Acta Linguistica Hungarica Vol. **62** (2015) 1, 1–35
DOI: 10.1556/ALing.62.2015.1.1

The nature of phonological conditioning in Latin inflectional allomorphy

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Abstract: This paper offers a comprehensive analysis of the inflectional morphology of Latin in terms of the patterns of allomorphy and the environments governing the distribution of allomorphs. It is demonstrated that all the attested allomorphic alternations can be described as functions of a vocalic scale, practically the sonority scale of vowels plus the undifferentiated class of consonants as the least sonorous extreme. The distribution of allomorphs along the vocalic scale crucially displays the property of contiguity, i.e., the subsections of the scale that trigger one particular allomorph are uninterrupted.

Keywords: Latin; allomorphy; phonological conditioning; vocalic scale; sonority

1. Preliminary remarks

Classical Latin inflectional and derivational morphology involves a great variety of allomorphy, fusional exponence and stem alternation. Some of it can be described as agglutinating (more or less purely concatenative); in particular, the case/number inflection of nouns and adjectives, and the finite verb forms, all based on either of two stems (imperfective and perfective), to which one may add the infinitives and the participles based on the same two stems. Also, a considerable part of derivation is concatenative, but that is something we will not be concerned with here.

Both the nominal and the verbal inflectional system involves intricate patterns of allomorphy, which are the basis of the traditional classification of verbs into four conjugations and nouns/adjectives into five declensions (i.e., paradigm classes). It is demonstrated here that this variety can be reduced to patterns of mostly binary allomorphy which are phonologically conditioned by the stem-final segment as a function of a scale of vocalicness.[1] A crucial observation with respect to the vocalic scale – in relation to

[1] The application of this idea to nominal inflection is explored in Spaelti (2004) and, with very minor modifications, in Emonds & Spaelti (2005), an upgraded extension of the former. The present paper takes broader scope than either of these in giving

the allomorphy conditioned by it – is contiguity: if two environments that are not adjacent on the scale select the same allomorph, then all the environments between the two select the same allomorph. Without contiguity, the scale would be of no descriptive or theoretical significance whatever. The vocalic scale is the same for verbal and nominal morphology, and it is non-arbitrary in the sense that it corresponds to vowel height. The relation between this vocalic scale and the sonority scale is taken up in section 5. To anticipate the conclusion, it is reasonable to identify the vocalic scale with the sonority scale of vowels, but for sonority to play such a pervasive role in inflectional morphology is an unusual feature not previously highlighted in the literature (though the traditional classifications of Latin inflectional patterns show that the intuition was certainly present).

The vowel system of Latin consists of the five short and five long oral vowels [i e a o u iː eː aː oː uː], plus five surface-contrastive long nasal vowels [ĩː ẽː ãː õː ũː]. The nasal vowels can be derived both diachronically and synchronically from oral vowel + nasal sequences; this will be relevant when we discuss the AccSing suffixation, but otherwise the phonology of the nasal vowels will not be in the focus of the paper.

Stem is here defined as the imperfective and the perfective stem for verbs and the portion preceding the case endings for nouns/adjectives. This is in harmony with the traditional use of these terms in Latin linguistics. Most verbs also have a third stem, on which no finite forms are based, but which has an important function in the formation of other participles, a defective nominal form (called supine) and several derived nouns, adjectives and verbs. In this paper we will not be concerned with any forms based on the third stem.

It will be seen that the traditional classification into stem types, which is based on etymological and comparative considerations, is insufficient for a theoretically informed description. Our phonological specification of nominal as well as verbal imperfective stems, more precisely of the stem-final segments will depart slightly from what is found in the descriptive literature. The phonological specification of the endings will be, at certain points, radically different from it. This is mainly because our characterisations are not etymologically based but are meant to capture synchronic patterns and alternations.[2] Relevant differences will be highlighted and explained at the appropriate points in the paper.

a unified account of nominal and verbal inflection, and also treats significant aspects of nominal morphology (e.g., *i*-stems) differently. Details of the analysis that are identical to Spaelti's (e.g., the phonological formalisation of certain endings) are pointed out in due course.

[2] The descriptive tradition of Latin inflectional morphology as it is today is basically a distilled version of the vast amount of diachronic work going back to the nineteenth

Importantly, the putative morphological status of the stem-final segment proves to be irrelevant. In some cases systemic considerations clearly indicate a morphological formative (e.g., when the *ē* or *ā* regularly appears in the imperfective forms of the verb but nowhere else, or when the perfective stem ends in a *v* or *s* not found in any non-perfective verb forms; or when nominal/adjectival stem-final *a* and *o/u* alternate as a function of gender). In many cases there is no compelling reason to assume any morphological function. The point is that morphophonologically there is no difference whatsoever between identical stem-final segments, the only exception being the deletability of stem-final *v* in perfective verb forms (see 2.3.2.1).

As a consequence, we believe that denoting stem-final segments as e.g., thematic vowels (as in Aronoff 1994) or any other morphological or quasi-morphological entity is of little use. As another consequence we will generally not be concerned with the formal relations between the three stems of a verb. This relation shows extensive variation from lexeme to lexeme, and generalisations can be made only in certain types of cases, and even then of restricted validity. Because of this, we take it without further argumentation that this relation is lexically specified for each verb. A third consequence is that even where all three verb stems show concatenative affixation, and thus a common morphological "core" could be formally isolated, we will refrain from identifying such entities as morphological units of any kind.

A case in point is the verb *monere* 'to warn': imperfective stem *monē-*, perfective stem *monu-*, third stem *monit-* with the productive or at least frequent affixes *-ē-, -u-, -(i)t-*, respectively. The common unit *mon-* can be easily isolated as a root, and this is indeed the well justified etymological practice in Indo-European linguistics (e.g., Baldi 2002, 381 and passim, de Vaan 2008 s.v. *memini, mens* and *moneo*). But in a synchronic analysis of Latin there is no such straightforward segmentation for most verbs, so an analysis of this kind is simply impracticable in general; furthermore, it would lead to irrelevant information at best, since the morphology of *monere* does not differ from that of e.g., *delere* 'to delete' in the imperfective (where the final *ē* is definitely not an affix), or from *fui* 'to be' in the perfective, where the *u* is again not an affix. What is presented here does not depend on assumptions about the morphological structure of stems, or about the relations between the stems. References will be made to morpho-

century; for excellent recent histories of Latin in English see Sihler (1995); Baldi (2002); Clackson & Horrocks (2007); Weiss (2009) (listed in chronological order).

logical exponence but only where a fairly obvious agglutinating structure can be discerned.[3]

The structure of the paper is the following. In section 2 the patterns of allomorphy found in verbal inflection are presented under three main headings after a general discussion of the structure of verbal inflection (affixes immediately following the imperfective stem in 2.2., affixes immediately following the perfective stem in 2.3., affixes following extended stems in 2.4). In section 3 nominal inflection follows, with a lengthier discussion of the nominative singular (3.2), then all the other cases (3.3). The morphophonological analysis in 4 summarily presents the relation between the vocalic scale and all allomorphy. In 5 the relation of the vocalic scale to sonority is explored. Section 6 concludes the paper.

All the data referred to in the paper were taken from volume 1 of the Brepols Corpus (CLCLT-5 – Library of Latin Texts by Brepols Publishers, release 2002).[4] We have also made extensive use of the Perseus Digital Library for lemmata, glosses and loci (http://www.perseus.tufts.edu/hopper).

2. Allomorphy in the verbal inflection

2.1. The general structure of verbal inflection

In Latin, all finite verb forms are based on either the imperfective stem or the perfective stem. In addition, two infinitives and two participles are also based on the imperfective stem, and another infinitive on the perfective stem. These two stems can be followed by a variety of elements in a concatenative fashion. Figure 1 gives a conspectus of all the forms based on these two stems – meaning all the finite forms of a Latin verb.[5] The morphemes can combine left-to-right as the lines indicate; morphemes in

[3] That said, the interested reader is encouraged to consult the wealth of literature on the formation of the three verb stems and the relations between them. Of the diachronic literature Meiser (1998; 2003) stand out; of synchronic analyses Matthews (1974); Aronoff (1994), though we disagree with the latter's analysis of the imperfective, and Steriade (submitted), which is specifically concerned with the relation between the perfective and the third stems and presents an OT analysis of that relation.

[4] The database includes over 47 million words altogether, and covers all works from the classical period (more than 5 million words) based on highly regarded textual editions, supplemented with extensive bibliographic infomation.

[5] Full paradigms are not given here for reasons of space; they can easily be found in any of the standard grammars. For verb paradigms in a grammar digitised in the Perseus Project see http://tinyurl.com/ofyjuys, chapters 184–188.

the same column do not combine with each other. The chart also lists all the allomorphs that the post-stem formatives have.[6]

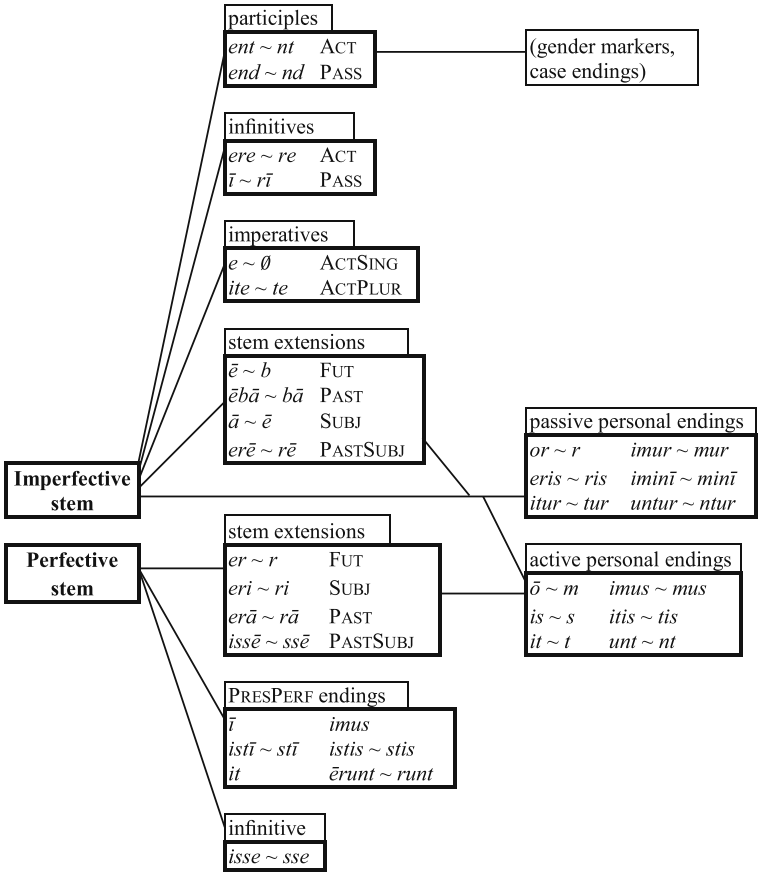


Figure 1: The general structure of Latin verbal inflection. (Of the imperatives, only the active endings are included, since the passive (singular and plural) endings are identical to the active infinitive ending and the passive 2PLUR personal ending, respectively.)

