 1994 (66ff) for the details). The reason for the mismatch is of course that morphological affixation can produce complex consonant clusters at word edges that never occur domain-internally.

In the case of English, most of the complex word-final sequences result from word-level suffixation, primarily involving the plural, present, past and ordinal morphemes. These suffixes can in principle be appended to anything that is morphologically appropriate; that is, any regular verb can take a past tense form, any regular countable noun can attach a plural ending, and so on. Such processes produce a host of complex final sequences, including for example the *ltʃt, mpft, lmz, ntθs* of **belched, triumphed, films, thousandths**. One good reason for being suspicious of the claim that these constitute genuine tautosyllabic clusters is the fact that they are not permitted within roots; that is, there are no monomorphemic words containing any of these sequences. Moreover, consonant sequences straddling a word-level morpheme boundary are more or less unrestricted in the same way as are sequences that arise across words at sentence level. Note for example how the following word-final sequences have direct parallels with cross-word sequences:

(12)

| Word-level suffixation | Sentence level |
|---|---|
| **dreamed** | **dream did** |
| **ringed** | **ring David** |
| **seems** | **seem zany** |
| **walked** | **walk tall** |
| **boats** | **boat sailed** |

Word-level suffixation is thus little different from sentence-level concatenation in producing pseudo-clusters — combinations which reveal nothing about syllable-internal phonotactics. Any segment sequence crossing a word-level boundary results from lexical insertion and is, from a phonological point of view, accidental.

The appropriate place to establish systematic patterns is within root-level domains, most clearly within monomorphemic words. Once we inspect this portion of the vocabulary of English, we arrive at a very different picture from that painted by templates allowing for four or five coda consonants. The overwhelming pattern is that, shorn of word-level suffixes, English words can end in a maximum of two consonants. Typical final clusters are *nd, nt, lt, ld, pt, kt, mp, ŋk, st, ft* as in **sand, lent, halt, bold, apt, act, lamp, link, last, oft**.[1]

Should we then conclude that two is the limit for the English coda? This still leaves us with a template that makes provision for one more position than is found domain-internally. One response might be to shave the supernumerary final consonant off the template through recourse to the device of extrasyllabicity. In serialist approaches, this dispensation only holds underlyingly; during the course of derivation the extrasyllabic consonant has to be incorporated into syllable structure proper, either into the preceding coda or into a following onset if one becomes available through morphological concatentation (see Blevins 1995 for references). In the first instance, this in effect results in the postulation of two templates — an underlying one allowing for a single coda consonant and a surface one allowing for two.

While extrasyllabicity has no formal representational status in more recent output-oriented theory, its effect can be simulated by means of a constraint interaction which forces the right edge of a final syllable to be moved off the right edge of the word (see Prince & Smolensky 1993: ch 4). Specifically, a constraint which requires perfect alignment of syllable edges with word edges is outranked by some other constraint which excludes a final consonant from the preceding syllable. The impact of this interaction on a final two-consonant cluster is tabulated in (13). Here, as a result of syllable-word misalignment, the final consonant in the optimal candidate form (13)b is unsyllabified.

(13)

| /...VCC/ | | | ℂ[?] | ALIGN |
|---|---|---|---|---|
| (a) | | ...VCC•] | *! | |
| (b) | ☞ | ...VC•C] | | * |

The defeated candidate (13)a, with perfect alignment, recapitulates the traditional final-coda analysis.

No matter whether they are implemeted serially or by output constraint, both the final-coda and the extrasyllabicity analyses carry with them certain presumptions about the phonotactics of final two-consonant clusters that are difficult to square with the facts. To illustrate the problem, we will now consider final CC] combinations in four languages which, although typologically distinct in one respect, all share the following trait: a significant set of the clusters in question obey the same phonotactic restrictions as internal coda-onset clusters.

Starting with English, note how four of the most systematic phonotactic patterns found in final CC] clusters are replicated in internal C•C clusters (examples from Harris 1994: 74):

(14)

(a) STOP-STOP

| MEDIAL | FINAL |
|---|---|
| **chapter** | **apt** |
| **vector** | **sect** |

(b) SONORANT-STOP

| MEDIAL | FINAL |
|---|---|
| **pamper** | **damp** |
| **winter** | **flint** |
| **wrinkle** | **rink** |
| **filter** | **guilt** |
| **scalpel** | **scalp** |

(c) FRICATIVE-STOP

| MEDIAL | FINAL |
|---|---|
| **mister** | **mist** |
| **after** | **raft** |
| **whisper** | **wisp** |

(d) SONORANT-FRICATIVE

| MEDIAL | FINAL |
|---|---|
| **cancer** | **manse** |
| **dolphin** | **golf** |
| **whisker** | **whisk** |

From the viewpoint of the final-coda and extrasyllabicity approaches, the most damaging aspect of the parallel between domain-internal C•C and domain-final CC] is that it has to be viewed as totally accidental. The phonotactic regularities evident in both contexts have to be stated twice — once for internal coda-onset clusters and again either for two-consonant codas (the final-coda view) or for a coda followed by an unsyllabified C (the extrasyllabicity view). If anything, the extrasyllabicity approach fares even worse than the

final-coda approach in this respect: it would lead us to expect no phonotactic dependencies to hold between the members of a final C<C>$_{es}$ sequence.

