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Studies in early English morphophonology

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7

A-stem nouns in West Saxon: synchrony

7.1 Problems

According to standard handbooks of OE grammar, regular sound change from West Germanic (henceforth WGmc) to OE produced the neuter *a*-stem noun paradigms set out in (7,1); see e.g. Campbell (1959: §570, §574.3, §574.4).[1] The gen.pl. form given here is representative of all the oblique cases, which differ from each other only in respect of the inflectional ending (gen.sg. *-es*, dat.sg. *-e*, gen.pl. *-a*, dat.pl. *-um*). Note that the final *-a-* in the WGmc etyma is a stem formative (whence the term '*a*-stem nouns'); by OE times it has been lost or has become fused with the inflectional endings.

(7,1)

WGmc stem	*skipɑ-	*worðɑ-	*weruðɑ-	*hɑuβuðɑ-	*wɑtrɑ-	*tuŋglɑ-
nom/acc.sg.	*scip*	*word*	*werod*	*hēafod*	*wæter*	*tungol*
nom/acc.pl.	*scipu*	*word*	*werod*	*hēafdu*	*wæter*	*tungol*
gen.pl.	*scipa*	*worda*	*weroda*	*hēafda*	*wætra*	*tungla*
gloss	'ship'	'word'	'troop'	'head'	'water'	'star'

Of interest here are three types of surface alternation:

(i) between *-u* and -∅ in nom/acc.pl. forms,
(ii) between a medial vowel and -∅- in the stem of nouns such as *hēafod*,

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1 Those readers who are not already acquainted with OE spelling should note the following points:

(i) In forms presented orthographically, an editorial macron is used to mark long vowels where needed. The digraphs <īo, ēo, ēa, īe> indicate bimoraic diphthongs, whose quantitative behaviour is identical with that of long monophthongs; they appear in transcription as /iːu, eːo, æːɑ, iːy/. In contrast, the sequences spelt <io, eo, ea, ie> consist of a single mora and behave like short vowels; they are transcribed /iu, eo, æɑ, iy/. For the controversy surrounding the OE vowel digraphs, see Hogg (1992: §2.19-§2.41) and references therein.

(ii) The letters <f, ð/þ, s> correspond to the phonemes /f, θ, s/. These have voiceless allophones word-initially, word-finally, word-medially next to a voiceless sound, and in gemination, but are voiced elsewhere. This allophonic pattern is irrelevant to my concerns and will hereafter be ignored in transcription.

(iii) The sequence <sc> is usually held to represent /ʃ/, though see Minkova (2003: §3.9, §5.2).

(iv) In OE the letter <g> was used to represent reflexes of both Gmc */j/ and Gmc */ɣ/. The phoneme /ɣ/ was realized as a stop after nasals and in gemination; elsewhere it had continuant allophones. In addition, /ɣ/ was subject to palatalization next to front (unrounded) vowels. The palatalized continuant allophone of /ɣ/, i.e. [j̞], was eventually reinterpreted as a realization of /j/. Additionally, nonpalatalized word-initial [ɣ] hardened to [g] late in the historical period. See Hogg (1992: §2.56, §2.61), Minkova (2003: ch. 3), and references therein.

and (iii) between a medial vowel and -∅- in the stem of nouns such as *wæter* and *tungol*. Diachronically, the first type of alternation arose through the apocope of the suffix *-u* (<WGmc *-*ō*). Inspection of the WGmc etyma reveals that the second alternation came about through syncope of the second vowel of the stem; the third, through stem-medial epenthesis.

According to the received view, the state of affairs represented in (7,1) reflects the operation of two major sound changes. Following Keyser & O'Neil (1985), the first of these innovations is commonly known as 'high vowel deletion'. The literature on this development is extensive: for handbook descriptions, see e.g. Brunner (1965), Campbell (1959), Hogg (1992), or Luick (1964); linear analyses in the style of *SPE* include Dresher (1978), Kiparsky & O'Neil (1976), Peinovich (1979), and Wagner (1969); for nonlinear treatments, see e.g. Bermúdez-Otero & Hogg (2003: §3), Dresher & Lahiri (1991), Hutton (1998b), Idsardi (1994), or Keyser & O'Neil (1985). The precise formulation of the change is apt to vary from work to work, but at the descriptive level there is remarkable consensus; we may accordingly describe high vowel deletion as follows:

(7,2) *High vowel deletion*
Short high vowels undergo deletion in unstressed open syllables immediately preceded by a bimoraic foot.

As shown in (7,3), high vowel deletion conflates the apocope of neut.nom/acc.pl. *-u* with syncope in nouns of the *hēafod* type:[2]

(7,3)	[.ʃi.pu.]	[.wor.].du.	[.we.ru.].du.
		↓	↓
	n.a.	∅	∅
	[.hæːɑ.].fu.du.	[.wæt.].ru.	[.tuŋ.].glu.
	↓	↓	↓
	∅	∅	∅

For the second of the changes that brought about (7,1), I use the term 'parasiting', following Fulk (1992). Parasiting can be described as follows (see e.g. Campbell 1959: §363, Hogg 1992: §6.38-§6.40):

(7,4) *Parasiting*
A vowel is inserted between the two members of a word-final obstruent+sonorant cluster.

Parasiting is responsible for the presence of an unstressed vowel in the suffixless surface forms of nouns such as *wæt**er*** and *tung**ol***.

It is generally believed that high vowel deletion preceded —and fed— parasiting (Brunner 1965: §148, Anm. 2; Campbell 1959: §574.3; Dresher & Lahiri 1991: 279-281; Keyser & O'Neil 1985: 141-142; Luick 1964: §304). As a result, the nom/acc.pl. forms of neuter stems ending in an obstruent+sonorant cluster are expected to show up in OE without a suffix but with an epenthetic vowel:

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2 Henceforth, unless otherwise indicated, unlabelled square brackets represent foot (Σ) boundaries. Where brackets are labelled, the label appears in subscript characters following the left bracket. Prosodic word boundaries are therefore indicated as follows: $[_{\omega}$ ...]. I use dots to mark both edges of a syllable.

(7,5)	*Pre-OE*	wætru	tuŋglu
	High vowel deletion	wætr	tuŋgl
	Parasiting	wæter	tuŋgol

Despite commanding widespread agreement, this account raises difficult questions: notably, the paradigms set out in (7,1) do not accurately reflect the behaviour of neuter *a*-stems nouns in *any* of the attested OE dialects. In anticipation of a full survey of the data in §7.2, a few unexpected forms will suffice to establish this point here. In the early Mercian dialect of the *Vespasian Psalter* gloss, for example, predicted nom/acc.pl. *hēafdu* fails to occur; instead, one encounters both *hēafudu* and *hēafud* (see note 6 below). The problem is particularly severe in West Saxon (Hogg 1997: §3, 2000: §3). In the Lauderdale manuscript of Alfred's translation of Orosius, for example, the nom/acc.pl. of *wǣpen* 'weapon' (<WGmc *wɑːpnɑ-) appears not only as the expected *wǣpn*, with apocope, but also as *wǣpna* and indeed *wǣpeno* (see §7.2 and §AppA.2).[3] Similarly, the Hatton manuscript of the *Cura Pastoralis* contains one instance of unexpected *hēafudu* alongside predicted *hēafdu*. More seriously, Ælfric consistently fails to apocopate the neut.nom/acc.pl. suffix after stems originally ending in an obstruent+sonorant cluster: e.g. *wæteru, tungla, wǣpna* (Pope 1967-8: 183, Hogg 1997: §3).

The standard handbooks deal with this problem in orthodox Neogrammarian fashion (Hogg 1997: 118). It is implied that the paradigms in (7,1) represent the actual state of affairs at some prehistoric stage in the development of OE. The behaviour of neuter *a*-stem nouns in the extant manuscripts is described as resulting from the operation of analogy upon these paradigms. Particular instances of analogy are explained by means of four-part proportional equations:

(7,6) a. *werod* : *werod* = *hēafod* : x
x = *hēafod*

b. *hēafod* : *hēafdu* = *wǣpen* : x
x = *wǣpnu*

(7,6a) is advanced by Luick (1964: §307, An. 1) as the explanation of nom/acc.pl. *hēafud* in the *Vespasian Psalter*. Brunner (1965: §148, An. 2) uses (7,6b) to account for the failure of the neut.nom/acc.pl. suffix to apocopate after obstruent+sonorant clusters in Ælfric. It is obvious, however, that these equations are purely *ad hoc*. If, for example, one took *scip* as the term of comparison, one would predict the apocope of the neut.nom/acc.pl. ending to cease altogether:

(7,7) *scip* : *scipu* = *word* : x
x = *wordu*

Interestingly, apocope was indeed lost in West Saxon, but only towards the end of the OE period (Bermúdez-Otero & Hogg 2003: §3; see §8.6 below for a summary); forms such as *wordu* are ungrammatical for Alfred and Ælfric, whose respective dialects nevertheless fail to conform to the predictions of (7,1). This shows that the evolution of *a*-stem noun declension

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3 Parasiting can be inconsistently reflected in the spelling: hence <wæpn> alongside <wæpen>. As we shall see in §7.5, the variation between -*u*, -*o* and -*a* in the neut.nom/acc.pl. ending is partly phonological and partly morphological, but it does not in any case affect the application of apocope.

in West Saxon must be analysed with more advanced conceptual tools than Neogrammarian theory affords.

7.2 Sources, data, and overview of the analysis

The standard reference grammars tend to cover the behaviour of neuter *a*-stem nouns in West Saxon in footnotes to the story outlined in §7.1. In consequence, the information they provide is fragmentary and unclear. More narrowly focused works in the generative tradition have tended to concentrate on non-West-Saxon dialects (e.g. the *Vespasian Psalter*: Dresher 1978, Keyser & O'Neil 1985) or have altogether disregarded dialectal differences (e.g. Idsardi 1994; see Hogg 2000: §3).[4] For this reason, it will be necessary in this section to review the primary evidence for Alfred's Early West Saxon dialect and Ælfric's Late West Saxon. For the purposes of comparison, I shall also describe the behaviour of neuter *a*-stem nouns in a non-West-Saxon dialect: that of the *Rushworth2* gloss.[5]

For West Saxon in its early period, i.e. at the time of King Alfred (871-899), the most reliable sources are Alfred's translation of Pope Gregory the Great's *Liber Regulae Pastoralis*, also known as *Cura Pastoralis* (henceforth *CP*), and Alfred's OE version of Paulus Orosius' *Historiarum adversum Paganos Libri VII* (henceforth *Or*). Admittedly, the information provided by these texts raises a few problems. First, certain types of neuter *a*-stem noun occur somewhat infrequently in the interesting case and number forms: this is true in particular of the nom/acc.pl. of nouns like *werod* (see §AppA.3). Secondly, *CP* and *Or* show a high degree of variability for certain stem-types, and are moreover not completely homogeneous with each other: e.g. the innovative neut.nom/acc.pl. ending *-a*, which in Ælfric was well on its way to replacing the original *-u* (Pope 1967-8: 183), occurs 19 times in *Or*, but only 3 times in *CP*(*H*) and not at all in *CP*(*C*) (Cosijn 1886: §3; though see note 19 below). In this respect, Alfredian usage contrasts sharply with Ælfric's standardized *Schriftsprache*. Apart from scribal interference, one cannot altogether discard a possible link between the variation found in Alfred's corpus and the influence of his Mercian assistants; nonetheless, independent criteria suggest that Mercian influence was weakest in *CP* and *Or* (Campbell 1959: §§16-17; see further Horgan 1963). Relatedly, a direct genetic link between Alfredian and Ælfrician West Saxon cannot be taken for granted (Hogg 1988; see note 4), although both correspond to dialects roughly centred on Winchester. Despite these difficulties, however, the data I present below suggest a clear line of development for *a*-stem nouns in West Saxon.

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4 A few basic facts should be mentioned here for the benefit of readers unacquainted with OE dialectology. The traditional division of OE into four major dialects (Northumbrian, Mercian, West Saxon, and Kentish) is motivated primarily by patterns of linguistic similarity and difference between the extant manuscripts. The manuscripts, however, provide only a partial and obscure reflection of the actual geographical distribution of linguistic variants in Anglo-Saxon England, about which much is unknown (see e.g. Campbell 1959: §6-§22, specially §19; Hogg 1988; Hogg 1992: §1.5-§1.12, specially §1.6). Nonetheless, it is customary to provide the following broad geographic definitions for the four major dialects of Old English (see Hogg 1992): Northumbrian comprises the dialects spoken north of a line from the Mersey to the Humber; Mercian encompasses the varieties found south of the Northumbrian area and north of the Thames; West Saxon is the dialect of the Thames Valley and areas to the south and west of that, centring on Winchester; and Kentish corresponds to a southeastern area centred on Canterbury, and including Kent and maybe Surrey. Northumbrian and Mercian are grouped together as 'Anglian', in contrast with West Saxon and Kentish, which are collectively labelled as 'Southern'.

5 Henceforth, upon first mention of an OE text I shall provide both its full title and the conventional abbreviation; thereafter, I use the short title only. See the Note on Sources for information on reference conventions, manuscript provenance, sigla, and methods of data collection.

For Ælfric (*c.* 950 – *c.* 1010), the picture is much clearer, as his writings survive in a voluminous and highly uniform corpus of manuscripts. I use data mainly from Pope's (1967-8) *Homilies of Ælfric: a supplementary collection* (henceforth *ÆHom*), and occasionally from the two series of the *Catholic homilies* (henceforth *ÆCHom* I, II). Reliable observations concerning Ælfric's morphophonology can be found in Hogg (1997, 2000), in Bermúdez-Otero & Hogg (2003: §3), and in Pope's introduction and glossary to *ÆHom*.

In order to flesh out the development of West Saxon during the tenth century, I shall also occasionally adduce evidence from Æthelwold's dialect as reflected in the OE version of the *Regula S. Benedicti* (henceforth *BenR*). Æthelwold, bishop of Winchester from 963 until his death in 984, is particularly relevant here because he played a leading rôle in the regulation of the Late West Saxon *Schriftsprache* and because Ælfric was one of his pupils (see e.g. Hogg 1992: 78).

As we chart the history of neuter *a*-stem nouns from Alfred to Ælfric, it will be useful to have some idea of the state of affairs in those OE dialects which escaped the developments that affected West Saxon. Accordingly, I shall also present here data from the *Rusworth2* gloss (henceforth *Ru2*), written in the tenth century by a scribe named Owun in an Anglian dialect described by Lindelöf (1901) as 'South Northumbrian'. The choice of a tenth-century Northumbrian text may appear surprising in this context, but looking at *Ru2* offers several advantages. First, Hogg (1997: §6) observes that, in a typology of OE *a*-stem declensional systems, *Ru2* shows substantial similarities with much older Anglian monuments, notably the *Vespasian Psalter* (henceforth *Ps*(*A*)); *Ru2* is thus relatively conservative. At the same type, however, *Ru2* appears largely free from Mercian idiosyncrasies such as nom/acc.pl. *hēafud* in *Ps*(*A*) and *Rushworth1* (henceforth *Ru1*).[6] Secondly, *Ru2* is a holograph manuscript, which can for our purposes be treated as a direct reflection of Owun's idiolect.

Neuter *a*-stem nouns fall into several groups. Historically, each group follows a different evolutionary path, even though within an individual dialect its declensional pattern may merge with that of some other group. Membership in a given class correlates strongly with the following independent criteria; their synchronic import will become clear in §7.4-§7.8 as the analysis progresses.

- First, those nouns which had a monosyllabic root in WGmc[7] behave differently from those whose root was disyllabic: e.g. *scip* < *skip-, *tungol* < *tuŋgl-; vs *hēafod* < *hɑːuβuð-.
- Among originally monosyllabic stems (see note 7), it is necessary to distinguish those which ended in a cluster of obstruent+sonorant from those which did not: e.g. *wæter* < *wɑtr-, *tungol* < *tuŋgl-; vs *scip* < *skip-, *word* < *worð-.

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[6] The apocopated nom/acc.pl. form *hēafud* is shown to be a Mercian idiosyncrasy by the fact that it occurs both in *Ps*(*A*) and in *Ru1*, but is absent from West Saxon (though see §AppA.4 note 7) and from the South Northumbrian dialect of *Ru2* (though see §AppB.4 note 3). *Ps*(*A*) has acc.pl. *hēafud* five times: at 65.10, 73.13, 108.25, 109.7, and *Ca* 6.24; acc.pl. *hēafudu* occurs twice: at 67.21 and *Ca* 6.23. *Ru1* has acc.pl. *hēafud* once at *MtGl*(*Ru*) 27.39; in addition, note nom/acc.pl *dēoful~dīoful* 'devil' eight times at *MtGl*(*Ru*) 4.24, 7.22, 8.31, 9.34, 12.24, 12.27, 12.28, and *MkGl*(*Ru*) 1.32 (for *dēoful* as a *hēafod*-type noun, see §AppA.4 note 2).

[7] Recall that roots and stems were phonologically (as well as morphologically) distinct in WGmc: a stem of the *a*-class was formed by adding the thematic vowel *-*a*- to the root. By OE times, however, the thematic vowel has no separate identity, and so roots and stems are phonologically identical. Accordingly, when an OE *stem* is described below as 'originally monosyllabic' (or 'originally disyllabic'), it will be understood that the WGmc *root* had one (or two) syllables, as appropriate.

- Within originally disyllabic stems (see note 7), those whose medial vowel was etymologically root-initial (as in obscured compounds) or long form a separate class: e.g. *nīeten* 'animal' < *nɑutiːn-; cf. *hēafod* < *hɑuβuð-.
- Finally, these classes are cross-cut by a distinction between stems with light or heavy root-syllables. This criterion refers here to OE nom/acc.sg. forms, ignoring the final consonant and assuming parasiting where appropriate: e.g. *sci<p>*, *wæ.ter*, and *we.rod* are light stems; *wor<d>*, *tun.gol*, and *hēa.fod* are heavy stems.

Hereafter, the terms 'monosyllabic stem', 'disyllabic stem', 'light stem', and 'heavy stem' are to be interpreted in the sense defined above, unless otherwise stated. The interaction of all four criteria yields the following seven *a*-stem noun classes:

(7,8) *Classification of* a-*stem nouns*[8]

WGmc	OE	stem	root-σ	obs+son	medial V
*skip-	*scip*	1σ	σ̆	no	—
*worð-	*word*	1σ	σ̄	no	—
*wɑtr-	*wæter*	1σ	σ̆	yes	—
*tuŋgl-	*tungol*	1σ	σ̄	yes	—
*weruð-	*werod*	2σ	σ̆	(no)	short
*hɑuβuð-	*hēafod*	2σ	σ̄	(no)	short
*nɑutiːn-	*nīeten*	2σ	σ̄	(no)	long

Henceforth I shall use the examples in (7,8) to identify whole noun classes: I will thus speak of nouns of the *scip* type, *word* type, *wæter* type, and so forth, as appropriate.

Table (7,9) provides model paradigms for each of these noun types in the dialects of Owun, Alfred, and Ælfric. As in (7,1), I give the nom/acc.sg., nom/acc.pl., and gen.pl. of each noun type, with the gen.pl. representing all oblique forms. The paradigms are based on the manuscript sources described above (see also Note on Sources). In Ælfric's case, the manuscript evidence is copious and readily interpretable; for Alfred and Owun, however, the data are somewhat limited in amount and often require careful philological elucidation, particularly in the *wæter*, *tungol*, *werod, hēafod,* and *nīeten* classes. To facilitate scrutiny, therefore, the primary data on these noun types from *CP*, *Or*, and *Ru2* are supplied in full in Appendices A and B. Note that each entry in table (7,9) was constructed by aggregating the evidence from *all* nouns of the relevant class in the appropriate case and number forms. Take, for example, the nom/acc.pl. entry for the *tungol* type in Alfred's dialect: i.e. *tungol; tungolu, -a; tunglu, -a*. There are in fact only two tokens of the word *tungol* in my Alfredian corpus: *tungul Or*(*C*) 28.10 and *Or*(*L*) 58.11 (§AppA.2). Nonetheless, *tunglu, -a* has been included as one of the model forms in the table because the manuscripts contain tokens of other members of the *tungol* class in the nom/acc.pl. exhibiting neither epenthesis nor apocope: viz. *wǣpna Or*(*L*) 29.21, *wundru* 'wonder' (< WGmc **wundr-ō*) *CP*(*H*,*C*) 103.13.

[8] Henceforth, σ̆ represents a light syllable, σ̄ a heavy syllable.