First we look at the distribution of the allomorphs of formatives immediately following the imperfective stem. This means mood and tense

[6] The passive perfect in Latin consists entirely of participle + *esse* 'to be' combinations. Not being morphological constructions these will not be discussed here. We will also not cover the handful of verbs that show irregular allomorphic patterns (e.g., *ferre* 'take', *esse* 'be', *velle* 'want').

formatives (which we here call stem extensions), infinitival and participial affixes, and personal endings with no stem extensions intervening, among them the imperative endings. Then we look at those affixes that can immediately follow the perfective stem. Finally we look at the personal endings following extended stems (both imperfective and perfective).

2.2. Affixes immediately following the imperfective stem

On the left of table 1, imperfective stem types are listed according to their final segment (consonant, high vowels, non-high vowels, with one example for each type). The columns are numbered for reference. Imperfective stem extensions are highlighted in the middle columns; these can be followed by personal endings, such constructions will be discussed in 2.4. The gender markers and the case endings which can follow the participial affixes are discussed under nominal morphology in section 3. The personal endings are scattered towards the left and the right. The 1SING ending is added for completeness, but it only appears as *-ō*, never as *-m* when immediately following the imperfective stem. The numbers in parentheses in some cells refer to notes to the table.

As can be seen, there are two major types of allomorphy in terms of environment and there are three idiosyncratic ones, namely affixes 9, 13 and 14, which show allomorphic distributions different from all other affixes. The two major patterns are represented by 1–6 on the one hand (henceforth we will refer to these as Type 1 allomorphy) and 7, 8, 10–12 on the other (henceforth Type 2 allomorphy). Both Type 1 and Type 2 allomorphy as well as the allomorphy in 13 share a common feature in terms of environment: these affixes select one variant after consonants and [u] (*ag-, tribu-*),[7] and another variant after non-high vowels (*vidē-, amā-*).

[7] In fact, it is possible to argue that *u*-final stems are not vowel-final at all but consonant-final (phonologically – and perhaps phonetically – [uw]). One point to consider is that they absolutely never pattern differently from consonant-final stems proper. Another is that no imperfective stem ends in [o] or [o:], which looks like an accidental gap since all other vowel qualities are attested. If we also add [u] and [u:], we are at least able to make a more general statement: imperfective stems never end in a round vowel. The third point is the marginal existence of a single "true" *u*-stem verb, *fore* 'be', which behaves phonologically in a fashion parallel to *i*-stems in showing the lowering of the high vowel before [r] (*fu-* → *fore* like *capi-* → *capere*, see note (2) to table 1 above). The only attested forms of the verb *fore* are the *-re, -rē-* and *-ā-*suffixed ones. The idea that what are called *u*-stems (and also *u*-final perfective stems) are to be analysed as [uw]-final is found in different versions, underpinned by different arguments, in Juret (1913, 200); Moralejo (1991) and Touratier

Table 1: Affix variants immediately following the imperfective stem (first version)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	is, it, imus, itis, ite	*e*	*itur, imur, iminī*	*eris*	*ere*	*erē-*	*ē-*	*ēbā-*	*ā-*	*ent-*	*end-*	*unt, untur*	*ī*	*ō*
ag-														
tribu-														
capi-		(1)			(2)								(4)	
ferī-														
vidē-														
amā-									(3)					(3)
	s, t, mus, tis, te	*Ø*	*tur, mur, minī*	*ris*	*re*	*rē-*	*b-*	*bā-*	*ē-*	*nt-*	*nd-*	*nt, ntur*	*rī*	*(m)*
	act. p. e. 23SING, 12PLUR, IMPER2PLUR	IMPER2SING	pass. p. e. 3SING, 12PLUR	pass. p. e. SING	ACTINF	PASTSUBJ	FUT	PAST	SUBJ	ACTPARTIC	PASSPARTIC	p. e. 3PLUR	PASSINF	p. e. 1SING

Notes to table 1:

(1) Lowering 1: by a phonological rule i → e / __#, thus *capi* → *cape*.

(2) Lowering 2: by a phonological rule i → e / __r (in derived environments), thus *caperis*, etc.

(3) Truncation 1: by a phonological rule ā,a → Ø / __V (in derived environments), thus *amā* + *ē-* → *amē-* and *amā* + *ō* → *amō*.

(4) Truncation 2: by a local[8] rule, i + ī → ī, thus *capi* + *ī* → *capī*.

The stems on the left belong to the verbs *agere* 'do', *tribuere* 'distribute', *capere* 'catch', *ferire* 'hit', *videre* 'see', *amare* 'love'.

The difference between Type 1 and Type 2 is which allomorph is selected after (short and long) [i]: in Type 1, the variant after [i] is the one selected after the non-high vowels, in Type 2 the variant is the one selected after consonants and [u]. Schematically:

(2005, 68ff), among others. If this analysis is adopted it follows that the difference between "*u*-stem" verbs and "real" *v*-stems such as *vivere* 'live' is merely orthographic: [w] is not indicated in the writing of verbs like *tribuere* but it is in *vivere*, etc.

[8] Local rule means a rule that is specific to these constructions and is not found e.g., in nominal forms or perfective verb forms.

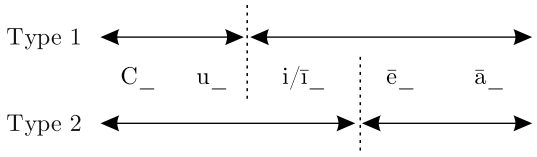


Figure 2: The environments of Type 1 vs. Type 2 allomorphy

As will be seen shortly, these two types recur elsewhere in the verbal paradigms, and Type 2 is found in nominal morphology too.

2.2.1. An alternative analysis of *i*-stems

In table 1 above the line indicating different allomorph selections in Type 1 allomorphy is drawn between *i*-stems (*capi-*) and *u*-stems/C-stems (*tribu-*/*ag-*). But the phonological shape of the allomorphs (showing [i] ∼ ∅ and [e] ∼ ∅ alternations) coupled with the phonological processes described in the notes to the table ([i] → [e] lowering rules) lead to surface forms after concatention in which all distinctions are erased between *i*-stems and *u*-/C-stems. The same is true of the passive infinitive allomorphy (13 in table 1). On the other hand, all those forms of *i*-stem verbs that do not coincide with consonant stem verb forms are formally indistinguishable from *ī*-stem forms, i.e., all cases of Type 2 allomorphy, plus 9 and (vacuously) 14. This results from the near-exceptionless hiatus shortening rule in Latin, which also affects [iː] and neutralises it with [i] before the relevant affixes (all vowel-initial):

(1) $V\text{ː} \rightarrow V \,/\, \_\_V$

whereby *ferī* + *o* 'hit-1SING', *vidē* + *at* 'see-SUBJ3SING' → *ferĭo, vidĕat*, etc.

The net result is that *i*-stems do not have a single form that is unique to them. But then the question arises why we should posit a separate stem type for them at all (apart from etymological considerations). The alternative is to regard them as systematically heteroclitic: this populous group is basically a subset of *ī*-stems which are inflected as C-stems (without the *ī*) in certain forms. Such an analysis has several advantages. Of the four additional notes to table 1, three disappear: we no longer need word-final lowering and pre-*r* lowering of [i] and we also do not need the *i*-truncation rule. Whether these are independently needed as phonological rules is another issue (word-final and pre-*r* lowering are needed for nominal morphophonology). Furthermore, the passive infinitive ending is

now regularised to a Type 1 allomorphy (*capī* now being a consonant stem form). The revised chart below is split into Type 1 (table 2) vs. all other kinds of allomorphy (table 3); note the different placement of *cap(ī)-* on the left.

Table 2: Type 1 affix variants immediately following the imperfective stem (revised from table 1)

Type 1	1	2	3	4	5	6	13
	is, it, imus, itis, ite	*e*	*itur, imur, iminī*	*eris*	*ere*	*erē-*	*ī*
ag-/cap-							
tribu-							
ferī-							
vidē-							
amā-							
	s, t, mus, tis, te	*ø*	*tur, mur, minī*	*ris*	*re*	*rē-*	*rī*
	act. p. e. 23SING, 12PLUR, IMPER2PLUR	IMPER2SING	pass. p. e. 3SING, 12PLUR	pass. p. e. 2SING	ACTINF	PASTSUBJ	PASSINF

Table 3: Type 2 and other affix variants immediately following the imperfective stem (revised from table 1)

Type 2 & other	7	8	9	10	11	12	14
	ē-	*ēbā-*	*ā-*	*ent-*	*end-*	*unt, untur*	*ō*
ag-							
tribu-							
ferī-/capī-							
vidē-							
amā-			(1)				(1)
	b-	*bā-*	*ē-*	*nt-*	*nd-*	*nt, ntur*	*(m)*
	FUT	PAST	SUBJ	ACTPARTIC	PASSPARTIC	p. e. 3PLUR	p. e. 1SING

Note to table 3: (1) Truncation: by a phonological rule ā,a $\rightarrow \emptyset / \_\_V$ (in derived environments), thus *amā* + *ē-* → *amē-* and *amā* + *ō* → *amō*.

2.3. Affixes immediately following the perfective stem

2.3.1. Classification of affixes

The affixes that can be adjacent to the perfective stem fall into three categories functionally. Like in the imperfective, there are mood and tense formatives (stem extensions), there is an infinitive ending, and there is a set of active personal endings found only in the present perfective indicative paradigm. (As will be seen later, stem extensions can be followed by active personal endings identical to those found in imperfective forms.)