Modern Irish admits a rather more constrained set of internal and final clusters than English (Ó Siadhail & Wigger 1975: 68 ff). The same point is clear, however: as exemplified in (15), whatever is found word-finally also shows up as an internal coda-onset sequence.

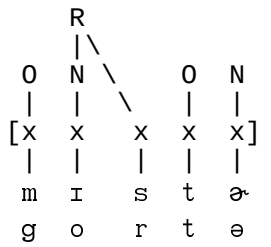
(15)

| | MEDIAL | | FINAL | |
|---|---|---|---|---|
| SONORANT-STOP | | | | |
| *rp* | **torpa** | ‘clod’ | **corp** | ‘body’ |
| *rt* | **gorta** | ‘hunger’ | **gort** | ‘field’ |
| *lt* | **rialta** | ‘regular’ | **oscailt** | ‘open’ |
| *lk* | **folca** | ‘flood (n. pl.)’ | **folc** | ‘flood (nom. sg.)’ |
| *rd* | **garda** | ‘police’ | **bord** | ‘table’ |
| *ŋg* | **rangaigh** | ‘classify’ | **long** | ‘ship’ |
| FRICATIVE-STOP | | | | |
| *χt* | **donachta** | ‘badness (gen.)’ | **donacht** | ‘badness (nom.)’ |
| *st* | **postaire** | ‘messenger’ | **post** | ‘post’ |
| *sk* | **taoscach** | ‘gushing’ | **taosc** | ‘drain’ |

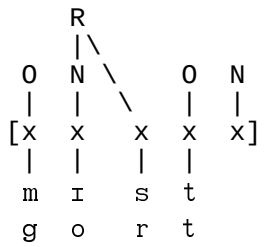
The parallel between the phonotactics of final CC] and internal C•C in both English and Irish adds further to the body of negative evidence we have accumulated against the final-coda view. But it goes beyond this by providing us with the first positive indication of an alternative syllabification: a final C] is an onset.

If we make this assumption, the phonotactic parallel just outlined falls out automatically: a word-final CC] cluster behaves just like an internal coda-onset cluster because it IS a a coda-onset cluster. Since this means that internal –C•C– and final –C•C] clusters are syllabically identical, the phonotactic generalisations illustrated above for English and Irish need only be stated once. Below we supply representations for the English pair **mister – mist** and Irish **gorta – gort**. Since the relevant structures are syllabically identical, the same set of syllabic representations will do for both languages.

(16) (a) Internal coda-onset C•C
**mister, gorta**




(b) Final coda-onset C•C]
**mist, gort**




Assigning a final consonant to an onset begs the following question: what is it the onset of? For the time being, we will simply assume that it is the onset of a syllable that is well-formed to the extent that it contains a nucleus, albeit one that remains silent (hence the final empty position (16)b). It is important to note that none of the evidence we have discussed to this point has any direct bearing on this particular issue. We will leave it until the last part of the paper to address the concerns of those sad realists who harbour a deep suspicion of empty categories in phonology.

One question we are in a position to answer right away is whether both members of a final two-consonant cluster could inhabit the same onset. Since branching onsets are found word-initially (**bring, clutter**) and word-medially (**algebra, umbrella**), we should expect them also to turn up word-finally. The prediction is indeed borne out, but only by some languages. While neither English nor Irish tolerates branching onsets in this position, there are languages such as Polish and French which do. These languages show two types of word-final CC cluster. One, exemplified in (17), follows the English and Irish C•C pattern illustrated in (16).