(7,9) *Neuter* a-*stem noun paradigms in Owun, Alfred, and Ælfric*

Owun	Alfred	Ælfric
scip	*scip*	*scip*
sciopo, *-u*	*scipu*, *-a*	*scipa*, *-u*
scipa	*scipa*	*scipa*
word	*word*	*word*
word	*word*	*word*
worda	*worda*	*worda*
wæter	*wæter*	*wæter*
wæter	*wætru*, *-a*; *wæteru*, *-a*; *wæter*	*wætera*, *-u*; *wætra, -u*
wætra; *wætera*	*wætra*; *wætera*	*wætera*; *wætra*
tungol	*tungol*	*tungol*
tungol; *tungolo*; [*tunglo*?]	*tungol*; *tungolu*, *-a*; *tunglu*, *-a*	*tungla*, *-u*
tungla	*tungla*	*tungla*
werod	*werod*	*werod*
werod	[*werod*]	*werod*
weroda	*weroda*	*weroda*
hēofod	*hēafod*	*hēafod*
hēofodo; *hēofdo*	*hēafdu*, *-a*; *hēafodu*, *-a*	*hēafda*, *-u*
hēofda	*hēafda*	*hēafda*
nēten	*nīeten*	*nȳten*
nēteno	*nīetenu*, *-a*	*nȳtena*, *-u*
nētena	*nīetena*	*nȳtena*

In the following sections I shall present a synchronic analysis of the declensional patterns set out in (7,9); this will yield a partial description of the grammars of Owun, Alfred, and Ælfric. Since the argument is fairly intricate, it will be convenient to give an overview of the main points here.

I shall begin by noting that, during its recorded history, West Saxon was subject to a process of morphological change that replaced the original neut.nom/acc.pl. ending *-u* (<WGmc *-*ō*) with an innovative suffix *-a*, identical with the gen.pl. ending both underlyingly and on the surface. Unlike the homophonous gen.pl. ending, the new neut.nom/acc.pl. suffix *-a* underwent deletion in exactly the same environments as the original *-u*. This observation leads to two conclusions. First, OE *a*-stem noun affixation is phonologically *stratified*: the neut.nom/acc.pl. ending is added at the stem level, whilst other *a*-stem noun affixes are word-level. Secondly, by the historical period vowel deletion no longer depends on vowel height, but is sensitive to the stratification of the inflectional morphology. At the same time, it is necessary to decouple the two deletion processes conflated under the rubric of 'high vowel deletion' in (7,2): the *apocope* of final vowels (effectively of the neut.nom/acc.pl. ending) and the *syncope* of medial vowels. Apocope only applies at the stem level; syncope is initially restricted to the word level but percolates historically into the stem level.

Similarly, I will show that it is necessary to distinguish two processes of vowel epenthesis which are generally conflated in the literature. As we saw in (7,4), there is *parasiting*, which breaks up word-final clusters of obstruent+sonorant. Alongside parasiting, however, the history of West Saxon saw the rise of a separate process of *anaptyxis*, which, under certain metrical conditions, inserted vowels word-medially to repair coda-onset clusters with a rising sonority contour.

The proposed stratification of *a*-stem noun affixation will be confirmed by the convergence of three pieces of evidence:

- apocope only targets the neut.nom/acc.pl. suffix, even when it is phonologically identical with the gen.pl. ending;
- in Owun and Alfred syncope may fail in the presence of the neut.nom/acc.pl. ending, but not in that of other *a*-stem noun suffixes;
- anaptyxis must be word-level since it applies in the presence of all inflections, but it counterfeeds the apocope of the neut.nom/acc.pl. ending.

The argument will proceed as follows. In §7.3 I provide some background information on OE phonology. The prosodic constraints which drive vowel deletion are identified in §7.4. Apocope is discussed in §7.5, where I observe that West Saxon is characterized by the blocking of apocope after obstruent+sonorant clusters (variably in Alfred, invariantly in Ælfric). Subsequent sections deal with the other processes introduced above: §7.6 with syncope, §7.7 with anaptyxis, §7.8 with parasiting. The synchronic argument concludes in §7.9 with a synoptic view of the grammars of Owun, Alfred, and Ælfric.

7.3 Background

This section outlines some of the general principles that govern syllable and foot structure in OE. As later sections will show, these prosodic principles set the boundaries for the application of processes of vowel deletion and insertion in *a*-stem nouns. The outline first addresses foot structure and stress assignment. I then turn to the syllabification of word-final consonants. The section concludes with a detailed discussion of the behaviour of obstruent+sonorant clusters in several prosodic environments.

I assume that, for the purposes of stress assignment, OE relies on the moraic trochee (Hutton 1998a: §3, McCully 2002; cf. Dresher & Lahiri 1991, Lahiri *et al.* 1999). Any foot headed by a heavy syllable must accordingly be monosyllabic. Similarly, degenerate monomoraic feet are not tolerated. The constraints FTBIN and RHHRM are thus unviolated:[9]

(7,10) a. FTBIN (Prince & Smolensky 1993: 47)
Feet are binary at some level of analysis (μ, σ).

b. RHHRM (Prince & Smolensky 1993: 59)
$**[_{\Sigma}\bar{\sigma}\breve{\sigma}]$

Hereafter, constraints on foot well-formedness, including (7,10a) and (7,10b), will be collectively designated as FTFORM. In tableaux, candidates containing ill-formed moraic trochees will generally be excluded from consideration.

Primary stress is assigned by erecting a moraic trochee at the left edge of the domain. This pattern is dictated by the top-ranked constraint ALIGN-ω:

(7,11) ALIGN-ω = ALIGN(ω,L;Σ,L) (McCarthy & Prince 1993: 95)
Every $[_{\omega}$ is aligned with some $[_{\Sigma}$.

[9] On the metrification of domain-initial $\breve{\sigma}\bar{\sigma}$ sequences, see Hutton (1998a: 121-2).

In forms containing more than one foot, it is usually assumed that foot construction proceeds from left to right (see e.g. McCully & Hogg 1990). In the data discussed below, however, the question of directionality does not arise, as no prosodic word happens to contain more than three syllables.

I assume that, when a stem-final consonant occurs word-finally, it is allowed to become extrasyllabic if this is necessary to preserve foot well-formedness, to attain foot nonfinality, or to avoid a superheavy syllable. In all other circumstances, word-final consonants are parsed as codas. Thus, nom/acc. *word* (sg. or pl.) receives the parse [$_ω$[.wor.]d], where the extrasyllabic consonant ensures foot nonfinality and avoids a trimoraic syllable. Similarly, the final consonant of nom/acc.sg.pl. *werod* becomes extrasyllabic in order both to guarantee foot nonfinality and to avoid an unbalanced σ̆σ̄ foot: [$_ω$[.we.ro.]d]. In contrast, the final consonant of nom/acc.sg. *hēafod* [$_ω$[.hæːɑ.].fod.] can be incorporated into syllable structure, as the main foot remains nonfinal and the second syllable does not become superheavy. This freedom in the prosodification of final consonants seems to be common in the Gmc family in the early period: Kiparsky (1998b, 2000a), for example, finds a similar pattern in Gothic. In OE, however, extrasyllabicity appears to be restricted to stem-final consonants. As we shall see in §7.6, it is not possible to attain foot nonfinality by extrasyllabifying a word-final consonant belonging to an inflectional suffix: parses such as gen.sg. **[$_ω$[.hæːɑ.][.fo.de.]s] or dat.pl. **[$_ω$[.hæːɑ.][.fo.du.]m] are ungrammatical. To capture this fact, I will assume that PARSE-seg is ranked low in the stem-level hierarchy but becomes superordinate at the word level.

(7,12) a. *Constrainst on word-final consonants*
Stem level: FTFORM, NONFIN, **.μμμ. » PARSE-seg » WEAKC
Word level: PARSE-seg » FTFORM, NONFIN, **.μμμ. » WEAKC

b. NONFIN (Kager 1999: 151; cf. Prince & Smolensky 1993: 73)
No foot is final in ω.

c. **.μμμ. (Prince & Smolensky 1993: 210)
Syllables are maximally bimoraic.

d. PARSE-seg
Every segment must be dominated by σ.

e. WEAKC (Spaelti 1994, Bermúdez-Otero 1998: 183)
A ω-final consonant must be directly dominated by the highest possible node.

f.

Stem level		FtForm	NonFin	**.μμ.	Parse-seg	WeakC
word	[$_\omega$[.word.]]		*!	*!		*
	[$_\omega$[.wor.]d] ☜				*	
werod	[$_\omega$[.we.rod.]]	*!	*!			*
	[$_\omega$[.we.ro.]d] ☜				*	
hæːɑfod	[$_\omega$[.hæːɑ.].fod.] ☜					*
	[$_\omega$[.hæːɑ.].fo.d]				*!	

In the case of unsuffixed nouns with monosyllabic light stems, such as nom/acc.sg. *scip*, the requirements of foot binarity and foot nonfinality conflict. In such circumstances, foot binarity takes precedence over nonfinality, and the rightmost consonant is syllabified even at the stem level: i.e. [$_\omega$[.ʃip.]].

(7,13)

ʃip	FtBin	NonFin
[$_\omega$[.ʃi.]p]	*!	
[$_\omega$[.ʃip.]] ☜		*

I assume that candidates lacking foot structure, e.g. **[$_\omega$.ʃip.], are ruled out by an inviolable principle of Proper Headedness (Itô & Mester 1992, Selkirk 1996: 190), which requires that every prosodic word should contain at least one foot. In addition, **[$_\omega$.ʃip.] violates superordinate Align-ω.

Note, moreover, that only one extrasyllabic segment at the right edge of the prosodic word is permitted. This effect could be captured by placing Lin's (1997) Weak Layering Well-Formedness constraint (WLWF) at the top of the hierarchy.

(7,14) WLWF (Lin 1997: 32)
No two adjacent phonological units unlicensed by their next higher category are allowed.

As we shall see in §7.6, however, West Saxon tolerated sequences of two unfooted syllables on the surface: e.g. nom/acc.pl. *nīetenu* [$_\omega$[.niːy.].te.nu.]. For our purposes, therefore, a segment-specific version of Lin's constraint is required:

(7,15) WLWF-seg
Two adjacent segments cannot both be extrasyllabic.[10]

I now turn to the prosodification of consonant clusters with rising sonority profiles, particularly sequences of obstruent plus sonorant. In OE, the behaviour of these sequences is extremely sensitive to the prosodic environment. As will later emerge, understanding this behaviour is vital to the analysis of *a*-stem nouns of the *wæter* and *tungol* types.

In word-initial position, OE allows a fairly wide range of consonant sequences (see Hogg 1992: §2.83). As in present-day English, the status of initial /s/, particularly in /s/+obstruent clusters, is controversial. It is also far from obvious how to analyse word-initial /wr-/ and /wl-/, which, if treated as complex onsets, would involve gross violations of the Sonority Sequencing Generalization (Selkirk 1984: 116): e.g. *wrēon* 'to cover', *wlanc* 'proud'. Otherwise, acceptable complex onsets include the following:

(7,16)

— pr- *prēost* 'priest' pl- *pleoh* 'danger' —	tw- *twelf* 'twelve' tr- *trum* 'strong' — —	kw- *cwic* 'alive' kr- *crabba* 'crab' kl- *clǣne* 'clean' kn- *cnēo* 'knee'
— br- *brād* 'broad' bl- *blōd* 'blood' —	dw- *dweorg* 'dwarf' dr- *drēam* 'joy' — —	— gr- *grið* 'truce' gl- *glæs* 'glass' gn- *gnætt* 'gnat'
— fr- *frēa* 'lord' fl- *flōr* 'floor' fn- *fnǣsan* 'sneeze'	θw- *þwang* 'thong' θr- *þridda* 'third' — —	xw- *hwæl* 'whale' xr- *hrōf* 'roof' xl- *hlāford* 'lord' xn- *hnutu* 'nut'

All these combinations respect the Sonority Sequencing Generalization. Additionally, gaps such as **/pw-/ and **/tl-/ reflect straightforward restrictions on the cooccurrence of place features. Without going into further detail, I shall henceforth use the term ONSFORM to refer to the constraint package that determines the composition of complex onsets in OE; all the sequences in (7,16) satisfy ONSFORM.

In word-initial position, then, consonant clusters satisfying ONSFORM are allowed to constitute complex onsets, in violation of **$[_\sigma$CC:

(7,17) **$[_\sigma$CC (a subcase of **COMPLEX; Prince & Smolensky 1993: 87)
The onset may maximally comprise a single segment.

As we shall soon see, however, the same sequences receive a different treatment word-medially, where, depending on the prosodic environment, they may be heterosyllabic and

[10] Lin's more general constraint would suffice if one assumed that the two unstressed syllables in *nīetenu* are not directly licensed by the prosodic word but are rather adjoined to a superfoot: i.e. $[_\omega[_{\Sigma'}[_\Sigma$.niːy.].te.nu.]]. The drawback of this alternative, however, is that it would require NONFIN to be reformulated in such a way as to apply to feet (Σ) but not to superfeet (Σ', Σ'', etc.).

may even be broken up by anaptyxis (on the latter, see §7.7). The question therefore arises as to why complex onsets are tolerated in word-initial position and, in particular, why they fail to undergo vowel epenthesis.[11] The answer is straightforward. Given the dominant position of ALIGN-ω in the constraint hierarchy, a vowel inserted to break up a word-initial complex onset would have to bear primary stress. A dominant faithfulness constraint, however, requires stressed vowels to have input counterparts (Alderete 1999: 35):

(7,18) HEAD-DEP (adapted from Alderete 1999: 36)
Let α be a segment in the output.
If α is the ultimate head of a foot, then α must have an input correspondent.

Thus, the ranking {FTFORM, ALIGN-ω, HEAD-DEP} » $**[_\sigma$CC prevents epenthesis in word-initial complex onsets:

(7,19)

trum	FTFORM	ALIGN-ω	HEAD-DEP	$**[_\sigma$CC
$[_\omega$[.te.ˈru.]m]	*! (iamb)			
$[_\omega$.te.[.ˈrum.]]		*!		
$[_\omega$[.ˈte.ru.]m]			*!	
$[_\omega$[.trum.]] ☜				*

An altogether different state of affairs holds word-medially. Here, consonant clusters that violate ONSFORM are of course heterosyllabic. However, those clusters that fulfil ONSFORM are also heterosyllabic whenever the first member can be incorporated into the preceding coda without violating FTFORM or **.µµµ. Thus, complex onsets are only tolerated word-medially if putting the obstruent in the coda would create an unbalanced foot or a superheavy syllable. Accordingly, input /wætrɑ/ is mapped onto output $[_\omega$[.wæt.].rɑ.], avoiding a branching onset; input /tuŋglɑ/, in contrast, is mapped onto output $[_\omega$[.tuŋ.].glɑ.], as the alternative candidate $**[_\omega$[.tuŋg.].lɑ.] contains a trimoraic syllable. Note, however, that in *wǣpna* $[_\omega$[.wæːp.].nɑ.] heterosyllabicity is the only option, as /-pn-/ is not a viable onset cluster.

(7,20) a. *Constraints on word-medial obstruent+sonorant clusters*
ONSFORM » FTFORM, **.µµµ. » $**[_\sigma$CC » CONTACT

b. CONTACT (Clements 1990, 1992; Vennemann 1988: 40; Bat-El 1996: 304)
If $\alpha_\sigma][_\sigma\beta$, then $\text{son}(\alpha) \geq \text{son}(\beta)$.

[11] In the entire corpus of OE there seems to be only one case of a word-initial branching onset broken up by an epenthetic vowel: *berōþor* 'brother', for *brōþor*, which appears twice in the inscription on the Brussels Cross (Campbell 1959: §362, Hogg 1992: §6.34 note 1).

c.

All levels		OnsForm	FtForm	**.μμμ.	**[$_\sigma$CC	Contact
wætrɑ	[$_\omega$[.wæt.].rɑ.] ☜					*
	[$_\omega$[.wæ.trɑ.]]				*!	
tuŋglɑ	[$_\omega$[.tuŋg.].lɑ.]			*!		*
	[$_\omega$[.tuŋ.].glɑ.] ☜				*	
wæːpnɑ	[$_\omega$[.wæːp.].nɑ.] ☜			*		*
	[$_\omega$[.wæː.].pnɑ.]	*!			*	

The syllabification pattern illustrated in (7,20c) was inherited from Common Gmc and ultimately reflected the application of Sievers' Law in Indo-European. For the analysis embodied in the ranking in (7,20a), see Kiparsky (1998b: §7) and Bermúdez-Otero (1999: §3.5.2.2, §3.5.2.5). Wetzel (1981) and Lutz (1986) provide empirical support from word-division data in OE manuscripts.

To conclude this section, let us now address the behaviour of domain-final sonorant consonants immediately preceded by obstruents. I assume that, when they do not trigger parasiting, such sonorants become extrasyllabic: e.g. [$_\omega$[.wæt.]r]. By the same token, they do not become syllable heads, even though they constitute sonority peaks: i.e. **[$_\omega$[.wæ.tr̩.]]. This behaviour reflects the exclusion of all nonvocalic segments from the syllable nucleus: the constraint NUC→V is superordinate.

(7,21) a. *Constraints on domain-final obstruent+sonorant clusters (in the absence of parasiting)*
NUC→V » SONPK→σ, PARSE-seg

b. NUC→V (a subcase of HNUC; Prince & Smolensky 1993: 16)
Every syllable must be headed by a vowel.

c. SONPK→σ (Selkirk 1984)
If a segment constitutes a sonority peak, then it heads a syllable.

d.

wætr	NUC→V	SONPK→σ	PARSE-seg
[$_\omega$[.wæt.]r] ☜		*	*
[$_\omega$[.wæ.tr̩.]]	*!		

In contrast, most reference grammars assume —usually without question— that word-final sonorants preceded by obstruents are syllabic (e.g. Campbell 1959: §363, Hogg 1992: §6.38). Nonetheless, the evidence of poetic metre supports the analysis I adopt here: in the earliest

OE verse, forms not subject to parasiting, such as *wætr* and *wǣpn*, behaved like monosyllables (Fulk 1992).

7.4 Prosodic constraints on vowel deletion

As I announced in §7.2 and will demonstrate below, in the recorded dialects of OE apocope and syncope are two separate phonological processes, applying at different grammatical levels. However, most recent scholarship —with the notable exception of Hogg (1997, 2000)— has attempted to conflate both phenomena under a single rule of vowel deletion. This approach is doomed to failure, as it overlooks the fact that the two processes operate in different morphological domains. The attempt is nonetheless understandable, for the prosodic environments where apocope and syncope apply are virtually identical. In this sense, the close prosodic similarities between apocope and syncope need to be accounted for, but I would suggest that the correct account is a historical one: the processes of apocope and syncope found in recorded OE do in all likelihood descend from a single prehistoric rule of vowel deletion, but this rule became split as a result of independent developments that brought about the stratification of *a*-stem noun inflection; §8.2 below outlines a likely scenario.

At this point, however, let us examine the prosodic constraints that regulate both apocope and syncope. In (7,22), partially reproducing (7,3), I give the form types where the application of vowel deletion is most straightforward; there is no variation between Owun, Alfred, and Ælfric in respect of these core cases.

(7,22)	[.ʃi.pu.]	[.wor.].du.	[.we.ro.].du.
		↓	↓
	n.a.	∅	∅

The contrast between nom/acc.pl. *scipu* and apocopated *word*, *werod* appears to indicate that vowel deletion simply avoids unfooted syllables, i.e. syllables that cannot be incorporated into a well-formed moraic trochee. If that were the case, one would be led to assume that OE vowel deletion processes are driven by PARSE-σ. This result would seem typologically natural: Kager (1997) implies that categorical rhythmic vowel deletion is typically caused by this constraint.

(7,23) a. *OE vowel deletion as driven by PARSE-σ*
PARSE-σ » MAX-V

b. PARSE-σ (Prince & Smolensky 1993: 58, Kager 1997: 470)
All syllables must be parsed by feet.

c. MAX-V (McCarthy & Prince 1995)
Every input vowel has an output correspondent.

d.

Input	Candidate	PARSE-σ	MAX-V
ʃipu	[$_{\omega}$[.ʃi.pu.]] ☜		
	[$_{\omega}$[.ʃip.]]		*!
wordu	[$_{\omega}$[.wor.].du.]	*!	
	[$_{\omega}$[.wor.]d] ☜		*
werodu	[$_{\omega}$[.we.ro.].du.]	*!	
	[$_{\omega}$[.wer.].du.]	*!	*
	[$_{\omega}$[.we.ro.]d] ☜		*
	[$_{\omega}$[.wer.]d]		**!