The present perfective indicative paradigm requires some explanation. These endings are a heterogeneous and partly idiosyncratic set (also etymologically problematic to a certain extent, see Clackson & Horrocks 2007, 98–101; Weiss 2009, 390ff; Clackson 2007, 120–128; Leumann 1977, 606–608). Two of the endings are not found anywhere else in the verbal morphology (1SING *-ī*, 2SING *-istī*), two are the same as their counterpart elsewhere (3SING *-it,* 1PLUR *-imus*), and two look as if they consisted of a stem extension and a personal ending seen elsewhere (2PLUR *-istis*, 3PLUR *-ērunt*). The unusual composition of this paradigm warrants its separate placement in the chart in figure 1 above.

In terms of form and alternations, these affixes (including the stem extensions, the infinitive ending and the PRESPERF endings) are traditionally classified into two sets with self-explanatory names, the *is*-class and the *er*-class (e.g., Leumann 1977, 608–609). As a third class one may add that of non-alternating suffixes (comprising the PRESPERF endings *-ī, -it* and *-imus,* though it will be shown below that even this group is heterogeneous). This tripartite formal division cross-classifies the functional categories in the following way:

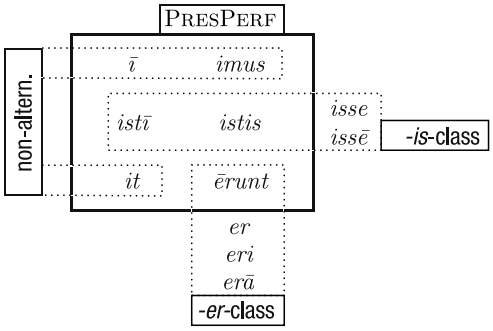


Figure 3: Formal types of affixes immediately following the perfective stem

In the following sections we look at the patterns of alternation in affixes adjacent to the perfective stem.

2.3.2. Alternations in the affixes and their environments

2.3.2.1. General pattern

The alternations of the affixes are conditioned by the phonological shape of the stems, in particular by their final segments. As we saw above, in the imperfective it is a lexical property of verbs what the final segment of the stem is (both when that segment can be analysed as an affix and when it cannot). This gives ample room for the conditioning of various kinds of allomorphy. In the perfective the possibilities are much more restricted: perfective stems in Latin end either in a consonant or in [u].[9] There are no other vowel-final perfective stems apart from two: *ī-* 'go' (e.g., *iī* 'I went', *ierat* 'he had gone', also in prefixed forms such as *abiī* 'I left' or *periī* 'I perished', etc.), and *desī-* 'cease' (*desiī, desierat*, etc.), the latter with many post-classical instances of *v*-addition (e.g., *desīverat*).

What leads to different environments conditioning the appearance of different affix variants in the perfective is primarily an optional but very frequently occurring process of *v*-deletion. The final [w] of perfective stems such as *nōv-* 'know' may delete, creating a vowel-final truncated stem, which then selects the affix variant without the initial vowel:

(2) nōv-ērunt ∼ nō-runt 'they knew'
nōv-isse ∼ nō-sse 'know-PERFINF'

The process of *v*-deletion is variable and subject to a combination of lexical and morphophonological conditions. One important factor is that [w] can only delete if it is an affix, not if it is part of the lexical make-up of the verb (this is clear from the data enumerated in Leumann 1977, 598–601). Though very similar to *nōv-*, the final [w] of *mōv-* 'move' almost never deletes, and *fōv-* 'warm' is absolutely unattested with deletion.[10]

[9] The stem-final segment can often, but not always, be analysed as an affix. The most frequent analysable perfect stem-forming affixes are *-v-, -u-* and *-s-*. Of these, *-v-* and *-u-* are in complementary distribution: *-v-* only occurs after long vowels, *-u-* only after consonants. Interestingly, stem-final [w] is always preceded by a long vowel even if it is not an affix.

[10] For *nōv-* with *-is*-class affixes, the ratio of deleted forms in the corpus we used is 96.3%, for *mōv-* (including prefixed forms) only 3.6%. In *nōv-*, the [w] is an affix that forms the perfective stem (the imperfective stem is *nōsc-*), whereas in *mōv-* and *fōv-* it is lexically part of the verb (cf. the imperfective stems *movē-* and *fovē-*). As an

Similarly, the [w] of *probāv-* 'approve' has a strong tendency to delete (***probavisti* 2SING is unattested, including all prefixed forms!), whereas that of *fāv-* 'favour' is stable (cf. the imperfective stems *probā-* vs. *favē-*). But even where the [w] is an affix, it is lexically specific whether it deletes or not; e.g., in *crēv-* 'separate' it does, in *sprēv-* 'despise' it does not.

Another factor is that *v*-deletion is much more frequent before *-is*-class affixes than before *-er*-class affixes, and it does not normally occur before the three non-alternating affixes.[11] The difference in the capacity of *-is*-class vs. *-er*-class affixes to induce *v*-deletion perhaps has to do with the large number of affixes including [r] overall in the Latin verbal paradigms: *v*-deleted forms, which also automatically lack the initial vowel of alternating suffixes, are at great risk of being confused with other verb forms. Add to this that, as statistical counts prove (Cser 2009, 124–126), [r] is the most frequent consonant word-internally. By contrast, the [ss] and the [st] sequences of the *-is*-class affixes are unique to them and mark their categories (PASTSUBJ and INF, and second person, respectively) very saliently.

The kinds of allomorphy that the alternating affixes display in this category are presented in table 4 with examples.

It is clear that the two classes of affixes display precisely those two types of allomorphy that were identified for the affixes following the imperfective stem, and figure 2 can be repeated here virtually unchanged, with only [oː] added to the environments:

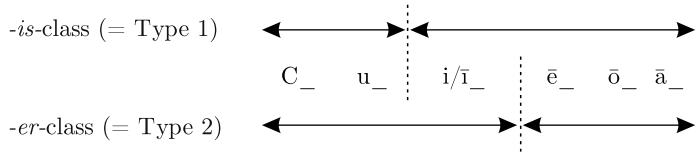


Figure 4: The environments of *-is*-class vs. *er*-class allomorphy

anonymous reviewer pointed out, the restriction of *v*-deletion to suffixes can be seen as an effect of the derived environment condition.

[11] The deletion of [w] before the two singular non-alternating suffixes is possible only if the truncated perfective stem ends in [i], e.g., *petii* 'I strove for', *nequiit* '(s)he was unable to' (the full forms being *petivi* and *nequivit*, respectively); more will be said about this later. On putative examples involving *v*-deletion and the concomitant appearance of vowelless variants of the affixes *-it* and *-imus*, see Leumann (1977, 599 ff).

Table 4: Affix variants immediately following the perfective stem. (The examples are *no(v)-* 'know', *ama(v)-* 'love', *tetig-* 'touch', *monu-* 'warn', *abi-* 'leave', *comple(v)-* 'complete'; the respective imperfectives are *noscere, amare, tangere, monēre, abire* and *complēre*.)

	-isse *-issē-* *-istī* *-istis*	*-er-* *-erā-* *-eri-* *-ērunt*
-C-	*nōv-isse* *amāv-isse* *tetig-isse*	*nōv-ērunt* *amāv-ērunt* *tetig-ērunt*
-u-	*monu-isse*	*monu-ērunt*
-i/ī-	*abī-sse*	*abi-ērunt*
-V[–high]-	*nō-sse* *complē-sse* *amā-sse*	*nō-runt* *complē-runt* *amā-runt*
	-sse *-ssē-* *-stī* *-stis*	*-r-* *-rā-* *-ri-* *-runt*

2.3.2.2. Vowel deletion after [s]

One minor point of complication involves *s*-final perfective stems (excluding *-ls-, -rs-*) combining with *is*-affixes. In more than just a handful of cases the vowelless affix variant appears, and the number of adjacent [s]'s is reduced. Thus *derexisti* ∼ *derexti* 'arrange' PresPerf2Sing, *divisisse* ∼ *divisse* 'divide' PerfInf, *accessistis* ∼ *accestis* 'approach' PresPerf2Plur, *admisisse* ∼ *admisse* 'send to' PerfInf, and many others. On the face of it this looks like the loss of an [is] sequence specifically after [s] in these particular constructions (as is the tradition, see Leumann 1977, 598), but it is more economical to analyse the disappearance of the vowel as being the same allomorphic variation as that seen after vowel-final stems, and the disappearance of [s] as resulting from an independently motivated phonological process of degemination,[12] because in this case we do not need any extra processes – apart from stipulating the somewhat odd context [s]__ for the otherwise postvocalic morpheme variants.

[12] The degemination rule mandates that all geminates must be shortened if they cannot be properly syllabified as coda–onset sequences or, in the case of [s], as a licit extrasyllabic segment (i.e., a single [s] between two stops). On Latin syllable structure in general and on extrasyllabic [s] see Cser (2012). Note that in *accestis* the rule deletes two [s]'s.

2.3.2.3. Hiatus and *i*-final perfective stems

Those perfective stems that are *i*-final (whether truncated or not) present minor issues in connection with hiatus that merit a brief excursus. One fact to note is that – fully in line with the general rule of hiatus, see (1) above – if a stem ending in long [iː] is followed by the vowel-initial suffixes, the [iː] shortens: *finīv-erat* but *finĭ-erat* 'finish' PastPerf3Sing; cf. *finī-sse* PerfInf.

Another, somewhat more complicated, point to note is that with *i*-final stems, especially if they do not result from the truncation of *-iv*-final stems, the choice of the vowelled variant is marginally possible with the *-is*-class too: *abiisse* next to the majority *abisse*, etc. forms. Morphologically this represents nothing but a minor variation within the pattern described above. Phonologically it is more tantalising, however; as other data not discussed here show, a sequence of two short [i]'s is forbidden in Latin (e.g., *societas* 'fellowship', *varietas* 'variety' vs. *novitas* 'novelty', *celebritas* 'multitude', nouns derived with the same suffix). Forms like *abiisse,* though marginal in terms of numbers, clearly contradict this generalisation (we do not have even marginal ***sociitas*, etc.).