(17) (a) Polish

| | | | |
|---|---|---|---|
| **ba**[*rk*] | ‘shoulder’ | **wi**[*lk*] | ‘wolf’ |
| **ka**[*nt*] | ‘edge’ | **la**[*mp*] | ‘lamp (gen. pl.)’ |
| **ska**[*rp*] | ‘treasure’ | | |

(b) French

| | | | |
|---|---|---|---|
| **po**[*rt*]**e** | ‘door’ | **lou**[*rd*]**e** | ‘heavy (fem.)’ |
| **ba**[*rb*]**e** | ‘beard’ | **Prou**[*st*] | |

The other type replicates the branching-onset pattern encountered word-intially and medially. Compare the following initial and final clusters in Polish (final devoicing and some other processes disregarded):

(18)

| | WORD-INITIAL | | WORD-FINAL | |
|---|---|---|---|---|
| *tr* | **trawa** | ‘grass’ | **jesiotr** | ‘sturgeon’ |
| *dr* | **droga** | ‘road’ | **wydr** | ‘otter (gen. pl.)’ |
| *bɬ/bw* | **błądzić** | ‘err’ | **zasłabł** | ‘he fainted’ |
| *dɬ/dw* | **długi** | ‘long’ | **zbladł** | ‘he grew pale’ |
| *tɬ/tw* | **tłusty** | ‘fat’ | **zamiótł** | ‘he swept’ |
| *fl* | **flądra** | ‘flounder’ | **trefl** | ‘clubs’ |
| *fr* | **fraza** | ‘phrase’ | **szyfr** | ‘code’ |
| *kl* | **kląć** | ‘curse’ | **cykl** | ‘cycle’ |
| *kr* | **kret** | ‘mole’ | **akr** | ‘acre’ |
| *gɬ/gw* | **głowa** | ‘head’ | **biegł** | ‘he ran’ |

The same situation prevails in French:

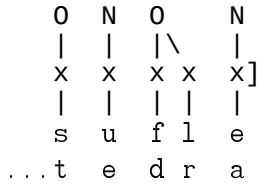
(19)

| | WORD-INITIAL | | WORD-FINAL | |
|---|---|---|---|---|
| *br* | **bras** | ‘shoulder’ | **sabre** | ‘sabre’ |
| *tr* | **trou** | ‘hole’ | **vitre** | ‘pane’ |
| *dr* | **drap** | ‘drape’ | **poudre** | ‘dust’ |
| *gr* | **gris** | ‘grey’ | **maigre** | ‘slim’ |
| *vr* | **vrai** | ‘true’ | **pauvre** | ‘poor’ |
| *kl* | **clou** | ‘nail’ | **boucle** | ‘buckle’ |
| *fl* | **flotte** | ‘fleet’ | **soufle** | ‘breath’ |
| *bl* | **blanc** | ‘white’ | **lisible** | ‘legible’ |
| *pl* | **plaisir** | ‘pleasure’ | **peuple** | ‘people’ |

(For further exemplification and discussion of the French facts, see Charette 1991 (120 ff); for Polish, see Gussmann & Cyran, this volume).

The exact phonotactic parallels exhibited by the pairs of clusters in (18) and (19) come as no surprise if we assume they obtain in precisely the same syllabic configuration, namely a branching onset. This is illustrated by the medial and final clusters below:

(20) (a) Medial complex onset
**souffler** ‘to blow’
**katedra** ‘cathedral’




(b) Final complex onset
**souffle** ‘breath’
**katedr** ‘cathedral (gen. pl.)’

Any account which treats final clusters of this type as codas faces two main difficulties. Firstly, it is problematic on theory-internal grounds: alleged coda clusters are typically assumed to obey the Sonority Sequencing Generalisation (see for example Selkirk 1982). That is, their sonority is supposed to decrease, as indeed it does in sequences of the type illustrated by words such as English **damp** in (14) and Irish **corp** in (15). The sonority profile of the **soufle/cykl** cases, however, slopes in precisely the opposite direction: the relevant clusters all consist of obstruent plus liquid. Secondly, the final-coda account completely misses the fact that, phonotactically, these domain-final clusters have direct domain-internal counterparts.

Since Polish and French accommodate both final coda-onset and final branching-onset clusters, we expect these patterns to occur in combination, resulting in final C.CC] clusters. This is exactly what we do find: for example, French **arbre** *arbr* 'tree', Polish **cha**[*ndr*] 'blues (gen. pl.)', **fi**[*ltr*] 'filter', **ma**[*rtf*] 'worry (imp.)'.

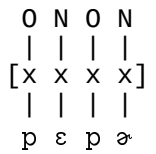
The phonotactic facts taken from the four languages just discussed strengthen the conclusion that the second member of a final CC cluster can't be a coda. Only the first member of such clusters may have this status, a pattern encountered in all four languages. Alternatively, the first member may occur as the lefthand position of a branching onset, a pattern permitted in Polish and French. In either event, the second member of a final CC cluster can only be an onset.

### 3.2 Final onsets and vowel length

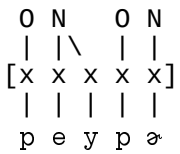
Having concluded that final CC] syllabifies as either a coda-onset cluster or as a branching onset, suppose we now make the further claim that ANY final consonant — including singletons — occupies an onset. In this way, we readily capture the extra-rhymal behaviour of this position with respect to vowel length and stress assigment.