However, although this analysis is on the right track, it requires major refinements (cf. Bermúdez-Otero & Hogg 2003: 110-1). Observe, first, that the nom/acc.sg. form *hēafod* contains an unfooted syllable that resists deletion: /hæːɑfod/ → [$_{\omega}$[.hæːɑ.].fod.].[12] This is true in all recorded OE dialects; see (7,9). It would be tempting to assume that in this case deletion is blocked for phonotactic reasons, to avoid the creation of an ultraheavy -VXCC monosyllable: i.e. ***hēafd* (for this hypothesis, see Hogg 2000: §1). Yet this solution proves unworkable. First, OE does tolerate ultraheavy monosyllables: e.g. *lēoht* 'light', *dūst* 'dust'. These are presumably parsed as trimoraic -VXC syllables (which, unlike ME, OE permits word-internally)[13] followed by a single extrasyllabic consonant: e.g. [$_{\omega}$[.leːox.]t]. More decisively, we shall later see that nom/acc.pl. *tungol*, found in both Alfred and *Ru2*, derives from underlying /tuŋglu/ by stem-level apocope; in this case, the deletion of the final vowel yields the stem-level form [$_{\omega}$[.tuŋg.]l], an ultraheavy monosyllable. Another example would be nom/acc.pl. *wǣpen* 'weapon', from underlying /wæːpnu/, parsed as [$_{\omega}$[.wæːp.]n] at the stem level. Such forms prove conclusively that vowel deletion is not prevented from creating -VXCC monosyllables, at least in Alfred and *Ru2*.

Traditional analyses suggest instead that the final syllable of *hēafod* is protected from deletion because it is closed; apocope and syncope target only unchecked vowels (see e.g. Campbell 1959: §347, Hogg 1992: §6.19 note 1, Keyser & O'Neil 1985: 10). It therefore appears that, in OE, vowel deletion is not driven by PARSE-σ, but by a more specific constraint targeting unfooted *light* syllables: PARSE-σ̆. This constraint should be interpreted as the local conjunction (Smolensky 1993) of its more general counterpart PARSE-σ with **σ̆, a constraint banning monomoraic syllables.

(7,24) a. PARSE-σ̆ = { PARSE-σ $\&_{\sigma}$ **σ̆ }
All monomoraic syllables must be parsed by feet.

12 We know that the final syllable surfaces without stress because, historically, it undergoes qualitative processes of vowel reduction (on which see §7.5 and §8.2 below), viz. lowering: cf. WGmc *hɑuβ**u**ð-. The alternative parse **[$_{\omega}$[.hæːɑ.][.fod.]], where the final syllable is footed, is ruled out by NONFIN; see §7.6.

13 On Closed Syllable Shortening in ME, particularly in the *Ormulum*, see §8.6.

b. **σ̆ (Broselow 1992: 32, Kager 1999b: 217, Kiparsky forthcoming)
A syllable must not be monomoraic.

There is good independent evidence that **σ̆ can trigger rhythmic deletion processes: see the analyses of syncope in Arabic dialects in Broselow (1992), Kager (1999b), and Kiparsky (forthcoming).

(7,25) a. *OE vowel deletion as driven by* P*ARSE*-*σ̆*
Parse-σ̆ » MAX-V » PARSE-σ

b.

		PARSE-σ̆	MAX-V	PARSE-σ
wordu	[$_\omega$[.wor.].du.]	*!		*
	[$_\omega$[.wor.]d] ☜		*	
hæːɑfod	[$_\omega$[.hæːɑ.].fod.] ☜			*
	[$_\omega$[.hæːɑf.]d]		*!	

Later sections will confirm that, in the fragment of OE phonology under consideration, it is indeed PARSE-σ̆, rather than its more general counterpart PARSE-σ, that plays an active rôle. Notably, we shall see that the variation between unsyncopated nom/acc.pl. *hēafodu* (found in Alfred and *Ru2*, as well as in *Ps*(*A*)) and syncopated *hēafdu* depends on the relative ranking of PARSE-σ̆ and NONFIN at the stem level; PARSE-σ, in contrast, is invariantly subordinate to NONFIN throughout OE (see §7.6). In consequence, PARSE-σ will hereafter be omitted from the discussion.

We have established that, in OE, rhythmic vowel deletion is driven by the ranking PARSE-σ̆ » MAX-V. There are situations, however, where this ranking does not suffice to determine the outcome. Consider, for example, underlying /hæːɑfodu/. A faithful parse with a single left-aligned moraic trochee would in this case contain not one but *two* unfooted light syllables: i.e. [$_\omega$[.hæːɑ.].fo.du.]. This opens up a number of possibilities. As we shall see in §7.6, both Owun and Alfred tolerate variants where the problem is resolved at the stem level by creating a weak foot over the last two syllables: i.e. [$_\omega$[.hæːɑ.][.fo.du.]].[14] However, when deletion does occur (variably in Alfred and *Ru2*, obligatorily in Ælfric), it consistently targets the first unfooted syllable, rather than the second: e.g. nom/acc.pl. *hēafdu*, not ***hēafod* (Campbell 1959: §353).[15] This is problematic for two reasons:

(i) *hēafdu* performs worse than its ungrammatical counterpart ***hēafod* on PARSE-σ̆, as it still contains one unfooted monomoraic syllable;
(ii) similarly, *hēafdu* violates **.μμμ., whilst ***hēafod* does not.

Accordingly, there must be some other constraint that favours syncope over apocope in words potentially containing two unfooted light syllables; this third constraint must dominate both PARSE-σ̆ and **.μμμ.

Obviously, the third constraint cannot be ANCHOR-R, which has the effect of banning deletion or insertion at the right edge of the domain.

[14] At the word level, this weak foot is dismantled in order to satisfy foot nonfinality, but the medial syllable is protected from deletion by virtue of its status as a foot head in the input. See §7.6 for details.

[15] Of course, this excludes Mercian (see note 6).

(7,26) ANCHOR-R (see Kiparsky forthcoming)
A domain-final input segment has a domain-final output correspondent.[16]

The ranking ANCHOR-R » PARSE-σ̆ would incorrectly block apocope altogether.

Once more, traditional analyses hold the key to the problem. The handbooks clearly state that a vowel will not be vulnerable to apocope or syncope unless it is immediately preceded by one heavy stressed syllable or by a light stressed syllable plus another light. This translates into a straightforward metrical generalization: deletion only targets syllables that are immediately adjacent to a foot (Keyser & O'Neil 1985: 10; Hogg 1992: §6.18, §6.20; Hutton 1998b: §3.4). In $[_{\omega}$[.hæːɑ.].fo.du.], the medial syllable meets this criterion; the final syllable, however, does not, and it is therefore not susceptible to apocope.

Drawing upon proposals advanced by Halle & Vergnaud (1987b: 238), I suggest that a *stress well* is created under any syllable that is immediately adjacent to a metrically stronger prosodic unit, i.e. to a syllable or foot bearing a higher degree of stress.[17] Crosslinguistically, attrition processes such as destressing, shortening, reduction, and deletion seem to show a particular affinity with stress wells. Formally, this can be interpreted as a positional faithfulness effect (Beckman 1997, 1998): a syllable enjoys special protection from markedness pressures when it does not occupy a stress well. I shall accordingly posit the following constraint:

(7,27) STRESSWELL
If
- α is a vowel in the input,
- β is a correspondent of α in the output,
- at least one syllable intervenes between β and any strong prosodic unit (syllable or foot),

then
$\beta \neq \varnothing$.

As we have seen, PARSE-σ̆ demands the deletion of vowels that would otherwise surface in unfooted light syllables; but, with STRESSWELL ranked above PARSE-σ̆, the resulting vowel deletion site must be adjacent to either a stressed syllable or a foot, i.e. it must occupy a stress well. In tableau (7,28), both candidates contain a vowel deletion site (notated with the symbol ∅ coindexed with the deleted vowel). In the syncopated candidate, the deletion site is adjacent to a foot (and to a stressed syllable). In the apocopated candidate, in contrast, there is no stress well under the deletion site, i.e. there is no adjacent foot or stressed syllable. Consequently, syncope proves more harmonic than apocope.

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16 In monostratal OT, ANCHOR-R usually functions as a hybrid alignment constraint, demanding that the right edge of a designated grammatical category should coincide with the right edge of a designated prosodic category: ANCHOR-R(Root,σ), for example, requires root-final segments to be syllable-final; see (2,80). In the present context, however, there is no need to refer to specific morphological categories: ANCHOR-R simply access the right edge of the visible domain; level segregation and cyclicity independently ensure that the visible domain corresponds to a morphological category of the correct type. See §2.4.5.1 for germane discussion.

17 In Halle & Vergnaud's definition, only syllables induce stress wells.

(7,28)

hæːɑfo$_i$du$_j$	StressWell	Parse-σ̆	**.μμμ.	Max-V
[$_ω$[.hæːɑf.]∅$_i$.du$_j$.] ☜		*	*	*
[$_ω$[.hæːɑ.].fo$_i$d.∅$_j$]	*!			*

There remains the problem that, after syncope, *hēafdu* still contains an unfooted light syllable in a stress well. Thus, as Hogg (2000: §1) observes, syncope recreates the environment for deletion, yet, puzzingly, deletion fails to iterate: ***hēafd*. We saw above that ***hēafd* is not ruled out on photactic grounds. Heavy neuter *ja*-stems provide further confirmation of this: e.g. nom/acc.pl. *wītu* [$_ω$[.wiː.].tu.] 'punishment', from underlying /wiːtiu/, undergoes syncope but not apocope. Observe that, in this case, both processes could apply without creating a -VXCC monosyllable: ***wīt* (Hogg 1997: §5). This indicates that the failure of deletion to iterate is due to faithfulness rather than markedness: more specifically, OE does not tolerate the loss of more than one input vowel (Hogg 1992: §6.25). Max-V^2 must accordingly occupy a superordinate position in the hierarchy; this constraint can be understood as the self-conjunction (Smolensky 1995, Alderete 1997, Itô & Mester 1998) of Max-V.[18]

(7,29) Max-V^2 = { Max-V & Max-V }
No more than one input vowel may lack an output correspondent.

The effects of top-ranked Max-V^2 are illustrated in tableau (7,30):

(7,30)

hæːɑfodu	Max-V^2	Parse-σ̆	Max-V
[$_ω$[.hæːɑf.].du.] ☜		*	*
[$_ω$[.hæːɑf.]d]	*!		**

Diachronic evidence confirms the conclusion that faithfulness constraints are responsible for the failure of deletion to iterate. Prehistorically, atonic long vowels shortened at the same time as short vowels underwent deletion; this shows that the overall process of rhythmic vowel attrition involved the loss of exactly one mora (Hogg 1992: §6.13). By Alfred's time, however, underlying long vowels need not be postulated outside root syllables (see §7.6), and so vowel attrition can simply be characterized as involving the loss of at most one input vowel.

Parse-σ̆, in sum, is the engine of vowel deletion in OE, its effects modulated by the top-ranked faithfulness constraints StressWell and Max-V^2. There is an aspect of this analysis, however, that deserves further comment. In their critique of Kager's (1999a: §4.3) analysis of stress and length in Hixkaryana, Halle & Idsardi (2000) charge OT with defining a grammatical space of 'extreme delicacy and specificity'. The terms *delicate* and *specific*, which Halle & Idsardi borrow from Cohn & McCarthy (1994: 68), are intended to describe a

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18 If Łubowicz (1999: §7.2) is correct in suggesting that the local domain of a constraint conjunction is the minimal sequence over which both its members can be evaluated, then Max-V^2 should probably be interpreted as forbidding the deletion of two or more *consecutive* input vowels.

theory of grammar in which single choices (parameter settings or rankings of constraint pairs) may have extremely limited repercussions upon phonological systems, possibly affecting the realization of no more than one form or class of forms. Delicacy, as Halle & Idsardi point out, has a detrimental effect upon learnability: where a delicate grammatical choice is not the default, the child can acquire it correctly only if she is exposed to —and notices— those few surface forms where the choice is crucially expressed. In other words, delicacy in the grammar space renders acquisition nonrobust. Halle & Idsardi argue that grammars should be robustly learnable, i.e. learnable on the basis of random and possibly degenerate evidence; this aim can only be achieved if the correct analysis of complex or rare forms follows from the interaction of grammatical choices acquired upon exposure to simple and frequent data.

In this context, it should be clear that the constraint system postulated in this section does suffer from delicacy and specificity, particularly as regards the interaction between PARSE-σ̆ and STRESSWELL. The ranking STRESSWELL » PARSE-σ̆ has no effect upon the core deletion cases illustrated in (7,22). Let us moreover assume that markedness constraints outrank faithfulness in the initial state of the grammar (see §5.3). If so, the child will embark upon the acquisition process with the default ranking PARSE-σ̆ » STRESSWELL, which generates the incorrect mapping /hæːɑfodu/ → **[hæːɑfod]. To acquire the target ranking STRESSWELL » PARSE-σ̆, the child needs to be exposed to nom/acc.pl. forms of the *hēafdu* type. If these are not abundant and salient in the trigger experience, the child will retain the opposite ranking. We must therefore conclude that, from the viewpoint of learnability, the hierarchy STRESSWELL » PARSE-σ̆ is not particularly robust in OE.

To use this argument against my analysis of OE vowel deletion would however miss an all-important point. Delicacy constitutes a flaw in a grammatical analysis only if it can be shown that the system described is in fact robustly learnable. However, if the system in question is diachronically unstable and prone to reanalysis, then a delicate description enjoys a positive advantage, for it identifies the cause of the system's vulnerability to innovation. As it happens, the realization of input forms of the /hæːɑfodu/ type showed signs of instability in OE from an early period. In particular, a failure to acquire the ranking STRESSWELL » PARSE-σ̆ already becomes manifest in the mid-ninth century in the Mercian dialect of *Ps*(*A*), where nom/acc.pl. *hēafud* occurs whilst *hēafdu* is absent (see §7.1 and note 6); I shall discuss this development more extensively in §8.3. In contrast, the behaviour of core deletion targets such as /ʃipu/, /wordu/, and /werodu/, where the ranking of STRESSWELL is irrelevant, displays remarkable consistency and resilience across dialects; see table (7,9) again. In this sense, my optimality-theoretic analysis of OE vowel deletion shows delicacy and specificity exactly where the evidence of history calls for it (see §7.6 for further discussion).

7.5 Apocope: the stratification of *a*-stem noun inflection

When not subject to apocope, the nom/acc.pl. ending of neuter *a*-stem nouns occurred in OE in three variants: *-u*, *-o*, and *-a*. As we have already seen, the high vowel *-u* is the regular reflex of the original WGmc ending **-ō*. The mid variant *-o* arose historically through a process lowering /u/ in unstressed syllables; this applied fairly systematically word-internally, but was variable in word-final position (Campbell 1959: §373). The lowering of /u/ to [o] was part of a wider pattern of reduction which caused the contrast between high and nonhigh vowels to be neutralized on the surface in unstressed syllables. In §8.2 below I shall argue that the underlying distinction was concomitantly lost at an early period, and that this development was instrumental in the rise of a stratal split in OE nominal inflection. In this section, however, my first aim will be to demonstrate that the stratification of *a*-stem noun affixes was an established fact in the grammar of West Saxon by the time of Alfred. For this purpose, the evidence of neut.nom/acc.pl. *-o* is inconclusive, and so it need detain us no further.

The behaviour of the low variant *-a* is, in contrast, of crucial significance, for it can be demonstrated that, unlike [-o], surface [-ɑ] in the nom/acc.pl. of neuter *a*-stem nouns cannot possibly be derived from underlying /-u/ by means of a phonological rule of lowering. Unstressed word-final /-u/ also occurs in OE in the nom.sg. of *ō*-stem nouns, where, as in the nom/acc.pl. of neuter *a*-stems, it undergoes apocope under the conditions described in §7.4 (see e.g. Campbell 1959: §585, §588). Yet, as Hogg (1997: §4, 2000: §4) has pointed out, the nom.sg. suffix of *ō*-stems does not suffer lowering to [-ɑ] in West Saxon: e.g. fem.nom.sg. *gifu* 'gift', never ***gifa* (for Alfred, see Cosijn 1886: §13, §14; for Ælfric, see e.g. Pope 1967-8). This proves that there is no general phonological rule lowering /-u/ to [-ɑ] in West Saxon. We must therefore conclude that the occurrence of surface [-ɑ] in the nom/acc.pl. forms of neuter *a*-stem nouns reflects an ongoing process of *morphological* change substituting /-ɑ/ for /-u/ in underlying representations. In Early West Saxon this development is still incipient: Cosijn (1886: §3, §12) reports 23 cases of neut.nom/acc.pl. *-a* in *Or* (including *ja*-stems) and 3 in *CP*(*H*), but none in *CP*(*C*).[19] In Ælfric's dialect, however, the replacement of /-u/ by /-ɑ/ is highly advanced, to the extent that *-a* is prevalent (Pope 1967: 183).

How does the innovative neut.nom/acc.pl. suffix /-ɑ/ behave in respect of apocope? Unexpectedly, it undergoes deletion in exactly the same environments as the more conservative ending /-u/. This fact stands out if one compares the behaviour of neut.nom/acc.pl. /-ɑ/ with that of gen.pl. /-ɑ/, as the two suffixes are homophonous both underlyingly and on the surface. Table (7,31) shows that, whereas neut.nom/acc.pl. /-ɑ/ never surfaces after stems that trigger the apocope of /-u/, gen.pl. /-ɑ/ is consistently immune to deletion (as are all the oblique suffixes).

(7,31)

nom/acc.sg.	nom/acc.pl.	gen.pl.
scip	*scipu* ~ *scipa*	*scipa*
word	*word*, ***wordu*, ***worda*	*worda*

These data prove that, by Alfred's time, rhythmic vowel deletion has become insensitive to the quality of the target segment: deletion is no longer restricted to high vowels, for neut.nom/acc.pl. *-a* undergoes apocope despite being nonhigh both underlyingly and on the surface. Synchronically, it is the morphological identity of the suffix, rather than the height of the vowel, that determines whether or not a vocalic suffix will undergo apocope under the prosodic conditions outlined in §7.4. In this sense, the term 'high vowel deletion', whilst appropriate for prehistoric OE, is a misnomer in West Saxon.

Our discussion so far suggests that apocope is a natural phonological process driven by ordinary prosodic constraints (§7.4); its application is, however, limited to a morphologically defined subset of its potential targets. In a framework that countenances level segregation, analysing this type of interaction between phonology and morphology poses no difficulty. In the case at hand, it transpires that the lexicon of West Saxon must

[19] These figures cannot be fully correct. Cosijn overlooks *a*(*p*)*pla* 'apple' neut.nom/acc.pl. *CP*(*H*,*C*) 95.4-13; see §AppA.1 (note 1). Counting these forms in, there turn out to be at least 3 tokens of the neut.nom/acc.pl. ending *-a* in *CP*(*C*).

comprise no less than two levels: the stem level and the word level.[20] The morphological process affixing nom/acc.pl. endings (whether /-u/, /-o/, or /-ɑ/) to neuter *a*-stems operates on the stem level; other *a*-stem noun suffixes belong in the word level. In addition, apocope is active at the stem level, but turns off at the word level. As a result, apocope is fed by neut.nom/acc.pl. inflection, but is counterfed by the suffixation of other *a*-stem noun endings:

(7,32)

		nom/acc.pl.	gen.pl.
Root		/word-/	/word-/
SL	*morphology*	word-ɑ	—
	phonology	[$_{\omega}$[.wor.]d]	[$_{\omega}$[.wor.]d]
WL	*morphology*	—	[$_{\omega}$[.wor.]d]-ɑ
	phonology	[$_{\omega}$[.word.]]	[$_{\omega}$[.wor.].dɑ.]
		word	*worda*

This instance of stratification is not an isolated phenomenon in OE morphology. Anglian and early Kentish, for example, show another split between apocope-prone and apocope-resistant inflectional endings. In these dialects, as in West Saxon, final /-u/ is vulnerable to deletion in the nom/acc.pl. of neuter *a*-stem nouns; in the 1sg.pres.ind. of strong verbs, however, it fails to apocopate: e.g. *bīdu* 'I wait', *haldu* 'I hold' (Campbell 1959: §346, §731 note 1; Suzuki 1988).[21] Dresher (1993) diagnoses a similar split between nominal and verbal inflection in the early Mercian dialect of *Ps*(*A*). Level distinctions also affect OE derivational morphology: according to Suphi (1988), the stratification of the lexicon is responsible for the contrast between stressed nominal prefixes and unstressed verbal prefixes (see Campbell 1959: §71-§86).[22]

I have assigned to the word level all the *a*-stem noun endings that are immune to apocope (i.e. all except the neut.nom/acc.pl. suffix; see note 31). In the appropriate prosodic environment, however, these word-level affixes trigger syncope consistently: e.g. gen.pl. /hæːɑfod-ɑ/ → [hæːɑfdɑ]. Indeed, syncope before word-level endings in stems of the *hēafod* type may be added to the list of core cases of vowel deletion where Owun, Alfred, and Ælfric agree with each other and show no variation; see table (7,9).[23] It is therefore clear that syncope must be active at the word level, even if apocope is not. In turn, this confirms the position adumbrated in Hogg (1997: 114-117, 2000: §1) and adopted here: apocope and syncope are separate phonological processes in the recorded OE dialects and, despite their similar prosodic conditioning, cannot be subsumed under a single synchronic rule.