One way to circumvent this irregularity would be to claim that ⟨ii⟩ was simply a way to write [iː] and so ⟨abiisse⟩ and ⟨abisse⟩ are plain spelling variants representing [abiːsse], the expected (morpho)phonological form. While we cannot say with absolute certainty that ⟨ii⟩ never represented [iː] in such (or in other) cases, it would be incongruous with our knowledge of the history of Latin writing, and also plainly contradicted by several attestations in poetic texts where ⟨ii⟩ sequences are disyllabic.[13] Thus we must conclude that in at least some cases ⟨ii⟩ represented [ii].

Another way out would be to claim that the second [i] in these sequences was long; in that case it would not contradict the ban on **[ii]. However, there is no evidence whatsoever for the length of the [i] of the *-is*-suffixes, and etymological considerations clearly point to a short vowel.[14]

[13] Cf. the hexametre line Stat. *Theb.* 10.237: *(numina) qui fractos superi rediistis ad Argos* 'What gods are ye, who have turned again to Argos in her distress?' (translation by John Henry Mozley), where *rediistis* must scan as four syllables (LLHL).

[14] Diachronically the [is] part and the [er] part of the suffixes in question is identical, differentiated by rhotacism ([s] > [r] / V__V) and pre-r lowering ([i] > [e] / __[r]). Though both rules are arguably present in the synchronic phonology of Latin, we would not want to derive these perfective suffixes from a common underlying form because in order to create a derived environment for rhotacism (a lexical rule in Classical Latin) one would need to further analyse the stem extensions as composites,

A third way of looking at these forms concentrates on word stress.[15] If one considers where stress occurs, the *abiisse*-type is markedly different from the *societas*-type. In nouns such as the latter, stress can simply never fall on the alternating short vowel. In the NomSing it falls on the vowel before it (*nóvitas, socíetas*), in all other forms it falls on the vowel following it (AccSing *novitátem, societátem*, DatPlur *novitátibus, societátibus*, etc.). By contrast, in the perfective verb forms with *-is*-type suffixes stress falls on the [i] in question in 7 out of the 9 possible forms (*abiísse, abiíssem, rediísses, abiísset, rediíssent, rediísti, rediístis*).[16] The only forms in which they could possibly fall elsewhere are the SubjPast1Plur and SubjPast2Plur *redissémus, abissétis*. But such forms ending in ⟨iissemus⟩ or ⟨iissetis⟩ (i.e., including a sequence of two unstressed short [i]'s) are not attested apart from a single instance of *obiissemus* (in Tertullian's *De jejunio*) in the entire corpus. Whether the absence of such forms is statistically significant we cannot establish, given the relatively small number of the relevant forms overall and given that the 1Plur and 2Plur verb forms are in general rarer than third person or 1Sing forms. But at least tentatively we could say that the ban on **[ii] is categorical only with respect to unstressed vowels; an [ií] sequence is marginally possible – though in the majority of such cases the vowel-less allomorph is selected by the stem and so no sequence of vowels results.

2.3.3. The non-alternating suffixes

The three remaining suffixes 1Sing *-ī,* 3Sing *-it* and 1Plur *-imus,* which we earlier termed non-alternating, present special problems. The data are somewhat messy, with textual editions reflecting manuscript variation, and their interpretation is not always straightforward, but the main thrust of the evidence seems to be the following.

1Sing *-ī* and 3Sing *-it* are categorically non-alternating, and *v*-deletion before them is possible only if the vowel preceding the [w] is [iː]; thus, *audīvi(t)* ∼ *audii(t),*[17] *finīvit* ∼ *finiit*, but only *novi(t), amavi(t)*, etc.

which in the end would simply replicate the accepted etymological analysis (see e.g., Baldi 2002, 387ff).

[15] Syllable weight and stress are not discussed here in detail, but the main points are these: in Latin all vowels and all coda consonants are moraic, and stress is assigned to the penult if it is heavy and to the antepenult if the penult is light. Deictics ending in [k] are end-stressed, e.g., *illínc* 'from there'.

[16] This list includes forms of *ire* 'to go' with two different prefixes because no single verb has all the forms in question attested.

[17] As a famous example note Vergil's extensive use of both *audivit* (metrically heavy–heavy–light) and *audiit* (heavy–light–light) in his Aeneid.

(This may reflect the analogical pull of the only truly vowel-final perfective stems *ī-* 'to go' and *desī-* 'to cease'.) As is often seen in morphophonological variation in Latin, individual verbs of a similar phonological shape show differing ratios of truncated vs. non-truncated forms, and a variety of lexical factors appears to play a role.[18] Where the perfective stem ends in [iː] with no original [w] at all (i.e., *ī-* together with prefixed forms, and *desī-*), one finds invariable *-ii(t)*: *abii(t), redii(t), desii(t)*, with very rare, largely postclassical secondary *v*-additions (*perivit* in Apuleius, *desivit* once in Quintilian, then several times in the Church Fathers). On some occasions the spelling only has one ⟨i⟩ which may scan long in poetry.[19] When these can be taken at face value, they represent genuine cases of vowel contraction, which makes them doubly exceptional (contraction[20] plus vowel length before final [t]). At the same time, uncontracted *abiit*-type 3SING forms are also exceptional in that they contain an [ii] sequence within which neither vowel is stressed; but in verse, the metre usually makes it clear that forms like *abiit* are indeed trisyllabic. Note that for some poets in such constructions a long suffix vowel was a possible option depending on metrical exigencies (i.e., *-iīt* instead of *-iĭt,* see Castillo Herrera 2009 for a conspectus of the data). 1SING forms such as *abiī* are unproblematic because the second [i] is always long in them.

Before 1PLUR *-imus v*-deletion is almost completely unattested, even with *-īv*-final stems. This means that this suffix can only be preceded by consonants, [u] or the [iː] of *ī-* 'to go' and *dēsī-* 'to cease'. After consonants and [u] no suffix ever shows a vowel-less variant. After the [iː] of *ī-* and all its compounds, however, *-imus* drops the initial [i] quite categorically (*īmus, abīmus, obīmus, redīmus, exīmus* with rare instances of *adiimus, periimus*) in spite of the resulting homophony with the corresponding imperfective forms. With *desī-* there are far fewer forms in the corpus: one single *desīmus*, six occurrences of *desiimus* (and eleven of *desīvimus*, all post-classical). One would expect the usual form to be *desīmus*, all the more so since this would not coincide with the imperfective *desinimus* – but apparently here we have to do with the odd counterexample again, simi-

[18] For instance, *petere* 'strive for' mostly has truncated *petii(t)*, but its prefixed forms prefer the untruncated variants (*repetivi* 'I struck again', etc.).

[19] E.g. Verg. *Aen.* 9.418.

[20] The term *contraction* is widely used in Latin linguistics (e.g., Clackson & Horrocks 2007, 280, Baldi 2002, 381) whenever there is a longer and a shorter variant to the same form – we do not follow this practice because in most cases what happens is that one of two vowels is lost in the hiatus created by the deletion of a consonant, as in *nōsti, amārunt.*

larly to the two instances of *repetiimus* for the default form *repetīvimus*. So, revising the categorisation given above, one might reclassify *-imus* as a semi-alternating or marginally alternating affix. Another way of capturing its special status is that it is actually an alternating affix (Type 1), just like *is*-class affixes in general, but for an independent reason (viz. the impossibility of *v*-deletion before it) it only occurs in a restricted set of environments and can never follow a non-high vowel.[21]

At this point let us present a small but particularly instructive piece of textual philology, which illustrates the nature of the data we work with. When looking for evidence for the behaviour of *-imus* in the corpus, we came across a contrast between *petĭmus* 'we strive for' and *petīmus* 'we strove for' within a single work, Lucan's *Pharsalia*.[22] In theory, this could be a contrast between an imperfective and a perfective form, not otherwise visible in writing but highlighted in this case by the metre. The interpretation of the perfective form would be then *v*-deletion of *petīv-* (*contra* the generalisation above) and *-mus* with the vowel deleted. However, the critical apparatus of the Teubner edition (Shackleton Bailey 1997, 241) makes it clear that the manuscripts have four different readings for the end of the hexametre line in question: besides ⟨petimus ab orbe⟩, the reading that made its way into the main text of this edition and thus also into the Brepols-corpus, there is ⟨petivimus orbe⟩ (non-*v*-deleted perfect), ⟨petemus ab orbe⟩ (ImpfFut, which can be excluded on contextual grounds) and the metrically impossible ⟨petimus orbe⟩.[23]

The point we want to make here is that the limitations on what one can do with a textual database for Latin become quite severe when when try to disentangle issues such as the (morpho)phonological interpretation of ⟨desiimus⟩, ⟨repetiimus⟩, ⟨abiisse⟩ and similar forms. It would be unrealistic not to admit that combinations of [i]-final stems and [i]-initial affixes will always represent a bit of a grey zone and a full understanding of them may well remain impossible.

That said, the generalisations regarding the distribution of the perfective affixes will now be extended to encompass what we have termed non-alternating affixes and to encompass the minor variations described above.

[21] Note, however, the celebrated pre-classical hapax *nōmus* for *nōvimus* 'we know', found in a fragment attributed to the early poet Ennius.

[22] Also known as *Bellum civile;* the occurrences are *petĭmus* in 4.362, 7.803, 8.441, 9.878, *petīmus* in 9.430.

[23] The full line (in this edition) is *extremoque epulas mensasque petimus ab orbe*, in a free translation 'we strove to bring tables and food from the limits of the world'; Sir Edward Ridley's translation is available at http://tinyurl.com/qx6mckx.