Taking length first, consider again the English closed-rhyme shortness facts introduced in §2.3. Recall that domain-internally in English there are severe restrictions on the character of the rhymal consonant that can follow a branching nucleus (the **pastry, poultry, shoulder** examples in (5)). Absolutely no such restrictions are found for word-final consonants. This is why pairs such as **lid – lead** abound in English (see the examples in (5)). If word-final consonants are codas, this asymmetry remains a mystery. If, on the other hand, word-final consonants are onsets, then the arbitrariness disappears: the general pattern is that a short or a long vowel is free to appear before a single consonant in the onset of the following syllable. It matters not whether this onset occurs domain-internally, as in **litter – litre, villain – silent, beckon – bacon** (see (21)a), or finally, as in **bit – beat, pill – pile, wreck – rake** (see (21)b).

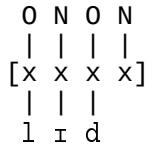
(21) (a) **pepper**



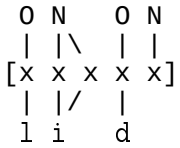

**paper**




(b) **tip**




**tape**




Alternations involving closed-syllable shortening, illustrated in (7), tell exactly the same story: the vowel of a morphological root must be short before an internal rhymal consonant (as in **perceptive, fifty**) but can be long before a final consonant (**perceive, five**). If the final consonant is a coda, we have no obvious explanation for this asymmetry. If the final consonant is an onset, the failure to shorten before a single word-final consonant is exactly to be expected: shortening takes places before a coda and not before an onset.

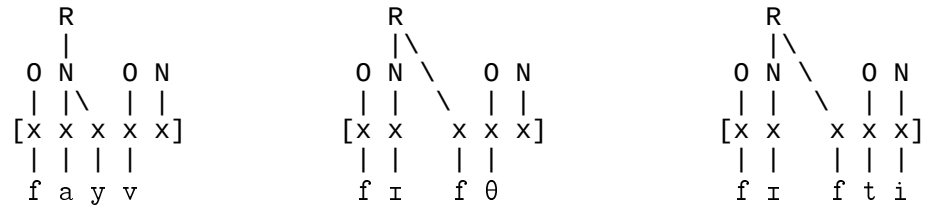
The occurrence of closed syllable shortening before word-final two-consonant clusters is also expected, since we have established that the first of these consonants occupies a coda (as per the arguments outlined in §3.1). Hence alternations such as the following:

(22)

| VV.C] | VC.C] |
|---|---|
| **keep** | **kept** |
| **deep** | **depth** |
| **wide** | **width** |
| **leave** | **left** |
| **five** | **fifth** |
| **thief** | **theft** |

The following representations illustrate the difference between alternants displaying length before a single final consonant (as in (23)a) and those showing closed-rhyme shortness (as in (23)b and (23)c).

(23) (a) **five** (b) **fifth** (c) **fifty**




Turning once again to Icelandic, we may now note that the vowel-length problem posed in §2.3 has a straightforward solution which accords with our initial intuition that, in this language, stressed vowels must be long in open syllables. This interpretation is possible only as long as a word-final consonant is regarded as an onset rather than as a coda. In that case, VVC] forms such as those in (24)a have long vowels for exactly the same reason as forms such as those in in (24)b and (24)c: in all instances, the stressed vowel occurs in an open syllable, whether this be in absolute final position (as in (24)b) or is followed by an onset (as in (24)a and (24)c). In the latter case, it is irrelevant whether the onset is domain-internal (as in (24)c) or final (as in (24)a).

(24) (a) VV.C]

| | | | | | |
|---|---|---|---|---|---|
| **tal** | *tʰaːl* | ‘number’ | **von** | *vɔːn* | ‘hope’ |
| **hæð** | *haiːð* | ‘height’ | **þjóð** | *θjouːð* | ‘nation’ |
| **rök** | *røːkʰ* | ‘cause’ | **bil** | *bɪːl* | ‘moment’ |
| **fet** | *fɛːtʰ* | ‘step’ | | | |

(b) VV.]

| | | | | | |
|---|---|---|---|---|---|
| **svo** | *svoː* | ‘so’ | **þú** | *θuː* | ‘you’ |
| **fæ** | *faiː* | ‘I get’ | **fé** | *fjɛː* | ‘livestock’ |

(c) VV.CV

| | | | | | |
|---|---|---|---|---|---|
| **fela** | *fɛ́ːla* | ‘hide’ | **tala** | *tʰáːla* | ‘speak’ |
| **ráða** | *ráuːða* | ‘advise’ | **éta** | *jɛ́ːtʰa* | ‘devour’ |
| **þola** | *θɔ́ːla* | ‘tolerate’ | **yfir** | *íːvɪr* | ‘over |
| **sími** | *síːmɪ* | ‘telephone’ | | | |

We also noted in §2.3 that vowels before final CC] in Icelandic are short before certain clusters and long before others. If we assume that Icelandic is like Polish and French, but unlike English and Irish, in allowing word-final branching onsets, a long vowel is required in words such as those in (25)a for the same reason as in words containing an internal complex onset, such as those in (25)b.