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20 Bermúdez-Otero & Hogg (2003: §3) use the terms 'level I' and 'level II'. Nothing of substance hinges on the choice of labels.

21 In the 1sg.pres.ind. of strong verbs, West Saxon has *-e* instead of the original *-u* (<WGmc **-ō*). This *-e* must be word-level, since it too fails to undergo apocope. (Recall that apocope is not synchronically sensitive to vowel height in West Saxon.)

22 Like Suphi, Hutton (1998b) acknowledges two prefix classes belonging to two different phonological levels, which he labels 'cyclic' and 'noncyclic'. Unlike Suphi, however, Hutton notes that 'cyclic' prefixes need not be internal to 'noncyclic' ones. For this reason, he couches his analysis in Halle & Vergnaud's (1987a, b) noninteractionist version of LPM. In terms of the discussion in §2.6.2, we would say that the evidence of prefixal stress supports level segregation but refutes extrinsic level ordering.

23 In Alfred and in *Ru2*, but not in Ælfric, there is variation between syncopated and unsyncopated forms in the neut.nom/acc.pl. I address this observation in §7.6.

We have seen that vowel deletion processes operate on both lexical levels: apocope applies at the stem level and then turns off, whereas syncope must at least be active at the word level. By implication, the constraint ranking that drives vowel deletion (i.e. STRESSWELL, MAX-V^2 » PARSE-σ̆ » MAX-V; see §7.4) must hold throughout the lexical phonology. The question now arises as to how apocope is turned on and off whilst this ranking remains in place. The answer is provided by the constraint ANCHOR-R, which forbids deletion or insertion at the right edge of the visible domain; see (7,26) above. Ranked above ANCHOR-R, PARSE-σ̆ is free to trigger apocope; under the opposite ranking, syncope is permitted but apocope is blocked.

(7,33) a.

Stem level (nom/acc.pl.)		PARSE-σ̆	ANCHOR-R
word-u	[$_\omega$[.wor.].du.]	*!	
	[$_\omega$[.wor.]d] ☜		*

b.

Word level (gen.pl.)		ANCHOR-R	PARSE-σ̆
[$_\omega$[.wor.]d]-ɑ	[$_\omega$[.wor.].dɑ.] ☜		*
	[$_\omega$[.word.]]	*!	

The operation of apocope raises one further question. As it stands at present, my analysis predicts that the neut.nom/acc.pl. ending will undergo deletion after stems ending in an obstruent+sonorant cluster, whether light like /wætr-/ or heavy like /tuŋgl-/:[24]

(7,34)

Stem level		PARSE-σ̆	ANCHOR-R
wætr-u	[$_\omega$[.wæt.].ru.]	*!	
	[$_\omega$[.wæt.]r] ☜		*
tuŋgl-u	[$_\omega$[.tuŋ.].glu.]	*!	
	[$_\omega$[.tuŋg.]l] ☜		*

Table (7,9), however, contains several forms which appear to contradict this prediction: e.g. nom/acc.pl. *wæt*(*e*)*ru* in Alfred and Ælfric, *tung*(*o*)*lu* both in West Saxon and in *Ru2*. However, this evidence should be interpreted with care. In particular, it must be noted that, from a very early point in the history of OE, heavy monosyllabic stems ending in an obstruent+sonorant cluster were prone to be reanalysed as underlyingly disyllabic and so join the *hēafod*-class: e.g. /tuŋgl-/ > /tuŋgol-/. This process of restructuring was gradual and proceeded on an item-by-item basis (see §8.3 below for extensive discussion). As a

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[24] For the syllabification of obstruent+sonorant clusters in intervocalic and word-final position, see again §7.3, particularly (7,20) and (7,21).

consequence of restructuring, however, the testimony of unapocopated forms such as *tunglu* is ambiguous: such forms may derive either from underlying /tuŋgl-u/ or from restructured /tuŋgol-u/, but only the first case would indicate an anomalous failure of apocope.

In contrast, light stems such as *wæter* resisted restructuring and remained underlyingly monosyllabic until a very advanced point in the development of West Saxon: Bermúdez-Otero & Hogg (2003: §3) show that, up until the stage represented by Ælfric's dialect, the distinction between the /wætr-/ and /werod-/ classes remained stable (see §7.7 and §8.6 below). In the dialects considered here, therefore, forms like *wætru* and *wæteru* are unambiguously derived from underlying /wætr-u/, and hence diagnose a failure of apocope after obstruent+sonorant clusters. This evidence is unequivocal: if we assumed a hypothetically restructured input form /wæter-u/ for Alfred, Ælfric, or Owun, the normal application of apocope would incorrectly produce surface *wæter*; cf. /werod-u/ → [werod] (see §7.7).

In this light, the failure of apocope after an obstruent+sonorant cluster emerges as a property of relatively innovative dialects. In Early West Saxon, for example, the phenomenon remains variable. As I have argued, apocope has clearly failed in forms such as *wætru* and *wæteru* (§AppA.1). Alongside these, however, Alfred's corpus still contains forms such as nom/acc.pl. *tungul* (§AppA.2), which can only derive from underlying /tuŋgl-u/ with deletion of the final vowel; recall that restructured /tuŋgul-u/ would not be liable to apocope (§7.4). In Ælfric's more advanced dialect, however, the failure of apocope after obstruent+sonorant clusters has become systematic: apocopated nom/acc.pl. forms such as *wæter* and *tungol* are consistently absent. Instances of the blocking of apocope after rising sonority clusters can also be found in the late North Northumbrian dialect of the gloss to the *Lindisfarne Gospels* (henceforth *Li*): e.g. *uætro JnGl*(*Li*) 3.23. This dialect, however, is even more advanced than Ælfric's, as it has reached a point in which apocope is generally obsolescent (Hogg 1997: 123); on the eventual loss of apocope in West Saxon, see Bermúdez-Otero & Hogg (2003: §3) and §8.6 below.

In contrast, the regular application of apocope after obstruent+sonorant clusters characterizes relatively conservative varieties of OE. Tellingly, unapocopated *wæt*(*e*)*ru* fails to occur in the early Mercian dialect of *Ps*(*A*): cf. acc.pl. *megen* 'power' 20.13, 77.5, 77.61, *Ca* 13.9;[25] nom/acc.pl. *weter* 28.3, 32.6, 45.3, 68.1, etc. (21×); nom/acc.pl. *yfel* 'evil' 7.4, 20.11, 27.4, 39.13, etc. (25×).[26] Diagnostic forms of the *wæt*(*e*)*ru* type are also absent from *Ru2*: cf. nom/acc.pl. *hrægl*, *mægen*, *wæter*, *yfel* (§AppB.1). This fact is recorded by Hogg (1997: 123), who observes that, whilst Owun produces unapocopated forms like *tāceno*,[27] "words such as *wæter*, *yfel* have a ∅-inflected plural." Hogg's observation is highly significant, for it shows that the restructuring of *tungol*-type stems is older and more widespread than the blocking of apocope after rising sonority clusters: Owun's dialect has evidence of the former, but not the latter.

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25 It is unclear whether *megen* (*mægen* in West Saxon and *Ru2*) belongs etymologically in the *wæter* or in the *werod* class; in Alfred, Ælfric, and Owun, however, it clearly patterns synchronically as a monosyllabic stem (see §AppA.1 note 2, and references therein). The same is true in *Ps*(*A*): cf. the oblique forms *megnes* gen.sg. 8× e.g. 32.15, *megne~mægne* dat.sg. 19× e.g. 17.31, *megna* gen.pl. 17× e.g. 23.10, and *megnum* dat.pl. 4× e.g. 43.11; though note ins.sg. *megene* 67.12.

26 *Yfel* originally belonged in the *werod* class, but in the dialect of *Ps*(*A*) it has been transferred into the *wæter* group, like *megen* (see note 25): cf. the oblique forms *yfle* dat.sg. 5× e.g. 9.26, *yfla* gen.pl. 2× e.g. 26.7, *yflum* dat.pl. 3× e.g. 34.24. The same phenomenon can be observed in *Ru2* (§AppB.1 note 3).

27 For a list of trisyllabic nom/acc.pl. forms of the *tāceno* type in *Ru2*, see (7,36) below. As indicated in table (7,9), however, these forms coexist with instances of the conservative apocopated nom/acc.pl: cf. acc.pl. *fore-tācun*. See §AppB.2.

How was this blocking effect implemented in the grammar? In the light of the information provided in §7.3, the answer is simple. Recall that in OE a syllable may not be headed by any segment other than a vowel: we assume that the constraint NUC→V is top-ranked and remains inviolate at all phonological levels. In consequence, the sonorant consonant in a word-final obstruent+sonorant cluster cannot be a syllable nucleus, but must occupy an extrasyllabic position despite constituting a sonority peak. This results in a violation of SONPK→σ. Note, however, that the application of apocope to forms such as /wætr-u/ and /tuŋgl-u/ at the stem level has precisely the effect of creating word-final obstruent+sonorant clusters. Therefore, in order to block apocope after stems ending in a rising sonority cluster, we need simply rank SONPK→σ above PARSE-σ̆. Under this ranking, a parse with an unfooted light syllable is less disharmonic than one with a nonsyllabic sonority peak.

(7,35) *Apocope after stems ending in an obstruent+sonorant cluster*

a. Apocope permitted (Owun; Alfred variably)
PARSE-σ̆ » SONPK→σ

wætr-u	NUC→V	PARSE-σ̆	SONPK→σ	ANCHOR-R
[$_\omega$[.wæt.].ru.]		*!		
[$_\omega$[.wæ.tr̩.]]	*!			*
[$_\omega$[.wæt.]r] ☜			*	*

b. Apocope blocked (Alfred variably; Ælfric)
SONPK→σ » PARSE-σ̆

wætr-u	NUC→V	SONPK→σ	PARSE-σ̆	ANCHOR-R
[$_\omega$[.wæt.].ru.] ☜			*	
[$_\omega$[.wæ.tr̩.]]	*!			*
[$_\omega$[.wæt.]r]		*!		*

7.6 Syncope: the problem of *hēafodu*

In the previous section I pointed out that, both in West Saxon and in the Anglian dialect of *Ru2*, syncope applies regularly to nouns of the *hēafod* type in forms containing word-level suffixes. In the neut.nom/acc.pl., however, the situation is more complex. In Ælfric, syncope applies regularly: e.g. acc.pl. *hēafdu ÆCHom* (1×), *hēafda ÆCHom* (4×) (Godden 2000: 722 sub voce *heafod*); acc.pl. *hēafda ÆHom* 21.566. Early West Saxon and *Ru2*, in contrast, display variation between disyllabic and trisyllabic forms. In *CP*, for example, one finds trisyllabic *hēafudu* alongside the expected disyllabic forms: i.e. *hēafdu, hēafda* (§AppA.4). Similarly, Owun has unsyncopated *dīowulo* and *hēofodo* alongside syncopated *dīowlo*, *dīowla*, and *hǣmdo* (§AppB.4).

The following trisyllables provide further evidence that, in Alfred's and Owun's dialects, syncope can fail in the neut.nom/acc.pl. (§AppA.2, §AppB.2):

(7,36)	Alfred	*wǣpeno*	'weapon' (2×)
		wǣpena	'weapon' (1×)
	Owun	*āiðulo*	'disease' (1×)
		bēceno ~ bēcono	'sign' (6×)
		tāceno ~ tācono	'sign' (2×)
		wēpeno	'weapon' (1×)

Originally, all these nouns had monosyllabic stems ending in an obstruent+sonorant cluster, i.e. they belonged to the *tungol* type (Campbell 1959: §574.3). We shall later see, however, that heavy stems do not undergo anaptyxis in suffixed forms (§7.7). The items in (7,36) can therefore only derive from restructured, underlyingly disyllabic stems: i.e. /tɑːken-/, /wæːpen-/, etc. (on this restructuring, see §7.5 above and §8.3 below). However, the very fact that these forms surface as trisyllabic implies a failure of syncope in the neut.nom/acc.pl.

Since neut.nom/acc.pl. suffixes are introduced at the stem level, one might be tempted to generate these unsyncopated forms by simply turning syncope off at the stem level. However, a moment's thought suffices to show that this solution would not work, for a neut.nom/acc.pl. form exiting the stem level as trisyllabic would still undergo syncope in its pass through the word level; see (7,37). Recall that syncope is exceptionless at the word level in all the dialects under consideration here.

(7,37)			nom/acc.pl.	
	Root		/hæːɑfod-/	
	SL	*morphology*	hæːɑfod-u	
		phonology	[$_{\omega}$[.hæːɑ.].fo.du.]	(syncope off)
	WL	*morphology*	—	
		phonology	[$_{\omega}$[.hæːɑf.].du.]	(syncope on)

Why, then, do stems of the *hēafod* type (and restructured stems of the *tungol* type) sometimes fail to undergo syncope in the nom/acc.pl. in Owun and Alfred? The key to the answer, it turns out, lies in a different class of neuter *a*-stem: the *nīeten* type. In West Saxon, whether Alfredian or Ælfrician, nouns of this type are altogether immune to syncope not only in the nom/acc.pl. but also in the oblique cases (Campbell 1959: §574.6). They thus afford a unique insight into the factors that block the application of syncope. Their paradigms conform to the following models (§AppA.5):[28]

(7,38)	WGmc stem	*nɑutiːnɑ-	*wiːxβiuðɑ-
	nom/acc.sg.	*nīeten*	*wēofod*
	nom/acc.pl.	*nīet**enu***	*wēof**odu***
	oblique (gen.pl.)	*nīet**ena***	*wēof**oda***
		'animal'	'altar'

[28] As one would expect, the behaviour of *nīeten*-type nouns in the mid-10th century West Saxon dialect of *BenR* is identical with that found in Alfred and Ælfric: e.g. *ful**tu**mes* 'help' gen.sg. *BenR* 53.85.13, 66.127.2; *ful**tu**me* dat.sg. *BenR* 1.9.7, 31.55.16, 35.60.6, 64.119.10; *inn**o**þe* 'interior' dat.sg. *BenRApp* 134.14; *wēof**o**des* 'altar' gen.sg. *BenR* 62.113.6. For the etymology of *fultum*, see §AppA.5 (note 8); on *innoþ*, see §AppA.5 (note 7); on *wēofod*, see §AppA.5 (note 5).

In this class of nouns the medial vowels display an intriguing behaviour. In WGmc they were either long or root-initial: e.g. WGmc *nɑutiːnɑ- contains the long-vowelled derivational suffix *-iːn- (§AppA.5 note 1); *wēofod* derives from the compounding of the roots *wiːx- and *βeð- or *βiuð- (§AppA.5 note 5). From this one can infer that, at some point in history, the second syllable of *nīeten*-type stems bore secondary stress: *ˈnɑuˌtiːnɑ-, *ˈwiːxˌβiuðɑ-.[29] In recorded OE, however, these syllables are no longer stressed on the surface. This is shown by the fact that —though consistently immune to syncope— they are not protected from vowel reduction processes such as lowering. Accordingly, the surface prosodification of the forms in (7,38) must be as follows:

(7,39)	nom/acc.sg.	[$_\omega$[.niːy.].ten.]	[$_\omega$[.weːo.].fod.]
	nom/acc.pl.	[$_\omega$[.niːy.].te.nu.]	[$_\omega$[.weːo.].fo.du.]
	oblique	[$_\omega$[.niːy.].te.nɑ.]	[$_\omega$[.weːo.].fo.dɑ.]

All this leads to the conclusion that the surface prosodic status of the medial vowel in *nīeten*-type nouns is identical with that of the medial vowel in unsyncopated nom/acc.pl. forms such as *hēafodu*: in both cases, the vowel is short and unstressed on the surface. Nonetheless, the medial vowel of *nīeten*-type nouns must possess some distinctive underlying property that protects it from syncope in all cases. It is plausible, furthermore, that this distinctive underlying property is connected with the fact that such vowels bore secondary stress during some prehistoric period.

The fact that the neut.nom/acc.pl. ending does not undergo apocope in nouns of the *nīeten* type (Campbell 1959: §574.6) provides a further clue. Imagine that length were the underlying property that distinguishes the medial vowels of *nīeten*-type nouns synchronically. This would allow the medial syllable to constitute a moraic trochee by itself at an early stage in the derivation. In that case, however, we should expect nom/acc.pl. forms to undergo apocope at the stem level, as the inflectional ending would occupy an unfooted light syllable in a stress well:

(7,40) [$_\omega$[.niːy.][.tiː.].nu.]
↓
∅

We know, however, that apocope does not apply to nouns of the *nīeten* type. In consequence, their special synchronic feature cannot be an underlyingly long medial vowel. In contrast, everything falls beautifully into place if we assume that the second vowel of *nīeten*-type nouns is underlyingly short but marked in the lexicon as heading a foot:

(7,41)
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    *
    |
/niːyten-/
```

[29] I assume that WGmc had iterative left-to-right footing, rather than simple root-initial stress: hence the weak foot in *[$_\omega$[.ˈnɑu.][.ˌtiː.].nɑ.]. Lahiri *et al.* (1999) assume iterative left-to-right footing for the entire Gmc family, although they rely on the so-called 'Germanic foot' rather than on the moraic trochee: cf. §7.3. Kiparsky (1998b) shows that foot construction was iterative in Gothic, *pace* Calabrese (1994). For compounds such as *ˈwiːxˌβiuðɑ- we may posit essentially the same prosodic structure as in present-day English: i.e. [$_{\omega'}$[$_\omega$.ˈwiːx.][$_\omega$.ˌβiu.ðɑ.]].

I shall first show how this solution works out in Ælfric's grammar, which is a pure *hēafdu* system (i.e. apocope applies regularly to the nom/acc.pl. of *hēafod*-type nouns). Later, I will return to Owun and Alfred's variable *hēafodu*-and-*hēafdu* system.

At the stem level, I simply assume that Ælfric's grammar requires underlying foot heads to retain their metrical status, i.e. underlyingly stressed vowels cannot be destressed. As a result, all forms of *nīeten*-type nouns exit the stem level as bipedal, with a root-initial strong foot plus a subsidiary foot headed by the second syllable of the stem. In the nom/acc.pl., however, this subsidiary foot incorporates the inflectional ending. Accordingly, there are no unfooted light syllables, and neither syncope nor apocope gets a chance to apply:

(7,42) Nīeten-*type nouns at the stem level*

	bare stem	nom/acc.pl.
	*	*
	|	|
UR	/niːyten-/	/niːyten-u/
SL	[$_ω$[.niːy.][.ten.]]	[$_ω$[.niːy.][.te.nu.]]

Assume, moreover, that weak feet are not allowed to be final in the prosodic word unless their head is underlyingly prespecified. This will have the effect of preventing the erection of subsidiary feet in nouns of the *hēafod* type. In consequence, nom/acc.pl. /hæːɑfod-u/ will undergo vowel deletion. (For the factors that promote syncope and inhibite apocope in this case, consult §7.4.)

(7,43) Hēafod-*type nouns at the stem level* (*Ælfric*)

	bare stem	nom/acc.pl.
UR	/hæːɑfod-/	/hæːɑfod-u/
SL	[$_ω$[.hæːɑ.].fod.]	[$_ω$[.hæːɑf.].du.]

In terms of constraint ranking, these provisions are easy to implement. In order to block the creation of word-final weak feet, one need only rank NONFIN, as stated in (7,12b), above PARSE-σ̆.[30] In addition, NONFIN must be dominated by both MAX-V́ and IDENT-stress: the former ensures that underlyingly stressed vowels are not deleted; the latter prevents their output correspondents from being defooted. Tableau (7,44d) shows how these rankings effect the stem-level mappings represented in (7,42) and (7,43).

(7,44) *The stem level in* hēafdu *systems*

a. The hierarchy
STRESSWELL, MAX-V́, IDENT-stress » NONFIN » PARSE-σ̆ » MAX-V

b. MAX-V́ (Kiparsky forthcoming)
Let α be a segment in the input.
If α is the ultimate head of a foot, then α has an output correspondent.

[30] Of course, NONFIN must remain subordinate to FTBIN, as head feet do occur in final position in the prosodic word: e.g. nom/acc.sg. *scip* [$_ω$[.ʃip.]]. See (7,13).

c. IDENT-stress (Pater 2000: 252)
Let α be a segment in the input.
Let β be an output correspondent of α.
If α is the ultimate head of a foot, then β is the ultimate head of a foot.

d.

Stem level		StressWell	Max-V́	Ident-stress	NonFin	Parse-σ̆	Max-V
hæːɑfod	[$_\omega$[.hæːɑ.][.fod.]]				*!		
	[$_\omega$[.hæːɑ.].fod.] ☜						
hæːɑfod-u	[$_\omega$[.hæːɑ.][.fo.du.]]				*!		
	[$_\omega$[.hæːɑ.].fo.du.]					**!	
	[$_\omega$[.hæːɑ.].fod.]	*!					*
	[$_\omega$[.hæːɑf.].du.] ☜					*	*
* | niːyten	[$_\omega$[.niːy.][.ten.]] ☜				*		
	[$_\omega$[.niːy.].ten.]			*!			
* | niːyten-u	[$_\omega$[.niːy.][.te.nu.]] ☜				*		
	[$_\omega$[.niːy.].te.nu.]			*!		**	
	[$_\omega$[.niːy.].ten.]	*!		*!			*
	[$_\omega$[.niːyt.].nu.]		*!			*	*

Observe that, after a pass through the stem level, the underlying metrical opposition between *hēafod*-type nouns and *nīeten*-type nouns remains intact: in the *hēafod* class, the medial vowel has either been deleted (in the nom/acc.pl.) or else remains unstressed (in the bare stem); in the *nīeten* class, in contrast, the medial vowel retains its status as a foot head in all forms. At the word level, however, the situation changes slightly. The medial vowel of *hēafod*, which is unstressed in the input, is once again targeted by syncope in suffixed forms. In contrast, the medial vowel of *nīeten* enters the word level as a foot head and hence escapes syncope; in the output, however, it is no longer stressed (see (7,39) above).

(7,45) Hēafod-*type and* nīeten-*type nouns at the word level* (*Ælfric*)

		nom/acc.sg.	nom/acc.pl.	oblique (gen.pl.)
a.	input	[$_\omega$[.hæːɑ.].fod.]	[$_\omega$[.hæːɑf.].du.]	[$_\omega$[.hæːɑ.].fod.]-ɑ
	output	*no change*	*no change*	[$_\omega$[.hæːɑf.].dɑ.]
b.	input	[$_\omega$[.niːy.][.ten.]]	[$_\omega$[.niːy.][.te.nu.]]	[$_\omega$[.niːy.][.ten.]]-ɑ
	output	[$_\omega$[.niːy.].ten.]	[$_\omega$[.niːy.].te.nu.]	[$_\omega$[.niːy.].te.nɑ.]

The application of defooting in (7,45b) indicates that, at the word level, the ban on word-final weak feet has become absolute: input metrical structure is no longer exempt. NONFIN is accordingly promoted over IDENT-Stress. Nonetheless, the failure of stressed input vowels to syncopate, even when subject to defooting, shows that MAX-V́ remains ranked above PARSE-σ̆:

(7,46) *The word level* (*both* hēafodu *and* hēafdu *systems*)

Word level		STRESSWELL	MAX-V́	NONFIN	PARSE-σ̆	IDENT-stress	MAX-V
[$_\omega$[.hæːɑ.].fod.]	[$_\omega$[.hæːɑ.][.fod.]]			*!			
	[$_\omega$[.hæːɑ.].fod.] ☜						
[$_\omega$[.hæːɑ.].fod.]-ɑ	[$_\omega$[.hæːɑ.][.fo.dɑ.]]			*!			
	[$_\omega$[.hæːɑ.].fo.dɑ.]				**!		
	[$_\omega$[.hæːɑ.].fod.]	*!					*
	[$_\omega$[.hæːɑf.].dɑ.] ☜				*		*
[$_\omega$[.niːy.][.ten.]]	[$_\omega$[.niːy.][.ten.]]			*!			
	[$_\omega$[.niːy.].ten.] ☜					*	
[$_\omega$[.niːy.][.ten.]]-ɑ	[$_\omega$[.niːy.][.te.nɑ.]]			*!			
	[$_\omega$[.niːy.].te.nɑ.] ☜				**	*	
	[$_\omega$[.niːy.].ten.]	*!				*	*
	[$_\omega$[.niːyt.].nɑ.]		*!		*		*

In this connection, recall that, unlike stem-final consonants, word-final consonants belonging to inflectional suffixes are not capable of rendering a weak foot nonfinal by becoming extrasyllabic: i.e. parses such as **[$_\omega$[.hæːɑ.][.fo.de.]s], where the final consonant belongs to the gen.sg. suffix *-es*, are ungrammatical. As we saw in §7.3, particularly (7,12), this indicates that PARSE-seg dominates NONFIN at the word level:

(7,47)

Word level		StressWell	Parse-seg	NonFin	Parse-σ̆	WeakC	Max-V
[$_{\omega}$[.hæːɑ.].fod.]-es	[$_{\omega}$[.hæːɑ.][.fo.de.]s]		*!				
	[$_{\omega}$[.hæːɑ.][.fo.des.]]			*!		*	
	[$_{\omega}$[.hæːɑ.].fo.de.s]		*!		**		
	[$_{\omega}$[.hæːɑ.].fo.des.]				*!	*	
	[$_{\omega}$[.hæːɑ.].fod.s]	*!	*!				*
	[$_{\omega}$[.hæːɑ.].fods.]	*!				*	*
	[$_{\omega}$[.hæːɑf.].de.s]		*!		*		*
	[$_{\omega}$[.hæːɑf.].des.] ☜					*	*

So much for syncope in pure *hēafdu* systems like Ælfric's. We now have a vital key to our original problem: the variable failure of syncope in nom/acc.pl. forms of *hēafod*-type nouns in Owun and Alfred. Our analysis of the *nīeten* class reveals that, when an unfooted light syllable in a stress well escapes syncope, its correspondent in the output of the stem level heads a foot. Accordingly, surface [$_{\omega}$[.hæːɑ.].fo.du.] must correspond to a bipedal stem-level parse [$_{\omega}$[.hæːɑ.][.fo.du.]]. In the same grammar, however, the bare stem must still be monopedal in the input to the word level: i.e. [$_{\omega}$[.hæːɑ.].fod.]. Recall that, as we saw in §7.5, there are no exceptions to syncope among *hēafod*-type nouns in forms containing oblique case endings.[31]

[31] Masculine and neuter *a*-stem nouns have identical oblique endings. In the nom/acc.pl., however, masculine *a*-stems take the suffix /-ɑs/. The masculine counterparts of the *hēafod* class include nouns such as *engel* 'angel' (§AppA.4 note 4), as well as masculine occurrences of *dēofol* (§AppA.4 note 2). Among such nouns, I have found no reliable examples of failed syncope in the nom/acc.pl. in either Alfred or Owun: cf. *englas CP* (§AppA.4), *MkGl*(*Ru*) 12.25, 13.27, etc.; *dīowlas Ru2* (§AppB.4 note 1). It appears, therefore, that, like the oblique endings, masc.nom/acc.pl. /-ɑs/ belongs in the word level; in §8.2 below this fact will be seen to follow logically from a diachronic account of how the *a*-stem noun affixes became stratified in prehistoric OE. Of course, the masculine parallels of *nīeten* are immune to syncope throughout their paradigms; see §AppA.5 for examples.

(7,48) Hēafod-*type nouns in* hēafodu *systems* (*Owun and Alfred variably*)

		nom/acc.sg	nom/acc.pl.	oblique (gen.pl.)
Root		/hæːɑfod-/	/hæːɑfod-/	/hæːɑfod-/
SL	*morphology*	—	hæːɑfod-u	—
	phonology	[$_ω$[.hæːɑ.].fod.]	[$_ω$[.hæːɑ.][.fo.du.]]	[$_ω$[.hæːɑ.].fod.]
WL	*morphology*	—	—	[$_ω$[.hæːɑ.].fod.]-ɑ
	phonology	—	[$_ω$[.hæːɑ.].fo.du.]	[$_ω$[.hæːɑf.].dɑ.]
		hēafod	*hēafodu*	*hēafda*

The mappings in (7,48) indicate that, in *hēafodu* systems, the stem-level constraint hierarchy allows a sequence of two light syllables to be gathered into a word-final weak foot. The same constraint hierarchy, however, forbids word-final weak feet erected over a single heavy syllable: **[$_ω$[.hæːɑ.][.fod.]]. Of course, these provisions apply only when the foot head is not prespecified in the underlying representation, i.e. they affect the *hēafod* class but not the *nīeten* class.

Once again, the implementation of this analysis in optimality-theoretic terms proves straightforward. We need only assume that, in the stem-level constraint hierarchy of *hēafodu* systems, NONFIN is ranked below PARSE-σ̆ while still dominating PARSE-σ; in all other respects, *hēafodu* and *hēafdu* systems are identical.

(7,49) *Word-final weak feet at the stem level: summary*

a. *Hēafodu* systems (Owun and Alfred variably)

• If a foot head is underlyingly specified, it must be respected;
• otherwise, word-final weak [$_Σ$σ̆σ̆] is permitted,
but word-final weak [$_Σ$σ̄] is banned.

MAX-V́, IDENT-stress, PARSE-σ̆ » NONFIN » PARSE-σ

b. *Hēafdu* systems (Owun and Alfred variably; Ælfric)

• If a foot head is underlyingly specified, it must be respected;
• otherwise, word-final weak feet are banned.

MAX-V́, IDENT-stress » NONFIN » PARSE-σ̆, PARSE-σ

The following tableau demonstrates the operation of stem-level constraints in *hēafodu* systems; for *hēafdu* systems, see again (7,44).

(7,50) *The stem level in* hēafodu *systems*

Stem level		StressWell	Max-V́	Ident-stress	Parse-σ̆	NonFin	Parse-σ	Max-V
hæːɑfod	[$_\omega$[.hæːɑ.][.fod.]]					*!		
	[$_\omega$[.hæːɑ.].fod.] ☜						*	
hæːɑfod-u	[$_\omega$[.hæːɑ.][.fo.du.]] ☜					*		
	[$_\omega$[.hæːɑ.].fo.du.]				**!		**	
	[$_\omega$[.hæːɑ.].fod.]	*!					*	*
	[$_\omega$[.hæːɑf.].du.]				*!		*	*
* | niːyten	[$_\omega$[.niːy.][.ten.]] ☜					*		
	[$_\omega$[.niːy.].ten.]			*!			*	
* | niːyten-u	[$_\omega$[.niːy.][.te.nu.]] ☜					*		
	[$_\omega$[.niːy.].te.nu.]			*!	**!		**	
	[$_\omega$[.niːy.].ten.]	*!		*!			*	*
	[$_\omega$[.niːyt.].nu.]		*!		*!		*	*

Incidentally, it is far from clear how *hēafodu* systems ought to be analysed in phonological frameworks where final syllable extrametricality is an all-or-nothing parameter. At the stem level, as we have seen, *hēafodu* systems disallow weak feet over final heavy syllables, but tolerate the parsing of final light syllables. However, postulating separate extrametricality parameters for mono- and bimoraic syllables would be clearly undesirable. It could be argued that this would be no worse than acknowledging Parse-σ and Parse-σ̆ as separate constraints; but recall that Parse-σ̆ arises from the local conjunction of two independently motivated constraints, Parse-σ and **σ̆, both of which perform various functions in metrical systems beyond regulating the behaviour of final syllables.

In the history of West Saxon, and more generally of OE, *hēafodu* systems are relatively conservative, whereas *hēafdu* systems are innovative (Kiparsky & O'Neil 1976: 534). *Pace* Hogg (1997: 115), several pieces of evidence point in this direction:

- First, unsyncopated nom/acc.pl. forms (either of *hēafod*-type nouns or of restructured *tungol*-type nouns) occur in several of the older monuments, including *CP*(*H*) and *Or*(*L*) in Early West Saxon, and *Ps*(*A*) in early Mercian. In comparison, Ælfric's *hēafdu*-only dialect is relatively late.
- Moreover, unsyncopated nom/acc.pl. forms display a pervasive dialectal distribution. In the preceding discussion we have come across examples in West Saxon (*CP*(*H*) and *Or*(*L*)), Mercian (*Ps*(*A*)), and South Northumbrian (*Ru2*). To these dialects one

could for example add the North Northumbrian of *Li* (Hogg 1997: 123).[32] In contrast, there are dialects in which syncopated *hēafdu* does not occur at all, such as the Mercian of *Ps*(*A*) and of *Ru1*; see note 6 and, for *Ps*(*A*), Dresher (1978: 148).

- Finally, some evidence in continental WGmc suggests that *hēafodu* systems reflect an ancestral metrical pattern whose last traces in OE are confined to the stem level. In Old Saxon, words consisting of a bimoric foot followed by a sequence of two light syllables evade high vowel deletion: e.g. *gôdumu, managumu* (Gallée 1993: §115). The absence of syncope (or apocope) in these forms is indicative of a bipedal parse with a word-final disyllabic weak foot: i.e. [$_ω$[.*gô*.][.*du.mu*.]], [$_ω$[.*ma.na*.][.*gu.mu*.]]. This is precisely the type of parse that characterizes the stem level in OE *hēafodu* systems: e.g. [$_ω$[.hæːɑ.][.fo.du.]]; see (7,48).

In conclusion, the history of West Saxon saw the gradual replacement of *hēafodu* systems by *hēafdu* ones. The process was well under way in Alfred, and by the time of Ælfric's writings it had already reached completion.

In the light of these diachronic facts, it is interesting to note that the contrast between *hēafodu* and *hēafdu* systems in OE constitutes another instance of extreme delicacy in the grammar space defined by cyclic OT (see §7.4). The choice between the stem-level rankings PARSE-σ̆ » NONFIN » PARSE-σ and NONFIN » {PARSE-σ̆, PARSE-σ} is expressed in only one class of surface forms: the nom/acc.pl. of *hēafod*-type nouns. In comparison, the correct choice at the word level, i.e. NONFIN » {PARSE-σ̆, PARSE-σ}, is less specific and more robustly learnable, as it is expressed in all syncopated oblique forms. Diachronically, therefore, we should expect word-level syncope to be relatively resistant to change, whereas the stem-level contrast between *hēafodu* and *hēafdu* systems should prove unstable. These expectations are strikingly confirmed by developments in West Saxon. Accordingly, this episode in OE morphophonological history lends further weight to the argument that delicacy in the grammar space is not undesirable in itself; nonrobust analyses are suspect only when the relevant patterns prove to be historically enduring (see again §7.4). More generally, one is again led to the striking conclusion that, when assessing the explanatory adequacy of grammatical theories, diachronic evidence is not merely relevant, but in fact often indispensable.

Significantly, if we consider the stem-level rankings PARSE-σ̆ » NONFIN » PARSE-σ and NONFIN » {PARSE-σ̆, PARSE-σ} in isolation, there is no clear reason to consider either to be the default: both NONFIN and PARSE are markedness constraints, and so the M » F bias does not apply (cf. the discussion of STRESSWELL and PARSE-σ̆ in §7.4). Without looking at input-output relationships, therefore, one would have no reason to expect either ranking to have gained the upper hand in the history of West Saxon. In §8.4, however, I will show that the input optimization algorithm introduced in chapter 5 favours *hēafdu* systems, as *hēafodu* systems involve considerably greater input-output disparity at the word level; in other words, *hēafodu* systems depend on word-level inputs that are hard to acquire and prone to restructuring. Historically, therefore, *hēafodu* systems should change into *hēafdu* ones, rather than the opposite —and, as we have seen, this is indeed what the evolution of West Saxon shows. Thus, delicacy and input optimization are essential concepts in an account of morphophonological change: by identifying delicate grammatical choices, synchronic analysis highlights phonological patterns that are vulnerable to misacquisition; input optimization then predicts the likely outcome of restructuring.

32 E.g. (*fore*)*tāceno*, from restructured /tɑːken-/, in *MtGl*(*Li*) 24.24, *MkGl*(*Li*) 13.8, *JnGl*(*Li*) 3.2; *bēceno*, from restructured /beːken-/, in *MtGl*(*Li*) 24.24, *MkGl*(*Li*) 13.22, *LkGl*(*Li*) 21.25, *JnGl*(*Li*) 8× e.g. 4.48.

At this point, moreover, it is already possible to appreciate some of the purely synchronic advantages arising from a stratal approach to the morphophonology of *a*-stem nouns in OE:

- First, neut.nom/acc.pl. forms exhibit a cluster of idiosyncratic phonological properties: both the application of apocope and the failure of syncope are morphologically circumscribed to these forms. My analysis tracks the various symptoms in this syndrome down to a single factor: the ascription of neut.nom/acc.pl. suffixation to the stem level.
- Secondly, syncope displays both lexical and systematic exceptions: the former, as we have seen, occur in *nīeten*-type nouns throughout the paradigm; the latter arise in neut.nom/acc.pl. forms in *hēafodu* systems. In my analysis there is a direct prosodic link between both types of exception: in the output of the stem level, syncope-resistant items are characterized by a bipedal parse, whilst syncope-prone forms contain a single foot.

These arguments show that the stratification of *a*-stem noun morphology in OE yields much more than mere 'strata of convenience' (McCarthy 1998: §2); it enables one to capture generalizations which would otherwise remain unexpressed.

7.7 Anaptyxis: the problem of *wæteru*

The analysis of vowel deletion in West Saxon must face yet another challenge (Hogg 2000: §6). The problem arises in the paradigm of neuter *a*-stem nouns with light monosyllabic stems ending in an obstruent+sonorant cluster: e.g. *wæter* /wætr-/ < WGmc *wɑtr-. It turns out that, in both Early and Late West Saxon, such nouns may have not only disyllabic but also trisyllabic realizations in the nom/acc.pl.: e.g. Alfred *wætru~wæteru* (§AppA.1), Ælfric *mægnu~mægenu* (§AppC.3). Forms like *wæteru* and *mægenu* are problematic because apocope appears to underapply:

(7,51) $[_{\omega}$[.wæ.te.].ru.]
‡
∅

Observe that the final syllable is light, is not footed, and occupies a stress well created by the main (and only) foot in the prosodic word. In addition, the final vowel is not preceded by an obstruent+sonorant cluster, and so deletion could apply without creating an extrasyllabic sonority peak (cf. §7.5). On the surface, therefore, there is no apparent reason for apocope to be blocked.

It could be suggested that the occurrence of forms such as *wæteru* indicates that apocope is no longer active in the grammar. However, this inference would be clearly incorrect, since for both Alfred and Ælfric apocope applies regularly to heavy stems of the *word* type; in their dialects, unapocopated ***wordu* is ungrammatical. As I pointed out in §7.1, apocope does indeed become obsolescent in a highly advanced stage of Late West Saxon, but Ælfric's grammar has not yet reached this point (see §8.6 below and Bermúdez-Otero & Hogg 2003: §3).

Alternatively, forms like *wæteru* could be taken to indicate that vowel deletion has undergone reanalysis and no longer applies in the stress well created by a foot; in the new version, rather, the target vowel must be immediately adjacent to a stressed heavy syllable. This solution has been espoused in several studies: e.g. Kiparsky & O'Neil (1976: 534), Dresher (1978: ch. 3), Dresher & Lahiri (1991: 279-281), Hogg (1997: 120). Typically, these scholars propose diachronic scenarios where the reanalysis of vowel deletion is brought about by the restructuring of monosyllabic stems ending in an obstruent+sonorant cluster: i.e. /tuŋgl-/ > /tuŋgol-/ (see §7.5 and §8.3). Nonetheless, this approach does not satisfactorily account for the evidence of the Ælfrician corpus. In Ælfric, apocope applies regularly to the nom/acc.pl. forms of *werod*-type nouns: his works contain a single token of nom/acc.pl. *werodu* (*ÆHom* 18.405) against fifteen of *werod* (e.g. *ÆHom* 11.290; *ÆCHom* I.1.22, I.1.24).[33] The contrast between nom/acc.pl. *wæteru* and *werod* indicates that Ælfric's dialect retains a distinction between originally monosyllabic and originally disyllabic light stems. Moreover, the application of apocope to input /werodu/ shows that deletion is not confined to posttonic syllables.[34]

I suggest, rather, that nom/acc.pl. *wæteru* constitutes a relatively simple case of surface opacity. The underlying representation is /wætr-u/, with an unrestructured monosyllabic stem. At the stem level, apocope is blocked in order to avoid creating a word-final obstruent+sonorant cluster, which would otherwise give rise to an extrasyllabic sonority peak (see §7.5); accordingly, the stem-level output is [$_{\omega}$[.wæt.].ru.]. The syllable contact in this parse, however, is relatively disharmonic, as sonority rises from the coda of the first syllable to the onset of the second; cf. (7,20b). This violation of CONTACT, I suggest, is

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33 I am grateful to Richard Hogg for providing me with these figures, which are based on a search of *The Dictionary of Old English corpus in electronic form* (Healey *et al.* 1998). Hogg's results confirm Godden's summary of the facts in the glossary to *ÆCHom*, which gives "n[om.]a[cc.]p[l.] werod" (Godden 2000: 787 sub voce *werod*).

34 At this point one should note that nom.pl. <ofǽtu> 'fruits' *ÆCHom* I.AppB2.2 does not constitute an exception to apocope in the *werod* class. The history of this word is in fact rather complex. The following outline draws on Pope (1968: 665-6), who touched upon the key issues in an extensive editorial note on *ofæt*[*an*] *ÆHom* 20.379. I am also grateful to Richard Hogg for discussing the linguistic and philological intricacies of the case with me.