Table 5: Affix variants immediately following the perfective stem (revised and extended from table 4)

	isse *issē-* *istī* *istis*		*er-* *erā-* *eri-* *ērunt*	*imus*	*ī* *it*
-C-	*nōv-isse* *amāv-isse* *audīv-isse* *tetig-isse*		*nōv-ērunt* *amāv-ērunt* *audīv-ērunt* *tetig-ērunt*	*nōv-imus* *amāv-imus* *audīv-imus* *tetig-imus*	*nōv-it* *amāv-it* *audīv-it* *tetig-it*
-s-	*(dīvīs-(s)se)*	*dīvīs-isse*	*dīvīs-ērunt*	*dīvīs-imus*	*dīvīs-it*
-u-	*monu-isse*		*monu-erat*	*monu-imus*	*monu-it*
non-truncated *-i/ī-*	*abī-sse*	*(abi-isse)*	*abi-erat*	*abī-mus*	*abi-it*
truncated *-ī-*	*audī-sse*	*(audi-isse)*	*audi-erat*		*audi-it*
-V[–high]- (always truncated)	*nō-sse* *complē-sse* *amā-sse*		*nō-runt* *complē-runt* *amā-runt*		
	sse *ssē-* *stī* *stis*		*r-* *rā-* *ri-* *runt*	*mus*	

2.4. Affixes following the extended stems

Extended stems, whether perfective or imperfective, can only be followed by the personal endings. These featured already in table 1 since they can also follow the imperfective stem immediately. After extended stems, however, their distribution is somewhat different. First, while imperfective and extended imperfective stems can be followed by active as well as by passive endings, extended perfective stems can only be followed by active endings. Second, after extended stems the 1Sing ending displays allomorphy too (when immediately after the imperfective stem, it is invariably *-ō*).[24] Third, after extended stems all personal endings, even 3Plur *-unt*, display Type 1 allomorphy. This is clear even though the set of actual segments found at the end of extended stems is quite small: [r b i aː eː]. The crucial point is that in this morphological construction all three vowels, including [i], pattern together as environments.[25] In a tabular form:

[24] The 1Sing ending written ⟨m⟩ is phonologically a placeless nasal which is realised as nasalisation and lengthening on the preceding vowel.

[25] In particular, the contrast can be captured at two points: (i) *-i+(u)nt* constructions, e.g., *veni-unt* 'come' PresImpf3Plur vs. *ven-eri-nt* PresPerfSubj3Plur; (ii) nearly all 1Sing forms, e.g., *vide-o* 'see' PresImpf1Sing vs. *am-e-m* 'love' PresImpfSubj1Sing or *vide-or* vs. *am-e-r*, the same forms in passive. The first contrast is due to Type 2 vs. Type 1 allomorphy of *-(u)nt* after imperfective and extended

Table 6: Affix variants following extended stems

	ō/or, is/eris, it/itur, imus/imur, itis/iminī, unt/untur
-C-	
-V-	
	m/r, s/ris, t/tur, mus/mur, tis/minī, nt/ntur

There are two local irregularities to mention, and with these the description of the systemic morphophonology of Latin verbal inflection is complete. One irregularity is that in the FUTPERF3PLUR the forms end in *-erint* (*fuerint, audierint...*), though they should end in **-*erunt*, since these forms consist of the perfective extension *-er-* plus the 3PLUR suffix *-(u)nt*. This is not a morhophonological irregularity; the *fuerint*-type forms have simply spilled over from the accidentally highly similar PRESPERFSUBJ paradigm, where the stem exension is *-eri-*. (Consequently, the only difference between the two paradigms is in the 1SING *fuero* vs. *fuerim.*)

Not unlike this is the case of the FUTIMPF1SING of consonant- and *i*-stem verbs. These forms end in *-am* (*agam, capiam, veniam*), although the stem extension here is *-ē-*; again, this is a case of contamination from the corresponding PRESIMPFSUBJ paradigm, where the the stem extension is *-ā-*.

3. Allomorphy in the nominal inflection

3.1. Introductory remarks

As was seen above, the environments of the allomorphic alternations encountered in verbal inflection can be defined over a scale of vocalicness, with consonants at one end, non-high vowels at the other, and the high vowels in between, patterning partly with the consonants, partly with the non-high vowels. Something very similar is found in nominal inflection, an insight expressed already in Spaelti (2004) and Emonds & Spaelti (2005).

Nominal inflection is structurally simpler but morphophonologically more complex than verbal inflection. It is structurally simpler because all forms consist of a stem and an ending; unlike with verbs, there are no

stems, respectively; the second is due to the wholly idiosyncratic behaviour of the 1SING suffix.

subsystems of extended stems apart from a certain kind of gender marking (see below); and, of course, various kinds of nominal derivations are found, which are not discussed here. In terms of morphosyntactic properties, nominal inflection includes cumulative case/number marking (henceforth referred to as case marking) for all kinds of nouns and adjectives, as well as gender marking for some nouns and many adjectives. Gender is encoded partly in the differential marking of the nominative and accusative cases, partly in the stem-final vowel. These details will be explained below.

Stems can end in all five vowel qualities and any of the consonants except [f] [j] and [h].[26] In particular, the stem-final segments which define the types by conditioning allomorphy in case marking are the following:[27] *-ă -ŏ/ŭ -ē -ū/ŭ -ĭ* -C. While this list largely corresponds to the traditionally distinguished declensions, one important difference is to be noted. In the time-honoured classification *i*-stems and consonant stems belong to what is called the third declension and are distinguished from each other on an etymological basis. Since the endings for the two kinds of stems were in several cases identical to begin with, and since subsequent sound changes and analogical levelling obscured some of the existing differences, only five points remained visible, viz. AccSing *-im* vs. *-em*, AblSing *-ī* vs. *-e*, NeutrNomAccPlur *-ia* vs. *-a*, MascFemAccPlur *-īs* vs. *-ēs*, and GenPlur *-ium* vs. *-um* (the former typical of the *i*-stem forms, the latter of consonant stems in all the five cases). Third declension nouns and adjectives show immense variation in what suffixes they take, and the picture is further obscured by the fact that many words are simply not attested in all of their case forms.

The details of this variation have been thoroughly described[28] and will not be rehearsed here. We will not treat the issue of *i*-stems vs. consonant stems as a matter of inflectional variation, i.e, as variation in the endings within a single general paradigm type. We will treat stem-final [i] as inher-

[26] Note that [f] and [j] are also never found in verb stem-final position.

[27] The type here marked *ŏ/ŭ* is traditionally called *o*-stem on an etymological basis. By the Classical Latin period the original stem-final *[o] developed into [u] in some forms. Thus these stems as a type may be described as ending in an unspecified back round vowel; this contrasts with the non-round vowelled stems, and it also contrasts with the clearly *u*-final stems. Nevertheless, for practical purposes we will continue to refer to this class as *o*-stems. The stems here marked as *ū/ŭ* end in an [u] unspecified for length, which appears either as long or as short in the case-marked forms, without any regularity that could be phonologically specified; the quality of the vowel is stable, as opposed that seen in *o*-stems.

[28] For a detailed conspectus see Leumann (1977, 342–353; 429–441).

ently unstable: if it is present, the given instantiation of the stem selects the appropriate allomorph typical of an *i*-stem; if it is not present, it selects an allomorph typical of a consonant stem. We regard this phenomenon essentially as heteroclisy. Some nouns display forms based on two different stems, e.g., *elephant-/elephanto-* 'elephant', *opulent-/opulento-* 'rich', *barbaria-/barbariē-* 'strange land', *materia-/materiē-* 'stuff', *domo-/domū-* 'house', and several others. What are called *i*-stems all belong to this set. In a few nouns such as *mare* 'sea' the stem-final [i] is present in most forms;[29] in some it is present only in one distinguishable form (e.g., *urbs* 'city' → GenPlur *urbium*); and there is a huge number of pure consonant stems with no *i*-stem forms at all.

The relation between *i*-stems and consonant stems is thus a kind of pervasive heteroclisy. The presentation of the allomorphic variation that follows does not explicitly show this or any other heteroclisy: stem types are listed as environments conditioning allomorph choice, and it is understood that certain lexical items shift between these stem types. It so happens that *i*-stem nouns and adjectives are a much less stable category, i.e., more prone to shifting between stem types, than most other stem types.[30] Furthermore, it is important to note that etymological considerations will be explicitly disregarded here in assigning either stems or endings to the *i*-stem class and consonant stem class.[31]

We saw above that verbs also show systematic heteroclisy between *ī*-stem and C-stem. The two types of heteroclisy are parallel to a certain extent in involving the presence vs. absence of the same vowel in stem-

[29] One could actually argue that *mare* is an *i*-stem throughout if one assigns the surface-ambiguous forms to the set of *i*-stem forms, e.g., GenSing *mari-s* rather than *mar-is*, which would be the consonant-stem form. We do not believe this ambiguity can be resolved, but we also do not believe very much hinges on it.

[30] The class of *ē*-stems is, in fact, also unstable in a slightly different and much less problematic way. The number of *ē*-stem nouns is rather small, only a handful show a full attested paradigm, and several are heteroclitic, see *materies* 'stuff' and *barbaries* 'strange land' above. However, the marginal nature of this stem type is unproblematic from a descriptive point of view because, unlike with *i*-stems, if a noun shows *ē*-stem forms, those are easily distinguished from forms based on other stems.

[31] For example, we classify the NomSing *-ēs* ending as a consonant stem ending because formally this is more straightforward than classifying it as an *i*-stem ending and then deleting the [i] in actual forms like *fames* 'hunger', *nubes* 'cloud', *clades* 'destruction'. Another motivation for this choice is that these words do not show other *i*-stem forms apart from GenPlur *nubium* and *cladium* (the latter varying with consonant-stem *cladum*; no GenPlur forms attested for *fames* at all). In Latin historical linguistics *-ēs* is known as a typical feminine *i*-stem ending for the NomSing originally.

final position. The important difference between verbal and nominal *i*-stem heteroclisy is not in the length of the vowel (which varies on the surface under well-defined conditions anyway) but in the patterning and symmetry of the variation.

Patterning in this case means a uniform behaviour for verbs: all verbs belonging to the class in question show C-stem forms in exactly the same paradigmatic cells and *ī*-stem forms in the complementary set of those paradigmatic cells.[32] By contrast, the nouns and adjectives that show *i*-stem forms as well as C-stem forms do so in a largely unpredictable paradigmatic distribution. There are hardly any discernible regularities in the stem allomorphy, or interdependencies between *i*-stem forms and consonant stem forms at a paradigmatic level.[33] Nominal heteroclisy is thus not systematic in the same way as verbal heteroclisy is.

Symmetry means that both "sides" of the heteroclisy exist in unadulterated form in the morphological system. This is unambiguously true only for verbs: there are pure *ī*-stems and there are pure C-stems, and there is a class of verbs that systematically shifts between the two in particular forms. For nouns this is not the case. While there are pure C-stems, there are no unambiguously pure *i*-stems (see note 29); the tantalising variation is not found between two extremes but at a lopsided periphery of a category.