(25) (a) VV.CC]

| | | | | | |
|---|---|---|---|---|---|
| **snupr** | *snʏːpr* | ‘scolding’ | **flysj** | *flɪːsj* | ‘peeling’ |
| **pukr** | *pʰʏːkr* | ‘secretiveness’ | **sötr** | *søːtr* | ‘slurping’ |

(b) VV.CCV

| | | | | | |
|---|---|---|---|---|---|
| **betri** | *béːtʰrɪ* | ‘better’ | **vökva** | *vǿːkʰva* | ‘water flowers’ |
| **nepja** | *néːpʰja* | ‘cold weather’ | | | |

To summarise, metrical lengthening in Icelandic comes in four different segmental flavours: VV.CV, VV.C], VV.CCV and VV.CC]. As illustrated in (26)a, these contexts instantiate a single syllabic configuration, namely a stressed nucleus branching in an open rhyme.

(26) (a) **fela** *fɛ́ːla* ‘hide’

```
   R     R
   |     |
 O N   O N
 | |\  | |
[x x x x x]
 | |/  |  |
 f ɛ   l a
```

**von** *vɔːn* ‘hope’

```
   R     R
   |     |
 O N   O N
 | |\  | |
[x x x x x]
 | |/  |
 v ɔ   n
```

**nepja** *néːpʰja* ‘cold weather’

```
   R       R
   |       |
 O N   O   N
 | |\  |\  |
[x x x x x x]
 | |/  | | |
 n ɛ   p j a
```

**sötr** *søːtr* ‘slurping’

```
   R       R
   |       |
 O N   O   N
 | |\  |\  |
[x x x x x x]
 | |/  | |
 s ø   t r
```

(b) **panta** *pánta* ‘order’

```
   R
   |\
 O N \   O N
 | |  \  | |
[x x   x x x]
 | |   | | |
 p a   n t a
```

**kumr** *kʏmr* ‘bleating’

```
   R
   |\
 O N \   O N
 | |  \  | |
[x x   x x x]
 | |   | |
 k ʏ   m r
```

As illustrated in (26)b, the other type of stressed constituent is a closed rhyme containing a non-branching nucleus, under which the segmental strings VC.CV and VC.C] are subsumed. The significant point about the metrical generalisation embodied in (26) is that a final consonant behaves just like an internal onset rather than a coda.

## 4 A final consonant is followed by an empty nucleus

### 4.1 Empty nuclei

It is now time to address the issue of final empty nuclei. The evidence we have reviewed to this point is of two types: one leads us to reject the notion that final consonants are codas, while the other encourages us to embrace the notion that they are onsets. It is important to note that neither of these conclusions stands or falls by what we are about to say next.

There are good reasons to assume that any syllable onset must be supported by a following nucleus. For one thing, this allows us to maintain a more restrictive theory of syllable structure than one that would countenance stray constituents. If a final consonant occupies an onset, we are then driven to the conclusion that this must be followed by a silent nucleus. In other words, we have arrived at the eastern notion of a final dull syllable. Structurally, there is nothing unusual about a syllable of this type: it contains an onset position which is licensed by a nuclear position. To label it 'degenerate' (cf. Selkirk 1981) only makes sense from the viewpoint of the phoneme-centred view described in §1: a dull syllable is phonemically unusual in that it has no segmental content.

That is not to say, however, that an empty syllabic position can't make its presence felt. In this section, we present two types of evidence which indicate that empty nuclei, initially posited on theory-internal grounds, have independent motivation.

### 4.2 The metricality of empty nuclei

Since stress assignment is known to be sensitive to syllabic structure, and if empty nuclei really are structurally no different from other nuclei, then they should be expected to betray their presence metrically. We now present two cases where they can do just that.

Consider the regular pattern of stress location in Spanish: as illustrated in (27), stress typically falls either on the penultimate or the final vowel in a word.