First, OE had a neuter *a*-stem noun *ofet* 'fruit' that belonged in the *werod* class (Campbell 1959: §574.4). By comparing this word with its OHG cognate *obaz*, one can reconstruct a WGmc protoform *oβɑtɑ-. Beyond this point, however, the early prehistory of the noun remains unknown (Pope 1968: 666). WGmc *oβɑtɑ- yields OE *ofet* through a series of regular sound changes, including Anglo-Frisian Brightening of the posttonic vowel (**ofat*- > **ofæt*-; Campbell 1959: §333, Lass 1994: §3.5) and unstressed vowel reduction (**ofæt* > *ofet*; Campbell 1959: §369).

At some point in time, however, the monomorphemic noun *ofet* was reanalysed by some speakers as a derivative of *etan* 'to eat' (Pope 1968: 666). One possibility is that, before the posttonic vowel became subject to reduction, some speakers interpreted the form **ofæt* as a combination of the prefix *of*- and the first-preterite stem of *etan*, viz. *æt* (though, admittedly, by the historical period the vowel of the second preterite, viz. *ǣ*-, tended to oust *æ*- in the 1/3sg.past.ind. of *etan*; see Campbell 1959: §743). In this connection, note that strong first-preterite stems (the IE *o*-grade) were very often used in early Gmc as bases for word formation: e.g. causative verbs in *-jan*; OE *bearm* 'lap, bosom' < *βɑr-m, where *βɑr- is the first preterite of *βer-ɑn 'bear'; etc. (see Lass 1994: §8.3.1).

As a result of this reanalysis, therefore, a new neuter *a*-stem noun *of-æt* appears, where *-æt* is a stressed root element. Of course, root-stress protected the second syllable of the noun from vowel reduction, hence the frequent spelling <ofæt>; note that <æ> is not normally used to spell unstressed vowels in the West Saxon *Schriftsprache*. Particularly significant in this context are spellings such as <ofǽte> dat.sg. *ÆCHom* I.36.115 and <ofǽtu> nom.pl. *ÆCHom* I.AppB2.2, where the scribe has marked root-stress overtly with an acute accent. For our purposes, however, *of-æt* behaves as a (prefixed) member of the *scip* class, and is therefore not a candidate for apocope in the nom/acc.pl.

In a further twist to the tale, some scholars have also postulated a weak (*n*-stem) feminine noun *ofǣte* 'edible produce, food, fruit' alongside neuter *ofet* and *of-æt*. The existence of weak *ofǣte* would explain some instances of the spelling <ofætan> in contexts requiring accusative and dative forms. See Pope (1968: 665-6) for discussion.

repaired by a process of *anaptyxis* that inserts a vowel between the two members of the marked cluster.[35] This requires the ranking CONTACT » DEP-V:

(7,52) DEP-V (McCarthy & Prince 1995)
Every output vowel has an input correspondent.

Crucially, anaptyxis applies below the stem level (presumably at the word level) and, in consequence, counterfeeds apocope:

(7,53) *Anaptyxis counterfeeds apocope*

		nom/acc.pl.	
Root		/wætr-/	
SL	*morphology*	wætr-u	
	phonology	[$_\omega$[.wæt.].ru.]	(apocope blocked)
WL	*morphology*	—	
	phonology	[$_\omega$[.wæ.te.].ru.]	(anaptyxis)
		wæteru	

This analysis enjoys a striking advantage over previous proposals. As I will show in the following paragraphs, both the existence of anaptyxis as a separate phonological process and its ascription to the word level can be established on the basis of independent empirical evidence unrelated to the misapplication of apocope in forms such as *wæteru* and *mægenu*. Accordingly, the opaque interaction represented in (7,53) emerges without stipulation; in Stratal OT, in other words, the solution to the problem of *wæteru* comes for free.

Appendix C provides data concerning the distribution of anaptyctic vowels in *wæter*-type nouns at three points in the history of West Saxon (Alfred, Æthelwold, and Ælfric), as well as in Owun's South Northumbrian idiolect. The evidence shows, first, that anaptyxis remained a variable phonological process throughout the history of OE: all the dialects represented in Appendix C display instances of anaptyxis, but each of them also shows tokens of unepenthesized rising-sonority clusters. In West Saxon, however, the incidence of anaptyxis increased sharply during the tenth century: in the environment /t__r/, for example, the rate of vowel insertion jumps from 38% in Alfred to 100% in Ælfric; in the cluster /ɣ__l/ there is an equally conspicuous increase from 4% to 82%. The introduction of anaptyxis can therefore be described as incipient in Early West Saxon, but as well advanced in Late West Saxon. Unfortunately, it is difficult to provide a more precise chronological profile of the change during the tenth century; the evidence of Æthelwold's *BenR*, for example, is too scanty.[36] Nonetheless, Ælfric's data indicate that, by about AD 1000, anaptyxis has become obligatory in some contexts, including at least the environment /t__r/ and probably all clusters

[35] Following the terminological convention introduced in §7.2, I use the term 'anaptyxis' for vowel epenthesis in word-medial rising sonority sequences, and reserve the term 'parasiting' for vowel insertion in word-final obstruent+sonorant clusters.

[36] As an alternative, Bermúdez-Otero & Hogg (2003: §3.3) use data from the *Lǣcebōc* (*Leechbook*): London, British Library, MS Royal 12 D. xvii, Ker (1957: no. 264), mid-10th century. For /C__r/ environments, they report an overall rate of anaptyxis of 45% in Alfred, 54% in the *Lǣcebōc*, and 100% in Ælfric.

of a voiceless stop plus /r/.[37] I assume that the variability of anaptyxis and its increased incidence directly reflect changes in the phonological competence of West Saxon speakers, to be modelled in terms of stochastic constraint ranking (Boersma 1997, 1998; Boersma & Hayes 2001). Considered from this viewpoint, the data show that, during the tenth century, the probability distribution of CONTACT shifted steadily upwards relative to DEP-V in the constraint hierarchy of the relevant phonological level.

In addition, the variability of anaptyxis shows that it was considerably younger than apocope, which had already become obligatory in prehistoric OE. In this sense, the relative age of the two processes accords well with their location in the morphophonological system of OE: since apocope entered the grammar much earlier than anaptyxis, it would not be expected to apply at a lower grammatical level. Of course, this is not the key piece of independent evidence that proves that anaptyxis applied at the word level (the clinching synchronic argument will be made below), but it offers a nice example of how synchronic and diachronic observations dovetail in Stratal OT.

Interestingly, *Ru2* was barely affected by anaptyxis, with a single instance of vowel insertion in 198 tokens of *wæter*-type nouns: *wæt**e**re LkGl*(*Ru*) 3.16 (§AppB.1, §AppC.4). This result provides further evidence of the markedly conservative character of *a*-stem noun morphophonology in Owun's idiolect (§7.2); conversely, West Saxon proves to be a relatively innovative dialect. As we have seen, Owun's South Northumbrian also lagged with respect to Late West Saxon by failing to block apocope after obstruent+sonorant clusters (§7.5) and by retaining the option of not syncopating the nom/acc.pl. of *hēafod*-type nouns (§7.6).

The data in Appendix C also suggest that anaptyxis is finely sensitive to the sonority profile of the target cluster. In particular, the probability of vowel insertion is highest in sequences of a voiceless stop plus /r/: as we have seen, this is the only environment where anaptyxis is attested in *Ru2* and where it reaches obligatory status in Ælfric. This observation is precisely what one would expect if anaptyxis optimizes syllable contact: heterosyllabic clusters of a voiceless stop plus /r/ cause the sharpest sonority rise from coda to onset, and therefore create the worst possible type of juncture between consecutive syllables. The statement of CONTACT in (7,20b) does not formally capture this sonority-governed markedness gradient, but can easily be amended to do so: one possibility would be to replace (7,20b) by a family of harmonically ranked constraints such that, for any given C, **C.r » **C.l » **C.[+nasal], but the precise details need not be pursued here. Since anaptyxis also had the effect of moving the first consonant in the target cluster from the coda to the onset, it is likely that its application was also affected by the inherent markedness of certain segments as codas: I note, for example, that /ɣ/ triggers high rates of anaptyxis throughout.

Moreover, anaptyxis was not the only phonological process that removed heterosyllabic obstruent+sonorant clusters in OE; the language also had an alternative repair strategy of gemination, which it had inherited from the WGmc protolanguage (Campbell 1959: §408; see Bermúdez-Otero 1999: §3.5.2 for a detailed account). Significantly, gemination, like anaptyxis, remained variable in the historical period, so that the two processes entered into synchronic competition with each other. Thus, Appendix C contains striking instances of threefold variation between anaptyxis, gemination, and no repair: e.g.

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[37] For the enviroment /t__r/, §AppC.3 provides evidence from 65 suffixed tokens of the noun *wæter* in *ÆCHom* and *ÆHom*. These can be supplemented with 8 suffixed tokens of the adjective *biter* /bitr-/ 'bitter' (Campbell 1959: §643.4): e.g. *bit**e**ra ÆHom* 11.113, 11.115; *bit**e**re ÆCHom* II.19.154; *bit**e**rum ÆCHom* 4× e.g. I.29.280, II.10.21; *bit**e**rost ÆCHom* II.37.111.

/wætr-e/ → [wætere ~ wættre ~ wætre] in both Alfred and *Ru2*.[38] A similar phenomenon can be found in Farmon's tenth-century North Mercian dialect (*Ru1*; see Note on Sources): e.g. *settlas MtGl*(*Ru*) 21.12 ~ *setulas MtGl*(*Ru*) 23.6 'chair' masc.acc.pl. In Ælfric the competition between anaptyxis and gemination is best illustrated by the adjective *micel* (~ *mycel*) 'great':[39]

(7,54) *Resolution of* CONTACT *violations in* micel *'great'*

	Alfred (*CP*(*H*), *Or*)		Ælfric (*ÆCHom*, *ÆHom*)	
micl- ~ mycl-	197	(98%)	45	(8%)
miccl- ~ myccl-	2	(1%)	384	(71%)
micel- ~ mycel-	2	(1%)	110	(21%)

Intriguingly, Ælfric appears to favour gemination over anaptyxis in the environment [k^j__l]. Be that as it may, the contrast between Alfred's and Ælfric's figures nicely confirms the promotion of CONTACT in West Saxon during the tenth century: in the Alfredian texts, the inflected forms of *micel* violate the constraint 98% of the time; in Ælfric's works, the number of violations plummets to 8%.

Finally, the data in Appendix C clearly show that anaptyxis was not sensitive to morphological distinctions between inflectional endings. Among neuter *a*-stem nouns, for example, instances of vowel insertion are found not only in the nom/acc.pl. (e.g. *wæ**te**ru*), but also in all the oblique cases (gen.sg. *wæ**te**res,* dat.sg. *wæ**te**re*, gen.pl. *wæ**te**ra*, dat.pl. *wæ**te**rum*); see §AppC.1 for examples from Alfred and §AppC.3 for Ælfric. Anaptyxis also applies in the nom/acc.pl. of masculine *a*-stems (see note 31): e.g. *æ**ce**ras* 'field'. It is thus clear that the domain of anaptyxis includes all word-level endings. In fact, there is no evidence to suggest that anaptyxis was morphologically conditioned in any way: notably, the process applies not only to *a*-stems, but also to *ō*-stem nouns (§AppC.2 note 4, §AppC.4 note 2), adjectives of the *a*-/*ō*-/*n*-declension (note 37, table (7,54)), etc. It therefore follows that anaptyxis must apply on a stratum no higher than the word level; if the process were assigned to the stem level, it would incorrectly fail to apply in the presence of word-level inflections. The crucial point for our purposes, however, is that the stratal ascription of anaptyxis can be securely established without reference to its opaque interaction with apocope. The derivational analysis proposed in (7,53) is thus independently confirmed.

From a theoretical viewpoint, this is an important result. It demonstrates the advantages that Stratal OT derives from linking the domain of a phonological generalization with its location in the grammar and its interaction with other patterns (§3.1, §3.2). Notably, we see how, given the domain of two phonological processes, Stratal OT will correctly predict whether they interact transparently or opaquely. Such predictions enhance the falsifiability and typological restrictiveness of the theory, but, even more importantly, they provide a key to learnability (§3.2, §5.2). Consider, for example, the position of a West Saxon learner who, through exposure to forms such as *wætres~wæteres* and *wætre~wætere*,

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38 In Alfred no less than Owun, the three variants can all be found within the same manuscript: e.g. *wætere CP*(*H*) 293.8 ~ *wættre CP*(*H*) 309.7 ~ *wætre CP*(*H*) 261.8 (§AppA.1).

39 Originally, the stem of *micel* was disyllabic, but the adjective was historically transferred into the *wæter* class (Campbell 1959: §388, §643.5). Other words affected by this development include the noun *mægen* (§AppA.1 note 2) and the adjective *yfel* (§AppB.1 note 3). The figures in table (7,52) are based on a machine search of Healey *et al.* (1998).

correctly acquires a variable word-level process of anaptyxis. Suppose, in addition, that, by noticing nom/acc.pl. forms such as *word*, *werod*, *wætru* and *mægnu*, this learner discovers that apocope applies at the stem level and that it is blocked after obstruent+sonorant clusters. Such a learner, it turns out, will be able to generate opaque forms such as *wæteru* and *mægenu* even if these do not happen to occur in her trigger experience. In this light, the fact that many opaque generalizations are robustly learnable (McCarthy 1999: §8.1) becomes rather less mysterious: Stratal OT suggests that, given appropriate information about domains, children can acquire opaque interactions without attempting to match opaque surface forms.

A few words must also be said here about traditional accounts of anaptyxis. The handbooks assume —usually without question— that anaptyctic vowels arise through analogical levelling from nom/acc.sg. forms subject to parasiting. Campbell (1959: §363), for example, describes items such as *æceras* masc.nom/acc.pl. 'field' and *fugoles* masc.gen.sg. 'bird' (whose stems are underlyingly monosyllabic) as displaying "extension of a parasitic vowel to internal open syllables". Our discussion has shown, however, that the rise of anaptyxis bears all the hallmarks of a phonetically driven Neogrammarian sound change. First, anaptyxis is finely sensitive to its phonological environment but blind to morphology. Secondly, its application spreads along a sonority-governed markedness cline. Surprisingly, all the handbooks record this fact (Brunner 1965: §160, Campbell 1959: §363, Cosijn 1883: 149-50, Sievers 1898: §148), but none explains why a supposedly analogical (i.e. morphologically driven) development should behave in this fashion. Thirdly, anaptyxis competes for inputs with gemination, which is clearly not driven by levelling from the nom/acc.sg.

In a stratal analysis of West Saxon morphophonology it is easy to demonstrate that anaptyctic vowels cannot arise through the cyclic transfer of parasiting from bare stems to suffixed forms. Take for example the declension of the noun *mægen* /mæɣn-/ 'power, virtue' in Ælfric (*ÆCHom*, *ÆHom*). In suffixless forms, whether isolated or in a compound, parasiting is obligatory and admits no exceptions: e.g. *mæg**e**n* nom.sg. 6× e.g. *ÆCHom* I.18.114; *mæg**e**nþrym* [$_{\omega}$'[$_{\omega}$ˈmæj**e**n][$_{\omega}$ˌθrym]] 'majesty' (literally, 'power-glory') e.g. *ÆCHom* I.AppA2.5 (see note 29). In contrast, forms containing inflectional suffixes undergo anaptyxis only variably: e.g. *mægne*~*mæg**e**ne*, *mægnu*~*mæg**e**nu*, *mægna*~*mæg**e**na* (§AppC.3). Now, if parasiting applied at the stem level, then parasitic vowels inserted into the bare stem during the stem cycle would carry over to forms undergoing suffixation at the word level:

(7,55) *Modelling anaptyxis as the overapplication of parasiting*

	dat.sg.
Root	/mæɣn-/
SL *parasiting*	mæɣen
WL *affixation*	mæɣen-e
	mægene

The problem in that case would be how to derive disyllabic forms such as dat.sg. *mægne*. We could not postulate an *ad hoc* variable rule of syncope applying after stressed light syllables, because the inflected forms of *werod*-type nouns do not undergo syncope.[40] Assuming that

[40] Note, for example, the absence of vowel deletion in the following surface stem forms, extracted from tokens of *werod*-type nouns with inflectional endings in *ÆCHom* and *ÆHom*: *bydel-* 'herald' 36×; *gafol-*

parasiting itself is variable would not solve the problem either, for in that case one would expect to find nom/acc.sg. forms without parasitic vowels: i.e. ***mægn*. We must therefore conclude that parasiting applies at the word level, that it does not overapply in suffixed forms, and that anaptyctic vowels are inserted by a separate phonological process.

In fact, as we shall see in §8.6, the traditional approach to anaptyxis puts the cart before the horses: anaptyxis did not arise by analogy, but was itself a *cause* of analogical change. Observe that, when anaptyxis becomes obligatory in a given cluster, parasitic vowels in the nom/acc.sg. cease to alternate with ∅ in other case forms: e.g. nom/acc.sg. *wæt**e**r* (with parasiting) ~ obl. *wæt**e**re* (with anaptyxis), ***wætre*. At this stage, *wæter*-type stems become liable to restructuring: /wætr-/ > /wæter-/. The effects of this reanalysis are momentous: ultimately, it leads to the collapse of apocope as a phonological process. This development cannot yet be observed in Ælfric, but affects other less conservative varieties of Late West Saxon. For detailed discussion, see §8.6 (also Bermúdez-Otero & Hogg 2003: §3.3).

So far, we have discovered that anaptyxis is a variable phonological process, that it applies at the word level, and that it counterfeeds stem-level apocope. We also know that it removes rising-sonority coda-onset clusters and becomes active when CONTACT outranks DEP-V. From this we can infer that, at the stem level, the grammar of West Saxon had the ranking DEP-V » CONTACT; at the word level, in constrast, the probability distribution of CONTACT rose relative to that of DEP-V in the course of the tenth century.

The next question is: what constraint blocks anaptyxis in nouns of the *tungol* type? At first glance, this looks like a tough problem. In a form such as dat.sg. *wǣpne* [.wæːp.ne.], for example, there is a violation of CONTACT that anaptyxis could eliminate: cf. **[.wæː.p**e**.ne.]. In addition, consider the following ranking argument. We know that, at all phonological levels, **[$_σ$CC dominates CONTACT; see (7,20). When anaptyxis is active, however, CONTACT outranks DEP-V in the word-level hierarchy. By transitivity of domination, it follows that, in systems with anaptyxis, **[$_σ$CC is ranked above DEP-V at the word level. Surprisingly, this appears to predict that anaptyxis will also get rid of the branching onset in forms such as dat.sg. *tungle* [.tuŋ.gle.], but this is certainly not the case: cf. **[.tuŋ.g**o**.le.].

It turns out, however, that the absence of anaptyxis in heavy stems calls for no special stipulation, but follows directly from constraint rankings independently required by syncope (§7.6). The anaptyctic syllable in the ungrammatical forms ***wǣp**e**ne* and ***tung**o**le* is both light and unfooted: **[$_ω$[.wæː.].p**e**.ne.],**[$_ω$[.tuŋ.].g**o**.le.]. Accordingly, these candidates perform worse than their optimal competitors in relation to PARSE-σ̆: cf. [$_ω$[.wæːp.].ne.], [$_ω$[.tuŋ.].gle.].[41] Thus, CONTACT and **[$_σ$CC promote anaptyxis in heavy stems, but PARSE-σ̆ inhibits it. Using data from syncope, however, we can construct a simple ranking argument to show that PARSE-σ̆ must dominate both **[$_σ$CC and CONTACT. Recall that, in nouns of the *hēafod* type, syncope creates superheavy syllables: e.g. dat.sg. *hēafde* [$_ω$[.hæːɑf.].de.]. This implies that PARSE-σ̆, which drives syncope, dominates **.μμμ. At the same time, we know on independent grounds that **.μμμ. » **[$_σ$CC » CONTACT; see (7,20) again. Therefore, by transitivity, it must be the case that PARSE-σ̆ outranks **[$_σ$CC and CONTACT.

‘tribute’ 12×; *heofen-* ~ *heofon-* ‘heaven’ (masc *a*-stem / fem. *ō*-stem / fem *n*-stem) 495×, though note *heofnan* 1× *ÆCHom* I.37.41; *metod* ‘god, fate?’ 7× (see Godden 2000: 741 sub voce *metod*); *munuc-* ~ *munec-* ‘monk’ 21×; *regol-* ‘rule’ 4×; *rodor-* ~ *roder-* ‘firmament’ 2×; *weler-* ‘lip’ 9×; *weorod-* ~ *werod-* ~ *wered-* ‘troop’ 53×. For Alfred, see §AppA.3.

41 The anaptyctic syllable in ***wǣp**e**ne* and ***tung**o**le* does not enjoy the protection of STRESSWELL either, as it is immediately adjacent to the main foot; see (7,27).

(7,56) *PARSE-σ̆ blocks anaptyxis in heavy stems*

a. PARSE-σ̆ » **.μμμ. because [$_ω$[.hæːɑf.].de.] ≻ [$_ω$[.hæːɑ.].fo.de.]
b. **.μμμ. » **[$_σ$CC, CONTACT by (7,20)

∴ PARSE-σ̆ » **[$_σ$CC, CONTACT by transitivity of domination

A possible way of circumventing PARSE-σ̆ would be to assign secondary stress to the anaptyctic vowels: i.e. **[$_ω$[.wæː.][.p**e**.ne.]],**[$_ω$[.tuŋ.][.g**o**.le.]]. However, this option is ruled out by two independent ranking arguments. Note that these ungrammatical candidates violate both HEAD-DEP (by stressing an epenthetic vowel) and NONFIN (by incorporating a ω-final foot). In §7.3, however, we showed that HEAD-DEP dominates both **[$_σ$CC and CONTACT; see (7,18) and (7,19). Accordingly, the latter cannot trigger anaptyxis at the cost of stressing an epenthetic segment. Furthermore, our analysis of syncope (§7.6) revealed that, at the word level, NONFIN outranks PARSE-σ̆. It follows that light anaptyctic syllables cannot be protected from syncope by being placed in a ω-final foot.

These ranking arguments are no mere notational play; on the contrary, they illustrate the crucial importance of the principle of Cycle-Internal Transparency; see (2,19) and §3.1. We have been able to use syncope-related rankings to regulate the application of anaptyxis only because Stratal OT dictates that, within any one cycle, all constraints interact in parallel. Accordingly, since anaptyxis and syncope apply together at the word level, the rankings that drive one process must necessarily be true of the other, and vice versa. In rule-based LP, in contrast, these predictions are lost, as the theory allows syncope and anaptyxis to be extrinsically ordered with respect to each other within the same stratum. To appreciate this point, consider two rules of syncope and anaptyxis formulated very generally as in (7,57):

(7,57) a. *Syncope*