3.2. Case endings and allomorphy: nominative and accusative singular

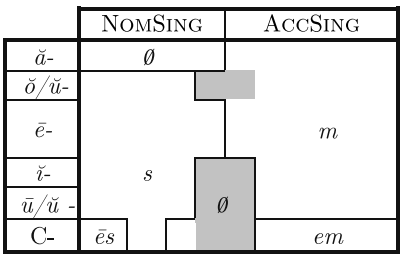
The case endings that different nominal stems take will be summarised in the following four tables. The nominative and accusative cases are presented separately from the other three cases in both numbers because they involve gender differentiation, and because they involve greater variability and require more explanation (especially the nominative singular).

The most typical NomSing ending is *-s* (with variant *-ēs*) for the animate genders, and zero for neuters and for *a*-stems (which are overwhelmingly feminine, with very few masculines). Zero is also found with

[32] With the notable exception of *oriri* 'arise', which shows more *ī*-stem forms than the other verbs in the same class.

[33] To note one such rare regularity, if a stem ends in a consonant cluster that cannot be a complex onset, it shows an *i*-stem form in the GenPlur: *urbium* 'city', *amnium* 'river' vs. *patrum* 'father', *volucrum* 'bird'; see also Spaelti (2004). An example of interdependency is that the *i*-stem AccSing form implies the *i*-stem NomSing form for any given lexeme (*puppim* → *puppis* 'ship'), but not the other way around (*hostis* but *hostem* 'enemy').

Table 7: Nominative and accusative singular endings[34]



ara			*aram*
annus	*pilum*		*annum*
diēs			*diem*
puppis	*mare*		*puppim*
tribus	*cornū*		*tribum*
famēs/ rex/pater	*caput*		*famem/regem/patrem*

most sonorant-final and all [s]-final stems of any gender. Animate *u*-stems show the short vowel, neuter *u*-stems presumably show the long vowel in the NomSing, though the latter cannot be definitively established (Leumann 1977, 441). The placeless nasal (written ⟨m⟩ in word-final position) is the general AccSing ending for all vowel-final stem types, the only exceptions being the zero-marked neuters of the high vowel and the consonant stems. Combined with a stem-final vowel this placeless nasal results in a long nasal vowel (always written ⟨Vm⟩) which inherits the quality of the stem-final vowel. After consonant stems the suffix is [ẽ:] (writen ⟨em⟩). As a rule without exception, neuters have the same nominative and accusative forms; this is indicated as the shaded area overlapping the two cases in the table above. For *o*-stem neuters, the nasal-final accusative form functions also as the nominative. There are no neuters at all among *a*-stems and *ē*-stems.[35]

[34] Here and in table 9 the shaded area marks forms typical of neuter nouns and adjectives. For each table, orthographic forms are added below. The examples are *ara* 'altar', *annus* 'year', *pilum* 'javelin', *dies* 'day', *puppis* 'ship', *mare* 'sea', *tribus* 'tribe', *cornu* 'horn', *fames* 'hunger', *rex* 'king', *pater* 'father', *caput* 'head'.

[35] Emonds and Spaelti (2005) establish the generalisation that among vowel-final stems genders show near-complementary distribution, with non-round-vowel stems being typically feminine and round-vowel stems typically masculine and neuter. They claim this can only be overridden by natural gender. This generalisation is highly problematic for several reasons. One is that it disregards the many *i*-stem neuters (such as

3.2.1. Phonological alternations in the nominative singular

The NomSing of nouns and adjectives often shows peculiarities which we here only mention briefly. One example is dental stop deletion before [s] (*mile-s* ∼ *milit-em* 'soldier' NomSing ∼ AccSing), a systematic phonological process attested independently of nominal morphology. Also, the vowel of the last stem syllable often differs in this form from that found in all other cases. Some such alternations are phonologically systematic, such as the *e* ∼ *i* alternation in closed vs. open syllables, as in *miles* (quoted above for dental stop deletion). In *i*-stem neuters the lowering rule [i] → [e] / __# applies (*mari-* → *mare* 'sea'). Some alternations are less systematic, such as the *u* ∼ *e* alternation in *genus* ∼ *generis* 'kind'. Some are fairly frequent lexically but cannot be described phonologically. The classic example of this is the set of *n*-final animate stems. These are zero-suffixed but the [n] is deleted too, and the NomSing shows final [oː], whether it is present in the stem otherwise or not: *tirōn-* → *tirō* 'new recruit', *origin-* → *origō* 'beginning'.

If a stem ends in [Cr], an epenthetic [e] is inserted in the NomSing (*patr-* → *pater* 'father', *agr-* → *ager* 'field'). Some of these stems are inflected as consonant stems throughout (e.g., *pater*), some are inflected as *o*-stems in all forms except the NomSing (e.g., *ager*); we regard the latter type as formally heteroclitic, even if only marginally. On adjectives of a similar stem shape see below.

3.2.2. Gender marking

The following common ways of marking gender in adjectives (and a number of nouns) are found.[36]

(i) Masc, Neutr full *o*-stem inflection, Fem full *a*-stem inflection (e.g., *purus* ∼ *purum* ∼ *pura* 'clean'). In adjectives like these the feminine differs from the other two genders throughout except in the DatAblPlur

mare 'sea') and the *u*-stem feminines (e.g., *domus* 'house', *manus* 'hand'). The other is that they use the term natural gender beyond reasonable limits. For instance the feminine gender of *fagus* 'beech-tree' is explained with reference to the fact that trees are usually feminine in Latin. While this is a true generalisation, it has nothing to do with natural gender (as opposed to, say, *nurus* 'daughter-in-law').

[36] Some adjectives do not mark gender in the singular at all (e.g., *vetus* 'old', *audax* 'bold'). More precisely, they only mark gender by using the NomSing form for the neuter accusative (Masc/Fem *veterem, audacem* vs. Neutr *vetus, audax*). Note that in these neuter nominative-accusative forms the animate NomSing affix *-s* appears on adjectives like *audax* or all the *-ns*-final participles, which is very unusual from a systemic – and also from an Indo-European – point of view.

(see later); the neuter differs from the masculine in the NomSing (Masc *purus,* Neutr *purum*), as explained above, and also in the NomAccPlur (see later).

(ii) All three genders heteroclitic *i*-stem/C-stem inflection, but Masc and Fem have NomSing *i*-stem plus *-s* and AccSing C-stem plus *-em*, whereas Neutr has *i*-stem plus zero for both (e.g., Masc/Fem NomSing *viridis,* AccSing *viridem,* Neutr *viride* 'green').

As a subcategory that cross-classifies both (i) and (ii), there is a populous group of *r*-final adjectives which do not show a stem-final vowel or a suffix in the masculine NomSing (e.g., *tener* ∼ *tenerum* ∼ *tenera* 'soft', otherwise same type as *purus* above, or *celer* ∼ *celere* ∼ *celeris* 'swift', otherwise same type as *viridis* above). Unlike *tener* and *celer,* the majority of such stems end in C*ro*-/C*ra*-/C*r*- or C*ri*-/C*r*-. In these the masculine NomSing usually has no stem-final vowel, epenthesises [e] as any C*r*-final noun stem (see above), and is then zero-suffixed as any sonorant-final noun stem.[37] In all other forms these adjectives are regular. Examples:

(3) Adjectives with C*r*(V)-final stems in NomSing (*piger* 'reluctant', *acer* 'sharp')
Masc *piger* (stem *pigr*-, zero suffix, *e*-epenthesis)
Neutr *pigrum* (stem *pigro*-, placeless nasal suffix)
Fem *pigra* (stem *pigra*-, zero suffix)
Masc *acer* (stem *acr*-, zero suffix, *e*-epenthesis)
Neutr *acre* (stem *acri*-, zero suffix, final *e*-lowering)
Fem *acris* (stem *acri*-, suffix *-s*)

3.3. Case endings and allomorphy: The remaining cases

The genitive forms are quite varied along the vocalic scale, but a fundamental dichotomy between a vocalic ([j] or *ī*) and a consonantal (*s/is*) affix type is easily identifiable. Stems ending in [a] take [j] (written ⟨ae⟩); *o*-stems take *ī* and the stem-final vowel deletes; *ē*-stems also take *ī* and the stem-final vowel shortens in line with the hiatus rule in (1) above.[38] *U*-stems and *i*-stems take *-s,* and consonant-stems take *-is*, which on the surface makes these latter forms indistinguishable from *i*-stem genitives – and also makes the analysis equivocal: *reg-is* 'king', because this word has no straightfor-

[37] Formally this means that C*ro*-/C*ra*-/C*r*- adjectives are heteroclitic just like the C*ro*-/C*r*- nouns of the *ager* type. C*ri*-/C*r*- adjectives are also heteroclitic but that is evident since all *i*-stem nouns and all *i*-stem adjectives are.

[38] Except when the stem-final *ē* is preceded by *i*, the only vowel possible, in which case it remains long, e.g., *rē*- → *rĕī* 'thing', but *diē*- → *diēī* 'day'.

ward *i*-stem forms at all; but *mari-s* (*i*-stem) or *mar-is* (C-stem) 'sea' are, in theory, equally possible analyses.

Table 8: Genitive, dative and ablative singular endings

	GenSing	DatSing	AblSing
ă-	*j*		
ŏ/ŭ-			
ē-		*ī*	V
ĭ-	*s*		
ū/ŭ-			
C-	*is*		*e*
	arae	*arae*	*arā*
	annī	*annō*	*annō*
	diēī	*diēī*	*diē*
	maris	*marī*	*marī*
	tribūs	*tribuī/senatū*	*tribū*
	regis	*regī*	*rege*

The dative of *a*-stems is identical to the genitive; the dative of *o*-stems is identical to the ablative, with an empty vowel suffix (see below). For all other stems the affix is -*ī*, resulting in the combinations *eī* and *uī* (with hiatus shortening again), *ī* (stem-final [i] disappears before the suffix) and C*ī*. As a point of variation the dative of *u*-stems can also be identical to the ablative instead of taking the -*ī* suffix.[39]

For vowel-final stems the ablative is uniformly suffixed with an empty vowel,[40] which appears on the surface as the lengthening of the stem-final vowel if it is short, and as vacuous lengthening (sheer stem) if the final vowel is already long. The suffix is -*e* after consonant-final stems (table 9).