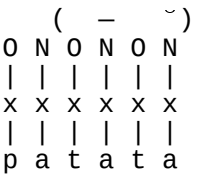
| | | | | | | |
|---|---|---|---|---|---|---|
| (27) | (a) | **patáta** | 'potato' | (b) | **Madríd** | |
| | | **palóma** | 'pretty' | | **jamón** | 'ham' |
| | | **camisa** | 'shirt' | | **papél** | 'paper' |

Expressed in terms of a western-oriented view of syllable structure, the generalisation can be stated as follows: stress falls on the last syllable of a word if it is C-final (as in (27)b); otherwise it falls on the penult (as in (27)a). While observationally adequate, this statement contains a rather ugly disjunction: it is not immediately obvious why final VCV] and VC] strings should converge on the same stress result.

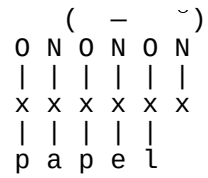
An eastern-oriented statement is, in contrast, much simpler. The C-final context in (27)b

reduces to the V-final context in (27)a, if we make the assumption that a dull syllable is incorporated in metrical structure. Specifically, a final empty nucleus forms the weak member of a left-headed foot — the same configuration as that found in words ending in an unstressed vowel. The stress generalisation can now be recast as a uniform statement: regular stress in Spanish consists in a final trochaic foot. This is illustrated below:

(28) (a) **patáta**




(b) **papél**




Not all languages treat final VCV and VC] alike for stress purposes. In contrast to Spanish, Polish always stresses the penultimate vowel of a word, irrespective of whether the word ends in a consonant (e.g. **kobiéto** ‘woman (voc. sg.)’, **kobiétom** ‘woman (dat. pl.)’). From the eastern perspective, this means that final empty nuclei are not projected to metrical structure in this language. Whether or not empty nuclei are metrified can thus be construed as a matter of parametric variation (cf. Burzio 1994).

Consider now the English stress sub-regularity that emerges from examples such as the following:

(29) (a) **agénda**
**magénta**
**aróma**

(b) **torménT**
**lamént**
**cajóle**

A traditional western treatment would have to distinguish between heavy and super-heavy syllables, where the latter contains a two-consonant coda: specifically, we have non-final stress on a heavy syllable in (29)a and final stress on a super-heavy syllable in (29)b. This bifurcation disappears once we assume that the so-called super-heavy syllables are, in fact, sequences of a heavy syllable followed by a light, where the latter contains an empty nucleus. This means that a heavy-light trochee falls at the right edge of all the forms in (29), regardless of whether the weak nucleus is sounded (as in **a(génda)**) or remains silent (as in **tor(méntØ)**).

The recognition of final empty nuclei eases a little embarrassment that arises over the different uses of the term RHYME in syllable theory and in versification. Two words are said to form a verse rhyme when they are share the same ‘terminal sounds’. Traditionally two types of such rhymes are distinguished, namely masculine and feminine. The former is defined as holding between words which end in a stressed monosyllable, for example **cook – book**, **collect – direct** in English and **liść** ‘leaf’– **kiść** ‘cluster’, **wróg** ‘enemy’ – **próg**

'threshold' in Polish. Feminine rhymes are defined as holding between words in which one or more unstressed syllables follow a stressed one, for example **elation – nation**, **merrily – verily** and Polish **mężny** 'valiant' – **dalekosiężny** 'far-reaching', **mówiła** 'she spoke' – **dzieliła** 'she divided'. These definitions incorporate the western notion of final codas. Under this view, a phonological rhyme corresponds only to a masculine verse rhyme; that is, word-final identical consonants qualify as both phonological and verse rhymes. A feminine verse rhyme, on the other hand, corresponds to a phonological frame consisting of a stressed rhyme followed by at least one unstressed syllable — in other words, a trochaic foot. The disparity in usage is at best odd and rarely acknowledged in the standanrd literature.

Under the eastern view, ALL verse rhymes are potentially phonological feet. The main difference between masculine and feminine verse rhymes boils down to the matter of whether or not the weak nucleus of the foot is sounded: in feminine rhymes it is (as in **pla(cénta) – ma(génta)**), while in masculine rhymes it isn't (as in **pre(téndØ) – ex(péndØ)**). Syllabically and metrically speaking, all verse rhymes are feminine. (This is consistent with the conclusion that all feet are feminine, i.e. minimally binary (cf. McCarthy & Prince 1986).)

A parting shot on versification: the notion that there exist metrifiable entities that are nevertheless silent is not completely alien to the Graeco-Roman tradition. It is inherent in the device of CATALEXIS, described in standard works on verse structure and now integrated into modern metrical theory (e.g. Giegerich 1985, Kiparsky 1991). As traditionally used, this refers to a silent stress — in musical terms a rest — which must be counted at the end of a line of verse in order for it to scan. Examples of it are marked by Ø at the end of the second and fourth lines of the following piece of doggerel (cited by Malof 1970: 40):

> Taffy was a Welshman
> Taffy was a thief Ø
> Taffy came to my house
> And stole a piece of beef Ø

It's not difficult to see how the catalectic beat converges on the eastern notion of a final dull syllable.