```
          *
          |
CV → C /  σ̄ __ σ
```

b. *Anaptyxis*

```
            Rh        Ons
            |          |
∅ → V / [–son] __ [+son]
```

(7,57a) removes the vowel from a word-medial light syllable preceded by a stressed heavy; (7,57b) inserts an epenthetic vowel between a coda obstruent and a following onset sonorant. If anaptyxis is ordered before syncope, then the suffixed forms of nouns such as *wǣpen* surface correctly without epenthesis, although they are forced to go through a vacuous Duke-of-York derivation:

(7,58)
previous rules [$_ω$[.wæːp.].ne.]
anaptyxis [$_ω$[.wæː.].pe.ne.]
syncope [$_ω$[.wæːp.].ne.]

wǣpne

In rule-based LP, however, the reverse order (with anaptyxis counterfeeding syncope) is equally possible:

(7,59) *previous rules* [$_{\omega}$[.wæːp.].ne.]
syncope —
anaptyxis [$_{\omega}$[.wæː.].pe.ne.]

***wǣpene*

This ordering problem could of course be circumvented by adding some stipulation to (7,57b) to the effect that anaptyxis only applies if the target cluster is immediately preceded by a stressed short vowel. However, such a stipulation would only highlight the fact that rule-based LP is insufficiently constrained. As I have shown, given Cycle-Internal Transparency the absence of anaptyxis in heavy stems need not be stipulated; it can be deduced from the facts of syncope.

To conclude, tableau (7,60) summarizes the analysis:

(7,60) *Anaptyxis*

Word level		OnsForm	Head-Dep	NonFin	Parse-σ̆	**.μμμ.	**[$_{\sigma}$CC	Contact	Dep-V
[$_{\omega}$[.wæt.]r]-ɑ	[$_{\omega}$[.wæ.trɑ.]]			*!			*		
	[$_{\omega}$[.wæt.].rɑ.]				*			*!	
	[$_{\omega}$[.wæ.te.].rɑ.] ☜				*				*
[$_{\omega}$[.tuŋg.]l]-ɑ	[$_{\omega}$[.tuŋ.].glɑ.] ☜				*		*		
	[$_{\omega}$[.tuŋg.].lɑ.]				*	*!		*	
	[$_{\omega}$[.tuŋ.].go.lɑ.]				**!				*
	[$_{\omega}$[.tuŋ.][.go.lɑ.]]		*!	*!					*
[$_{\omega}$[.wæːp.]n]-ɑ	[$_{\omega}$[.wæː.].pnɑ.]	*!			*		*		
	[$_{\omega}$[.wæːp.].nɑ.] ☜				*	*		*	
	[$_{\omega}$[.wæː.].pe.nɑ.]				**!				*
	[$_{\omega}$[.wæː.][.pe.nɑ.]]		*!	*!					*

7.8 Parasiting

The analysis of parasiting will not now detain us long, for its key elements have already been put into place in previous sections.

Our discussion of anaptyxis has shown that there are no parasitic vowels at the stem level; parasiting applies on the word level. At the stem level, therefore, domain-final sonorants immediately preceded by obstruents are forced to become extrasyllabic (§7.3). As we saw in (7,21), this requires the ranking Nuc→V » SonPk→σ, Parse-seg. Additionally, the absence of parasiting indicates that, in the stem-level hierarchy, SONPK→σ is also dominated by DEP-V.

(7,61)

Stem level		NUC→V	DEP-V	SONPK→σ	PARSE-seg
wætr	[ω[.wæ.tr̩.]]	*!			
	[ω[.wæ.te.]r]		*!		*
	[ω[.wæ.ter.]]		*!		
	[ω[.wæt.]r] ☜			*	*

To activate parasiting at the word level, one need only demote DEP-V in relation to SONPK→σ. By enforcing faithfulness in domain-final position, ANCHOR-R independently ensures that the parasitic vowel is inserted before, rather than after, the sonorant; see (7,26). Incidentally, the sonorant itself does not remain extrasyllabic, but is incorporated into the rhyme of the final syllable even when this violates foot nonfinality; recall that, as we saw in §7.3 and §7.6, PARSE-seg is top-ranked at the word level.

(7,62)

Word level		NUC→V	SONPK→σ	ANCHOR-R	PARSE-seg	DEP-V
[ω[.wæt.]r]	[ω[.wæ.tr̩.]]	*!				
	[ω[.wæt.]r]		*!		*!	
	[ω[.wæt.].re.]			*!		*
	[ω[.wæ.te.]r]				*!	*
	[ω[.wæ.ter.]] ☜					*

Interestingly, parasiting differs from anaptyxis in that it applies to both light and heavy stems, even though, in the latter, it creates new unfooted syllables: e.g. [ω[.tuŋg.]l] → [ω[.tuŋ.]**.gol.**]; ungrammatical **[ω[.tuŋ.][.gol.]] is ruled out by both HEAD-DEP and NONFIN. Unlike anaptyctic syllables, however, parasitic syllables are heavy because they incorporate the word-final sonorant as a coda. In consequence, the application of parasiting to heavy stems does not conflict with PARSE-σ̆; it only violates PARSE-σ. To capture the contrast between anaptyxis and parasiting, therefore, it is enough to rank SONPK→σ above PARSE-σ. This move is unproblematic, as PARSE-σ plays no significant rôle elsewhere (see §7.4).

(7,63)

Word level		HEAD-DEP	NONFIN	SONPK→σ	PARSE-σ	DEP-V
[$_{\omega}$[.tuŋg.]l]	[$_{\omega}$[.tuŋ.][.gol.]]	*!	*!			*
	[$_{\omega}$[.tuŋg.]l]			*!		
	[$_{\omega}$[.tuŋ.].gol.] ☞				*	*

7.9 Summary and prospects

We now have all the necessary ingredients for a complete grammatical description of the morphophonology of *a*-stem nouns in Owun, Alfred, and Ælfric; it only remains to show how all the pieces of the puzzle fit together. To conclude this chapter, therefore, I shall now combine all the ranking arguments formulated in sections 7.3 to 7.8. In particular, I will demonstrate the internal consistency of the analysis by defining a single constraint hierarchy for the stem level and word level of each dialect.

Let us begin with the stem-level hierarchy. Here, the dialects we have been focusing upon differ from one another in just two respects. First, we saw in §7.6 that some dialects do not have vowel deletion in the nom/acc.pl. of *hēafod*-type nouns, whereas others have syncope in all suffixed forms; we referred to the former as *hēafodu*-systems, and to the latter as *hēafdu*-systems. This contrast involves just two constraints in the stem-level hierarchy: in *hēafodu*-systems, PARSE-σ̆ dominates NONFIN; *hēafdu*-systems have the opposite ranking (see (7,49)). Recall that, when PARSE-σ̆ takes precedence over NONFIN, two light syllables preceded by a stressed heavy are compelled to form a word-final weak foot; this word-final weak foot is then dismantled at the word level (where NONFIN dominates PARSE-σ̆ in all dialects), but MAX-V́ protects its head from deletion: e.g. /hæːɑfod-u/ → [$_{\omega}$[.hæːɑ.][.fo.du.]] → [$_{\omega}$[.hæːɑ.].fo.du.].

Secondly, some dialects allow apocope after obstruent+sonorant clusters, whereas others forbid it; see §7.5. Nom/acc.pl. forms such as *tunglu* are in fact found in both types of dialect because, from very early on, *tungol*-type nouns became vulnerable to restructuring: i.e. /tuŋgl-/ > /tuŋgol-/, whence nom/acc.pl. /tungol-u/ → [tuŋglu] by syncope. In contrast, the nom/acc.pl. form of *wæter*-type nouns provides a reliable diagnostic: those dialects that allow apocope after obstruent+sonorant clusters have nom/acc.pl. *wæter*; those which forbid it have *wæt*(*e*)*ru*. Again, the contrast between *wæter*- and *wæt*(*e*)*ru*-systems reflects the relative ranking of just two constraints in the stem-level hierarchy: *wæter*-systems have PARSE-σ̆ » SONPK→σ; *wæt*(*e*)*ru*-systems have SONPK→σ » PARSE-σ̆ (see (7,35)).

(7,64) *Dialectal variation at the stem level*

	Stem-level ranking	*Effect*	*Diagnostic form* (*neut.nom/acc.pl.*)
(*a*)	PARSE-σ̆ » NONFIN NONFIN » PARSE-σ̆	ω-final weak [$_{\Sigma}$σ̆σ̆]; no syncope no ω-final weak feet; syncope	*hēafodu* *hēafdu*
(*b*)	PARSE-σ̆ » SONPK→σ SONPK→σ » PARSE-σ̆	apocope after obs+son clusters no apocope after obs+son clusters	*wæter* *wæt*(*e*)*ru*

These two variables are formally unrelated. In the OE dialects we have discussed, however, they turn out to be empirically linked: if apocope is blocked after obstruent+sonorant clusters (even if only optionally), then there is syncope (at least optionally) in the nom/acc.pl. of *hēafod*-type nouns. In other words, no OE dialect simultaneously admits the variant *wæt*(*e*)*ru* and forbids the variant *hēafdu*; see (7,9). Of course, this implicational relationship is not imposed by UG; it holds true in OE for purely historical reasons. In §7.6 we saw that *hēafodu*-systems are relatively conservative; syncope in the nom/acc.pl. of *hēafod*-type nouns is an innovation. In the case of apocope, blocking after obstruent+sonorant clusters is the innovative variant; conservative dialects have nom/acc.pl. *wæter* (see §7.5). It so happens, however, that the introduction of vowel deletion in the nom/acc.pl. of *hēafod*-type nouns[42] is chronologically older and geographically more pervasive than the blocking of apocope after obstruent+sonorant clusters; in consequence, dialects affected by the latter tend to show the former too (see also §8.4 and §8.5).

In the OE dialects under consideration, therefore, the path of morphophonological change for *a*-stem nouns involves two successive innovations in the stem-level hierarchy: PARSE-σ̆ is demoted first below NONFIN and later below SONPK→σ. For expository purposes, it will be convenient to characterize this diachronic path as a series of three consecutive synchronic states A, B, and C:

(7,65) *Historical evolution of the stem level*

State	*Constraint ranking*	*Behaviour*	*Variants* (*neut.nom/acc.pl.*)
A	PARSE-σ̆ » NONFIN, SONPK→σ	no syncope apocope after obs+son	*hēafodu* *wæter*
B	NONFIN » PARSE-σ̆ » SONPK→σ	syncope apocope after obs+son	*hēafdu* *wæter*
C	NONFIN, SONPK→σ » PARSE-σ̆	syncope no apocope after obs+son	*hēafdu* *wæt*(*e*)*ru*

Given these reference points, one can easily interpret the synchronic variation found within Owun's, Alfred's, and Ælfric's dialects as the signature of change in progress:

42 Like West Saxon and South Northumbrian, Mercian (as reflected in *Ps*(*A*) and *Ru1*) evolved from the *hēafodu*-only grammar of prehistoric OE to one permitting vowel deletion in the nom/acc.pl. of *hēafod*-type nouns. Unlike the other dialects, however, Mercian chose the path of apocope, rather than syncope: i.e. nom/acc.pl. *hēafodu* > *hēafod*; see note 6 above. The Mercian option involves subordinating STRESSWELL to PARSE-σ̆, whereas in West Saxon and South Northumbrian STRESSWELL remains top-ranked; see §7.4. I discuss the causes of this divergence in §8.3.

(7,66) *Synchronic stem-level variation as change in progress*

← *conservative* *advanced* →

<table>
<tr><td>System A
PARSE-σ̆ » NONFIN
PARSE-σ̆ » SONPK→σ
hēafodu, wæter</td><td>System B
NONFIN » PARSE-σ̆
PARSE-σ̆ » SONPK→σ
hēafdu, wæter</td><td>System C
NONFIN » PARSE-σ̆
SONPK→σ » PARSE-σ̆
hēafdu, wæt(e)ru</td></tr>
<tr><td>Prehistoric OE</td><td colspan="2"></td></tr>
<tr><td colspan="2">Owun</td><td></td></tr>
<tr><td colspan="3">Alfred</td></tr>
<tr><td colspan="2"></td><td>Ælfric</td></tr>
</table>

As in §7.7, I shall continue to assume that synchronic variation reflects stochastic ranking in the grammar (Boersma 1997, 1998; Boersma & Hayes 2001). In this light, table (7,66) is to be read as follows:

(i) In Owun's stem-level hierarchy, PARSE-σ̆ consistently dominates SONPK→σ, but its ranking in relation to NONFIN varies stochastically.

(ii) In Alfred's stem-level hierarchy, there is stochastic variation in the ranking of both {PARSE-σ̆, NONFIN} and {PARSE-σ̆, SONPK→σ}.

(iii) In Ælfric's stem-level hierarchy, PARSE-σ̆ is consistently dominated by both NONFIN and SONPK→σ.

A more refined formalization of these claims will be provided below.

At the word level there is rather less dialectal variation. The grammars of Owun, Alfred, and Ælfric all resemble one another in having word-level syncope (§7.6), anaptyxis (§7.7), and parasiting (§7.8); they differ only with respect to the application rate of anaptyxis, which is extremely low in Owun, significant in Alfred, and reaches 100% in favourable environments in Ælfric. In terms of constraint ranking, the variability of anaptyxis indicates that, in all three dialects, CONTACT and DEP-V have partially overlapping probability distributions along a word-level linear scale of constraint strictness. In Owun, however, the mean ranking value of DEP-V is a good deal higher than that of CONTACT, whereas the reverse holds for Ælfric. For expository purposes, however, I shall hereafter ignore these quantitative differences, and will merely focus on the fact that, in all the grammars under discussion, word-level evaluation is sometimes effected under the ranking DEP-V » CONTACT, and sometimes under the ranking CONTACT » DEP-V.[43]

(7,67) *Variation at the word level*

Word-level ranking	*Effect*	*Diagnostic forms*
DEP-V » CONTACT	no anaptyxis	*wætres*, *-e*, (*-u*,) *-a*, *-um*
CONTACT » DEP-V	anaptyxis	*wæteres*, *-e*, (*-u*,) *-a*, *-um*

[43] I also ignore the fact that, in a detailed analysis, CONTACT should be replaced by a family of harmonic ranked constraints such that, for any given low-sonority C, **C.r » **C.l » **C.[+nasal]; see §7.7.

Given this understanding of synchronic variation, I can now provide unified constraint hierarchies for the stem and word levels of each dialect. In table (7,68), as elsewhere in this work, rankings are presented as 'stratified domination hierarchies' of the form

$$C_1, C_2, ..., C_3 \gg C_4, C_5, ..., C_6 \gg ... \gg C_7, C_8, ..., C_9,$$

where the constraints $C_1, C_2, ..., C_3$ are not ranked with respect to one another, but they each dominate all the remaining constraints; for the definition of harmonic ordering that applies to such hierarchies, see Tesar & Smolensky (2000: §3.1.2). Each stratified domination hierarchy includes all the rankings that are crucial to the analysis. When, in addition, a constraint could be placed in more than one stratum of the hierarchy without crucial effects, its position is determined according to a strong version of the M » F bias (see §5.3): i.e. markedness constraints are placed in the highest stratum compatible with the data, faithfulness constraints in the lowest. For references to the place where each constraint is defined, see the Index of Constraints.

(7,68) *Summary of rankings*

a. *Top-ranked constraints*

The following constraints are never crucially dominated by another constraint employed in the analysis:

FTBIN, RHHRM, ALIGN-ω, WLWF-seg, ONSFORM, HEAD-DEP, NUC→V, STRESSWELL, MAX-V^2, MAX-V́

b. *Bottom-ranked constraints*

The following constraints never crucially dominate another constraint employed in the analysis:

WEAKC, PARSE-σ, WLWF, MAX-V

c. *The stem level*

c(i) *System A*
(*hēafodu*, *wæter*)

DEP-V, IDENT-stress, **PARSE-σ̆** » **NONFIN, SONPK→σ**, **.μμμ. » **[$_σ$CC » CONTACT, PARSE-seg, ANCHOR-R

c(ii) *System B*
(*hēafdu*, *wæter*)

DEP-V, IDENT-stress » **NONFIN** » **PARSE-σ̆** » **SONPK→σ**, **.μμμ. » **[$_σ$CC » CONTACT, PARSE-seg, ANCHOR-R

c(iii) *System C*
(*hēafdu*, *wæt*(*e*)*ru*)

DEP-V, IDENT-stress » **NONFIN, SONPK→σ** » **PARSE-σ̆** » **.μμμ. » **[$_σ$CC » CONTACT, PARSE-seg, ANCHOR-R

d. *The word level*

d(i) *Without anaptyxis*
(*wætres*, *-e*, (*-u*,) *-a*, *-um*)

PARSE-seg, SONPK→σ » NONFIN, ANCHOR-R » PARSE-σ̆ » **.μμμ. » **[$_\sigma$CC, **DEP-V » CONTACT**, IDENT-stress

d(ii) *With anaptyxis*
(*wæteres*, *-e*, (*-u*,) *-a*, *-um*)

PARSE-seg, SONPK→σ » NONFIN, ANCHOR-R » PARSE-σ̆ » **.μμμ. » **[$_\sigma$CC » **CONTACT » DEP-V**, IDENT-stress

With these unified hierarchies to hand, I can now explain in greater detail how stochastic ranking accounts for the internal synchronic variation found within each of the dialects under consideration. Consider, for example, Owun's stem-level hierarchy. In (7,66) we saw that Owun's grammar varies between Systems A and B. I interpreted this observation as indicating that, at the stem level, PARSE-σ̆ consistently dominates SONPK→σ, whereas the relative ranking of PARSE-σ̆ and NONFIN varies stochastically. In addition, an inspection of (7,68.c(i)) and (7,68.c(ii)) reveals that NONFIN is consistently dominated by IDENT-stress; as we saw in (7,44) and (7,50), this ranking is essential for blocking syncope in nouns of the *nīeten* type. We therefore have the following rankings:

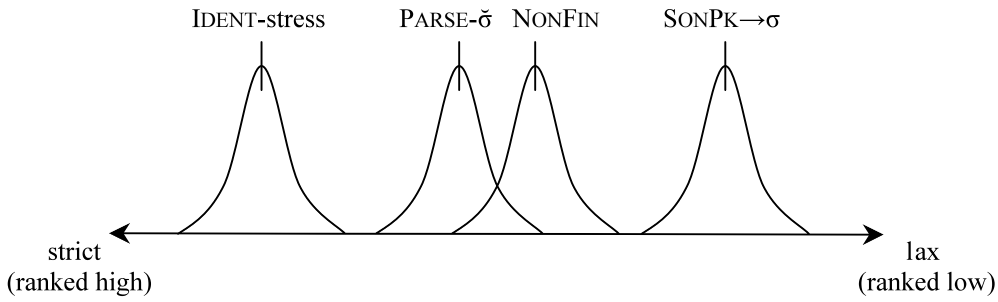
(7,69) a. *Invariant rankings*: PARSE-σ̆ » SONPK→σ
IDENT-stress » NONFIN

b. *Stochastic variation*: PARSE-σ̆, NONFIN

Translated into probability distributions along a stem-level linear scale of constraint strictness, (7,69) implies the following:
(i) PARSE-σ̆ has a higher mean ranking value than SONPK→σ, and their respective probability distributions do not overlap;[44]
(ii) IDENT-stress has a higher mean ranking value than NONFIN, and their respective probability distributions do not overlap;
(iii) the probability distributions of PARSE-σ̆ and NONFIN overlap.
Furthermore, the evidence of §AppB.2 and §AppB.4 suggests that, in Owun's dialect, neut.nom/acc.pl. forms of the *hēafodu* type occur more frequently than those of the *hēafdu* type; in particular, see §AppB.2 (note 3). If this is correct, then one can also infer the following:
(iv) PARSE-σ̆ has a higher mean ranking value than NONFIN.
Given these four requirements, the relevant portion of Owun's stem-level hierarchy will look roughly like this:

[44] Boersma & Hayes (2001) assume that constraints have normal (i.e. Gaussian) probability distributions. This implies that probability values decline towards zero on both sides of the peak (which coincides with the mean ranking value) but never actually reach zero. If so, it can never be strictly true to say that the probability distributions of two constraints C_1 and C_2 do not overlap. Such a statement can nonetheless be understood as useful descriptive shorthand for a situation where the mean ranking values of C_1 and C_2 are so distant that there is an infinitesimally small chance that the lower-ranked constraint will dominate the higher-ranked constraint at any given evaluation time.

(7,70) *Synchronic variation in Owun's stem-level hierarchy*



To conclude this review of the analysis, I shall now summarize the grammatical derivation of *a*-stem noun forms under the rankings laid out in (7,68). For each of the seven *a*-stem noun types defined in (7,8), table (7,71) describes the derivation of its nom/acc.sg, nom/acc.pl., and gen.pl. forms in Systems A, B, and C. As elsewhere in this chapter, the gen.pl. is used to represent all oblique forms. The *tungol* class receives special treatment. First, I show the course of derivations both from the original stem /tuŋgl-/ and from the restructured stem /tuŋgol-/. Secondly, alongside /tuŋgl-/ I offer /wæːpn-/ as an example of a heavy stem ending in an obstruent+sonorant cluster that cannot be syllabified as a complex onset: the paradigms of *tungol* and *wǣpen* are fully isomorphic segmentally, but they have some subtle prosodic differences. In addition, Appendix D contains a set of synoptic tableaux which show in some detail how the rankings in (7,68) effect the derivations laid out in (7,71); readers wishing to check the effectiveness of the analysis across entire paradigms are referred to this Appendix.

(7,71) *Summary of derivations*

a. *System A* (*hēafodu*, *wæter*)

			nom/acc.sg.	*nom/acc.pl.*	*gen.pl.*
a(i)	*scip* 'ship'		/ʃip-/	/ʃip-/	/ʃip-/
	SL	*morphology*	—	ʃip-u	—
		phonology	[ω[.ʃip.]]	[ω[.ʃi.pu.]]	[ω[.ʃip.]]
	WL	*morphology*	—	—	[ω[.ʃip.]]-ɑ
		phonology	[ω[.ʃip.]]	[ω[.ʃi.pu.]]	[ω[.ʃi.pɑ.]]
a(ii)	*word* 'word'		/word-/	/word-/	/word-/
	SL	*morphology*	—	word-u	—
		phonology	[ω[.wor.]d]	[ω[.wor.]d]	[ω[.wor.]d]
	WL	*morphology*	—	—	[ω[.wor.]d]-ɑ
		phonology	[ω[.word.]]	[ω[.word.]]	[ω[.wor.].dɑ.]
a(iii)	*wæter* 'water'		/wætr-/	/wætr-/	/wætr-/
	SL	*morphology*	—	wætr-u	—
		phonology	[ω[.wæt.]r]	[ω[.wæt.]r]	[ω[.wæt.]r]
	WL	*morphology*	—	—	[ω[.wæt.]r]-ɑ
		phonology	[ω[.wæ.ter.]]	[ω[.wæ.ter.]]	[ω[.wæt.].rɑ.] ~[ω[.wæ.te.].rɑ.]
a(iv)	*tungol* 'star'		/tuŋgl-/	/tuŋgl-/	/tuŋgl-/
	SL	*morphology*	—	tuŋgl-u	—
		phonology	[ω[.tuŋg.]l]	[ω[.tuŋg.]l]	[ω[.tuŋg.]l]
	WL	*morphology*	—	—	[ω[.tuŋg.]l]-ɑ
		phonology	[ω[.tuŋ.].gol.]	[ω[.tuŋ.].gol.]	[ω[.tuŋ.].glɑ.]
a(v)	*tungol* 'star' (restructured)		/tuŋgol-/	/tuŋgol-/	/tuŋgol-/
	SL	*morphology*	—	tuŋgol-u	—
		phonology	[ω[.tuŋ.].gol.]	[ω[.tuŋ.][.go.lu.]]	[ω[.tuŋ.].gol.]
	WL	*morphology*	—	—	[ω[.tuŋ.].gol.]-ɑ
		phonology	[ω[.tuŋ.].gol.]	[ω[.tuŋ.].go.lu.]	[ω[.tuŋ.].glɑ.]

(continues)

(continued)

			nom/acc.sg.	*nom/acc.pl.*	*gen.pl.*
a(vi)	*wǣpen* ‘weapon’		/wæːpn-/	/wæːpn-/	/wæːpn-/
	SL	*morphology*	—	wæːpn-u	—
		phonology	[ω[.wæːp.]n]	[ω[.wæːp.]n]	[ω[.wæːp.]n]
	WL	*morphology*	—	—	[ω[.wæːp.]n]-ɑ
		phonology	[ω[.wæː.].pen.]	[ω[.wæː.].pen.]	[ω[.wæːp.].nɑ.]
a(vii)	*werod* ‘troop’		/werod-/	/werod-/	/werod-/
	SL	*morphology*	—	werod-u	—
		phonology	[ω[.we.ro.]d]	[ω[.we.ro.]d]	[ω[.we.ro.]d]
	WL	*morphology*	—	—	[ω[.we.ro.]d]-ɑ
		phonology	[ω[.we.rod.]]	[ω[.we.rod.]]	[ω[.we.ro.].dɑ.]
a(viii)	*hēafod* ‘head’		/hæːɑfod-/	/hæːɑfod-/	/hæːɑfod-/
	SL	*morphology*	—	hæːɑfod-u	—
		phonology	[ω[.hæːɑ.].fod.]	[ω[.hæːɑ.][.fo.du.]]	[ω[.hæːɑ.].fod.]
	WL	*morphology*	—	—	[ω[.hæːɑ.].fod.]-ɑ
		phonology	[ω[.hæːɑ.].fod.]	[ω[.hæːɑ.].fo.du.]	[ω[.hæːɑf.].dɑ.]
a(ix)	*nīeten* ‘animal’		* | /niːyten-/	* | /niːyten-/	* | /niːyten-/
	SL	*morphology*	—	niːyten-u	—
		phonology	[ω[.niːy.][.ten.]]	[ω[.niːy.][.te.nu.]]	[ω[.niːy.][.ten.]]
	WL	*morphology*	—	—	[ω[.niːy.][.ten.]]-ɑ
		phonology	[ω[.niːy.].ten.]	[ω[.niːy.].te.nu.]	[ω[.niːy.].te.nɑ.]

b. *System B* (*hēafdu*, *wæter*)

			nom/acc.sg.	*nom/acc.pl.*	*gen.pl.*
b(i)	*scip* ‘ship’			See a(i)	
b(ii)	*word* ‘word’			See a(ii)	
b(iii)	*wæter* ‘water’			See a(iii)	
b(iv)	*tungol* ‘star’			See a(iv)	
b(v)	*tungol* ‘star’ (restructured)		/tuŋgol-/	/tuŋgol-/	/tuŋgol-/
	SL	*morphology*	—	tuŋgol-u	—
		phonology	[$_{\omega}$[.tuŋ.].gol.]	[$_{\omega}$[.tuŋ.].glu.]	[$_{\omega}$[.tuŋ.].gol.]
	WL	*morphology*	—	—	[$_{\omega}$[.tuŋ.].gol.]-ɑ
		phonology	[$_{\omega}$[.tuŋ.].gol.]	[$_{\omega}$[.tuŋ.].glu.]	[$_{\omega}$[.tuŋ.].glɑ.]
b(vi)	*wǣpen* ‘weapon’			See a(vi)	
b(vii)	*werod* ‘troop’			See a(vii)	
b(viii)	*hēafod* ‘head’		/hæːɑfod-/	/hæːɑfod-/	/hæːɑfod-/
	SL	*morphology*	—	hæːɑfod-u	—
		phonology	[$_{\omega}$[.hæːɑ.].fod.]	[$_{\omega}$[.hæːɑf.].du.]	[$_{\omega}$[.hæːɑ.].fod.]
	WL	*morphology*	—	—	[$_{\omega}$[.hæːɑ.].fod.]-ɑ
		phonology	[$_{\omega}$[.hæːɑ.].fod.]	[$_{\omega}$[.hæːɑf.].du.]	[$_{\omega}$[.hæːɑf.].dɑ.]
b(ix)	*nīeten* ‘animal’			See a(ix)	

c. *System C* (*hēafdu*, *wæt*(*e*)*ru*)

				nom/acc.sg.	*nom/acc.pl.*	*gen.pl.*
c(i)	*scip* 'ship'				See a(i)	
c(ii)	*word* 'word'				See a(ii)	
c(iii)	*wæter* 'water'			/wætr-/	/wætr-/	/wætr-/
		SL	*morphology*	—	wætr-u	—
			phonology	[$_\omega$[.wæt.]r]	[$_\omega$[.wæt.].ru.]	[$_\omega$[.wæt.]r]
		WL	*morphology*	—	—	[$_\omega$[.wæt.]r]-ɑ
			phonology	[$_\omega$[.wæ.ter.]]	[$_\omega$[.wæt.].ru.] ~[$_\omega$[.wæ.te.].ru.]	[$_\omega$[.wæt.].rɑ.] ~[$_\omega$[.wæ.te.].rɑ.]
c(iv)	*tungol* 'star'			/tuŋgl-/	/tuŋgl-/	/tuŋgl-/
		SL	*morphology*	—	tuŋgl-u	—
			phonology	[$_\omega$[.tuŋg.]l]	[$_\omega$[.tuŋ.].glu.]	[$_\omega$[.tuŋg.]l]
		WL	*morphology*	—	—	[$_\omega$[.tuŋg.]l]-ɑ
			phonology	[$_\omega$[.tuŋ.].gol.]	[$_\omega$[.tuŋ.].glu.]	[$_\omega$[.tuŋ.].glɑ.]
c(v)	*tungol* 'star' (restructured)				See b(v)	
c(vi)	*wǣpen* 'weapon'			/wæːpn-/	/wæːpn-/	/wæːpn-/
		SL	*morphology*	—	wæːpn-u	—
			phonology	[$_\omega$[.wæːp.]n]	[$_\omega$[.wæːp.].nu.]	[$_\omega$[.wæːp.]n]
		WL	*morphology*	—	—	[$_\omega$[.wæːp.]n]-ɑ
			phonology	[$_\omega$[.wæː.].pen.]	[$_\omega$[.wæːp.].nu.]	[$_\omega$[.wæːp.].nɑ.]
c(vii)	*werod* 'troop'				See a(vii)	
c(viii)	*hēafod* 'head'				See b(viii)	
c(ix)	*nīeten* 'animal'				See a(ix)	

In the analysis I have just summarized, the story of *a*-stem nouns in West Saxon is told as a sequence of synchronic snapshots, each characterized by a particular ranking of constraints at the stem and word levels. Though essentially synchronic, however, this account provides a rich testing ground for the diachronic proposals advanced in chapter 6. Indeed, the theory of morphophonological change sketched there invites one to ask very specific questions:

(i) Did each innovation in the stem-level constraint hierarchy of West Saxon involve the upward percolation of a word-level ranking?

(ii) Did each of these instances of reranking follow upon the restructuring of input representations at the word level?

(iii) Were there cases of input restructuring at the word level without change in underlying representations?

(iv) Did input restructuring proceed according to the definition of input optimality formulated in §5.5?

In chapter 8 we shall see that all of these questions are to be answered in the affirmative. Such success in the historical realm, I would argue, provides strong empirical support for the synchronic grammatical framework in which the analysis is formulated. But, before we turn our attention to diachronic issues, it may be fitting at this juncture to provide an overall appraisal of the analysis according to synchronic criteria.

Table (7,68), for example, mentions twenty-four different constraints. Is this too much machinery? Does the analysis end up displaying the same order of complexity as the empirical facts? On this point judgements are inevitably subjective, but I do not think that such an objection would be fair. First, from a purely theory-internal viewpoint the number of constraints employed in the analysis is not significant, as OT asserts that all constraints are present in all grammars. One should ask, rather, whether the constraints one postulates enjoy independent typological motivation and can therefore make a plausible claim to universality. In this connection, I shall merely note that, except for StressWell, all the constraints invoked in table (7,68) have been independently motivated in the literature, as shown by the bibliographic references accompanying their definitions.

Secondly, the complexity of the facts themselves should not be underestimated: we have had to contend with

- seven different stem-types (see (7,8)),
- four separate phonological processes (apocope, syncope, anaptyxis, parasiting),
- three dimensions of dialectal variation (see (7,64) and (7,67)),
- paradigmatic opacity (§7.5, §7.6),
- critical input dependence (§7.6),

and • nonparadigmatic opacity (§7.6, §7.7).[45]

In fact, I know of no other formalized or semiformalized analysis that matches the present one in empirical coverage. As pointed out in Hogg (1997, 2000), for example, no previous description tackles the problems attendant on the gradual replacement of /-u/ by /-ɑ/ as the neut.nom/acc.pl. inflectional ending (see §7.5) or accounts for opaque forms of the *wæteru* type in Alfred and Ælfric (see §7.7); even basic distinctions such as that between *hēafod*- and *nīeten*-type nouns have often failed to receive proper acknowledgement. Other published analyses may thus be simpler, but they purchase their simplicity at the expense of observational adequacy. In this respect, relying on handbook codifications of the data may have been a problem (see §7.2), but so was a certain fixation with formal simplicity. It is this fixation, I believe, that has persistently led scholars in the generative tradition to conflate syncope with apocope (see §7.4) and anaptyxis with parasiting (see §7.7).

Let us now move on to the question of descriptive adequacy. According to Chomsky (1965: 27), a grammar is descriptively adequate if it correctly characterizes an individual native speaker's tacit knowledge of language. Translated into operational terms, this definition is usually interpreted as demanding that the grammar should capture all generalizations presumed to be significant in the relevant language; i.e. if the facts subsumed by a linguistically significant generalization are merely stipulated in the grammar, rather than deduced from its rules and principles, then descriptive adequacy fails to be achieved. From this viewpoint, my analysis of *a*-stem noun morphophonology improves upon previous descriptions by capturing significant generalizations that had hitherto remained unexpressed. Examples include the following:

45 For the definition of paradigmatic opacity, nonparadigmatic opacity, and critical input dependence, see §2.2.

- I have detected a cluster of idiosyncratic phonological properties that distinguish the neut.nom/acc.pl. suffix /-u/~/-ɑ/ from all other *a*-stem noun endings: only neut.nom/acc.pl. forms are susceptible to apocope, and (in nouns of the *hēafod* type) only they can resist syncope. My analysis identifies a single grammatical factor as lying behind all the symptoms in this syndrome: the stratal split of *a*-stem noun inflection (see §7.5).
- Syncope has been shown to fail in two types of environment: one defined morphologically (neut.nom/acc.pl. forms in *hēafodu*-dialects), the other defined lexically (*nīeten*-type nouns throughout their paradigm). My analysis discovers a phonological feature common to both environments: a bipedal parse in the output of the stem level (see §7.6).
- The application of syncope in the *hēafod* class and the absence of anaptyxis in the *tungol* class both reflect a single word-level phonotactic generalization: nonfinal unfooted light syllables are not permitted. In my analysis, this generalization is expressed directly by the word-level ranking of NONFIN and PARSE-σ̆. There is no need either to order syncope extrinsically after anaptyxis, or to stipulate that obstruent+sonorant clusters only undergo anaptyxis when immediately preceded by a short stressed vowel (see §7.7).

Finally, let us evaluate the explanatory adequacy of the analysis. In the ordinary interpretation of this term, a language-particular grammar is said to be explanatorily adequate if it possesses descriptive adequacy and, in addition, it complies with the principles of an explanatory theory of grammar. In turn, a theory of grammar is deemed to be explanatory insofar as it solves the logical problem of language acquisition. In order to reach this goal, the theory of grammar must define a formal grammar space articulated in such a way as to enable the learner to search it effectively. As observed in Bermúdez-Otero (2003: §2, §3), however, linguists often adopt a weaker criterion for explanation, according to which the explanatory power of grammatical theory increases in direct proportion to its typological restrictiveness.[46]

Let us deal with the typological criterion first. As I pointed out above, the analysis is entirely couched in terms of optimality-theoretic constraints whose typological justification is, in the vast majority of cases, solidly established in the literature. More interestingly, my description of the morphophonology of *a*-stem nouns abides by the tight restrictions that Stratal OT imposes upon opacity effects and morphology-phonology interactions. Thus, in compliance with Cycle-Internal Transparency (2,19), all tautocyclical processes interact in parallel, and each constraint ranking is assigned to the stem or word level according only to whether its domain excludes or includes inflectional endings other than the neut.nom/acc.pl. suffix. Interestingly, restrictiveness and descriptive adequacy turn out to walk hand in hand: as we have seen, it is only because constraints interact in parallel within the word level, as required by Cycle-Internal Transparency, that one can use the same ranking to drive syncope and to block anaptyxis in nouns of the *tungol* type (§7.7).

What about learnability? In the course of this chapter, I have already made some observations about the way in which Stratal OT facilitates the learner's task. In §7.7, for example, we saw that a learner of West Saxon can acquire the counterfeeding interaction between apocope and anaptyxis without directly attempting to match opaque surface forms

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46 Echoing Tesar & Smolensky (2000: 2-3), Bermúdez-Otero (2003: §2, §3) points out that, by itself, an increase in typological restrictiveness need not always result in improved learnability. As long as the space of possible grammars is too large to be exhausted by brute-force searching, changes in the theory of grammar enhance learnability only if they refine the formal articulation of the grammar space in ways that enable the learner to navigate it more efficiently.

such as *wæteru* and *mægenu*: it is enough that the learner should assign anaptyxis to the word level on the basis of its domain of application and that, through exposure to forms such as *word*, *werod*, *wætru*, and *mægnu*, she should discover that apocope applies at the stem level and is blocked after obstruent+sonorant clusters. The acid test of learnability, however, will be analogical change. In the light of the learning theory expounded in chapter 5, some of the constraint rankings and input representations employed in my analysis of *a*-stem nouns seem robustly acquirable, and some do not. We have seen, for example, that in some instances the constraint hierarchy suffers from considerable delicacy and specificity (see e.g. §7.3, §7.6). If our learning theory is explanatorily adequate, then those rankings and representations that are robustly learnable should prove to be diachronically stable; those that are not should be vulnerable to analogical change. In the next chapter I show that these predictions are indeed confirmed. Strikingly, it is in the facts of history that synchronic grammatical theory turns out to meet its ultimate and most stringent test.