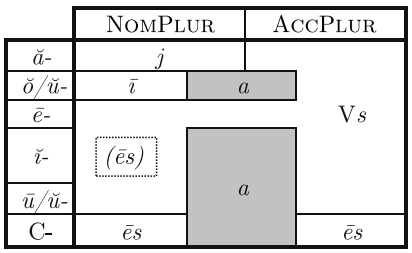
In the NomAccPlur all neuters are suffixed with *a*, before which the round stem vowel *ŏ/ŭ* disappears; *ū* and *i* remain but the former shortens in the hiatus. The round stem vowel *ŏ/ŭ* also disappears before *ī*, as in the GenSing. The *a*-stem NomPlur is formally identical to the GenDatSing (⟨-ae⟩). The AccPlur ending is Vs, which manifests itself as *s* preceded by

[39] Contrary to what Spaelti (2004, 133) claims, the *u*-stem dative without the -*ī* is not more typical of neuters than of masculines and feminines.

For the *i*-stem dative two other analyses are possible. It can be analysed as suffixed with the same empty vowel as the ablative (much like *o*-stems), in which case no deletion of the stem vowel is required. Or one could claim that there is no *i*-stem dative proper (as there is no NomPlur either, see table 9), and the lexical items in question all have C-stem datives.

[40] Spaelti (2004) describes the AblSing in the same way, as also the other cases that involve empty vowels (AccPlur and GenPlur).

Table 9: Nominative and accusative plural endings

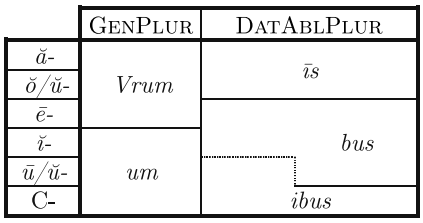


arae		*arās*
annī	*pila*	*annōs*
diēs		*diēs*
(puppēs)	*maria*	*puppīs*
tribūs	*cornua*	*tribūs*
regēs	*capita*	*regēs*

lengthening on short stem vowels and *s* preceded by vacuous lengthening on long stem vowels. The same functions as NomPlur ending on *ē*- and *ū*-stems. With consonant stems, both cases have *-ēs*.

Strictly speaking, there is no *i*-stem animate NomPlur form. All masculine and feminine *i*-stem nouns and adjectives show exclusively C-stem forms in *-ēs*.[41] This is in contrast to the AccPlur, where distinct *-ēs* vs. *-īs* forms are available.

Table 10: Genitive, dative and ablative plural endings



arārum	*arīs*
annōrum	*annīs*
diērum	*diēbus*
puppium	*puppibus*
tribuum	*tribubus/portibus*[42]
regum	*regibus*

[41] This is true again *contra etymologiam*, since the nominative *-ēs* ending is known to have belonged originally to the *i*-stems as opposed to the C-stem nominative plural, which is reconstructed as *-ĕs.

[42] *Portus* 'port' is an *u*-stem noun just like *tribus*.

The GenPlur allomorphy is a very clear case of what we called Type 2 allomorphy in the discussion of verbal inflection. All consonant and high-vowel-final stems are affixed with [ũː] (written ⟨um⟩), and all other vowel-final stems are affixed with [Vrũː] (written ⟨rum⟩), the latter resulting in lengthening on short stem vowels and vacuous lengthening on the long stem vowel [eː]. In the DatAblPlur (which two case forms are never distinguished in Latin) the three endings are *-īs* for back non-high vowels (with loss of the stem-final vowel), *-bus* for front and high vowels and *-ibus* for consonants. Some *u*-stem nouns show *-ibus* instead of *-bus*, which may be analysed as heteroclisy, in this case switching to a consonant stem. Before *-bus* the stem-final [u] is short. The ending *-bus* is also found exceptionally on *a*-stems where an explicit gender distinction is needed between an *a*-stem noun and a corresponding *o*-stem noun, the most typical such forms being *deabus* 'goddess' and *filiabus* 'daughter' (as opposed to *deis/dis* 'god' and *filiis* 'son', all forms DatAblPlur).

4. Morphophonological analysis: Inflectional allomorphy and the vocalic scale

The stem types as environments conditioning allomorphy can be arranged on a scale (see figure 5) according to vocalicness in both verbal and nominal inflection. At one extreme one finds [a], the most open vowel and therefore the most vocalic of all segments; at the other extreme one finds the set of consonants, undifferentiated from the point of view of the allomorphy in inflectional morphology.[43] The scale has high predictive strength in that there are no discontinuities in it: if two non-adjacent environments share an affix allomorph, then the environments between them also share the same allomorph.

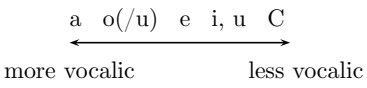


Figure 5: The vocalic scale (length unmarked; high vowels discussed below in section 5)

The scale is common to verbal and nominal inflection. Although in verbal inflection the vast majority of allomorphy belongs to either of two types,

[43] Though bear in mind that one of the two most vocalic consonants, [j] is not found in stem-final position at all.

that is, they only make a two-way distinction over the three categories consonants plus [u] vs. [iː] vs. non-high vowels, the isolated cases of allomorphy articulate the same cline differently without contradicting the generalisation made above: the subjunctive $\bar{e} \sim \bar{a}$ allomorphy (number 9 in tables 1 and 3) separates the most vocalic environment from all the others and the 1SING ending is vacuously non-contradictory in tables 1 and 3 since it does not alternate; after extended stems (table 6) it is Type 2 like all affixes.[44]

Affix variation is greater in the nominal inflection than in the verbal inflection, but a similar pattern is observable. The GENPLUR allomorphy is clearly Type 2, but the GENSING allomorphy is also Type 2 with respect to *s*-ful ([s], [is]) vs. vocalic ([j], [iː]) affixes. In DATABLPLUR forms the *-bus*/*-ibus* vs. *-īs* distinction draws the line between *ē*-stems and the more vocalic stems, and the same is true of the NOMPLUR (*s*-ful vs. vocalic affixes). Furthermore, in the animate NOMACCPLUR the full vowelled *-ēs* is confined to consonant stems as opposed to the empty vowelled variant. The ACCSING and ABLSING forms both contrast a full-vowelled and an empty-vowelled affix variant. A very minor exception is seen in animate NOMSING, where the zero suffix is found within a subclass of consonant-stems as one of the three possible endings.

The only notable difference between verbal and nominal allomorphy, which, however, still does not contradict the generalisation, concerns the high vowels. As we saw, in the verbal morphology, *u*-final stems always pattern with consonant-final stems (which led us to wonder if they really end in a vowel), whereas in the nominal morphology, *u*-final stems pattern with *i*-final stems, and both types pattern with consonant-final stems in the majority of cases, but in some cases with other vowel-final stems.

The following chart compares and summarises the relevant cases of allomorphy as functions of the stem-final segment in both nominal and verbal inflection. The list of verb stem-final segments has been reversed to parallel those of nominal stems.[45]

[44] Even the passive infinitive ending (number 13) under the first analysis (table 1), which we then replaced with the more streamlined one in tables 2 and 3, draws the line between short and long [i] and is thus non-contradictory.

[45] The inclusion of the DATSING in the chart is somewhat tentative since three different analyses are possible for the morphophonological structure of *i*-stems (see note 39). It is, however, indicated by the different shading that the DATSING of *o*-stems takes a suffix not identical to either of the two major types. Cells for non-existent form types are crossed out (neuter forms for *a*-stems and *ē*-stems).

Table 11: Summary of inflectional allomorphy[46]

Noun Adj	∅	*j*	*īs*	*j, ī*	*m*	*j, ī*	V*rum*	V*s*	*m*	V	...	...	*ē*	Verb
a														*ā*
o/u														*ō, (fore)*
ē														*ē*
i														*ī*
ū/u														*u*
C	∅													C
	s, ēs	*ī*	*(i)bus*	V*s, ēs*	∅	*(i)s*	*um*	*ēs*	*em*	*e*	...	...	*ā*	
	anim. NOM SING	DAT SING	DATABL PLUR	anim. NOM PLUR	NEUTR NOM ACC SING	GEN SING	GEN PLUR	anim. ACC PLUR	anim. ACC SING	ABL SING	Type 1	Type 2	IMPF SUBJ	

5. The vocalic scale and sonority

Given the obvious similarity between the vocalic scale that is relevant for the choice of allomorphs in inflection and the sonority scale, the question must be addressed whether the former is simply the subsection of the latter as defined on vowels. Does the vocalic scale simply instantiate the sonority ranking of vowels? To answer this question we need to consider what the sonority of vowels actually involves.[47]

From discussions of, and analyses invoking, sonority (Parker 2002; 2012; Kenstowicz 1997; Gordon 2006; De Lacy 2006; Gordon et al. 2012; Miller 2012), the following recurring points can be gleaned. Phonological descriptions of sonority pinpoint two dimensions of contrast, high vs. low and central vs. peripheral. It is generally agreed that low vowels have higher sonority than high vowels and peripheral vowels have higher sonor-

[46] I have added the marginal verb *fu-/fore* to the list on the right not because of its systemic importance, which is negligible, but because it is tempting to offer it as a parallel to the nominal stems that end in an unspecified round vowel ("*o*-stems"). As was seen above, among nominal stems there is a contrast between those ending in an unspecified round vowel, which function more vocalically, and those that are "true" *u*-stems, which function much more like consonant stems. As the *-re* and *-rē*-suffixed forms of *fore* show, the stem of this verb is more vocalic than the stem of those traditionally called *u*-stem verbs, the latter functioning exactly like consonant stems in all respects. This parallel, however, must not be pressed too far, not least because *fore* lacks Type 2 forms. Verb stem-final *ō* is only found in truncated perfects of the *nosse* type.

[47] Spaelti (2004) takes it for granted that the arrangement into three groups of the stem-final vowels as environments for allomorphy in the nominal inflection is based on the sonority hierarchy, but does not give arguments pertaining to vowel sonority as such. In Emonds & Spaelti (2005, 17) the term sonority does not figure at all, though there is reference at one point to the "more sonorous" (i.e., non-high) vowels.

ity than central vowels. The phonetic correlates of sonority are much more problematic; the parameters that have been proposed are intensity, vocal tract aperture, temporal duration, peak acoustic energy, peak intraoral pressure. It is possible that there is not one single parameter that defines sonority, though intensity takes pride of place (see especially Parker 2002 for arguments in favour of this position and methods of quantifying intensity and thus sonority).