### 4.3 The sound of silence

There's another way in which an empty nucleus can give itself away: under certain circumstances, it has to let its voice be heard. By way of illustration, we will look briefly at one such instance in English and one in Polish.

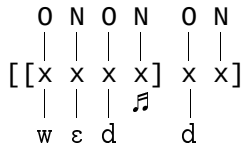
It is a well-known fact that the suffixation of **–(e)s** or **–ed** in English produces potential

consonant sequences that must be broken up by the appearance of a vowel. This happens when the consonants are phonetically too similar in certain respects, being either alveolar sibilants or plosives. Thus alongside **cats, ribs, leaps** with *s* or *z* we find **buses, bushes, churches** with *ɨz* (or *ɪz*, if you're that way inclined); alongside **travelled, crushed, wronged** with *d* or *t*, we find **wedded, waited** with *ɨd*.

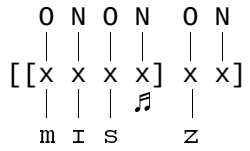
A standard rule-based account of this alternation treats it as a matter of epthenthesis: a vowel is inserted to split the offending cluster. Some pretty powerful theoretical machinery is engaged here. Phonological derivation is allowed to perform two syllabic transformations. One inserts a syllabic position, the nucleus housing the epenthetic vowel, while the other moves the stem-final consonant from a coda (in *bʌs*•) into an onset (in *bʌ*•*sɨz*•).

In contrast, an eastern-oriented account of these facts allows us to maintain a more restrictive theory of derivation which eschews resyllabification altogether. As noted in §3.1, word-level morphology in English produces consonant sequences which must be interpreted as belonging to separate syllabic domains. Since it occupies the onset of a dull syllable, any stem-final consonant is always separated from a following consonantal suffix by an empty nucleus, as in [[*rɪbØ*]*z*] **ribs**. (Actually, since the suffix in this example is also domain-final, it too is followed by an empty nucleus, but this is not crucial to the point at hand.) Under most circumstances, the intervening nucleus will remain silent. However, it's clear how the vocalic reflex of **–ed/–(e)s** should be interpreted under this account. Consider the representations of **wedded** and **misses**:

(30) (a) **wedded**




(b) **misses**




The *ɨ*/*ɪ* of **–ed/–(e)s** is the phonetic interpretation of an 'empty' nucleus. In this particular instance, it's the sound the nucleus makes when it is called on to sort out a little local difficulty between estranged consonants. So-called epenthesis is not epenthesis at all: no novel syllabic structure is inserted. Nor is any position resyllabified.

A similar case can be made for the Polish word-level prepositions **w** *v* 'in' and **z** *z* 'with'. Since each of these forms an independent domain, it must be terminated by an empty nucleus. The nucleus is inaudible before most consonant sequences, including some of considerable complexity, for example the initial *vmg* of **w mgnieniu** 'in a flicker' or the *zdrv* of **z drwalem** 'with a wood-cutter'. A heavy following cluster is thus in itself no bar to the appearance of either of these prepositions. However, whenever a word-initial a sequence

begins with a consonant similar to that of the preposition, the final nucleus of the preposition is phonetically expressed, as *e*, for example in **we wtorek** (*vevt...)* ‘on Tuesday’, or **ze złości** (*zezw...*) ‘out of spite’. The mechanism here seems to be the same as in English: the final empty nucleus betrays its presence when forced by some constraint governing the phonetic interpretation of particular sound sequences.

### 4.4 ‘CV’ typology revisited

Finally, we can return to the typological issue we started with in §2.1. There we noted how the traditional two-way classification of languages into ‘CV’ and ‘CVC’ types is contradicted by the observed four-way distinction which emerges from the separate choices that grammars evidently make with respect to internal closed syllables and final consonants. The recognition of (domain-internal) branching rhymes and domain-final dull syllables as independent entities allows us to capture this typology in a simple parametric fashion. One parameter controls whether or not a grammar allows rhymes to branch: OFF precludes closed syllables. Another controls whether or not a domain-final nucleus is allowed to remain silent: if it is set at off, then every word in the language must end in a vowel; if it is on, the language permits final consonants. The intersection of these two independent parameters is shown in (31).

(31)

| Final empty nuclei? | Branching rhyme? No | Branching rhyme? Yes |
|---|---|---|
| No | **Ia** ...V•CV] Zulu | **IIa** ...V(C)•CV] Italian |
| Yes | **Ib** ...V•CV(C)] Luo | **IIb** ...V(C)•CV(C)] English |

### 5 Conclusion

We have compared two views on the syllabic status of domain-final consonants, drawing on a range of evidence relating to language typology, word stress, vowel length, and cluster phonotactics. All of the evidence points to the conclusion that a final consonant is not a coda but rather forms the onset of a syllable containing a nucleus which is allowed to remain silent.

In short, the east was right all along.

## References


Árnason, K. 1980. *Quantity in Historical Phonology: Icelandic and Related Cases.* Cambridge: Cambridge University Press.

Blevins, J. 1995. The syllable in phonological theory. In J. A. Goldsmith (ed.) *The Handbook of Phonological Theory*. Oxford, Blackwell. 206-244.

Borowsky, T.J. 1986. *Topics in the Lexical Phonology of English*. PhD dissertation, University of Massachusetts. Published 1990, New York: Garland.

Burzio, L. 1994. *Principles of English Stress.* Cambridge: Cambridge University Press.

Charette, M. 1991. *Conditions on Phonological Government*. Cambridge: Cambridge University Press.

Giegerich, H. 1985. *Metrical Phonology and Phonological Structure: German and English.* Cambridge: Cambridge University Press.

Gussmann, E. 1985. The morphology of a phonological rule: Icelandic vowel length. In E. Gussmann (ed.) *Phono-Morphology: Studies in the Interaction of Phonology and Morphology*. Lublin: Redakcja Wydawnictw KUL.

Gussmann, E. & J. Kaye. 1993. Polish notes from a Dubrovnik café. *SOAS Working Papers in Linguistics and Phonetics* 3. 427-462.

Harris, J. 1994. *English Sound Structure*. Oxford, Blackwell.

Hayes, B. 1982. Extrametricality and English stress. *Linguistic Inquiry* 13. 227-276.

Hayes, B. 1995. *Metrical Stress Theory*. Chicago: University of Chicago Press.

Itô, J. 1986. *Syllabic Theory in Prosodic Phonology*. PhD dissertation, University of Massachusetts. Published 1988, New York: Garland.

Kaye, J. 1990. 'Coda' licensing. *Phonology* 7. 301-330.

Kahn, D. 1976. *Syllable-based Generalizations in English phonology*. PhD dissertation, MIT. Published 1980, New York: Garland.

Kiparsky, P. 1991. Catalexis. Paper presented at the EUROTYP workshop, Salzburg, October 1991.

Levin, J. 1985. A metrical theory of syllabicity. PhD dissertation, MIT.

McCarthy, J.J. & A. Prince. 1986. Prosodic morphology. Ms. University of Massachusetts.

Malof, J. 1970. *A Manual of English Meters*. Bloomington, IN: Indiana University Press.

Myers, S. 1987. Vowel shortening in English. *Natural Language and Linguistic Theory* 5. 485-518.

Prince, A.S. & P. Smolensky. 1992. Optimality Theory: constraint interaction in generative grammar. *Technical report # 2 of the Rutgers Center for Cognitive Science*, Rutgers University.

Ó Siadhail, M. & A. Wigger 1975. *Córas Fuaimeanna na Gaeilge*. Baile Átha Cliath: Institiúid Ard-Léinn Bhaile Átha Cliath.

Selkirk, E.O. 1981. Epenthesis and degenerate syllables in Cairene Arabic. *MIT Working Papers in Linguistics* 3. 209-232.

Selkirk, E. 1982. Syllables. In H. van der Hulst & N. Smith (eds.) *The Structure of Phonological Representations, vol.2.* Dordrecht: Foris. 337-84.

Spencer, A. 1996. *Phonology: Theory and Description*. Oxford: Blackwell.

Thráinsson, H. 1994. Icelandic. In E. König & J. van der Auwera (eds.) *The Germanic Languages*. London, Routledge. 142-189.

Vennemann, T. 1972. On the theory of syllabic phonology. *Linguistische Berichte* 18. 1-18.

Whorf, B.L. (1940). Linguistics as an exact science. *The Technology Review* 43. 61-63, 80-83. Reprinted in B.L. Whorf (1952), *Language, thought, and reality*, London, 220-232.

## Notes

* Parts of this paper were presented at the PASE Colloquium, Puławy, April 1996.

1 Compared to this quite systematic pattern, the number of monomorphemic words ending in more than two consonants is vanishingly small, e.g. **text** (and derivatives such as **context**), **mulct** and (rhotic pronunciations of) **corpse**. Note that the third consonant in all these cases is a suffix-like coronal.