The sonority of vowels manifests itself in certain patterns of phonological behaviour, which are in some cases interrelated. Syllable weight or moraicity, stress avoidance and the tendency to devoice split the set of vowels in several languages along such a scale (vowel height and peripherality in addition to length; see Gordon 2006, 123ff and Parker 2012 section 2.4). In such languages more sonorous vowels contribute to syllable weight while less sonorous vowels do not, and/or more sonorous vowels attract stress more than less sonorous vowels do. In some languages less sonorous (i.e., high or central) vowels are capable of devoicing whereas more sonorous vowels are not (Miller 2012, 285).

The vocalic scale in Latin very clearly shows vowel height as a defining phonological property, with [a] at one end and the high vowels at the other end followed only by consonants. The peripheral vs. central contrast is irrelevant, there being no central vowel in Latin at all. It is not clear if frontness as such plays a role: while [eː] appears to be closer to the consonantal end than [o] in nouns, the latter is actually a vowel alternating between [o] and [u] rather than a plain mid vowel. (In verbs there is no difference between [eː] and [oː].) Furthermore, as was made clear above, there is no difference between [i]-final and [u]-final stems in the nominal inflection, and between [u]-final and consonant-final stems in the verbal inflection. This either means that [u] is more consonantal than [i] (which would be consistent with the verbal but not with the nominal pattern), or that [u]-final imperfective as well as perfective verb stems are, in fact, consonant-final (that is, they end in [uw], see 2.2 above).

The implication with respect to the relation between the vocalic scale and sonority is that if the analysis of allomorphic patterns expounded here is correct and if the vocalic scale is indeed identical to the sonority scale as defined on vowels then either [u] is less sonorous than [i] or verb stems do not end in [u] and apparently *u*-final stems, whether imperfective or perfective, end in [uw] and are thus consonant-final. Identifying the vocalic scale with the sonority scale is desirable simply on account of simplicity; and since no compelling arguments are found in the literature for the higher sonority of [i] as opposed to [u], we must conclude that there are indeed no *u*-final verb stems.

The phonetic properties that correspond to sonority are mostly not retrievable for Latin, though there is some indication that high vowels may have been somewhat shorter than non-high vowels. More specifically Sen (2014) argues for the relative shortness of [i:]; if similar arguments are not found for the relative shortness of [u:], this may just possibly be a weak indication for another asymmetry between the two high vowels.

In terms of behaviour, vowels of different quality do not show corresponding differences in their contribution to syllable weight or their stressability[48] and there are no vowel devoicing processes at all in Latin. In Classical Latin, then, the only function of the vocalic scale appears to be that found in inflectional morphology. It follows that if we equate this vocalic scale with the sonority scale as defined on vowels (which the central role of vowel height warrants), this is a function or manifestation different from those formerly discussed in the literature. There are known cases of allomorph selection conditioned by high vs. non-high vowel (e.g., an Udibe case mentioned in Nevins 2011), but that is only a single binary feature; Anttila (1997) discusses the plural genitive suffix in Finnish whose allomorphs are selected in a subset of the lexicon on the basis of the sonority (i.e., height) of the vowel, but there are other factors interefering (word length, stress and syllable weight), and the effect is not systematic even with that proviso since it is demonstrable only for one single suffix. In Classical Latin, however, vowel sonority appears to be the fundamental organising principle of the entire inflectional system.

6. Conclusion

This paper illustrates the working of the vocalic scale, which appears to be a fundamental organising principle in the morphophonological system of nominal as well as verbal inflection in Classical Latin. In the preceding pages we gave an exhaustive survey of the inflectional morphology includ-

[48] In a broader perspective, however, stress and vowel height were related in Pre-Classical Latin. In that period word stress appears to have been on initial syllables, and short unstressed vowels, i.e., those in non-initial syllables, systematically became higher. In open syllables they usually ended up as [i], though the details of the process are highly complex and will not be rehearsed here (they can be found in the major handbooks, e.g., Weiss 2009 or Leumann 1977; most recently Sen 2012 gives a detailed description and analysis). However, when stress moved to its Classical Latin position (penult if it is heavy and antepenult if the penult is light), the quality of vowels proved to be irrelevant and high as well as non-high vowels received stress if in the appropriate position, thus e.g., **pérfacio* 'I complete' > *pérficio* > *perfício*.

ing all allomorphic variants. Most of this variation fits into the general pattern based on the vocalic scale; some of the variation is irrelevant, but none plainly contradicts it by appearing as a discontinuity on the scale. The most interesting aspects of this scale-based system of allomorphy concern the boundary between consonants and vowels, i.e., the two high vowels (the least vowel-like vowels) and the two glides (the most vowel-like consonants). Of these we discussed the patterns involving high vowels extensively, and we have touched upon those involving glides (the total absence of [j] from stem-final position in both verbs and nouns and the behaviour of stem-final [u] as [uw] in verbs). Our hope is that this case study, taken from a dead language, as it happens, contributes to a deeper understanding of scale-based phenomena in the phonology of natural languages.

Acknowledgedements

My thanks must go to an anonymous reviewer whose comments have been very useful in improving the first version. This paper was written while I was on the Hajdú Péter Research Grant at the Research Institute for Linguistics (HAS), and thus relieved of my teaching and administrative duties at PPCU between February and June 2014.

References

Anttila, Arto. 1997. Deriving variation from grammar. In F. Hinskens, R. van Hout and W. Wetzels (eds.) Variation, change and phonological theory. Amsterdam & Philadelphia: John Benjamins. 35–68.

Aronoff, Mark. 1994. Morphology by itself. Stems and inflectional classes. Cambridge, MA: MIT Press.

Baldi, Philip. 2002. The foundations of Latin. Berlin & New York: Mouton de Gruyter.

Castillo Herrera, Marina del. 2009. Las formas de perfecto de indicativo en *-iit* en la versificación latina: ¿una cuestión métrica o una cuestión morfológica? Cuadernos de Filología Clásica. Estudios Latinos 29. 5–20.

Clackson, James. 2007. Indo-European linguistics. An introduction. Cambridge: Cambridge University Press.

Clackson, James and Geoffrey Horrocks. 2007. The Blackwell history of the Latin language. Malden, MA & Oxford: Blackwell.

CLCLT 5. 2002. Library of Latin Texts by Brepols Publishers, Release 2002.

Cser, András. 2009. The phonotactics of Classical Latin consonants. Habilitation dissertation. Pázmány Péter Catholic University.

Cser, András. 2012. The role of sonority in the phonology of Latin. In Parker (2012, 39–63).

De Lacy, Paul. 2006. Markedness: Reduction and preservation in phonology. Cambridge: Cambridge University Press.

Emonds, Joseph and Philip Spaelti. 2005. Fully distributing morphology: The phonology and syntax of Latin case inflections. Theoretical and Applied Linguistics at Kobe Shoin 8. 1–20.

Gordon, Matthew 2006. Syllable weight. London: Routledge.

Gordon, Matthew, Edita Ghushchyan, Bradley McDonnell, Daisy Rosenblum and Patricia A. Shaw. 2012. Sonority and central vowels: A cross-linguistic phonetic study. In Parker (2012, 219–256).

Juret, A.-C. 1913. Dominance et résistance dans la phonétique latine. Heidelberg: Carl Winter.

Kenstowicz, Michael. 1997. Quality-sensitive stress. Rivista di Linguistica 9. 157–188.

Leumann, Manu. 1977. Lateinische Laut- und Formenlehre. München: Beck.

Matthews, Peter H. 1974. Morphology: An introduction to the theory of word structure. Cambridge: Cambridge University Press.

Meiser, Gerhard. 1998. Historische Laut- und Formenlehre der lateinischen Sprache. Darmstadt: Wissenschaftliche Buchgesellschaft.

Meiser, Gerhard. 2003. Veni vidi vici. Die Vorgeschichte des lateinischen Perfektsystems. München: Beck.

Miller, Brett. 2012. Sonority and the larynx. In Parker (2012, 257–288).

Moralejo, José-Luis. 1991. Vocalis ante vocalem: Corripitur an distrahitur? In R. Coleman (ed.) New studies in Latin linguistics. Amsterdam: John Benjamins. 35–45.

Nevins, Andrew. 2011. Phonologically conditioned allomorph selection. In M. van Oostendorp, C. Ewen, E. Hume and K. Rice (eds.) The Blackwell companion to phonology. Malden, MA & Oxford: Wiley-Blackwell. 2357–2382.

Parker, Stephen George. 2002. Quantifying the sonority hierarchy. Doctoral dissertation. University of Massachusetts, Amherst.

Parker, Steve (ed.). 2012. The sonority controversy. Berlin: de Gruyter Mouton.

Sen, Ranjan. 2012. Reconstructing phonological change: Duration and syllable structure in Latin vowel reduction. Phonology 29. 465–504.

Sen, Ranjan. 2014. Inverse compensatory lengthening in Latin: Weight preservation or phonologisation? Paper presented at the Symposium on Historical Phonology, Edinburgh, 13–14 January 2014.

Shackleton Bailey, David R. (ed.). 1997. Marcus Annaeus Lucanus De Bello Civili libri X. Stuttgart: Teubner.

Sihler, Andrew. 1995. New comparative grammar of Greek and Latin. Oxford: Oxford University Press.

Spaelti, Philip. 2004. Some phonological and morphological patterns in the Latin noun declension system. Theoretical and Applied Linguistics at Kobe Shoin 7. 131–137.

Steriade, Donca. submitted. The cycle without containment: Latin perfect stems. Submitted to Language.

Touratier, Christian. 2005. Système des consonnes. In C. Touratier (ed.) Essais de phonologie latine. Aix-en-Provence: Université de Provence. 61–134.

Vaan, Michiel de. 2008. Etymological dictionary of Latin and the other Italic languages. Leiden: Brill.

Weiss, Michael. 2009. Outline of the historical and comparative grammar of Latin. Ann Arbor, MI: Beech Stave Press.